AD-A009 157

A REVISED COMPUTER PROGRAM FOR AXIAL COMPRESSOR DESIGN. VOLUME II. PROGRAM LISTING AND PROGRAM USE EXAMPLE

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Prepared for:

Aerospace Research Laboratories

January 1975

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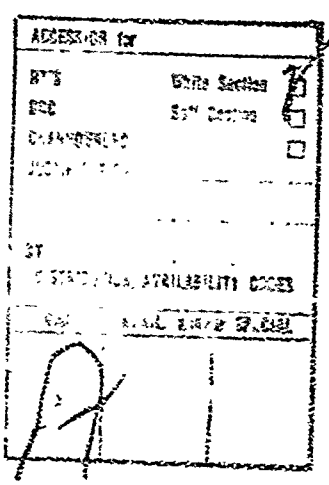

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AIR FORCE/56780/7 April 1975 — 300

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REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER: ARL 75-0001, Vol II 2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER: AD-A009157
4. TITLE (and Subtitle): A REVISED COMPUTER PROGRAM FOR AXIAL COMPRESSOR DESIGN Volume II. Program Listing and Program Use Example	5. TYPE OF REPORT & PERIOD COVERED: Technical - Final 1 Oct 73 - 30 Nov. 1974 6. PERFORMING ORG. REPORT NUMBER: UDRI-TR-74-47, Volume II
7. AUTHOR(s): Richard M. Hearsey	8. CONTRACT OR GRANT NUMBER(s): F33615-74-C-4030
9. PERFORMING ORGANIZATION NAME AND ADDRESS: University of Dayton Research Institute, 300 College Park Avenue, Dayton, Ohio 45469	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: 70650461 and Project 3066
11. CONTROLLING OFFICE NAME AND ADDRESS: Aerospace Research Laboratories ARL (AFSC) Fluid Mechanics Facilities Research Lab. (LF) Wright-Patterson Air Force Base, OH 45433	12. REPORT DATE: January 1975 13. NUMBER OF PAGES: 247
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report): Unclassified 15a. DECLASSIFICATION DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report): Approved for public release; distribution unlimited.	
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)	
18. SUPPLEMENTARY NOTES	
19. KEY WORDS (Continue on reverse side if necessary and identify by block number): axial compressor, test data analysis, computer program	

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

A revised computer program for the design of axial compressors is presented. It comprises three principal sections, two alternative means of determining blade geometry and an aerodynamic computation for the flow through the compressor. One method of determining blade geometry uses various analytic meanlines for the blade sections, and leads to the aerodynamic analysis of the flow through specified blading. The other

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method consists of creating arbitrary blade sections to follow the flow directions previously determined in an aerodynamic design calculation. The aerodynamic design section incorporates a loss calculation routine that may be used to estimate the design point performance of the compressor. One, two, or all three sections may be used in any one run of the program. This second volume of two describing the program shows the FORTRAN program listing and an example of the use of the program.

PREFACE

The work described in this Final Report was performed by the University of Dayton Research Institute, 300 College Park Avenue, Dayton, Ohio 45469, under Air Force Contract F33615-74-C-4030 during the period October 1973 to October 1974. It was a portion of Project 7065, Task 04 of the Aerospace Research Laboratories, and Project 3066 of the Aero Propoulsion Laboratory. Technical Monitors for the Air Force were Dr. A. J. Wennerstrom, ARL/LF, and Mr. M. A. Stibich, AFAPL/TBC, both at Wright-Patterson Air Force Base, Ohio 45433. This report was initially identified as UDRI-TR-74-47 by the University of Dayton.

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SECTION I

FORTRAN PROGRAM LISTING

The following pages show the FORTRAN program listings. Each program or subprogram is begun on a new page, except that the fluid properties package, Subroutine UDG1 through Function UDG9, has been listed as a single unit.

```
      OVERLAY(UD300,0,0)                                                $MN$
      PROGRAM UD0300(INPUT,OUTPUT,PUNCH,PLOT,FILE2,FILE3,TAPE1=INPUT,TAP$MN$
     1E2=OUTPUT,TAPE3=PUNCH,TAPE5=FILE2,TAPE6=FILE3)                    $MN$
      COMMON/CONTRL/NANAL,NAERO,NARBIT,LOG1,LOG2,LOG3,LOG4,LOG5,LOG6    $MN$
      DIMENSION TITLE1(18),WORD(2)                                      $MN$
      DATA WORD/2HNO,2HAN/                                              $MN$
      LOG1=1                                                            $MN$
      LOG2=2                                                            $MN$
      LOG3=3                                                            $MN$
      LOG4=1                                                            $MN$
      LOG5=5                                                            $MN$
      LOG6=6                                                            $MN$
      READ(LOG1,100)TITLE1,NANAL,NAERO,NARBIT                           $MN$
100   FORMAT(18A4,/,3I3)                                                $MN$
      WRITE(LOG2,110)TITLE1,NANAL,WORD(NAERO+1),NARBIT                  $MN$
110   FORMAT(1H1,/,40X,52HPROGRAM UD0300 - COMPRESSOR DESIGN - CONTROL S$MN$
     1ECTION,/,40X,52(1H*),//,10X,8HTITLE = ,18A4,/,10X,39HNUMBER OF ANA$MN$
     2LYTIC MEANLINE BLADEROWS =,I3,/,10X,14HTHERE WILL BE ,A2,33H ENTRY$MN$
     3 TO THE AERODYNAMIC SECTION,/,10X40HNUMBER OF ARBITRARY MEANLINE B$MN$
     4LADEROWS =,I3)                                                    $MN$
      IF(NANAL.EQ.0)GO TO 130                                           $MN$
      DO 120 K=1,NANAL                                                  $MN$
120   CALL OVERLAY(5HUD300,2,0,0)                                       $MN$
      REWIND LOG5                                                       $MN$
130   IF(NAERO.EQ.0)GO TO 140                                           $MN$
      CALL OVERLAY(5HUD300,1,0,0)                                       $MN$
      IF(NARBIT.NE.0)REWIND LOG6                                        $MN$
140   IF(NARBIT.EQ.0)GO TO 160                                          $MN$
      DO 150 K=1,NARBIT                                                 $MN$
150   CALL OVERLAY(5HUD300,3,0,0)                                       $MN$
160   STOP                                                              $MN$
      CALL PLOT                                                         $MN$
      END                                                               $MN$
```

```
      OVERLAY(UD300,1,0)                                                                $AR$    2
      PROGRAM UD0300                                                                    $AR$    3
      REAL LOSS,LAMIN1,LAMIF1,LAMIM1                                                    $AR$    4
      COMMON/CONTRL/DATA(100),DATA1(100),DATA2(100),DATA3(100),DATA4(100),LOG1,LOG2,LOG3,LOG4,LOG5,LOG6  $AR$    5
      COMMON/DIMS/MST,MSTP1,MAX,MPTS,IPL,IREAD,IPSPLIT,NREAD,NPUNCH,NPAG$AR$    6
     1S,MS,M1,M2,JDATA,IGAS,IFAILO,IMPS,I,IVFAIL,IFFAIL,MMIX,NTRANS$AR$    7
     2, LIT,ALOSS,LIT1,LIT2,I1,IFAIL,ITER,LOG1,LOG2,LOG3,LOG4,LOG5,LOG6$AR$    8
     3G6,IPRINT,NMARY,NSTPLT,NEQN                                                   $AR$    9
      COMMON NSPEC(30),NWORK(30),NLOSS(30),NDATA(30),NTERP(30),NMACH(30)$AR$   10
     1,NL1(30),NL2(30),NDIMEN(30),IS1(30),IS2(30),IS3(30),NEVAL(30),NDIF$AR$   11
     2F(4),NDEL(30),NLITER(30),NM(2),NRAD(2),NCURVE(30),NWHICH(30),NOUT1$AR$   12
     3(30),NOUT2(30),NOUT3(30),NBLADE(30)                                           $AR$   13
      COMMON UM(11,5,2),WFRAC(11,5,2)                                               $AR$   14
      COMMON R(21,30),XL(21,30),X(21,30),H(21,30),S(21,30),VM(21,30),VW($AR$   15
     121,30),TBETA(21,30),DIFF(15,4),FDHUB(15,4),FDMID(15,4),FDTIP(15,4)$AR$   16
     2,TERAD(2,2)                                                                   $AR$   17
      COMMON DATAC(100),DATA1(100),DATA2(100),DATA3(100),DATA4(100),DATA$AR$   18
     15(100),DATA6(100),DATA7(100),DATA8(100),DATA9(100),FLOW(10),SPEED($AR$   19
     230),SPDFAC(10),WBLOCK(30),BDIST(30),WBLOCK(30),WWBL(30),XSTN(150),$AR$   20
     3RSTN(150),DELF(30),DELC(100),DELTA(100),TITLE(18),DRD12(30),RIM1(3$AR$   21
     40),XIM1(30),WORK(21),LOSS(21),TANEPS(21),XI(21),VV(21),DELW(21),LA$AR$   22
     5MI(21),LAMIN1(21),LAMIF1(21),PHI(21),CR(21),GAMA(21),SPPG(21),CPPG$AR$   23
     6(21),HKEEP(21),SKEEP(21),VWKEEP(21),DELH(30),DELT(30)                         $AR$   24
      COMMON VISK,SHAPE,SCLFAC,EJ,G,TOLNCE,XSCALE,PSCALE,PLOW,RLOW,XMMAX$AR$   25
     1,RCONST,FM2,HMIN,C1,PI,CONTR,CONMX                                            $AR$   26
      DIMENSION XX1(21),XX2(21),XX3(21),XX4(21),VMOLD(21),VWOLD(21)         $AR$   27
      DIMENSION DELTAP(99,30),PASS(99)                                              $AR$   28
      LOG1=LOG1                                                                     $AR$   29
      LOG2=LOG2                                                                     $AR$   30
      LOG3=LOG3                                                                     $AR$   31
      LOG5=LOG5                                                                     $AR$   32
      LOG6=LOG6                                                                     $AR$   33
      WRITE(LOG2,1)                                                                 $AR$   34
    1 FORMAT(1H1)                                                                   $AR$   35
      PI=3.14159265359                                                              $AR$   36
      C1=180.0/PI                                                                   $AR$   37
      HMIN=50.0                                                                     $AR$   38
      WRITE(LOG2,50)                                                                $AR$   39
   50 FORMAT(1H1,37X,55HPROGRAM UD0300 - COMPRESSOR DESIGN - AERODYNAMIC$AR$   40
     1 SECTION,/,37X,55(1H*))                                                       $AR$   41
      LNCT=2                                                                        $AR$   42
      CALL UD0302                                                                   $AR$   43
      ICASE=1                                                                       $AR$   44
  100 WRITE(LOG2,104)ICASE                                                          $AR$   45
  104 FORMAT(1H1,9X,20HOUTPUT FOR POINT NO.,I2,/,10X,22(1H*),                       $AR$   46
      LNCT=2                                                                        $AR$   47
      DO 106 I=1,30                                                                 $AR$   48
      DO 106 J=1,99                                                                 $AR$   49
  106 DELTAP(J,I)=0.0                                                               $AR$   50
      IF (ICASE.EQ.1.AND.NREAD.EQ.1).OR.(ICASE.GT.1.AND.IFAILK.EQ.0))GO $AR$   51
```

```
      1TO 254                                                                   $AR$   52
       IF(NSPLIT.EQ.1)GO TO 170                                                 $AR$   53
       L1=NSPEC(1)                                                              $AR$   54
       XX1(1)=0.0                                                               $AR$   55
       DO 110 K=2,L1                                                            $AR$   56
  110  XX1(K)=XX1(K-1)+SQRT((RSTN(K)-RSTN(K-1))**2+(XSTN(K)-XSTN(K-1))**2      $AR$   57
     1)                                                                         $AR$   58
       X1=1.0/XX1(L1)                                                           $AR$   59
       DO 120 K=2,L1                                                            $AR$   60
  120  XX1(K)=XX1(K)*X1                                                         $AR$   61
       DO 130 K=1,11                                                            $AR$   62
  130  XX2(K)=FLOAT(K-1)*0.1                                                    $AR$   63
       CALL UD0301(XX1,XSTN,L1,XX2,XX3,X1,11,0,0)                               $AR$   64
       CALL UD0301(XX1,RSTN,L1,XX2,XX4,X1,11,0,0)                               $AR$   65
       DO 136 K=2,11                                                            $AR$   66
       XX1(K)=XX1(K-1)+SQRT((XX3(K)-XX3(K-1))**2+(XX4(K)-XX4(K-1))**2)          $AR$   67
  136  XX3(K-1)=(XX1(K)+XX1(K-1))*0.5                                           $AR$   68
       L2=IS1(2)                                                                $AR$   69
       XX2(1)=ATAN2(RSTN(L2)-RSTN(1),XSTN(L2)-XSTN(1))                          $AR$   70
       L2=L2+NSPEC(2)-1                                                         $AR$   71
       XX2(2)=ATAN2(RSTN(L2)-RSTN(L1),XSTN(L2)-XSTN(L1))                        $AR$   72
       XI(1)=0.0                                                                $AR$   73
       XI(2)=XX1(11)                                                            $AR$   74
       CALL UD0301(XI,XX2,2,XX3,PHI,X1,10,1,0)                                  $AR$   75
       CALL UD0301(RSTN,XSTN,L1,XX3,X1,GAMA,10,0,1)                             $AR$   76
       XX3(1)=0.0                                                               $AR$   77
       DO 140 K=2,11                                                            $AR$   78
  140  XX3(K)=XX3(K-1)+COS(PHI(K-1)+ATAN(GAMA(K-1)))*(XX4(K)+XX4(K-1))*(X       $AR$   79
     1X1(K)-XX1(K-1))                                                           $AR$   80
       X1=1.0/XX3(11)                                                           $AR$   81
       X2=1.0/XX1(11)                                                           $AR$   82
       DO 150 K=2,11                                                            $AR$   83
       XX1(K)=XX1(K)*X2                                                         $AR$   84
  150  XX3(K)=XX3(K)*X1                                                         $AR$   85
       X1=1.0/FLOAT(ITUB)                                                       $AR$   86
       DO 160 K=1,NSTRMS                                                        $AR$   87
  160  XX2(K)=FLOAT(K-1)*X1                                                     $AR$   88
       CALL UD0301(XX3,11,XX2,DELF,X1,NSTRMS,1,0)                               $AR$   89
  170  DO 250 I=1,NSTNS                                                         $AR$   90
       L1=IS1(I)                                                                $AR$   91
       L2=NSPEC(I)                                                              $AR$   92
       XX1(1)=0.0                                                               $AR$   93
       VV(1)=0.0                                                                $AR$   94
       DO 180 K=2,L2                                                            $AR$   95
       L3=L1+K-1                                                                $AR$   96
  180  VV(K)=VV(K-1)+SQRT((RSTN(L3)-RSTN(L3-1))**2+(XSTN(L3)-XSTN(L3-1))*      $AR$   97
     1*2)                                                                       $AR$   98
       X1=1.0/VV(L2)                                                            $AR$   99
       DO 190 K=2,L2                                                            $AR$  100
  190  XX1(K)=VV(K)*X1                                                          $AR$  101
```

```
      DO 200 K=1,11                                                              $AR$  102
  200 XX2(K)=FLOAT(K-1)*0.1                                                      $AR$  103
      CALL UDU301(XX1,XSTN(L1),L2,XX2,XX3,X1,11,0,0)                             $AR$  104
      CALL UDU301(XX1,RSTN(L1),L2,XX2,XX4,X1,11,0,J)                             $AR$  105
      DO 230 K=2,11                                                              $AR$  106
      XX1(K)=XX1(K-1)+SQRT((XX3(K)-XX3(K-1))**2+(XX4(K)-XX4(K-1))**2)            $AR$  107
      GAMA(K-1)=(XX4(K)+XX4(K-1))*0.5                                            $AR$  108
  230 XX3(K-1)=(XX1(K)+XX1(K-1))*0.5                                             $AR$  109
      IF(I.EQ.1.OR.I.EQ.NSTNS)GO TO 234                                          $AR$  110
      L3=IS1(I+1)                                                                $AR$  111
      L4=IS1(I-1)                                                                $AR$  112
      L5=L1                                                                      $AR$  113
      XX2(1)=(ATAN2(RSTN(L3)-RSTN(L5),XSTN(L3)-XSTN(L5))+ATAN2(RSTN(L5)-         $AR$  114
     1RSTN(L4),XSTN(L5)-XSTN(L4)))*0.5                                           $AR$  115
      L3=L3+NSPEC(I+1)-1                                                         $AR$  116
      L4=L4+NSPEC(I-1)-1                                                         $AR$  117
      L5=L5+L2-1                                                                 $AR$  118
      XX2(2)=(ATAN2(RSTN(L3)-RSTN(L5),XSTN(L3)-XSTN(L5))+ATAN2(RSTN(L5)-         $AR$  119
     1RSTN(L4),XSTN(L5)-XSTN(L4)))*0.5                                           $AR$  120
      GO TO 238                                                                  $AR$  121
  234 IF(I.EQ.NSTNS)GO TO 236                                                    $AR$  122
      L3=IS1(2)                                                                  $AR$  123
      XX2(1)=ATAN2(RSTN(L3)-RSTN(1),XSTN(L3)-XSTN(1))                            $AR$  124
      L4=NSPEC(1)                                                                $AR$  125
      L3=L3+NSPEC(2)-1                                                           $AR$  126
      XX2(2)=ATAN2(RSTN(L3)-RSTN(L4),XSTN(L3)-XSTN(L4))                          $AR$  127
      GO TO 238                                                                  $AR$  128
  236 L4=IS1(I-1)                                                                $AR$  129
      XX2(1)=ATAN2(RSTN(L1)-RSTN(L4),XSTN(L1)-XSTN(L4))                          $AR$  130
      L4=L4+NSPEC(I-1)-1                                                         $AR$  131
      L3=L1+L2-1                                                                 $AR$  132
      XX2(2)=ATAN2(RSTN(L3)-RSTN(L4),XSTN(L3)-XSTN(L4))                          $AR$  133
  238 XI(1)=0.0                                                                  $AR$  134
      XI(2)=XX1(11)                                                              $AR$  135
      CALL UDU301(XI,XX2,2,XX3,PHI,X1,10,1,0)                                    $AR$  136
      CALL UDU301(RSTN(L1),XSTN(L1),L2,GAMA,X1,GAMA,10,0,1)                      $AR$  137
      XX3(1)=0.0                                                                 $AR$  138
      DO 240 K=2,11                                                              $AR$  139
  240 XX3(K)=XX3(K-1)+COS(PHI(K-1)+ATAN(GAMA(K-1)))*(XX4(K)+XX4(K-1))*(X         $AR$  140
     1X1(K)-XX1(K-1))                                                            $AR$  141
      X1=1.0/XX3(11)                                                             $AR$  142
      DO 244 K=2,11                                                              $AR$  143
  244 XX3(K)=XX3(K)*X1                                                           $AR$  144
      CALL UDU301(XX3,XX1,11,DELF,XL(1,I),X1,NSTRMS,1,0)                         $AR$  145
      X1=VV(L2)/XX1(11)                                                          $AR$  146
      DO 246 J=2,NSTRMS                                                          $AR$  147
  246 XL(J,I)=XL(J,I)*X1                                                         $AR$  148
      CALL UDU301(VV,XSTN(L1),L2,XL(1,I),X(1,I),X1,NSTRMS,0,0)                   $AR$  149
  250 CALL UDU301(VV,RSTN(L1),L2,XL(1,I),R(1,I),X1,NSTRMS,0,0)                   $AR$  150
  254 IF(ICASE.GT.1)GO TO 270                                                    $AR$  151
```

```
      X1=(X(IMID,2)-X(IMID,1))**2+(R(IMID,2)-R(IMID,1))**2                    $AR$  152
      ORDM2(1)=((R(NSTRMS,1)-R(1,1))**2+(X(NSTRMS,1)-X(1,1))**2)/X1           $AR$  153
      L1=NSTNS-1                                                              $AR$  154
      DO 260 I=2,L1                                                           $AR$  155
      X2=(X(IMID,I+1)-X(IMID,I))**2+(R(IMID,I+1)-R(IMID,I))**2                $AR$  156
      X3=X2                                                                   $AR$  157
      IF(X1.LT.X3)X3=X1                                                       $AR$  158
      ORDM2(I)=((R(NSTRMS,I)-R(1,I))**2+(X(NSTRMS,I)-X(1,I))**2)/X3           $AR$  159
260   X1=X2                                                                   $AR$  160
      ORDM2(NSTNS)=((R(NSTRMS,NSTNS)-R(1,NSTNS))**2+(X(NSTRMS,NSTNS)-X(1$AR$  161
     1,NSTNS))**2)/X2                                                         $AR$  162
270   DO 280 I=1,NSTNS                                                        $AR$  163
280   WWBL(I)=WBLOCK(I)                                                       $AR$  164
      IPASS=1                                                                 $AR$  165
290   I=1                                                                     $AR$  166
      IF((IPASS.GT.1.OR.ICASE.GT.1).AND.NDATA(1).EQ.1)GO TO 400               $AR$  167
      L1=NDIMEN(1)+1                                                          $AR$  168
      GO TO(300,320,340,360),L1                                               $AR$  169
300   DO 310 J=1,NSTRMS                                                      $AR$  170
310   XX1(J)=R(J,1)                                                           $AR$  171
      GO TO 380                                                               $AR$  172
320   DO 330 J=1,NSTRMS                                                       $AR$  173
330   XX1(J)=R(J,1)/R(NSTRMS,1)                                               $AR$  174
      GO TO 380                                                               $AR$  175
340   DO 350 J=1,NSTRMS                                                       $AR$  176
350   XX1(J)=XL(J,1)                                                          $AR$  177
      GO TO 380                                                               $AR$  178
360   DO 370 J=1,NSTRMS                                                       $AR$  179
370   XX1(J)=XL(J,1)/XL(NSTRMS,1)                                             $AR$  180
380   L1=NTERP(1)                                                             $AR$  181
      L2=NDATA(1)                                                             $AR$  182
      CALL UD0301(DATAQ,DATA1,L2,XX1,S     ,X1,NSTRMS,L1,0)                   $AR$  183
      CALL UD0301(DATAQ,DATA2,L2,XX1,H     ,X1,NSTRMS,L1,0)                   $AR$  184
      CALL UD0301(DATAQ,DATA3,L2,XX1,TBETA,X1,NSTRMS,L1,0)                    $AR$  185
      DO 390 J=1,NSTRMS                                                       $AR$  186
      H(J,1)=UDG6(S(J,1),H(J,1))                                              $AR$  187
      S(J,1)=UDG3(S(J,1),H(J,1))                                              $AR$  188
390   TBETA(J,1)=TAN(TBETA(J,1)/C1)                                           $AR$  189
400   IF(IPASS.GT.1.OR.ICASE.GT.1)GO TO 420                                   $AR$  190
      X1=FLOW(1)/(UDG3(H,S)*PI*(R(NSTRMS,1)+R(1,1))*XL(NSTRMS,1))*SCLFAC$AR$  191
     1**2                                                                     $AR$  192
      DO 410 J=1,NSTRMS                                                       $AR$  193
410   VM(J,1)=X1                                                              $AR$  194
      IF(ISTAG.EQ.1)VM(1,1)=0.0                                               $AR$  195
420   IFAILO=0                                                                $AR$  196
      IFFAIL=0                                                                $AR$  197
      IVFAIL=0                                                                $AR$  198
      DO 430 J=1,NSTRMS                                                       $AR$  199
430   VMOLD(J)=VM(J,1)                                                        $AR$  200
      GO TO 500                                                               $AR$  201
```

```
440   IF(IPASS.GT.1)GO TO 460                                          $AR$ 202
      DO 450 J=1,NSTRMS                                                $AR$ 203
450   VM(J,I)=VM(J,I-1)                                                $AR$ 204
      IF(I-1.EQ.ISTAG)VM(1,I)=VM(2,I)                                  $AR$ 205
      IF(I.EQ.ISTAG)VM(1,I)=0.0                                        $AR$ 206
460   ILOSS=1                                                          $AR$ 207
      DO 464 J=1,NSTRMS                                                $AR$ 208
464   VMOLD(J)=VM(J,I)                                                 $AR$ 209
470   DO 474 J=1,NSTRMS                                                $AR$ 210
      VWKEEP(J)=VW(J,I-1)                                              $AR$ 211
      SKEEP(J)=S(J,I-1)                                                $AR$ 212
474   HKEEP(J)=H(J,I-1)                                                $AR$ 213
      X1=H(IMID,I-1)-(VM(IMID,I-1)**2+VW(IMID,I-1)**2)/(2.0*G*EJ)      $AR$ 214
      IF(X1.LT.HMIN)X1=HMIN                                            $AR$ 215
      PSMID=UDG4(X1,S(IMID,I-1))                                       $AR$ 216
      IF(NMIX.EQ.1)CALL UD0304(H(1,I-1),S(1,I-1),VW(1,I-1),R(1,I-1),R(1,$AR$ 217
     1I),X(1,I-1),X(1,I),VM(1,I-1),CONMX,SCLFAC,G,EJ,HMIN,VMIN,PSMID,NST$AR$ 218
     2RMS,LOG2,LNCT,IF)                                                $AR$ 219
      IF(IF.EQ.0)GO TO 478                                             $AR$ 220
      IFAILO=I-1                                                       $AR$ 221
      GO TO 640                                                        $AR$ 222
478   IF(NWORK(I).EQ.0)GO TO 480                                       $AR$ 223
      CALL UD0305                                                      $AR$ 224
      IF(NTRANS.EQ.1.AND.IPASS.GT.1)CALL UD0306(R(1,I-1),R(1,I),X(1,I-1)$AR$ 225
     1,X(1,I),H(1,I),S(1,I),VM(1,I),TBETA(1,I-1),TBETA(1,I),LOSS,CONTR,S$AR$ 226
     2CLFAC,SPEED(I),SPDFAC(ICASE),G,EJ,HMIN,NSTRMS,PI)                $AR$ 227
      ITER=0                                                           $AR$ 228
      CALL UD0307                                                      $AR$ 229
      GO TO 500                                                        $AR$ 230
480   DO 490 J=1,NSTRMS                                                $AR$ 231
      H(J,I)=H(J,I-1)                                                  $AR$ 232
      S(J,I)=S(J,I-1)                                                  $AR$ 233
      VW(J,I)=0.0                                                      $AR$ 234
      IF(I.GT.ISTAG.OR.J.NE.1)VW(J,I)=VW(J,I-1)*RIM1(J)/R(J,I)         $AR$ 235
490   CONTINUE                                                         $AR$ 236
500   DO 510 J=1,NSTRMS                                                $AR$ 237
510   VMLOLD(J)=VM(J,I)                                                $AR$ 238
      IF(NEQN.GE.2)GO TO 514                                           $AR$ 239
      CALL OVERLAY(5HUD300,1,1,6HRECALL)                               $AR$ 240
      GO TO 516                                                        $AR$ 241
514   CALL OVERLAY(5HUD300,1,2,6HRECALL)                               $AR$ 242
516   IF(NEVAL(I).LE.0)GO TO 590                                       $AR$ 243
      IPRINT=0                                                         $AR$ 244
      CALL UD0309                                                      $AR$ 245
      IF(IFAILO.NE.0.AND.IPASS.GT.NFORCE)GO TO 550                     $AR$ 246
      DO 520 J=1,NSTRMS                                                $AR$ 247
      IF(ABS(VM(J,I)/VMLOLD(J)-1.0).GT.TOLNCE/5.0)GO TO 530            $AR$ 248
520   CONTINUE                                                         $AR$ 249
      GO TO 590                                                        $AR$ 250
530   IF(ILOSS.GE.NLITER(I))GO TO 550                                  $AR$ 251
```

```
      ILOSS=ILOSS+1                                                          $AR$  252
      DO 540 J=1,NSTRMS                                                      $AR$  253
  540 VMLOLD(J)=VM(J,I)                                                      $AR$  254
      GO TO 470                                                              $AR$  255
  550 IF(IPASS.LE.NFORCE)GO TO 590                                           $AR$  256
      IF(LNCT+1.LE.NPAGE)GO TO 570                                           $AR$  257
      WRITE(LOG2,560)                                                        $AR$  258
  560 FORMAT(1H1)                                                            $AR$  259
      LNCT=1                                                                 $AR$  260
  570 LNCT=LNCT+1                                                            $AR$  261
      X1=VM(1,I)/VMLOLD(1)                                                   $AR$  262
      X2=VM(IMID,I)/VMLOLD(IMID)                                             $AR$  263
      X3=VM(NSTRMS,I)/VMLOLD(NSTRMS)                                         $AR$  264
      WRITE(LOG2,580)IPASS,I,X1,X2,X3                                        $AR$  265
  580 FORMAT(5X,4HPASS,I3,9H  STATION,I3,66H  VM PROFILE NOT CONVERGED W     $AR$  266
     1ITH LOSS RECALC   VM NEW/VM PREV  HUB=,F9.6,5H  MID=,F9.6,7H  CASE    $AR$  267
     2=,F9.6)                                                                $AR$  268
  590 IF(NBL.EQ.1.AND.(IFAILO.EQ.0.OR.IPASS.LE.NFORCE))CALL UD0310           $AR$  269
      DO 600 J=1,NSTRMS                                                      $AR$  270
      XIM1(J)=X(J,I)                                                         $AR$  271
      RIM1(J)=R(J,I)                                                         $AR$  272
      IF(I.EQ.ISTAG.AND.J.EQ.1)GO TO 600                                     $AR$  273
      IF(ABS(VM(J,I)/VMOLD(J)-1.0).GT.TOLNCE)IVFAIL=IVFAIL+1                 $AR$  274
      IF(ABS(DELW(J)-DELF(J)).GT.TOLNCE)IFFAIL=IFFAIL+1                      $AR$  275
  600 CONTINUE                                                               $AR$  276
      IF(NMAX.EQ.1.OR.(IPASS.EQ.1.AND.NREAD.EQ.1))GO TO 624                  $AR$  277
      X1=FM2                                                                 $AR$  278
      IF(X1.LT.1.0-XMMAX)X1=1.0-XMMAX                                        $AR$  279
      X2=1.0                                                                 $AR$  280
      IF(I.EQ.1.OR.NWORK(I).GE.5)X2=1.0+TBETA(IMID,I)**2                     $AR$  281
      X1=1.0/(1.0+X1*DRDM2(I)/(RCONST*X2))                                   $AR$  282
      L3=NSTRMS-2                                                            $AR$  283
      CALL UD0301(DELW,XL(1,I),NSTRMS,DELF(2),XX1(2),X1,L3,1,0)              $AR$  284
      XX=XL(IMID,I)                                                          $AR$  285
      DO 610 J=2,ITUB                                                        $AR$  286
  610 XL(J,I)=XL(J,I)+X1*(XX1(J)-XL(J,I))                                    $AR$  287
      L1=IPASS                                                               $AR$  288
      IF(L1.LE.59)GO TO 618                                                  $AR$  289
      L1=59                                                                  $AR$  290
      DO 616 K=1,58                                                          $AR$  291
  616 DELTAR(K,I)=DELTAR(K+1,I)                                              $AR$  292
  618 DELTAR(L1,I)=XL(IMID,I)-XX                                             $AR$  293
      L1=IS1(I)                                                              $AR$  294
      L2=NSPEC(I)                                                            $AR$  295
      XX1(1)=0.0                                                             $AR$  296
      DO 620 K=2,L2                                                          $AR$  297
      KK=L1-1+K                                                              $AR$  298
  620 XX1(K)=XX1(K-1)+SQRT((XSTN(KK)-XSTN(KK-1))**2+(RSTN(KK)-RSTN(KK-1)     $AR$  299
     1)**2)                                                                  $AR$  300
      CALL UD0301(XX1,RSTN(L1),L2,XL(2,I),R(2,I),X1,L3,1,0)                  $AR$  301
```

```
      CALL UDU3C1(XX1,XSTN(L1),L2,XL(2,I),X(2,I),X1,L3,1,0)                    $AR$  302
624   IF(IPASS.GT.NFORCE.AND.IFAILO.NE.0)GO TO 640                             $AR$  303
      IF(I.EQ.NSTNS)GO TO 630                                                  $AR$  304
      I=I+1                                                                    $AR$  305
      GO TO 440                                                                $AR$  306
630   IF(IPASS.GE.NMAX)GO TO 640                                               $AR$  307
      IF(IFAILO.NE.0)GO TO 635                                                 $AR$  308
      IF(IVFAIL.EQ.0.AND.IFFAIL.EQ.0)GO TO 640                                 $AR$  309
635   IPASS=IPASS+1                                                            $AR$  310
      GO TO 290                                                                $AR$  311
640   CALL UDU311                                                              $AR$  312
      L1=NSTNS                                                                 $AR$  313
      IF(IFAILO.NE.0)L1=IFAILO                                                 $AR$  314
      IPRINT=1                                                                 $AR$  315
      DO 650 I=2,L1                                                            $AR$  316
      IF(NEVAL(I).NE.0)CALL UDU309                                             $AR$  317
650   CONTINUE                                                                 $AR$  318
      IF(NPLOT.NE.0)CALL UDU312                                                $AR$  319
      IF(IFAILO.NE.0)GO TO 750                                                 $AR$  320
      IF(NPUNCH.EQ.0)GO TO 680                                                 $AR$  321
      WRITE(LOG3,660)(DELF(J),J=1,NSTRMS)                                      $AR$  322
660   FORMAT(6F12.8)                                                           $AR$  323
      WRITE(LOG3,670)((R(J,I),X(J,I),XL(J,I),I,J,J=1,NSTRMS),I=1,NSTNS)        $AR$  324
670   FORMAT(3F12.8,2I3)                                                       $AR$  325
680   DO 700 I=1,NSTNS                                                         $AR$  326
      IF(NOUT1(I).EQ.0)GO TO 700                                               $AR$  327
      WRITE(LOG3,690)(R(J,I),J,I,J=1,NSTRMS)                                   $AR$  328
690   FORMAT(F12.8,60X,2I4)                                                    $AR$  329
700   CONTINUE                                                                 $AR$  330
      L1=LOG3                                                                  $AR$  331
      IF(NARBIT.NE.0)L1=LOG6                                                   $AR$  332
      DO 740 I=1,NSTNS                                                         $AR$  333
      IF(NOUT2(I).EQ.0)GO TO 740                                               $AR$  334
      L2=IS1(I)                                                                $AR$  335
      L3=L2+NSPEC(I)-1                                                         $AR$  336
      WRITE(L1,710)NSPEC(I),(XSTN(K),RSTN(K),K=L2,L3)                          $AR$  337
710   FORMAT(I3,/,(2F12.7))                                                    $AR$  338
      XN=SPEED(I)                                                              $AR$  339
      IF(I.EQ.NSTNS)GO TO 714                                                  $AR$  340
      IF(SPEED(I).NE.SPEED(I+1).AND.NWORK(I+1).NE.0)XN=SPEED(I+1)              $AR$  341
714   XN=XN*SPDFAC(ICASE)*PI/(30.0*SCLFAC)                                     $AR$  342
      DO 720 J=1,NSTRMS                                                        $AR$  343
720   XX1(J)=ATAN((VW(J,I)-XN*R(J,I))/VM(J,I))*C1                              $AR$  344
      WRITE(L1,730)(R(J,I),XX1(J),J,I,J=1,NSTRMS)                              $AR$  345
730   FORMAT(2F12.4,48X,2I4)                                                   $AR$  346
740   CONTINUE                                                                 $AR$  347
750   IF(NSTPLT.EQ.0)GO TO 759                                                 $AR$  348
      L1=IPASS                                                                 $AR$  349
      IF(L1.GT.59)L1=59                                                        $AR$  350
      DO 754 K=1,L1                                                            $AR$  351
```

```
754   PASS(K)=FLOAT(K)
      DO 758 K=1,NSTNS                                                  $AR$ 352
      WRITE(LOG2,756)K                                                  $AR$ 353
756   FORMAT(1H1,53X,19HDELTA L FOR STATION,I3,/,2X)                    $AR$ 354
758   CALL UD0325(L1,IPASS,LOG2,PASS,DELTAR(1,K))                       $AR$ 355
759   IF(ICASE.GE.NCASE)GO TO 760                                       $AR$ 356
      ICASE=ICASE+1                                                     $AR$ 357
      IFAILK=IFAILD                                                     $AR$ 358
      GO TO 100                                                         $AR$ 359
760   WRITE(LOG2,770)                                                   $AR$ 360
770   FORMAT(1HS)                                                       $AR$ 361
      END                                                               $AR$ 362
                                                                        $AR$ 363
```

```
      SUBROUTINE UD331(XDATA,YDATA,NDATA,XIN,YOUT,SLOPE,NXY,NTYPE,NWOT)$01
      REAL M                                                          $01
      DIMENSION XDATA(1),YDATA(1),XIN(1),YOUT(1),SLOPE(1),A(21),B(21),D($01
     121),M(21)                                                       $01
      IF(NTYPE.EQ.1.OR.NDATA.LT.3)GO TO 210                           $01
      A(1)=1.0                                                        $01
      B(1)=0.0                                                        $01
      D(1)=0.0                                                        $01
      N=NDATA-1                                                       $01
      DO 110 I=2,N                                                    $01
      A(I)=(XDATA(I+1)-XDATA(I-1))/3.0-(XDATA(I)-XDATA(I-1))*B(I-1)/(3.0$01
     1*A(I-1))                                                        $01
      B(I)=(XDATA(I+1)-XDATA(I))/6.0                                  $01
  110 D(I)=(YDATA(I+1)-YDATA(I))/(XDATA(I+1)-XDATA(I))-(YDATA(I)-YDATA(I$01
     1-1))/(XDATA(I)-XDATA(I-1))-(XDATA(I)-XDATA(I-1))*D(I-1)/(6.0*A(I-1$01
     2))                                                              $01
      A(NDATA)=0.0                                                    $01
      B(NDATA)=1.0                                                    $01
      D(NDATA)=0.0                                                    $01
      M(NDATA)=A(NDATA)*D(N)/(A(NDATA)*B(N)-A(N)*B(NDATA))            $01
      DO 120 II=2,NDATA                                               $01
      I=NDATA+1-II                                                    $01
  120 M(I)=(D(I)-B(I)*M(I+1))/A(I)                                    $01
      ASSIGN 150 TO IY                                                $01
      IF(NWOT.EQ.1)ASSIGN 160 TO IY                                   $01
      ASSIGN 160 TO ISLOPE                                            $01
      IF(NWOT.EQ.0)ASSIGN 200 TO ISLOPE                               $01
      J=2                                                             $01
      DO 200 I=1,NXY                                                  $01
      IF(XIN(I).LT.XDATA(1))GO TO 170                                 $01
      IF(XIN(I).GT.XDATA(NDATA))GO TO 180                             $01
  130 IF(XIN(I).LE.XDATA(J))GO TO 140                                 $01
      J=J+1                                                           $01
      GO TO 130                                                       $01
  140 DX=XDATA(J)-XDATA(J-1)                                          $01
      GO TO IY,(150,160)                                              $01
  150 YOUT(I)=M(J-1)/(6.0*DX)*(XDATA(J)-XIN(I))**3+M(J)/(6.0*DX)*(XIN(I)$01
     1-XDATA(J-1))**3+(XDATA(J)-XIN(I))*(YDATA(J-1)/DX-M(J-1)/6.0*DX)+(X$01
     2IN(I)-XDATA(J-1))*(YDATA(J)/DX-M(J)/6.0*DX)                     $01
      GO TO ISLOPE,(160,200)                                          $01
  160 SLOPE(I)=(-M(J-1)*(XDATA(J)-XIN(I))**2/2.0+M(J)*(XIN(I)-XDATA(J-1)$01
     1)**2/2.0+YDATA(J)-YDATA(J-1))/DX-(M(J)-M(J-1))/6.0*DX           $01
      GO TO 200                                                       $01
  170 JP=1                                                            $01
      KP=2                                                            $01
      GO TO 190                                                       $01
  180 JP=NDATA                                                        $01
      KP=N                                                            $01
  190 YPPIME=(YDATA(KP)-YDATA(JP))/(XDATA(KP)-XDATA(JP))-M(KP)/6.0*(XDAT$01
     14(KP)-XDATA(JP))                                                $01
```

```
      IF(NWOT.NE.1)YOUT(I)=YDATA(JP)+(XIN(I)-XDATA(JP))*YPRIME
      IF(NWOT.NE.0)SLOPE(I)=YPRIME
200   CONTINUE
      RETURN
210   IF(NDATA.NE.1)GO TO 230
      DO 220 I=1,NXY
220   YOUT(I)=YDATA(1)
      RETURN
230   IF(NWOT.EQ.1)GO TO 254
      J=2
      DO 250 I=1,NXY
240   IF(XIN(I).LE.XDATA(J).OR.J.EQ.NDATA)GO TO 250
      J=J+1
      GO TO 240
250   YOUT(I)=YDATA(J-1)+(YDATA(J)-YDATA(J-1))/(XDATA(J)-XDATA(J-1))*(XI
     1N(I)-XDATA(J-1))
      IF(NWOT.NE.2)RETURN
254   YPRIME=(YDATA(2)-YDATA(1))/(XDATA(2)-XDATA(1))
      DO 260 I=1,NXY
260   SLOPE(I)=YPRIME
      RETURN
      END
```

```
      SUBROUTINE UU0302                                                                 $02$    2
      REAL LOSS,LAMI,LAMIP1,LAMIM1                                                      $02$    3
      COMMON NSTNS,NSTRMS,NMAX,NFORCE,NBL,NCASE,NSPLIT,NREAD,NPUNCH,NPAG$02$    4
     1E,NSET1,NSET2,ISIAG,ICASE,IFAILO,IPASS,I,IVFAIL,IFFAIL,NMIX,NTRANS$02$    5
     2,NPLOT,ILOSS,LNCT,ITOR,IMID,IFAIL,ITER,LOG1,LOG2,LOG3,LOG4,LOG5,LO$02$    6
     3G6,IPRINT,NMANY,NSTPLT,NEQN                                                   $02$    7
      COMMON NSPEC(30),NWORK(30),NLOSS(30),NDATA(30),NTERP(30),NMACH(30)$02$    8
     1,NL1(30),NL2(30),NDIMEN(30),IS1(30),IS2(30),IS3(30),NEVAL(30),NDIF$02$    9
     2F(30),NDEL(30),NLITER(30),NM(2),NRAD(2),NCURVE(30),NWHICH(30),NOUT1$02$   10
     3(30),NOUT2(30),NOUT3(30),NBLADE(30)                                           $02$   11
      COMMON UM(11,5,2),WFRAC(11,5,2)                                               $02$   12
      COMMON R(21,30),XL(21,30),X(21,30),H(21,30),S(21,30),VM(21,30),VW($02$   13
     121,30),TBETA(21,30),DIFF(15,4),FDHUB(15,4),FDMID(15,4),FDTIP(15,4)$02$   14
     2,TRAD(5,2)                                                                    $02$   15
      COMMON DATA0(100),DATA1(100),DATA2(100),DATA3(100),DATA4(100),DATA$02$   16
     15(100),DATA6(100),DATA7(100),DATA8(100),DATA9(100),FLOW(10),SPEED($02$   17
     230),SPDFAC(10),BHLOCK(30),BUIST(30),WBLOCK(30),WWBL(30),XSTN(150),$02$   18
     3RSTN(150),DELF(30),DELC(100),DELTA(100),TITLE(18),DRDM2(30),RIM1(3$02$   19
     40),XIM1(30),WORK(21),LOSS(21),TANEPS(21),XI(21),VV(21),DELW(21),LA$02$   20
     5M1(21),LAMIM1(21),LAMIP1(21),PHI(21),CR(21),GAMA(21),SPPG(21),CPPG$02$   21
     6(21),HKEEP(21),SKEEP(21),VWKEEP(21),DELH(30),DELT(30)                         $02$   22
      COMMON VISK,SHAPE,SCLFAC,RJ,G,TOLNCE,XSCALE,PSCALE,PLOW,RLOW,XMMAX$02$   23
     1,RCONST,FM2,HMIN,C1,PI,CONTR,CONMX                                            $02$   24
      DIMENSION II(21,30),JJ(21,30)                                                 $02$   25
      EQUIVALENCE (H,II),(S,JJ)                                                     $02$   26
      COMMON/PAGE/LIMIT,LO                                                          $02$   27
      NEVAL(1)=0                                                                    $02$   28
      READ(LOG1,100)TITLE                                                           $02$   29
  100 FORMAT(18A4)                                                                  $02$   30
      WRITE(LOG2,110)TITLE                                                          $02$   31
  110 FORMAT(10X,11HINPUT DATA,/,10X,10(1H*),//,10X,5HTITLE,34X,2H= ,18A$02$   32
     14)                                                                            $02$   33
      LNCT=LNCT+4                                                                   $02$   34
      CALL UUOG1(LNCT)                                                              $02$   35
      READ(LOG1,120)NSTNS,NSTRMS,NMAX,NFORCE,NBL,NCASE,NSPLIT,NSET1,NSET$02$   36
     12,NREAD,NPUNCH,NPLOT,NPAGE,NTRANS,NMIX,NMANY,NSTPLT,NEQN                      $02$   37
  120 FORMAT(18I3)                                                                  $02$   38
      IF(NSTRMS.EQ.0)NSTRMS=11                                                      $02$   39
      IF(NMAX.EQ.0)NMAX=40                                                          $02$   40
      IF(NFORCE.EQ.0)NFORCE=10                                                      $02$   41
      IF(NCASE.EQ.0)NCASE=1                                                         $02$   42
      IF(NPAGE.EQ.0)NPAGE=80                                                        $02$   43
      LO=LOG2                                                                       $02$   44
      LIMIT=NPAGE                                                                   $02$   45
      CALL UU0303(LNCT,19)                                                          $02$   46
      WRITE(LOG2,130)NSTNS,NSTRMS,NMAX,NFORCE,NBL,NCASE,NSPLIT,NSET1,NSE$02$   47
     1T2,NREAD,NPUNCH,NPLOT,NPAGE,NTRANS,NMIX,NMANY,NSTPLT,NEQN                     $02$   48
  130 FORMAT(2X,/,10X,18HNUMBER OF STATIONS,21X,1H=,I3,/,10X,21HNUMBER O$02$   49
     1F STREAMLINES,18X,1H=,I3,/,10X,20HMAX NUMBER OF PASSES,19X,1H=,I3,$02$   50
     2/,10X,30HMAX NUMBER OF ARBITRARY PASSES,9X,1H=,I3,/,10X,29HBOUNDAR$02$   51
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     3Y LAYER CALC INDICATOR,10X,1H=,I3,/,10X,24HNUMBER OF RUNNING POINT$022$   52
     4S,15X,1H=,I3,/,10X,33HSTREAMLINE DISTRIBUTION INDICATOR,6X,1H=,I3,$022$   53
     5/,10X,34HNUMBER OF LOSS/D-FACTOR CURVE SETS,5X,1H=,I3,/,10X,34HNUM$022$   54
     6BER OF LOSS/T.E.LOSS CURVE SETS,5X,1H=,I3,/,10X,2oHSTREAMLINE INPU$022$   55
     7T INDICATOR,13X,1H=,I3,/,10X,27HSTREAMLINE OUTPUT INDICATOR,12X,1H$022$   56
     8=,I3,/,10X,24HPRECISION PLOT INDICATOR,15X,1H=,I3,/,10X,24HMAX NUM$022$   57
     9BER OF LINES/PAGE,15X,1H=,I3,/,10X,29HWAKE TRANSPORT CALC INDICATO$022$   58
     AR,10X,1H=,I3,/,10X,32HMAINSTREAM MIXING CALC INDICATOR,7X,1H=,I3,/$022$   59
     B,10X,33HNO OF STATIONS FROM ANALYTIC SECN,6X,1H=,I3,/,10X,27HLINE-$022$   60
     CPRINTER PLOT INDICATOR,12X,1H=,I3,/,10X,32HMOMENTUM EQUATION FORM  $022$   61
     DINDICATOR,7X,1H=,I3)                                               $022$   62
      ITUB=NSTRMS-1                                                      $022$   63
      IMID=NSTRMS/2+1                                                    $022$   64
      IF(NMANY.EQ.0)GO TO 136                                            $022$   65
      READ(LOG1,132)(NWHICH(I),I=1,NMANY)                                $022$   66
132   FORMAT(24I3)                                                       $022$   67
      CALL UU0303(LNCT,2)                                                $022$   68
      WRITE(LOG2,134)(NWHICH(I),I=1,NMANY)                               $022$   69
134   FORMAT(2X,/,10X,51HGEOMETRY COMES FROM ANALYTIC SECTION FOR STATIO$022$   70
     1NS  ,23I3)                                                         $022$   71
136   CALL UU0303(LNCT,7)                                                $022$   72
      READ(LOG1,140)G,EJ,SCLFAC,TOLNCE,VISK,SHAPE                        $022$   73
140   FORMAT(6F12.0)                                                     $022$   74
      IF(G.EQ.0.0)G=32.174                                               $022$   75
      IF(EJ.EQ.0.0)EJ=778.16                                             $022$   76
      IF(SCLFAC.EQ.0.0)SCLFAC=12.0                                       $022$   77
      IF(TOLNCE.EQ.0.0)TOLNCE=0.001                                      $022$   78
      IF(VISK.EQ.0.0)VISK=0.00018                                        $022$   79
      IF(SHAPE.EQ.0.0)SHAPE=0.7                                          $022$   80
      WRITE(LOG2,150)G,EJ,SCLFAC,TOLNCE,VISK,SHAPE                       $022$   81
150   FORMAT(2X,/,10X,22HGRAVITATIONAL CONSTANT,17X,1H=,F8.4,/,10X,17HJO$022$   82
     1ULES EQUIVALENT,22X,1H=,F8.3,/,10X,29HLINEAR DIMENSION SCALE FACTO$022$   83
     2R,10X,1H=,F8.4,/,10X,15HBASIC TOLERANCE,24X,1H=,F8.5,/,10X,19HKINE$022$   84
     3MATIC VISCOSITY,20X,1H=,F8.5,/,10X,17HB.L. SHAPE FACTOR,22X,1H=,F8$022$   85
     4.5)                                                               $022$   86
      CALL UU0303(LNCT,7)                                                $022$   87
      READ(LOG1,140)XSCALE,PSCALE,PLOW,PLOW,XMMAX,RCONST                 $022$   88
      IF(XMMAX.EQ.0.0)XMMAX=0.6                                          $022$   89
      IF(RCONST.EQ.0.0)RCONST=6.0                                        $022$   90
      WRITE(LOG2,160)XSCALE,PSCALE,RLOW,PLOW,XMMAX,RCONST                $022$   91
160   FORMAT(2X,/,10X,29HPLOTTING SCALE FOR DIMENSIONS,10X,1H=,F7.3,/,10$022$   92
     1X,28HPLOTTING SCALE FOR PRESSURES,11X,1H=,F7.3,/,10X,22HMINIMUM RA$022$   93
     2DIUS ON PLOT,17X,1H=,F7.3,/,10X,24HMINIMUM PRESSURE ON PLOT,15X,1H$022$   94
     3=,F7.3,/,10X,40HMAXIMUM M-SQUARED IN RELAXATION FACTOR =,F8.4,/,10$022$   95
     4X,29HCONSTANT IN RELAXATION FACTOR,10X,1H=,F8.4)                  $022$   96
      CALL UU0303(LNCT,3)                                                $022$   97
      READ(LOG1,140)CONTR,CONMX                                          $022$   98
      WRITE(LOG2,164)CONTR,CONMX                                         $022$   99
164   FORMAT(2X,/,10X,22HWAKE TRANSFER CONSTANT,17X,1H=,F8.5,/,10X,25HTU$022$  100
     1RBULENT MIXING CONSTANT,14X,1H=,F8.5)                             $022$  101
```

```
      CALL UD0303(LNCT,5+NCASE)
      READ(LOG1,170)(FLOW(K),SPDFAC(K),K=1,NCASE)
170   FORMAT(2F12.0)
      WRITE(LOG2,180)(K,FLOW(K),SPDFAC(K),K=1,NCASE)
180   FORMAT(2X,/,10X,21HPOINTS TO BE COMPUTED,//,10X,2HNO,6X,8HFLOWRATE
     1,4X,12HSPEED FACTOR,//,(10X,I2,F13.3,F14.3))
      READ(LOG1,190)L1,(XSTN(K),RSTN(K),K=1,L1)
190   FORMAT(I3,/,(2F12.0))
      ISTAG=0
      IF(RSTN(1).EQ.0.0)ISTAG=1
      NSPEC(1)=L1
      CALL UD0303(LNCT,7+L1)
      WRITE(LOG2,200)L1,(XSTN(K),RSTN(K),K=1,L1)
200   FORMAT(2X,/,10X,36HANNULUS / COMPUTING STATION GEOMETRY,//,10X,24H
     1STATION  1  SPECIFIED BY,I3,7H POINTS,//,17X,4HXSTN,8X,4HRSTN,//,(
     2F22.4,F12.4))
      IS1(1)=1
      LAST=L1
      DO 220 I=2,NSTNS
      READ(LOG1,210)L1
210   FORMAT(I3)
      NEXT=LAST+1
      LAST=LAST+L1
      IF(LAST.GT.150)GO TO 550
      READ(LOG1,170)(XSTN(K),RSTN(K),K=NEXT,LAST)
      IF(RSTN(NEXT).EQ.0.0)ISTAG=I
      CALL UD0303(LNCT,5+L1)
      IS1(I)=NEXT
      NSPEC(I)=L1
220   WRITE(LOG2,230)I,L1,(XSTN(K),RSTN(K),K=NEXT,LAST)
230   FORMAT(2X,/,10X,7HSTATION,I3,14H  SPECIFIED BY,I3,7H POINTS,//,17X
     1,4HXSTN,8X,4HRSTN,//,(F22.4,F12.4))
      SPEED(1)=0.0
      READ(LOG1,240)L1,NTERP(1),NDIMEN(1),NMACH(1),(DATAC(K),DATA1(K),DA
     1TA2(K),DATA3(K),K=1,L1)
240   FORMAT(4I3,/,(4F12.0))
      CALL UD0303(LNCT,7+L1)
      IS2(1)=1
      NDATA(1)=L1
      LAST=L1
      WRITE(LOG2,250)L1,NTERP(1),NDIMEN(1),NMACH(1),(DATAC(K),DATA1(K),D
     1ATA2(K),DATA3(K),K=1,L1)
250   FORMAT(2X,/,10X,24HSTATION CALCULATION DATA,//,7X,18HSTATION  1  N
     1DATA=,I3,7H NTERP=,I2,8H NDIMEN=,I2,7H NMACH=,I2,//,11X,5HDATAC,6X
     2,14HTOTAL PRESSURE,4X,17HTOTAL TEMPERATURE,4X,11HWHIRL ANGLE,//,(5
     3X,F12.4,F15.4,F19.3,F18.3))
      DO 252 K=1,L1
252   DATA1(K)=DATA1(K)*SCLFAC**2
      LASTD=0
      NOUT1(1)=0
```

```
      NOUT2(1)=0                                                                $02$  152
      DO 320 I=2,NSTNS                                                          $02$  153
      LOGN=LOG1                                                                 $02$  154
      IF(NMANY.EQ.0)GO TO 258                                                   $02$  155
      DO 254 L1=1,NMANY                                                         $02$  156
      IF(NWHICH(L1).EQ.I)GO TO 256                                              $02$  157
  254 CONTINUE                                                                  $02$  158
      GO TO 258                                                                 $02$  159
  256 LOGN=LOG5                                                                 $02$  160
  258 READ(LOGN,260)NDATA(I),NTERP(I),NDIMEN(I),NMACH(I),NWORK(I),NLOSS($02$  161
     1I),NL1(I),NL2(I),NEVAL(I),NCURVE(I),NLITER(I),NDEL(I),NOUT1(I),NOU$02$  162
     2T2(I),NOUT3(I),NBLADE(I)                                                  $02$  163
  260 FORMAT(16I3)                                                              $02$  164
      L1=3                                                                      $02$  165
      IF(NDATA(I).NE.0)L1=L1+5+NDATA(I)                                         $02$  166
      IF(NDEL(I).NE.0)L1=L1+3+NDEL(I)                                           $02$  167
      CALL UD0303(LNCT,L1)                                                      $02$  168
      WRITE(LOG2,270)I,NDATA(I),NTERP(I),NDIMEN(I),NMACH(I),NWORK(I),NLO$02$  169
     1SS(I),NL1(I),NL2(I),NEVAL(I),NCURVE(I),NLITER(I),NDEL(I),NOUT1(I),$02$  170
     2NOUT2(I),NOUT3(I),NBLADE(I)                                               $02$  171
  270 FORMAT(2X,/,7X,7HSTATION,I3,8H  NDATA=,I3,7H NTERP=,I2,8H NDIMEN=$02$  172
     1,I2,7H NMACH=,I2,7H NWORK=,I2,7H NLOSS=,I2,5H NL1=,I3,5H NL2=,I3,7$02$  173
     2H NEVAL=,I2,8H NCURVE=,I2,8H NLITER=,I3,6H NDEL=,I3,/,19X,6HNOUT1=$02$  174
     3,I2,7H NOUT2=,I2,7H NOUT3=,I2,8H NBLADE=,I3)                              $02$  175
      SPEED(I)=0.0                                                              $02$  176
      IF(NDATA(I).EQ.0)GO TO 320                                                $02$  177
      NEXT=LAST+1                                                               $02$  178
      LAST=LAST+NDATA(I)                                                        $02$  179
      IS2(I)=NEXT                                                               $02$  180
      IF(LAST.GT.100)GO TO 550                                                  $02$  181
      READ(LOGN,280)SPEED(I),(DATAC(K),DATA1(K),DATA2(K),DATA3(K),DATA4($02$  182
     1K),DATA5(K),DATA6(K),DATA7(K),DATA8(K),DATA9(K),K=NEXT,LAST)              $02$  183
  280 FORMAT(F12.0,/,(9F12.0,/,4F12.0))                                         $02$  184
      WRITE(LOG2,290)SPEED(I),(DATAC(K),DATA1(K),DATA2(K),DATA3(K),DATA4$02$  185
     1(K),DATA5(K),DATA6(K),DATA7(K),DATA8(K),DATA9(K),K=NEXT,LAST)             $02$  186
  290 FORMAT(2X,/,10X,7HSPEED =,F9.2,//,13X,5HDATAC,7X,5HDATA1,7X,5HDATA$02$  187
     12,7X,5HDATA3,7X,5HDATA4,7X,5HDATA5,7X,5HDATA6,7X,5HDATA7,7X,5HDATA$02$  188
     28,7X,5HDATA9,//,(10X,F9.4,F12.3,F13.6,F11.4,F12.5,F12.5,4F12.4))          $02$  189
      IF(NWORK(I).NE.1)GO TO 296                                                $02$  190
      DO 294 K=NEXT,LAST                                                        $02$  191
  294 DATA1(K)=DATA1(K)*SCLFAC**2                                               $02$  192
  296 IF(NEVAL(I).GT.0.AND.NSTRMS.GT.NDATA(I))LAST=LAST+NSTRMS-NDATA(I)         $02$  193
      IF(NDEL(I).EQ.0)GO TO 320                                                 $02$  194
      NEXT=LAST0+1                                                              $02$  195
      LAST0=LAST0+NDEL(I)                                                       $02$  196
      IG3(I)=NEXT                                                               $02$  197
      IF(LAST0.GT.200)GO TO 550                                                 $02$  198
      READ(LOG1,300)(DELC(K),DELTA(K),K=NEXT,LAST0)                             $02$  199
  300 FORMAT(2F12.3)                                                            $02$  200
      WRITE(LOG2,310)(DELC(K),DELTA(K),K=NEXT,LAST0)                            $02$  201
```

```
310   FORMAT(2X,/,13X,4HDELC,8X,5HDELTA,//,(10X,F9.4,F12.4))
320   CONTINUE
      CALL UD0303(LNCT,5+NSTNS)
      READ(LOG1,330)(WBLOCK(I),BBLOCK(I),BDIST(I),I=1,NSTNS)
330   FORMAT(3F12.0)
      WRITE(LOG2,340)(I,WBLOCK(I),BBLOCK(I),BDIST(I),I=1,NSTNS)
340   FORMAT(2X,/,10X,30HBLOCKAGE FACTOR SPECIFICATIONS,//,10X,66HSTATIO
     1N   WALL BLOCKAGE   WAKE BLOCKAGE   WAKE DISTRIBUTION FACTOR,//,(1
     20X,I4,F16.5,F16.5,F19.3))
      IF(NSET1.EQ.0)GO TO 380
      DO 370 K=1,NSET1
      READ(LOG1,350)L1,(DIFF(J,K),FDHUB(J,K),FDMID(J,K),FDTIP(J,K),J=1,L
     11)
350   FORMAT(I3,/,(4F12.0))
      CALL UD0303(LNCT,6+L1)
      WRITE(LOG2,360)K,L1,(DIFF(J,K),FDHUB(J,K),FDMID(J,K),FDTIP(J,K),J=
     11,L1)
360   FORMAT(2X,/,10X,55HLOSS PARAMETER / DIFFUSION FACTOR CURVES FOR BL
     1ADE TYPE,I2,I5,16H D-FACTORS GIVEN,//,15X,9HDIFFUSION,5X,30HL O S
     2S   P A R A M E T E R S,/,16X,7HFACTORS,8X,3HHUB,9X,3HMID,8X,3HTIP
     3,//,(15X,F8.3,F13.5,F12.5,F11.5))
370   NDIFF(K)=L1
380   IF(NSET2.EQ.0)GO TO 450
      DO 440 K=1,NSET2
      READ(LOG1,390)L1,L2
390   FORMAT(2I3)
      CALL UD0303(LNCT,7+L1)
      NM(K)=L1
      NRAD(K)=L2
      READ(LOG1,400)TERAD(1,K),(DM(J,1,K),WFRAC(J,1,K),J=1,L1)
400   FORMAT(F12.0,/,(2F12.0))
      WRITE(LOG2,410)K,L1,L2,TERAD(1,K),(DM(J,1,K),WFRAC(J,1,K),J=1,L1)
410   FORMAT(2X,/,10X,51HFRACTIONAL LOSS DISTRIBUTION CURVES FOR BLADE C
     1LASS,I2,I5,15H POINTS GIVEN AT,I3,17H RADIAL LOCATIONS,//,10X,52HF
     2RACTION OF COMPUTING STATION LENGTH AT BLADE EXIT =,F7.4,//,10X,28
     3HFRACTION OF MERIDIONAL CHORD,4X,26HLOSS/LOSS AT TRAILING EDGE,//,
     4(15X,F11.4,20X,F11.4))
      IF(L2.EQ.1)GO TO 440
      DO 420 L=2,L2
      CALL UD0303(LNCT,5+L1)
      READ(LOG1,400)TERAD(L,K),(DM(J,L,K),WFRAC(J,L,K),J=1,L1)
420   WRITE(LOG2,430)TERAD(L,K),(DM(J,L,K),WFRAC(J,L,K),J=1,L1)
430   FORMAT(2X,/,10X,52HFRACTION OF COMPUTING STATION LENGTH AT BLADE E
     1XIT =,F7.4,//,10X,28HFRACTION OF MERIDIONAL CHORD,4X,26HLOSS/LOSS
     2AT TRAILING EDGE,//,(15X,F11.4,20X,F11.4))
440   CONTINUE
450   IF(NSPLIT.EQ.0.AND.NREAD.EQ.0)GO TO 570
      READ(LOG1,460)(DELF(J),J=1,NSTRMS)
460   FORMAT(6F12.0)
      L1=5
```

```
      IF(NSTRMS.GE.16)L1=8                                              $02$
      CALL UD0303(LNCT,L1)                                              $02$
      WRITE(LOG2,470)                                                   $02$
      L1=NSTRMS                                                         $02$
      IF(NSTRMS.GT.15)L1=15                                             $02$
      WRITE(LOG2,480)(J,J=1,L1)                                         $02$
480   FORMAT(2X,/,10X,10HSTREAMLINE,I5,14I7)                            $02$
470   FORMAT(2X,/,10X,78HPROPORTIONS OF TOTAL FLOW BETWEEN HUB AND EACH $02$
     1STREAMLINE ARE TO BE AS FOLLOWS)                                  $02$
      WRITE(LOG2,490)(DELF(J),J=1,L1)                                   $02$
490   FORMAT(10X,4HFLOW,7X,15F7.4)                                      $02$
      IF(NSTRMS.LE.15)GO TO 500                                         $02$
      L1=L1+1                                                           $02$
      WRITE(LOG2,480)(J,J=L1,NSTRMS)                                    $02$
      WRITE(LOG2,490)(DELF(J),J=L1,NSTRMS)                              $02$
500   IF(NREAD.EQ.0)GO TO 570                                           $02$
      READ(LOG1,510)((R(J,I),X(J,I),XL(J,I),II(J,I),JJ(J,I),J=1,NSTRMS),$02$
     1I=1,NSTNS)                                                        $02$
510   FORMAT(3F12.0,2I3)                                                $02$
      CALL UD0303(LNCT,5+NSTRMS)                                        $02$
      WRITE(LOG2,520)                                                   $02$
520   FORMAT(2X,/,10X,32HESTIMATED STREAMLINE COORDINATES)              $02$
      DO 530 I=1,NSTNS                                                  $02$
      IF(I.GT.1)CALL UD0303(LNCT,3+NSTRMS)                              $02$
530   WRITE(LOG2,540)(I,J,R(J,I),X(J,I),XL(J,I),II(J,I),JJ(J,I),J=1,NSTR$02$
     1MS)                                                               $02$
540   FORMAT(2X,/,10X,79HSTATION  STREAMLINE   RADIUS  AXIAL COORDINATE $02$
     1 L-COORDINATE    CHECKS-  I     J,//,(3X,2I11,F14.4,F12.4,F16.4,I17$02$
     2,I5))                                                             $02$
      GO TO 570                                                         $02$
550   WRITE(LOG2,560)                                                   $02$
560   FORMAT(1H1,10X,33HJOB STOPPED - TOO MUCH INPUT DATA)              $02$
      STOP                                                              $02$
570   RETURN                                                            $02$
      END                                                               $02$
```

```
      SUBROUTINE UDJ303(LNCT,L)                                          $03$    2
      COMMON/PAGE/LIMIT,LO                                               $03$    3
      LNCT=LNCT+L                                                        $03$    4
      IF(LNCT.LE.LIMIT)RETURN                                            $03$    5
      LNCT=1+L                                                           $03$    6
      WRITE(LO,100)                                                      $03$    7
  100 FORMAT(1H1)                                                        $03$    8
      RETURN                                                             $03$    9
      END                                                                $03$   10
```

```
      SUBROUTINE UD0304(H,S,VW,R1,R2,X1,X2,VM,EPS,SCLFAC,G,EJ,HMIN,VMIN,$044$    2
     1PSMID,NSTRMS,LOG2,LNCT,IFAIL)                                      $044$    3
      DIMENSION H(1),S(1),VW(1),R1(1),R2(1),X1(1),X2(1),VM(1)            $044$    4
      DIMENSION VZUP(21),VZDN(21),PSDN(21),HUP(21),VWUP(21),SUP(21),RMID$044$    5
     1(20),DELR(20),PSUP(21),HSUP(21),VWFUN(21),VZFUN(21),SDN(21),HSDN(2$044$    6
     21),VWDN(21),HDN(21),XX1(21),XX2(21),R(21)                          $044$    7
      DO 80 J=1,NSTRMS                                                   $044$    8
   60 R(J)=(R1(J)+R2(J))*0.5                                             $044$    9
      G1=R(NSTRMS)-R(1)                                                  $044$   10
      G2=VM(1)                                                           $044$   11
      DO 90 J=2,NSTRMS                                                   $044$   12
      IF(R(J)-R(J-1).LT.G1)G1=R(J)-R(J-1)                                $044$   13
      IF(VM(J).LT.G2)G2=VM(J)                                            $044$   14
   90 CONTINUE                                                           $044$   15
      DELZ=G2*G1**2/(EPS*SCLFAC)*0.25                                    $044$   16
      G1=(X2(1)+X2(NSTRMS)-X1(1)-X1(NSTRMS))*0.5                         $044$   17
      ISTEP=G1/DELZ+1.0                                                  $044$   18
      DELZ=G1/FLOAT(ISTEP)                                               $044$   19
      VM2=VMIN**2                                                        $044$   20
      ITUB=NSTRMS-1                                                      $044$   21
      IMID=NSTRMS/2+1                                                    $044$   22
      DO 110 J=1,NSTRMS                                                  $044$   23
      PSUP(J)=PSMID                                                      $044$   24
      HUP(J)=H(J)                                                        $044$   25
      VWUP(J)=VW(J)                                                      $044$   26
  110 SUP(J)=S(J)                                                        $044$   27
      DO 120 J=1,ITUB                                                    $044$   28
      RMID(J)=(R(J)+R(J+1))*0.5                                          $044$   29
  120 DELR(J)=R(J+1)-R(J)                                                $044$   30
      IFAIL=0                                                            $044$   31
      KSTEP=1                                                            $044$   32
  130 CALL UD0329(VWUP,R,XX2,NSTRMS)                                     $044$   33
      DO 150 J=1,NSTRMS                                                  $044$   34
  150 VWFUN(J)=EPS/R(J)*(XX2(J)-VWUP(J)/R(J))*SCLFAC                     $044$   35
      IF(KSTEP.GT.1)GO TO 240                                            $044$   36
      JSTEP=1                                                            $044$   37
      J1=IMID                                                            $044$   38
  190 J2=J1+JSTEP                                                        $044$   39
      JJ=J1                                                              $044$   40
      IF(JSTEP.EQ.-1)JJ=J2                                               $044$   41
      G1=((VWUP(J1)+VWUP(J2))*0.5)**2/RMID(JJ)                           $044$   42
      G1=DELR(JJ)*G1*FLOAT(JSTEP)                                        $044$   43
      X3=(SUP(J1)+SUP(J2))*0.5                                           $044$   44
      K=1                                                                $044$   45
  200 G2=UDG2(X3,(PSUP(J1)+PSUP(J2))*0.5)                                $044$   46
      IF(G2.GE.HMIN)GO TO 210                                            $044$   47
      IFAIL=1                                                            $044$   48
      GO TO 600                                                          $044$   49
  210 G2=UDG5(G2,X3)/G                                                   $044$   50
      X4=PSUP(J2)                                                        $044$   51
```

```
      PSUP(J2)=PSUP(J1)+Q1*Q2                                                  $04$   52
      IF(ABS(X4/PSUP(J2)-1.0).LE.1.0E-5)GO TO 220                              $04$   53
      K=K+1                                                                    $04$   54
      IF(K.LE.10)GO TO 200                                                     $04$   55
      IFAIL=2                                                                  $04$   56
      GO TO 600                                                                $04$   57
  220 IF(J2.EQ.1)GO TO 240                                                     $04$   58
      IF(J2.EQ.NSTRMS)GO TO 230                                                $04$   59
      J1=J2                                                                    $04$   60
      GO TO 190                                                                $04$   61
  230 JSTEP=-1                                                                 $04$   62
      J1=IMID                                                                  $04$   63
      GO TO 190                                                                $04$   64
  240 DO 260 J=1,NSTRMS                                                        $04$   65
      HSUP(J)=UDG2(SUP(J),PSUP(J))                                             $04$   66
      IF(HSUP(J).GE.HMIN)GO TO 250                                             $04$   67
      IFAIL=3                                                                  $04$   68
      GO TO 600                                                                $04$   69
  250 Q1=2.0*G*EJ*(HUP(J)-HSUP(J))-VWUP(J)**2                                  $04$   70
      IF(Q1.GE.VM2)GO TO 260                                                   $04$   71
      IFAIL=4                                                                  $04$   72
      GO TO 600                                                                $04$   73
  260 VZUP(J)=SQRT(Q1)                                                         $04$   74
      FLOW=0.0                                                                 $04$   75
      DO 270 J=1,ITUB                                                          $04$   76
  270 FLOW=FLOW+(R(J+1)**2-R(J)**2)*(VZUP(J)+VZUP(J+1))*UDGS((HSUP(J)+HS       $04$   77
     1UP(J+1))*0.5,(SUP(J)+SUP(J+1))*0.5)                                      $04$   78
  280 CALL UD0329(HSUP,R,XX2,NSTRMS)                                           $04$   79
      DO 300 J=1,NSTRMS                                                        $04$   80
  300 HDN(J)=HUP(J)+DELZ/VZUP(J)*EPS/R(J)*XX2(J)*SCLFAC                        $04$   81
      DO 310 J=1,NSTRMS                                                        $04$   82
  310 VWDN(J)=VWUP(J)+DELZ/VZUP(J)*VWFUN(J)                                    $04$   83
      CALL UD0329(VZUP,R,VZFUN,NSTRMS)                                         $04$   84
      DO 330 J=1,NSTRMS                                                        $04$   85
      VZFUN(J)=DELZ*EPS*SCLFAC*VZFUN(J)/R(J)                                   $04$   86
      SDN(J)=SUP(J)                                                            $04$   87
  330 PSDN(J)=PSUP(J)                                                          $04$   88
      KK=1                                                                     $04$   89
  340 J1=IMID                                                                  $04$   90
      JSTEP=1                                                                  $04$   91
  350 J2=J1+JSTEP                                                              $04$   92
      JJ=J1                                                                    $04$   93
      IF(JSTEP.EQ.-1)JJ=J2                                                     $04$   94
      Q1=((VWDN(J1)+VWDN(J2))*0.5)**2/RMID(JJ)                                 $04$   95
      Q1=DELR(JJ)*Q1*FLOAT(JSTEP)                                              $04$   96
      X3=(SDN(J1)+SDN(J2))*0.5                                                 $04$   97
      K=1                                                                      $04$   98
  360 Q2=UDG2(X3,(PSDN(J1)+PSDN(J2))*0.5)                                      $04$   99
      IF(Q2.GE.HMIN)GO TO 370                                                  $04$  100
      IFAIL=5                                                                  $04$  101
```

```
      GO TO 600                                                         $04$
370   Q2=UDG5(Q2,X3)/G                                                  $04$
      X4=PSDN(J2)                                                       $04$
      PSDN(J2)=PSDN(J1)+Q1*Q2                                           $04$
      IF(ABS(X4/PSDN(J2)-1.0).LE.1.0E-5)GO TO 380                       $04$
      K=K+1                                                             $04$
      IF(K.LE.10)GO TO 360                                              $04$
      IFAIL=6                                                           $04$
      GO TO 600                                                         $04$
380   IF(J2.EQ.1)GO TO 400                                              $04$
      IF(J2.EQ.NSTRMS)GO TO 390                                         $04$
      J1=J2                                                             $04$
      GO TO 350                                                         $04$
390   J1=IMID                                                           $04$
      JSTEP=-1                                                          $04$
      GO TO 350                                                         $04$
400   DO 410 J=1,NSTRMS                                                 $04$
      VZDN(J)=VZUP(J)+(VZFUN(J)-(PSDN(J)-PSUP(J))/UDG5(HSUP(J),SUP(J))*G$04$
     1)/VZUP(J)                                                         $04$
      HSDN(J)=HDN(J)-(VZDN(J)**2+VWDN(J)**2)/(2.0*G*EJ)                 $04$
      IF(HSDN(J).GE.HMIN)GO TO 410                                      $04$
      IFAIL=7                                                           $04$
      GO TO 600                                                         $04$
410   SDN(J)=UDG3(PSDN(J),HSDN(J))                                      $04$
      XX1(1)=0.0                                                        $04$
      DO 420 J=1,ITUB                                                   $04$
420   XX1(J+1)=XX1(J)+(R(J+1)**2-R(J)**2)*(VZDN(J+1)+VZDN(J))*UDG5((HSDN$04$
     1(J)+HSDN(J+1))*0.5,(SDN(J)+SDN(J+1))*0.5)                         $04$
      Q1=XX1(NSTRMS)                                                    $04$
      IF(ABS(Q1/FLOW-1.0).LE.1.0E-5.AND.KK.GT.1)GO TO 450               $04$
      IF(KK.LE.15)GO TO 430                                             $04$
      IFAIL=8                                                           $04$
      GO TO 600                                                         $04$
430   Q2=UDG9(HSDN(IMID),SDN(IMID),VZDN(IMID)**2)                       $04$
      Q1=(Q1-FLOW)*PSDN(IMID)*Q2/(FLOW*(1.0-Q2))                        $04$
      DO 440 J=1,NSTRMS                                                 $04$
440   PSDN(J)=PSDN(J)+Q1                                                $04$
      KK=KK+1                                                           $04$
      GO TO 340                                                         $04$
450   IF(KSTEP.EQ.ISTEP)GO TO 510                                       $04$
      DO 500 J=1,NSTRMS                                                 $04$
      PSUP(J)=PSDN(J)                                                   $04$
      HSUP(J)=HSDN(J)                                                   $04$
      VZUP(J)=VZDN(J)                                                   $04$
      VWUP(J)=VWDN(J)                                                   $04$
      HUP(J)=HDN(J)                                                     $04$
500   SUP(J)=SDN(J)                                                     $04$
      KSTEP=KSTEP+1                                                     $04$
      GO TO 130                                                         $04$
510   DO 520 J=1,NSTRMS                                                 $04$
```

```
      H(J)=HDN(J)                                                       $04$  152
      S(J)=SDN(J)                                                       $04$  153
520   VW(J)=VWDN(J)                                                     $04$  154
      RETURN                                                            $04$  155
600   CALL UU0303(LNCT,1)                                               $04$  156
      WRITE(LOG2,610)IFAIL                                              $04$  157
610   FORMAT(5X,30HMIXING CALCULATION FAILURE NO.,I2)                    $04$  158
      RETURN                                                            $04$  159
      END                                                               $04$  160
```

```
      SUBROUTINE UJJ329(Y,X,FXY,N)
      DIMENSION Y(1),X(1),FXY(1)
      X1=(X(3)+X(2))*(Y(3)-Y(2))/(X(3)-X(2))
      FXY(2)=X1/(X(3)-X(1))
      N2=N-2
      DO 100 J=3,N2
      X2=(X(J+1)+X(J))*(Y(J+1)-Y(J))/(X(J+1)-X(J))
      FXY(J)=(X2-X1)/(X(J+1)-X(J-1))
100   X1=X2
      FXY(N-1)=-X1/(X(N)-X(N-2))
      FXY(1)=FXY(2)-(FXY(3)-FXY(2))/(X(3)-X(2))*(X(2)-X(1))
      FXY(N)=FXY(N-1)+(FXY(N-1)-FXY(N-2))/(X(N-1)-X(N-2))*(X(N)-X(N-1))
      RETURN
      END
```

```
      SUBROUTINE UD0305                                                 $05$
      REAL LOSS,LAMI,LAMIP1,LAMIM1                                      $05$
      COMMON NSTNS,NSTRMS,NMAX,NFORCE,NBL,NCASE,NSPLIT,NREAD,NPUNCH,NPAG$05$
     1E,NSET1,NSET2,ISTAG,ICASE,IFAILO,IPASS,I,IVFAIL,IFFAIL,NMIX,NTRANS$05$
     2,NPLOT,ILOSS,LNCT,ITUB,IMID,IFAIL,ITEP,LOG1,LOG2,LOG3,LOG4,LOG5,LO$05$
     3G6,IPRINT,NMANY,NSTPLT,NEQN                                       $05$
      COMMON NSPEC(30),NWORK(30),NLOSS(30),NDATA(30),NTERP(30),NMACH(30)$05$
     1,NL1(30),NL2(30),NDIMEN(30),IS1(30),IS2(30),IS3(30),NEVAL(30),NDIF$05$
     2F(4),NDEL(30),NLITER(30),NM(2),NRAD(2),NCURVE(30),NWHICH(30),NOUT1$05$
     3(30),NOUT2(30),NOUT3(30),NBLADE(30)                               $05$
      COMMON DM(11,5,2),WFRAC(11,5,2)                                   $05$
      COMMON R(21,30),XL(21,30),X(21,30),H(21,30),S(21,30),VM(21,30),VW($05$
     121,30),TBETA(21,30),DIFF(15,4),FDHUB(15,4),FDMID(15,4),FDTIP(15,4)$05$
     2,TERAD(5,2)                                                       $05$
      COMMON DATAC(100),DATA1(100),DATA2(100),DATA3(100),DATA4(100),DATA$05$
     15(100),DATA6(100),DATA7(100),DATA8(100),DATA9(100),FLOW(10),SPEED($05$
     230),SPDFAC(10),BBLOCK(30),BDIST(30),WBLOCK(30),WWBL(30),XSTN(150),$05$
     3RSTN(150),DELF(30),DELC(100),DELTA(100),TITLE(18),DRDM2(30),RIM1(3$05$
     40),XIM1(30),WORK(21),LOSS(21),TANEPS(21),XI(21),VV(21),DELW(21),LA$05$
     5MI(21),LAMIM1(21),LAMIP1(21),PHI(21),CR(21),GAMA(21),SPPG(21),CPPG$05$
     6(21),HKEEP(21),SKEEP(21),VWKEEP(21),DELH(30),DELT(30)             $05$
      COMMON VISK,SHAPE,SCLFAC,EJ,G,TOLNCE,XSCALE,PSCALE,PLOW,RLOW,XMMAX$05$
     1,RCONST,FM2,HMIN,C1,PI,CONTR,CONMX                                $05$
      DIMENSION XX1(21),XX2(21),XX3(21),XX4(21),XX5(21)                 $05$
      L1=NDIMEN(I)+1                                                    $05$
      GO TO(100,120,140,160),L1                                         $05$
100   DO 110 J=1,NSTRMS                                                 $05$
110   XX5(J)=R(J,I)                                                     $05$
      GO TO 180                                                         $05$
120   DO 130 J=1,NSTRMS                                                 $05$
130   XX5(J)=R(J,I)/R(NSTRMS,I)                                         $05$
      GO TO 180                                                         $05$
140   DO 150 J=1,NSTRMS                                                 $05$
150   XX5(J)=XL(J,I)                                                    $05$
      GO TO 180                                                         $05$
160   DO 170 J=1,NSTRMS                                                 $05$
170   XX5(J)=XL(J,I)/XL(NSTRMS,I)                                       $05$
180   L2=IS2(I)                                                         $05$
      L3=NDATA(I)                                                       $05$
      L4=NTERP(I)                                                       $05$
      CALL UD0301(DATAC(L2),DATA1(L2),L3,XX5,WORK  ,X1,NSTRMS,L4,0)     $05$
      CALL UD0301(DATAC(L2),DATA3(L2),L3,XX5,TANEPS,X1,NSTRMS,L4,0)     $05$
      DO 190 J=1,NSTRMS                                                 $05$
190   TANEPS(J)=TAN(TANEPS(J)/C1)                                       $05$
      IW=NWORK(I)                                                       $05$
      IL=NLOSS(I)                                                       $05$
      IF(IW.EQ.7.OR.IL.LE.3)                                            $05$
     1CALL UD0301(DATAC(L2),DATA2(L2),L3,XX5,LOSS  ,X1,NSTRMS,L4,0)     $05$
      IF(IW.GE.5)                                                       $05$
     1CALL UD0301(DATAC(L2),DATA6(L2),L3,XX5,XX1,X1,NSTRMS,L4,0)        $05$
```

```
      IF(IL.NE.4)GO TO 350
      DO 200 II=I,NSTNS
      IF(NLOSS(II).EQ.1)GO TO 210
200   CONTINUE
210   L2=IS2(II)
      L3=NDATA(II)
      L4=NTERP(II)
      L1=NDIMEN(II)+1
      GO TO(220,240,260,280),L1
220   DO 230 J=1,NSTRMS
230   XX5(J)=R(J,II)
      GO TO 300
240   DO 250 J=1,NSTRMS
250   XX5(J)=R(J,II)/R(NSTRMS,II)
      GO TO 300
260   DO 270 J=1,NSTRMS
270   XX5(J)=XL(J,II)
      GO TO 300
280   DO 290 J=1,NSTRMS
290   XX5(J)=XL(J,II)/XL(NSTRMS,II)
300   CALL UD0301(DATAC(L2),DATA2(L2),L3,XX5,LOSS,X1,NSTRMS,L4,0)
      III=I+NL1(I)+1
      DO 320 J=1,NSTRMS
      XX2(J)=0.0
      DO 310 IK=III,II
      XX2(J)=XX2(J)+SQRT((X(J,IK)-X(J,IK-1))**2+(R(J,IK)-R(J,IK-1))**2)
      IF(IK.EQ.I)XX3(J)=XX2(J)
310   CONTINUE
320   XX3(J)=XX3(J)/XX2(J)
      L1=NCURVE(I)
      L2=NM(L1)
      L3=NRAD(L1)
      DO 340 J=1,NSTRMS
      DO 330 K=1,L3
330   CALL UD0301(DM(1,K,L1),WFRAC(1,K,L1),L2,XX3(J),XX2(K),X1,1,0,0)
      X2=(R(J,II)-R(1,II))/(R(NSTRMS,II)-R(1,II))
      CALL UD0301(TERAD(1,L1),XX2,L3,X2,X1,X1,1,0,0)
340   LOSS(J)=LOSS(J)*X1
350   IF(IW.LT.5)GO TO 420
      IF(IW.NE.5)GO TO 370
      DO 360 J=1,NSTRMS
360   TBETA(J,I)=TAN((WORK(J)+XX1(J))/C1)
      GO TO 420
370   IF(IW.EQ.7)GO TO 400
      DO 380 J=1,NSTRMS
380   XX2(J)=TAN((ATAN((R(J,I+1)-R(J,I))/(X(J,I+1)-X(J,I)))+ATAN((R(J,I)
     1-R(J,I-1))/(X(J,I)-X(J,I-1))))/2.0)
      L1=IS1(I)
      CALL UD0301(RSTN(L1),XSTN(L1),NSPEC(I),R(1,I),X1,XX3,NSTRMS,0,1)
      DO 390 J=1,NSTRMS
```

```
390   TBETA(J,I)=TAN(ATAN((TAN(WORK(J)/C1)*(1.0-XX3(J)*XX2(J))-XX2(J)*TA$05$  102
     1NEPS(J)*SQRT(1.0+XX3(J)**2))/SQRT(1.0+XX3(J)**2))+XX1(J)/C1)          $05$  103
      GO TO 420                                                            $05$  104
400   XN=SPEED(I)*SPDFAC(ICASE)*PI/(30.0*SCLFAC)                           $05$  105
      CALL UDD3G1(DATAC(L2),DATA7(L2),L3,XX5,XX2,X1,NSTRMS,L4,J)           $05$  106
      CALL UDD3D1(DATAC(L2),DATA8(L2),L3,XX5,XX3,X1,NSTRMS,L4,0)           $05$  107
      CALL UDD3D1(DATAC(L2),DATA9(L2),L3,XX5,XX4,X1,NSTRMS,L4,0)           $05$  108
      II=I+NL1(I)                                                          $05$  109
      DO 410 J=1,NSTRMS                                                    $05$  110
      X1=C1*ATAN((VM(J,II)-XN*R(J,II))/VM(J,II))                           $05$  111
      X2=XX3(J)                                                            $05$  112
      IF(X1.LT.XX1(J))X2=XX4(J)                                            $05$  113
      LOSS(J)=LOSS(J)*(1.0+((X1-XX1(J))/(X2-XX1(J)))**2)                   $05$  114
      IF(LOSS(J).GT.0.5)LOSS(J)=0.5                                        $05$  115
410   TBETA(J,I)=TAN((WORK(J)+(X1-XX1(J))*XX2(J))/C1)                      $05$  116
420   RETURN                                                               $05$  117
      END                                                                  $05$  118
```

```
      SUBROUTINE UD03Jb(R1,R2,X1,X2,H,S,VM,TB1,TB2,W,XK,SCLFAC,SPEED,SPD$06$    2
     1FAC,G,CJ,HMIN,NSTRMS,PI)                                          $06$    3
      DIMENSION R1(1),R2(1),X1(1),X2(1),H(1),S(1),VM(1),TB1(1),TB2(1),W($06$    4
     11)                                                                $06$    5
      DIMENSION R(150),W2D(150),W3D(150),XX1(150),XX2(150),XX3(150),XX5($06$    6
     19,9),B(150)                                                       $06$    7
      EQUIVALENCE (XX2(1),XX5(1))                                       $06$    8
      NTUB=NSTRMS-1                                                     $06$    9
      DO 50 J=1,NSTRMS                                                  $06$   10
      Q1=H(J)-VM(J)**2*(1.0+(TB2(J)+R2(J)*SPEED*SPDFAC*PI/(SCLFAC*30.0*V$06$   11
     14(J)))**2)/(2.0*G*CJ)                                             $06$   12
      IF(Q1.LT.HMIN)Q1=HMIN                                             $06$   13
      XX1(J)=UDG4(Q1,S(J))                                              $06$   14
50    XX2(J)=UDG5(Q1,S(J))                                              $06$   15
      CALL UD0301(R2,XX1,NSTRMS,R2,Q1,XX3,NSTRMS,0,1)                   $06$   16
      DO 60 J=1,NSTRMS                                                  $06$   17
60    XX1(J)=XX3(J)*G/XX2(J)                                            $06$   18
      Q1=(R2(NSTRMS)-R2(1))/149.0                                       $06$   19
      R(1)=R2(1)                                                        $06$   20
      DO 70 J=2,150                                                     $06$   21
70    R(J)=R(J-1)+Q1                                                    $06$   22
      CALL UD0301(R2,XX1,NSTRMS,R,XX2,Q1,150,0,J)                       $06$   23
      DO 80 J=1,NSTRMS                                                  $06$   24
80    XX3(J)=((R2(J)-R1(J))**2+(X2(J)-X1(J))**2)*(1.0+((TB1(J)+TB2(J))*0$06$   25
     1.5)**2)                                                           $06$   26
      CALL UD0301(R2,XX3,NSTRMS,R,XX1,Q1,150,0,0)                       $06$   27
      DO 90 J=1,NSTRMS                                                  $06$   28
90    W2D(J)=VM(J)**2*(1.0+TB2(J)**2)                                   $06$   29
      CALL UD03C1(R2,W2D,NSTRMS,R,XX3,Q1,150,0,0)                       $06$   30
      CALL UD0301(R2,W   ,NSTRMS,R,W2D,Q1,150,0,0)                      $06$   31
      NKEEP=NSTRMS                                                      $06$   32
      NSTRMS=150                                                        $06$   33
      NTUB=149                                                          $06$   34
      Q2=(SPEED*SPDFAC*PI/(30.0*SCLFAC))**2                             $06$   35
      DO 100 J=1,NSTRMS                                                 $06$   36
100   W3D(J)=0.0                                                        $06$   37
      B(1)=(R(2)-R(1))/2.0                                              $06$   38
      B(NSTRMS)=(R(NSTRMS)-R(NTUB))/2.0                                 $06$   39
      DO 110 J=2,NTUB                                                   $06$   40
110   B(J)=(R(J+1)-R(J-1))/2.0                                          $06$   41
      DO 270 J=1,NSTRMS                                                 $06$   42
      DR=XK*XX1(J)/XX3(J)*(Q2*R(J)-XX2(J))                              $06$   43
      IF(DR)130,120,200                                                 $06$   44
120   W3D(J)=W3D(J)+W2D(J)                                              $06$   45
      GO TO 270                                                         $06$   46
130   IF(J.EQ.1)GO TO 120                                               $06$   47
      IF(R(J)+DR.LE.R(1))GO TO 160                                      $06$   48
      DO 140 JJ=2,J                                                     $06$   49
      JJJ=J-JJ+1                                                        $06$   50
      IF(R(J)+DR.GE.R(JJJ))GO TO 150                                    $06$   51
```

```
140   CONTINUE
150   JJJ=JJJ+1
      Q1=W2D(J)*B(J)/(B(J)-DR)
      DO 170 JJ=JJJ,J
170   W3D(JJ)=W3D(JJ)+Q1
      GO TO 270
180   A=B(J)*W2D(J)/(R(NSTRMS)-R(1))
      IF(J.NE.NSTRMS)A=B(J)*W2D(J)/((R(J+1)+R(J))*0.5-R(1))
      DO 190 JJ=1,J
190   W3D(JJ)=W3D(JJ)+A
      GO TO 270
200   IF(J.EQ.NSTRMS)GO TO 120
      IF(R(J)+DR.GE.R(NSTRMS))GO TO 250
      DO 210 JJ=J,NSTRMS
      IF(R(J)+DR.LT.R(JJ))GO TO 220
210   CONTINUE
220   JJ=JJ-1
      Q1=W2D(J)*B(J)/(B(J)+DR)
      DO 240 JJJ=J,JJ
240   W3D(JJJ)=W3D(JJJ)+Q1
      GO TO 270
250   A=B(J)*W2D(J)/(R(NSTRMS)-R(1))
      IF(J.NE.1)A=B(J)*W2D(J)/(R(NSTRMS)-(R(J)+R(J-1))*0.5)
      DO 260 JJ=J,NSTRMS
260   W3D(JJ)=W3D(JJ)+A
270   CONTINUE
      NSTRMS=NKEEP
      XX1(1)=0.0
      DO 280 LL=1,150
280   XX1(1)=XX1(1)+W3D(LL)
      DO 290 L=2,9
      XX1(L)=0.0
      DO 290 LL=1,150
290   XX1(L)=XX1(L)+R(LL)**(L-1)*W3D(LL)
      DO 330 L=1,9
      DO 320 J=L,9
      IF(J.EQ.1)GO TO 310
      XX5(L,J)=0.0
      DO 300 LL=1,150
300   XX5(L,J)=XX5(L,J)+R(LL)**(L+J-2)
      GO TO 320
310   XX5(1,1)=150
320   XX5(J,L)=XX5(L,J)
330   CONTINUE
      CALL UD0330(XX5,XX1)
      DO 340 J=1,NSTRMS
340   W(J)=(((((((XX1(9)*R2(J)+XX1(8))*R2(J)+XX1(7))*R2(J)+XX1(6))*R2(J)
     1+XX1(5))*R2(J)+XX1(4))*R2(J)+XX1(3))*R2(J)+XX1(2))*R2(J)+XX1(1)
      RETURN
      END
```

```
      SUBROUTINE UDD330(A,B,INDEX)
      DIMENSION A(9,9),B(9),INDEX(9)
      N=10
      DO 100 J=1,N
      INDEX(J)=0
      AMAX=1.0
      DO 120 J=1,N
      IF(ABS(A(J,L)).LE.AMAX)GO TO 120
      IROW=J
      AMAX=ABS(A(J,L))
  120 CONTINUE
      IF(AMAX.NE.0.0)GO TO 115
      PV=0.0
      RETURN
  115 INDEX(L)=IROW
      IF(IROW.EQ.L)GO TO 150
      DO 140 J=1,N
      PV=A(IROW,J)
      A(IROW,J)=A(L,J)
      A(L,J)=PV
  140 CONTINUE
      PV=B(IROW)
      B(IROW)=B(L)
      B(L)=PV
  150 DO 160 I=1,N
      IF(I.EQ.L)GO TO 160
      A(I,L)=A(I,L)*PV
  160 CONTINUE
      DO 170 J=1,N
      IF(J.EQ.L)GO TO 170
      A(L,J)=A(L,J)*PV
  170 CONTINUE
      B(L)=B(L)*PV
  180 CONTINUE
      GO TO 110
      END
```

```
      SUBROUTINE UDD307                                                                 $07$    2
      REAL LOSS,LAMI,LAMIP1,LAMIM1                                                      $07$    3
      COMMON NSTNS,NSTRMS,NMAX,NFORCE,NBL,NCASE,NSPLIT,NREAD,NPUNCH,NPAG$07$    4
     1E,NSET1,NSET2,ISTAG,ICASE,IFAILD,IPASS,I,IVFAIL,IFFAIL,NMIX,NTRANS$07$    5
     2,NPLOT,ILOSS,LAST,ITUB,IMID,IFAIL,ITER,LOG1,LOG2,LOG3,LOG4,LOG5,LO$07$    6
     3G6,IPRINT,NMANY,NSTPLT,NEON                                                   $07$    7
      COMMON NSPEC(30),NWORK(30),NLOSS(30),NDATA(30),NTERP(30),NMACH(30)$07$    8
     1,NL1(30),NL2(30),NDIMEN(30),IS1(30),IS2(30),IS3(30),NEVAL(30),NJIF$07$    9
     2F(4),NBAL(30),NLITER(30),NM(2),NRAD(2),NCURVE(30),NWHICH(30),NOUT1$07$   10
     3(30),NOUT2(30),NOUT3(30),NBLADE(30)                                           $07$   11
      COMMON VM(11,5,2),WFRAC(11,5,2)                                               $07$   12
      COMMON R(21,30),XL(21,30),X(21,30),H(21,30),S(21,30),VM(21,30),VW($07$   13
     121,30),THETA(21,30),DIFF(15,4),FDHUB(15,4),FDMID(15,4),FDTIP(15,4)$07$   14
     2,TERAD(5,2)                                                                   $07$   15
      COMMON DATAC(100),DATA1(100),DATA2(100),DATA3(100),DATA4(100),DATA$07$   16
     15(100),DATA6(100),DATA7(100),DATA8(100),DATA9(100),FLOW(10),SPEED($07$   17
     230),SPDFAC(10),BBLOCK(30),BDIST(30),WBLOCK(30),WWBL(30),XSTN(150),$07$   18
     3RSTN(150),DFLE(30),DELC(100),DELTA(100),TITLE(18),DRUM2(30),RIM1(3$07$   19
     40),XIM1(30),WORK(21),LOSS(21),TANEPS(21),XI(21),VV(21),DELW(21),LA$07$   20
     5MI(21),LAMIM1(21),LAMIP1(21),PHI(21),CR(21),GAMA(21),SPPG(21),CPPG$07$   21
     6(21),HKEEP(21),SKEEP(21),VWKEEP(21),DELH(30),DELT(30)                         $07$   22
      COMMON VISK,SHAPE,SCLFAC,EJ,G,TOLNCE,XSCALE,PSCALE,PLOW,RLOW,XMMAX$07$   23
     1,RCONST,FM2,HMIN,C1,PI,CONTR,CONMX                                            $07$   24
      L1=I+NL1(I)                                                                   $07$   25
      L2=I+NL2(I)                                                                   $07$   26
      IW=NWORK(I)                                                                   $07$   27
      IL=NLOSS(I)                                                                   $07$   28
      XN=SPEED(I)*SPDFAC(ICASE)*PI/(30.0*SCLFAC)                                    $07$   29
      GO TO(100,25),270,240,440,440,440),IW                                         $07$   30
  100 GO TO(110,190,210,110),IL                                                     $07$   31
  110 IF(L2.NE.I)GO TO 150                                                          $07$   32
      DO 140 J=1,NSTRMS                                                             $07$   33
      IF(IPASS.EQ.1.AND.ITER.EQ.0)GO TO 120                                         $07$   34
      IF(ITER.EQ.0)VV(J)=VM(J,I)                                                    $07$   35
      X1=H(J,I)-(VV(J)**2+VW(J,I)**2)/(2.0*G*EJ)                                    $07$   36
      X2=H(J,I)-(VM(J,I)**2-(VW(J,I)-XN*R(J,I))**2)/(2.0*G*EJ)                      $07$   37
      IF(X1.LT.HMIN)X1=HMIN                                                         $07$   38
      IF(X2.LT.HMIN)X2=HMIN                                                         $07$   39
      X3=1.0/(1.0+LOSS(J)*(1.0-UDG4(X1,S(J,I))/UDG4(X2,S(J,I))))                    $07$   40
      GO TO 130                                                                     $07$   41
  120 X3=1.0                                                                        $07$   42
  130 H(J,I)=UDG2(S(J,L1),WORK(J)/X3)                                               $07$   43
  140 S(J,I)=UDG3(WORK(J),H(J,I))                                                   $07$   44
      GO TO 230                                                                     $07$   45
  150 DO 180 J=1,NSTRMS                                                             $07$   46
      IF(IPASS.EQ.1.AND.L2.GT.I)GO TO 160                                           $07$   47
      X1=H(J,L1)-(VW(J,L1)**2-(VW(J,L1)-XN*R(J,L1))**2)/(2.0*G*EJ)+XN**2$07$   48
     1*(R(J,I)**2-R(J,L1)**2)/(2.0*G*EJ)                                            $07$   49
      IF(X1.LT.HMIN)X1=HMIN                                                         $07$   50
      X2=H(J,L2)-(VM(J,L2)**2+VW(J,L2)**2)/(2.0*G*EJ)                               $07$   51
```

```
      X3=H(J,L2)-(VW(J,L2)**2-(VW(J,L2)-XN*R(J,L2))**2)/(2.0*G*EJ)
      IF(X2.LT.HMIN)X2=HMIN
      IF(X3.LT.HMIN)X3=HMIN
      X4=1.0-LOSS(J)/UDG4(X1,S(J,L1))*(UDG4(X3,S(J,L2))-UDG4(X2,S(J,L2))
     1)
      GO TO 170
160   X4=1.0
170   H(J,I)=UDG2(S(J,L1),WORK(J)/X4)
180   S(J,I)=UDG3(WORK(J),H(J,I))
      GO TO 230
190   DO 200 J=1,NSTRMS
      H(J,I)=H(J,L1)+(UDG2(S(J,L1),WORK(J))-H(J,L1))/LOSS(J)
200   S(J,I)=UDG3(WORK(J),H(J,I))
      GO TO 230
210   DO 220 J=1,NSTRMS
      S(J,I)=S(J,L1)+LOSS(J)
220   H(J,I)=UDG2(S(J,I),WORK(J))
230   DO 240 J=1,NSTRMS
240   VW(J,I)=(XN*RIM1(J)*VW(J,I-1)+(H(J,I)-H(J,I-1))*G*EJ)/(XN*R(J,I))
      GO TO 570
250   DO 260 J=1,NSTRMS
      H(J,I)=WORK(J)
260   VW(J,I)=(XN*RIM1(J)*VW(J,I-1)+(H(J,I)-H(J,I-1))*G*EJ)/(XN*R(J,I))
      GO TO 330
270   DO 280 J=1,NSTRMS
280   VW(J,I)=WORK(J)/R(J,I)
      GO TO 310
290   DO 300 J=1,NSTRMS
300   VW(J,I)=WORK(J)
310   DO 320 J=1,NSTRMS
320   H(J,I)=H(J,I-1)+XN*(R(J,I)*VW(J,I)-RIM1(J)*VW(J,I-1))/(G*EJ)
330   GO TO(340,400,420,340),IL
340   IF(L2.NE.I)GO TO 370
      DO 360 J=1,NSTRMS
      IF(IPASS.EQ.1.AND.ITER.EQ.0)GO TO 350
      IF(ITER.EQ.0)VV(J)=VM(J,I)
      X1=H(J,I)-(VV(J)**2+VW(J,I)**2)/(2.0*G*EJ)
      X2=H(J,I)-(VW(J,I)**2-(VW(J,I)-XN*R(J,I))**2)/(2.0*G*EJ)
      IF(X1.LT.HMIN)X1=HMIN
      IF(X2.LT.HMIN)X2=HMIN
      X3=1.0/(1.0+LOSS(J)*(1.0-UDG4(X1,S(J,I))/UDG4(X2,S(J,I))))
      GO TO 360
350   X3=1.0
360   S(J,I)=UDG3(X3*UDG4(H(J,I),S(J,L1)),H(J,I))
      GO TO 570
370   DO 390 J=1,NSTRMS
      IF(IPASS.EQ.1.AND.L2.GT.I)GO TO 380
      X1=H(J,L1)-(VW(J,L1)**2-(VW(J,L1)-XN*R(J,L1))**2)/(2.0*G*EJ)+XN**2
     1*(R(J,I)**2-R(J,L1)**2)/(2.0*G*EJ)
      IF(X1.LT.HMIN)X1=HMIN
```

```
      X2=H(J,L2)-(VM(J,L2)**2+VW(J,L2)**2)/(2.0*G*EJ)
      X3=H(J,L2)-(VM(J,L2)**2-(VW(J,L2)-XN*R(J,L2))**2)/(2.0*G*EJ)
      IF(X2.LT.HMIN)X2=HMIN
      IF(X3.LT.HMIN)X3=HMIN
      X4=1.0-LOSS(J)/UDG4(X1,S(J,L1))*(UDG4(X2,S(J,L2))-UDG4(X2,S(J,L2))
     1)
      GO TO 390
300   X4=1.0
390   S(J,I)=UDG3(X4*UDG4(H(J,I),S(J,L1)),H(J,I))
      GO TO 570
400   DO 410 J=1,NSTRMS
410   S(J,I)=UDG3(UDG4(H(J,L1)+LOSS(J)*(H(J,I)-H(J,L1)),S(J,L1)),H(J,I))
      GO TO 570
420   DO 430 J=1,NSTRMS
430   S(J,I)=S(J,L1)+LOSS(J)
      GO TO 570
440   DO 450 J=1,NSTRMS
450   XI(J)=H(J,I-1)-XN*RIM1(J)*VW(J,I-1)/(G*EJ)
      GO TO(460,510,550,460),IL
460   IF(L2.NE.I)GO TO 490
      DO 480 J=1,NSTRMS
      IF(IPASS.EQ.1.AND.ITER.EQ.0)GO TO 470
      IF(ITER.EQ.0)VV(J)=VM(J,I)
      X2=XI(J)+(XN*R(J,I))**2/(2.0*G*EJ)
      X1=X2-VV(J)**2*(1.0+TBETA(J,I)**2)/(2.0*G*EJ)
      IF(X1.LT.HMIN)X1=HMIN
      IF(X2.LT.HMIN)X2=HMIN
      X3=1.0/(1.0+LOSS(J)*(1.0-UDG4(X1,S(J,I))/UDG4(X2,S(J,I))))
      GO TO 480
470   X3=1.0
480   S(J,I)=UDG3(X3*UDG4(X2,S(J,L1)),X2)
      GO TO 570
490   DO 500 J=1,NSTRMS
      X4=XI(J)+(XN*R(J,I))**2/(2.0*G*EJ)
      IF(X4.LT.HMIN)X4=HMIN
      X1=UDG4(X4,S(J,L1))
      IF(IPASS.EQ.1.AND.L2.GT.I)GO TO 500
      X2=XI(J)+(XN*R(J,L2))**2/(2.0*G*EJ)
      X3=H(J,L2)-(VM(J,L2)**2+VW(J,L2)**2)/(2.0*G*EJ)
      IF(X2.LT.HMIN)X2=HMIN
      IF(X3.LT.HMIN)X3=HMIN
      X1=X1-LOSS(J)*(UDG4(X2,S(J,L2))-UDG4(X3,S(J,L2)))
500   S(J,I)=UDG3(X1,X4)
      GO TO 570
510   IF(IPASS.EQ.1.AND.ITER.EQ.0)GO TO 530
      DO 520 J=1,NSTRMS
      IF(ITER.EQ.0)VV(J)=VM(J,I)
      X1=H(J,I-1)+XN*(VV(J)*(TBETA(J,I)+XN*R(J,I)/VV(J))*R(J,I)-RIM1(J)*
     1VW(J,I-1))/(G*EJ)
      IF(X1.LT.HMIN)X1=HMIN
```

```
      X2=UDG4(H(J,L1)+(X1-H(J,L1))*LOSS(J),S(J,L1))                    $07$  152
520   S(J,I)=UDG3(X2,X1)                                               $07$  153
      GO TO 570                                                        $07$  154
530   DO 540 J=1,NSTRMS                                                $07$  155
540   S(J,I)=S(J,L1)                                                   $07$  156
      GO TO 570                                                        $07$  157
550   DO 560 J=1,NSTRMS                                                $07$  158
560   S(J,I)=S(J,L1)+LOSS(J)                                           $07$  159
570   RETURN                                                           $07$  160
      END                                                              $07$  161
```

```
      SUBROUTINE UD0309                                                 $09$
      REAL LOSS,LAMI,LAMIP1,LAMIM1                                      $09$
      COMMON NSTNS,NSTRMS,NMAX,NFORCE,NBL,NCASE,NSPLIT,NREAD,NPUNCH,NPAG$09$
     1E,NSET1,NSET2,ISTAG,ICASE,IFAILO,IPASS,I,IVFAIL,IFFAIL,NMIX,NTRANS$09$
     2,NPLOT,ILOSS,LNCT,ITUB,IMID,IFAIL,ITER,LOG1,LOG2,LOG3,LOG4,LOG5,LO$09$
     3G6,IPRINT,NMANY,NSTPLT,NEQN                                       $09$
      COMMON NSPEC(30),NWORK(30),NLOSS(30),NDATA(30),NTERF(30) NMACH(30)$09$
     1,NL1(30),NL2(30),NDIMEN(30),IS1(30),IS2(30),IS3(30),NEVAL(30),NDIF$09$
     2F(4),NDEL(30),NLITER(30),NM(2),NRAD(2),NCURVE(30),NWHICH(30),NOUT1$09$
     3(30),NOUT2(30),NOUT3(30),NBLADE(30)                               $09$
      COMMON OM(11,5,2),WFRAC(11,5,2)                                   $09$
      COMMON R(21,30),XL(21,30),X(21,30),H(21,30),S(21,30),VM(21,30),VW($09$
     121,30),TBETA(21,30),DIFF(15,4),FDHUB(15,4),FDMID(15,4),FDTIP(15,4)$09$
     2,TERAD(5,2)                                                       $09$
      COMMON DATAC(100),DATA1(100),DATA2(100),DATA3(100),DATA4(100),DATA$09$
     15(100),DATA6(100),DATA7(100),DATA8(100),DATA9(100),FLOW(10),SPEED($09$
     230),SPDFAC(10),BBLOCK(30),BDIST(30),WBLOCK(30),WWBL(30),XSTN(150),$09$
     3RSTN(150),DELF(30),DELC(100),DELTA(100),TITLE(18),DRDM2(30),RIM1(3$09$
     40),XIM1(30),WORK(21),LOSS(21),TANEPS(21),XI(21),VV(21),DELW(21),LA$09$
     5MI(21),LAMIM1(21),LAMIP1(21),PHI(21),CR(21),GAMA(21),SPPG(21),CPPG$09$
     6(21),HKEEP(21),SKEEP(21),VWKEEP(21),DELH(30),DELT(30)             $09$
      COMMON VISK,SHAPE,SCLFAC,EJ,G,TOLNCE,XSCALE,PSCALE,PLOW,RLOW,XMMAX$09$
     1,RCONST,FN2,HMIN,C1,PI,CONTR,CONMX                                $09$
      DIMENSION XX1(21),XX2(21),XX3(21),XX4(21),XX5(21),XX6(21),SOL(21),$09$
     1WPARA(21),WD(21),DIF(21),WS(21),PM1(21),XINC(21),BETA1(21),TALPH1($09$
     221),ANG(21),HIGHM(21),WT(21),XMR(21)                              $09$
      WMAX=0.7                                                          $09$
      L1=I+NL1(I)                                                       $09$
      XN=SPEED(I)*SPDFAC(ICASE)*PI/(30.0*SCLFAC)                        $09$
      IF(IPRINT.EQ.0)GO TO 116                                          $09$
      L2=ABS(FLOAT(NEVAL(I)))                                           $09$
      CALL UD0303(LNCT,7+NSTRMS)                                        $09$
      LNCT=LNCT-3                                                       $09$
      IF(NEVAL(I).GT.0)WRITE(LOG2,100)L1,I,L2                           $09$
      IF(NEVAL(I).LT.0)WRITE(LOG2,110)L1,I,L2                           $09$
100   FORMAT(2X,/,8X,57HLOSS COEFFICIENT DETERMINATION FOR BLADE BETWEEN$09$
     1 STATIONS,I3,4H AND,I3,47H - AS INCORPORATED IN ABOVE RESULTS  BLA$09$
     1DE TYPE,I2,/,8X,116(1H*),/,2X)                                    $09$
110   FORMAT(2X,/,8X,57HLOSS COEFFICIENT DETERMINATION FOR BLADE BETWEEN$09$
     1 STATIONS,I3,4H AND,I3,47H - FOR PURPOSES OF COMPARISON ONLY   BLA$09$
     2DE TYPE,I2,/,8X,116(1H*),/,2X)                                    $09$
116   L2=NDIMEN(I)+1                                                    $09$
      GO TO(120,140,160,180),L2                                         $09$
120   DO 130 J=1,NSTRMS                                                 $09$
      XX2(J)=R(J,L1)                                                    $09$
130   XX6(J)=R(J,I)                                                     $09$
      GO TO 200                                                         $09$
140   DO 150 J=1,NSTRMS                                                 $09$
      XX2(J)=R(J,L1)/R(NSTRMS,L1)                                       $09$
150   XX6(J)=R(J,I)/R(NSTRMS,I)                                         $09$
```

```
      GO TO 200                                                         $09$
160   DO 170 J=1,NSTRMS                                                 $09$
      XX2(J)=XL(J,L1)                                                   $09$
170   XX6(J)=XL(J,I)                                                    $09$
      GO TO 200                                                         $09$
180   DO 190 J=1,NSTRMS                                                 $09$
      XX2(J)=XL(J,L1)/XL(NSTRMS,L1)                                     $09$
190   XX6(J)=XL(J,I)/XL(NSTRMS,I)                                       $09$
200   L2=IS2(I)                                                         $09$
      CALL UD0301(DATAC(L2),DATA5(L2),NDATA(I),XX6,SOL,X1,NSTRMS,NTERP(I$09$
     1),0)                                                              $09$
      Q=1.0                                                             $09$
      IF(SPEED(I).LT.0.0)GO TO 208                                      $09$
      IF(SPEED(I).GT.0.0)GO TO 206                                      $09$
      IF(I.LT.3)GO TO 208                                               $09$
      II=I-1                                                            $09$
204   IF(SPEED(II).NE.0.0)GO TO 205                                     $09$
      IF(II.EQ.2)GO TO 208                                              $09$
      II=II-1                                                           $09$
      GO TO 204                                                         $09$
205   IF(SPEED(II).LT.0.0)Q=-1.0                                        $09$
      GO TO 208                                                         $09$
206   Q=-1.0                                                            $09$
208   DO 210 J=1,NSTRMS                                                 $09$
      TALPH1(J)=(VM(J,L1)-XN*R(J,L1))/VM(J,L1)                          $09$
210   DIF(J)=1.0-VM(J,I)/VM(J,L1)*SQRT((1.0+TBETA(J,I)**2)/(1.0+TALPH1(J$09$
     1)**2))+(VM(J,L1)*TALPH1(J)-VM(J,I)*TBETA(J,I))/(2.0*SOL(J)*VM(J,L1$09$
     2)*SQRT(1.0+TALPH1(J)**2))*Q                                       $09$
      L2=ABS(FLOAT(NEVAL(I)))                                           $09$
      L3=NDIFF(L2)                                                      $09$
      CALL UD0301(DIFF(1,L2),FDHUB(1,L2),L3,DIF,XX3,X1,NSTRMS,0,0)      $09$
      CALL UD0301(DIFF(1,L2),FDMID(1,L2),L3,DIF,XX4,X1,NSTRMS,0,0)      $09$
      CALL UD0301(DIFF(1,L2),FDTIP(1,L2),L3,DIF,XX5,X1,NSTRMS,0,0)      $09$
      XX1(1)=0.1                                                        $09$
      XX1(2)=0.5                                                        $09$
      XX1(3)=0.9                                                        $09$
      DO 220 J=1,NSTRMS                                                 $09$
      XX1(4)=XX3(J)                                                     $09$
      XX1(5)=XX4(J)                                                     $09$
      XX1(6)=XX5(J)                                                     $09$
      X1=(R(J,I)-R(1,I))/(R(NSTRMS,I)-R(1,I))                           $09$
220   CALL UD0301(XX1,XX1(4),3,X1,WPARA(J),X1,1,0,0)                    $09$
      DO 230 J=1,NSTRMS                                                 $09$
      XMR(J)=0.0                                                        $09$
      HIGHM(J)=0.0                                                      $09$
      ANG(J)=0.0                                                        $09$
      WS(J)=0.0                                                         $09$
      XINC(J)=0.0                                                       $09$
      BETA1(J)=0.0                                                      $09$
      WD(J)=WPARA(J)*2.0*SOL(J)*SQRT(1.0+TBETA(J,I)**2)                 $09$
```

```
230   WT(J)=WD(J)
      IF(NDEL(I).EQ.0)GO TO 384
      L2=IS3(I)
      CALL UD0301(DELC(L2),DELTA(L2),NDEL(I),XX2,PM1,X1,NSTRMS,1,0)
      IF(NDATA(L1).EQ.0)GO TO 340
      CALL UD0301(R(1,L1),X(1,L1),NSTRMS,R(1,L1),X1,XX1,NSTRMS,0,1)
      L2=NDIMEN(L1)+1
      GO TO(240,260,280,300),L2
240   DO 250 J=1,NSTRMS
250   XX2(J)=R(J,L1)
      GO TO 320
260   DO 270 J=1,NSTRMS
270   XX2(J)=R(J,L1)/R(J,NSTRMS)
      GO TO 320
280   DO 290 J=1,NSTRMS
290   XX2(J)=XL(J,L1)
      GO TO 320
300   DO 310 J=1,NSTRMS
310   XX2(J)=XL(J,L1)/XL(NSTRMS,L1)
320   L2=IS2(L1)
      L3=NDATA(L1)
      CALL UD0301(DATAC(L2),DATA1(L2),L3,XX2,XX3,X1,NSTRMS,NTERP(L1),0)
      CALL UD0301(DATAC(L2),DATA3(L2),L3,XX2,XX4,X1,NSTRMS,NTERP(L1),0)
      DO 330 J=1,NSTRMS
      X1=(ATAN((R(J,L1+1)-R(J,L1))/(X(J,L1+1)-X(J,L1)))+ATAN((R(J,L1)-R(
     1J,L1-1))/(X(J,L1)-X(J,L1-1))))/2.0
      BETA1(J)=ATAN((TAN(XX3(J)/C1)*(1.0-XX1(J)*TAN(X1))-TAN(X1)*TAN(XX4
     1(J)/C1)*SQRT(1.0+XX1(J)**2))*COS(X1))
330   XINC(J)=(ATAN(TALPH1(J))-BETA1(J))*Q
340   DO 380 J=1,NSTRMS
      ANG(J)=XINC(J)+PM1(J)/C1
      X1=H(J,L1)-(VM(J,L1)**2+VW(J,L1)**2)/(2.0*G*EJ)
      IF(X1.LT.HMIN)X1=HMIN
      X4=UDG8(X1,S(J,L1))
      X2=(X4+1.0)/(X4-1.0)
      X3=SQRT(X2)
      X5=UDG9(X1,S(J,L1),VM(J,L1)**2*(1.0+TALPH1(J)**2))
      XMR(J)=SQRT(X5)
      X6=X5
      IF(X6.LT.1.0)X6=1.0
      X7=X3*ATAN(SQRT(X6-1.0)/X3)-ATAN(SQRT(X6-1.0))+ANG(J)
      X10=0.0
      IF(X7.LE.0.0)GO TO 376
      X8=0.4*PI*(X3-1.0)
      IF(X7.GT.X8)GO TO 374
      X9=SQRT(X6-1.0)+0.1
      K=1
350   X10=X9-(X2+X9*X9)*(1.0+X9*X9)/(X9*X9*(X2-1.0))*(X3*ATAN(X9/X3)-ATA
     1N(X9)-X7)
      IF(ABS(X10-X9).LE.0.00001)GO TO 376
```

```
      IF(K.GT.20)GO TO 360                                                      $095$  152
      K=K+1                                                                     $095$  153
      X9=X10                                                                    $095$  154
      GO TO 350                                                                 $095$  155
  360 IF(IPRINT.EQ.0)GO TO 374                                                  $095$  156
      CALL UD0303(LNCT,1)                                                       $095$  157
      WRITE(LOG2,370)IPASS,I,J                                                  $095$  158
  370 FORMAT(5X,4HPASS,I3,9H  STATION,I3,12H  STREAMLINE,I3,58H  PRANDTL        $095$  159
     1-MEYER FUNCTION NOT CONVERGED - USE INLET MACH NO)                        $095$  160
  374 X10=SQRT(X6-1.0)                                                          $095$  161
  375 HIGHM(J)=SQRT(1.0+X10*X10)                                                $095$  162
      X1=(HIGHM(J)+SQRT(X6))/2.0                                                $095$  163
      IF(X5.LT.1.0)X1=X1*SQRT(X5)                                               $095$  164
      IF(X1.LE.1.0)GO TO 380                                                    $095$  165
      X1=X1*X1                                                                  $095$  166
      WS(J)=(((X4+1.0)*X1/((X4-1.0)*X1+2.0))**(X4/(X4-1.0))*((X4+1.0)/(2      $095$  167
     1.0*X4*X1-X4+1.0))**(1.0/(X4-1.0))-1.0)/((1.0+(X4-1.0)/2.0*X5)**(X4      $095$  168
     2/(1.0-X4))-1.0)                                                           $095$  169
  380 WT(J)=WD(J)+WS(J)                                                         $095$  170
  384 IF(IPRINT.EQ.1)GO TO 400                                                  $095$  171
      L2=IS2(I)                                                                 $095$  172
      L3=NTERP(I)                                                               $095$  173
      L4=NDATA(I)                                                               $095$  174
      IF(NWORK(I).GE.5)                                                         $095$  175
     1CALL UD0301(DATAC(L2),DATA6(L2),L4,XX6,XX5,X1,NSTRMS,L3,0)                $095$  176
      CALL UD0301(DATAC(L2),DATA1(L2),L4,XX6,XX1,X1,NSTRMS,L3,0)                $095$  177
      CALL UD0301(DATAC(L2),DATA4(L2),L4,XX6,XX4,X1,NSTRMS,L3,0)                $095$  178
      CALL UD0301(DATAC(L2),DATA3(L2),L4,XX6,XX3,X1,NSTRMS,L3,0)                $095$  179
      NDATA(I)=NSTRMS                                                           $095$  180
      L2=L2-1                                                                   $095$  181
      DO 390 J=1,NSTRMS                                                         $095$  182
      K=L2+J                                                                    $095$  183
      DATAC(K)=XX6(J)                                                           $095$  184
      IF(NWORK(I).GE.5)                                                         $095$  185
     1DATA6(K)=XX5(J)                                                           $095$  186
      DATA1(K)=XX1(J)                                                           $095$  187
      IF(WT(J).GT.WMAX)WT(J)=WMAX                                               $095$  188
      DATA2(K)=WT(J)                                                            $095$  189
      DATA3(K)=XX3(J)                                                           $095$  190
      DATA4(K)=XX4(J)                                                           $095$  191
  390 DATA5(K)=SOL(J)                                                           $095$  192
      GO TO 450                                                                 $095$  193
  400 IF(LNCT+3.LE.NPAGE)GO TO 420                                              $095$  194
      WRITE(LOG2,410)                                                           $095$  195
  410 FORMAT(1H1)                                                               $095$  196
      LNCT=4+NSTRMS                                                             $095$  197
  420 WRITE(LOG2,430)                                                           $095$  198
  430 FORMAT(5X,120HSTREAM  INLET   OUTLET  CASCADE   DIFF        LOSS         $095$  199
     1DIFFUSION  BLADE  INCIDENCE  EXPANSION INLET  EXPANDED SHOCK   TOT      $095$  200
     2AL,/,5X,120H-LINE   RADIUS  RADIUS  SOLIDITY  FACTOR  PARAMETER         $095$  201
```

```
      3LOSS     ANGLE     ANGLE       ANGLE     M.NO  MACH NO   LOSS    LOSS  $09$  202
     4,/,2X)                                                                  $09$  203
      LNCT=LNCT+3                                                             $09$  204
      CO 440 J=1,NSTRMS                                                       $09$  205
      X1=BETA1(J)*C1*D                                                        $09$  206
      X2=XINC(J)*C1                                                           $09$  207
      X3=ANG(J)*C1                                                            $09$  208
440   WRITE(LOG2,460)J,R(J,L1),R(J,I),SOL(J),DIF(J),WPARA(J),WD(J),X1,X2      $09$  209
     1,X3,XMR(J),HIGH1(J),WS(J),WT(J)                                         $09$  210
450   CONTINUE                                                                $09$  211
460   FORMAT(I9,F10.3,F8.3,2F9.4,F10.5,F9.5,2F9.3,F10.3,F10.4,F6.4,F8.5,      $09$  212
     1F9.5)                                                                   $09$  213
      RETURN                                                                  $09$  214
      END                                                                     $09$  215
```

```
      SUBROUTINE UDD310                                                                                                  $10     2
      REAL LOSS,LAMI,LAMIP1,LAMIM1                                                                                       $10     3
      COMMON NSTNS,NSTRMS,NMAX,NFORCE,NBL,NCASE,NSPLIT,NREAD,NPUNCH,NPAG$10     4
     1E,NSET1,NSET2,ISTAG,ICASE,IFAILD,IPASS,I,IVFAIL,IFFAIL,NMIX,NTRANS$10     5
     2,NPLOT,ILOSS,LNCT,ITOR,IMID,IFAIL,ITER,LOG1,LOG2,LOG3,LOG4,LOG5,LO$10     6
     3G6,IPRINT,NM1NY,NSTPLT,NEQN                                                                                    $10     7
      COMMON NSPEC(30),NWORK(30),NLOSS(30),NDATA(30),NTERP(30),NMACH(30)$10     8
     1,NL1(30),NL2(30),NDIMEN(30),IS1(30),IS2(30),IS3(30),NEVAL(30),NDIF$10     9
     2F(4),NDEL(30),NLITER(30),NM(2),NRAD(2),NCURVE(30),NWHICH(30),NOUT1$10    10
     3(30),NOUT2(30),NOUT3(30),NBLADE(30)                                                                            $10    11
      COMMON UM(11,5,2),WFRAC(11,5,2)                                                                                $10    12
      COMMON R(21,30),XL(21,30),X(21,30),H(21,30),S(21,30),VM(21,30),VW($10    13
     121,30),TBETA(21,30),DIFF(15,4),FOHUB(15,4),FOMID(15,4),FOTIP(15,4)$10    14
     2,TERAD(5,2)                                                                                                    $10    15
      COMMON DATAC(100),DATA1(100),DATA2(100),DATA3(100),DATA4(100),DATA$10    16
     15(100),DATA6(100),DATA7(100),DATA8(100),DATA9(100),FLOW(10),SPEED($10    17
     230),SPOFAC(10),WBLOCK(30),FOIST(30),WBLOCK(30),WWBL(30),XSTN(150),$10    18
     3RSTN(150),DELF(30),DELC(100),DELTA(100),TITLE(18),ORD12(30),RIM1(3$10    19
     40),XIM1(30),WORK(21),LOSS(21),TANEPS(21),XI(21),VV(21),DELW(21),LA$10    20
     5MI(21),LAMIM1(21),LAMIP1(21),PHI(21),CR(21),GAMA(21),SPPG(21),CPPG$10    21
     6(21),HKEEP(21),SKEEP(21),VWKEEP(21),DELH(30),DELT(30)                                                          $10    22
      COMMON VISK,SHAPE,SCLFAC,EJ,G,TULNCE,XSCALE,PSCALE,PLOW,RLOW,XMMAX$10    23
     1,RCONST,EM2,HMIN,A1,PI,CONTR,CONMX                                                                             $10    24
      IF(I.GT.1)GO TO 130                                                                                            $10    25
      V5=VISK**0.2                                                                                                   $10    26
      VINH=0.0                                                                                                       $10    27
      VINT=0.0                                                                                                       $10    28
      IF(WWBL(1).GT.0.0)GO TO 100                                                                                    $10    29
      C1H=0.0                                                                                                        $10    30
      C1T=0.0                                                                                                        $10    31
      DELH(1)=0.0                                                                                                    $10    32
      DELT(1)=0.0                                                                                                    $10    33
      GO TO 150                                                                                                      $10    34
  100 IF(ISTAG.GT.0)GO TO 110                                                                                        $10    35
      X1=WWBL(1)*XL(NSTRMS,1)*(CPPG(1)+CPPG(NSTRMS))/4.0                                                             $10    36
      DELH(1)=X1                                                                                                     $10    37
      DELT(1)=X1                                                                                                     $10    38
      X1=X1/(SCLFAC*SHAPE)                                                                                           $10    39
      C1H=(X1*VM(1,1)**3.4/V5)**1.25                                                                                 $10    40
      C1T=(X1*VM(NSTRMS,1)**3.4/V5)**1.25                                                                            $10    41
      GO TO 150                                                                                                      $10    42
  110 DELH(1)=0.0                                                                                                    $10    43
      C1H=0.0                                                                                                        $10    44
      IF(ABS(PHI(NSTRMS)).GT.PI/2.0-0.00015.AND.ABS(PHI(NSTRMS)).LT.PI/2$10    45
     1.0+0.00015)GO TO 120                                                                                           $10    46
      X1=(2(N                -SQRT(R(NSTRMS,1)**2-COS(PHI(NSTRMS))*CPPG(NSTRMS)*$10    47
     1WWBL(1)*(                RMS,1)+R(1,1))*XL(NSTRMS)))/COS(PHI(NSTRMS))                                     $10    48
      DELT(1)=X                                                                                                      $10    49
      C1T=(X1/(SHAPE*SCLFAC*V5)*VM(NSTRMS,1)**3.4)**1.25                                                             $10    50
      GO TO 150                                                                                                      $10    51
```

```
120   DELT(1)=WWBL(1)*XL(NSTRMS,1)/CPPG(NSTRMS)                          $10$
      C1T=(DELT(1)*VM(NSTRMS,1)**3.4/(V5*SCLFAC*SHAPE))**1.25            $10$
      GO TO 150                                                          $10$
130   VINT=VINT+SQRT((X(NSTRMS,I)-X(NSTRMS,I-1))**2+(R(NSTRMS,I)-R(NSTRM$10$
     1S,I-1))**2)*((VM(NSTRMS,I)+VM(NSTRMS,I-1))/2.0)**4/SCLFAC          $10$
      DELT(I)=V5*(C1T+0.016*VINT)**0.8/VM(NSTRMS,I)**3.4*SCLFAC*SHAPE    $10$
      DELH(I)=0.0                                                        $10$
      IF(I.LE.ISTAG)GO TO 140                                            $10$
      VINH=VINH+SQRT((X(1,I)-X(1,I-1))**2+(R(1,I)-R(1,I-1))**2)*((VM(1,I$10$
     1)+VM(1,I-1))/2.0)**4/SCLFAC                                        $10$
      DELH(I)=V5*(C1H+0.016*VINH)**0.8/VM(1,I)**3.4*SCLFAC*SHAPE         $10$
140   WWBL(I)=0.5*WWBL(I)+0.5*(((2.0*R(NSTRMS,I)-DELT(I)*COS(PHI(NSTRMS)$10$
     1))*DELT(I)/CPPG(NSTRMS)+(2.0*R(1,I)+DELH(I)*COS(PHI(1)))*DELH(I)/C$10$
     2PPG(1))/((R(NSTRMS,I)+R(1,I))*XL(NSTRMS,I)))                       $10$
      IF(WWBL(I).GT.0.3)WWBL(I)=0.3                                      $10$
      IF(WWBL(I).LT.0.0)WWBL(I)=0.3                                      $10$
150   CONTINUE                                                           $10$
      RETURN                                                             $10$
      END                                                                $10$
```

```
      SUBROUTINE UD0311                                                 $11$
      REAL LOSS,LAMI,LAMIP1,LAMIM1                                      $11$
      COMMON NSTNS,NSTRMS,NMAX,NFORCE,NBL,NCASE,NSPLIT,NREAD,NPUNCH,NPAG$11$
     1E,NSET1,NSET2,ISTAG,ICASE,IFAILO,IPASS,I,IVFAIL,IFFAIL,NMIX,NTPANS$11$
     2,NPLOT,ILOSS,LNCT,ITUB,IMID,IFAIL,ITER,LOG1,LOG2,LOG3,LOG4,LOG5,LO$11$
     3G6,IPRINT,NMANY,NSTPLT,NEQN                                       $11$
      COMMON NSPEC(30),NWORK(30),NLOSS(30),NDATA(30),NTERP(30),NMACH(30)$11$
     1,NL1(30),NL2(30),NDIMEN(30),IS1(30),IS2(30),IS3(30),NEVAL(30),NDIF$11$
     2F(4),NDEL(30),NLITER(30),NM(2),NRAD(2),NCURVE(30),NWHICH(30),NOUT1$11$
     3(30),NOUT2(30),NOUT3(30),NBLADE(30)                               $11$
      COMMON DM(11,5,2),WFRAC(11,5,2)                                   $11$
      COMMON R(21,30),XL(21,30),X(21,30),H(21,30),S(21,30),VM(21,30),VW($11$
     121,30),TBETA(21,30),DIFF(15,4),FDHUB(15,4),FDMID(15,4),FDTIP(15,4)$11$
     2,TERAD(5,2)                                                       $11$
      COMMON DATAC(100),DATA1(100),DATA2(100),DATA3(100),DATA4(100),DATA$11$
     15(100),DATA6(100),DATA7(100),DATA8(100),DATA9(100),FLOW(10),SPEED($11$
     230),SPDFAC(10),BBLOCK(30),BDIST(30),WBLOCK(30),WWBL(30),XSTN(150),$11$
     3RSTN(150),DELF(30),DELC(100),DELTA(100),TITLE(18),DRDM2(30),RIM1(3$11$
     40),XIM1(30),WORK(21),LOSS(21),TANEPS(21),XI(21),VV(21),DELW(21),LA$11$
     5MI(21),LAMIM1(21),LAMIP1(21),PHI(21),CR(21),GAMA(21),SPPG(21),CPPG$11$
     6(21),HKEEP(21),SKEEP(21),VWKEEP(21),DELH(30),DELT(30)             $11$
      COMMON VISK,SHAPE,SCLFAC,EJ,G,TOLNCE,XSCALE,PSCALE,PLOW,RLOW,XMMAX$11$
     1,RCONST,FM2,HMIN,C1,PI,CONTR,CONMX                                $11$
      DIMENSION XM(21),PPG(21),V(21),PT(21),PS(21),WT(21),PN(21),P1(21),$11$
     1DELTP(21,30),TS(21),SOLID(21),DELTB(21)                           $11$
      OPR=0.0                                                           $11$
      DEFF=1.0                                                          $11$
      PFAC=550.0                                                        $11$
      ILAST=NSTNS                                                       $11$
      IF(IFAILO.NE.0)ILAST=IFAILO                                       $11$
      DO 700 I=1,ILAST                                                  $11$
      CALL UD0303(LNCT,7+NSTRMS)                                        $11$
      WRITE(LOG2,100)I                                                  $11$
100   FORMAT(2X,/,10X, 7HSTATION,I3,24H  FLOW-FIELD DESCRIPTION,/,10X,34$11$
     1(1H*),//,42H  STREAM       -----MESH-POINT COORDS------,3X,16(1H-),$11$
     219HV E L O C I T I E S,16(1H-),4X,31HRADIUS OF  STREAMLINE   STATI$11$
     3ON,/,132H  -LINE        RADIUS     X-COORD    L-COORD   MERIDIONAL T$11$
     4ANGENTIAL    AXIAL       RADIAL      TOTAL     CURVATURE SLOPE ANGLE L$11$
     5EAN ANGLE,/,2X)                                                   $11$
      CALL UD0301(R(1,I),X(1,I),NSTRMS,R(1,I),X1,GAMA,NSTRMS,0,1)       $11$
      IF(I.NE.1.AND.I.NE.NSTNS)GO TO 130                                $11$
      L1=1                                                              $11$
      L2=2                                                              $11$
      IF(I.EQ.1)GO TO 110                                               $11$
      L2=NSTNS                                                          $11$
      L1=L2-1                                                           $11$
110   DO 120 J=1,NSTRMS                                                 $11$
      CR(J)=0.0                                                         $11$
120   PHI(J)=ATAN2(R(J,L2)-R(J,L1),X(J,L2)-X(J,L1))                     $11$
      GO TO 150                                                         $11$
```

```
130     DO 140 J=1,NSTRMS                                                       $115   52
        X1=SQRT((R(J,I+1)-R(J,I))**2+(X(J,I+1)-X(J,I))**2)                      $115   53
        X2=SQRT((R(J,I)-R(J,I-1))**2+(X(J,I)-X(J,I-1))**2)                      $115   54
        X3=ATAN2(R(J,I+1)-R(J,I),X(J,I+1)-X(J,I))                               $115   55
        X4=ATAN2(R(J,I)-R(J,I-1),X(J,I)-X(J,I-1))                               $115   56
        CR(J)=(X3-X4)/(X1+X2)*2.0                                               $115   57
        IF(CR(J).NE.0.0)CR(J)=1.0/CR(J)                                         $115   58
140     PHI(J)=(X3+X4)/2.0                                                      $115   59
150     DO 160 J=1,NSTRMS                                                       $115   60
        VA=VM(J,I)*COS(PHI(J))                                                  $115   61
        VR=VM(J,I)*SIN(PHI(J))                                                  $115   62
        FI=PHI(J)*C1                                                            $115   63
        GA=ATAN(GAMA(J))*C1                                                     $115   64
        FPG(J)=FI+GA                                                            $115   65
        V(J)=SQRT(VM(J,I)**2+VW(J,I)**2)                                        $115   66
160     WRITE(LOG2,170)J,R(J,I),X(J,I),XL(J,I),VM(J,I),VW(J,I),VA,VR,V(J),      $115   67
       1CR(J),FI,GA                                                             $115   68
170     FORMAT(I6,F14.4,2F11.4,5F11.2,1X,F10.2,2F11.3)                          $115   69
        CALL UDG3C3(LNCT,NSTRMS+4)                                              $115   70
        WRITE(LOG2,190)                                                         $115   71
180     FORMAT(/3H  STREAM,7X,4HMACH,6X,4(1H-),3HPRESSURES,4(1H-),5X,17H--      $115   72
       1-TEMPERATURES--,4X,6HSPECIFIC,4X,17H---ENTHALPIES----,4X,7HENTROPY      $115   73
       2,6X,4HFLOW,3X,11H(PHI+GAMMA),/,7H  -LINE,7X,6HNUMBER,5X,5HTOTAL,6X      $115   74
       3,6HSTATIC,5X,5HTOTAL,6X,6HSTATIC,5X,6HWEIGHT,5X,5HTOTAL,6X,6HSTATI      $115   75
       4C,16X,5HANGLE,/,2X)                                                     $115   76
        DO 190 J=1,NSTRMS                                                       $115   77
        DELTB(J)=0.0                                                            $115   78
        HS=H(J,I)-V(J)**2/(2.0*G*EJ)                                            $115   79
        IF(HS.LT.HMIN)HS=HMIN                                                   $115   80
        XM(J)=SQRT(UDG9(HS,S(J,I),V(J)**2))                                     $115   81
        PT(J)=UDG4(H(J,I),S(J,I))                                               $115   82
        PTINS=PT(J)/SCLFAC**2                                                   $115   83
        PS(J)=UDG4(HS,S(J,I))                                                   $115   84
        PSINS=PS(J)/SCLFAC**2                                                   $115   85
        TT=UDG7(H(J,I),S(J,I))                                                  $115   86
        TS(J)=UDG7(HS,S(J,I))                                                   $115   87
        WT(J)=UDG5(HS,S(J,I))                                                   $115   88
        ALPHA=0.0                                                               $115   89
        IF(I.NE.ISTAG.OR.J.NE.1)ALPHA=C1*ATAN(VW(J,I)/VM(J,I))                  $115   90
190     WRITE(LOG2,200)J,XM(J),PTINS,PSINS,TT,TS(J),WT(J),H(J,I),HS,S(J,I)      $115   91
       1,ALPHA,FPG(J)                                                           $115   92
200     FORMAT(I6,F14.4,2F11.4,2F11.3,F12.6,F10.3,F11.3,F12.6,F10.3,F11.3)      $115   93
        IF(I.NE.1)GO TO 220                                                     $115   94
        P1BAR=0.0                                                               $115   95
        H1BAR=0.0                                                               $115   96
        P1(1)=PT(1)                                                             $115   97
        DO 210 J=1,ITUB                                                         $115   98
        P1(J+1)=PT(J+1)                                                         $115   99
        X1=(DELF(J+1)-DELF(J))/2.0                                              $115  100
        P1BAR=P1BAR+X1*(PT(J)+PT(J+1))                                          $115  101
```

```
210   H1BAR=H1BAR+X1*(H(J,1)+H(J+1,1))                                  $11$  102
      HBAR=H1BAR                                                        $11$  103
      S1BAR=UDG3(P1BAR,H1BAR)                                           $11$  104
      PNBAR=P1BAR                                                       $11$  105
      HNBAR=H1BAR                                                       $11$  106
      SNBAR=S1BAR                                                       $11$  107
      L1KEEP=1                                                          $11$  108
      GO TO 700                                                         $11$  109
220   IFLE=0                                                            $11$  110
      IFTE=0                                                            $11$  111
      IF(NWORK(I).EQ.J)GO TO 230                                        $11$  112
      IFTE=1                                                            $11$  113
      IF(I.EQ.NSTNS.OR.NWORK(I+1).EQ.J.OR.SPEED(I).EQ.SPEED(I+1))GO TO 2$11$  114
     140                                                                $11$  115
      IFLE=1                                                            $11$  116
      GO TO 240                                                         $11$  117
230   IF(I.EQ.NSTNS.OR.NWORK(I+1).EQ.J)GO TO  40                        $11$  118
      IFLE=1                                                            $11$  119
240   IF(IFTE.EQ.0)GO TO 500                                            $11$  120
      CALL UU0303(LNCT,NSTRMS+8)                                        $11$  121
      XN=SPEED(I)*SPDFAC(ICASE)                                         $11$  122
      XBLADE=10.0                                                       $11$  123
      IF(NBLADE(I).NE.0)XBLADE=ABS(FLOAT(NBLADE(I)))                    $11$  124
      L1=XBLADE                                                         $11$  125
      WRITE(LOG2,250)I,XN,L1                                            $11$  126
250   FORMAT(2X,/,10X,7HSTATION,I3,57H IS WITHIN OR AT THE TRAILING EDGE$11$  127
     1 OF A BLADE ROTATING AT,F8.1,31H RPM  NUMBER OF BLADES IN ROW =,I3$11$  128
     2,/,10X,104(1H*),//,131H  STREAM      BLADE     RELATIVE     RELATIV$11$  129
     3E    RELATIVE   DEVIATION     BLADE       LEAN     PRESS DIFF     LOSS   $11$  130
     4    DIFFUSION    DELTA P,/,7H   -LINE,7X,115HSPEED      VELOCITY     MA$11$  131
     5CH NO.   FLOW ANGLE     ANGLE       ANGLE       ANGLE    ACROSS BLADE  C$11$  132
     6OEFF       FACTOR      ON Q,/,2X)                                $11$  133
      Q=1.0                                                             $11$  134
      IF(SPEED(I).LT.0.0)GO TO 290                                      $11$  135
      IF(SPEED(I).GT.0.0)GO TO 280                                      $11$  136
      IF(I.LT.3)GO TO 290                                               $11$  137
      II=I-1                                                            $11$  138
260   IF(SPEED(II).NE.0.0)GO TO 270                                     $11$  139
      IF(II.EQ.2)GO TO 290                                              $11$  140
      II=II-1                                                           $11$  141
      GO TO 260                                                         $11$  142
270   IF(SPEED(II).LT.0.0)Q=-1.0                                        $11$  143
      GO TO 290                                                         $11$  144
280   Q=-1.0                                                            $11$  145
290   L1=NDIMEN(I)+1                                                    $11$  146
      GO TO(300,320,340,360),L1                                         $11$  147
300   DO 310 J=1,NSTRMS                                                 $11$  148
310   TANEPS(J)=R(J,I)                                                  $11$  149
      GO TO 340                                                         $11$  150
320   DO 330 J=1,NSTRMS                                                 $11$  151
```

```
330   TANEPS(J)=R(J,I)/R(NSTRMS,I)                                                    $111  152
      GO TO 340                                                                       $111  153
340   DO 350 J=1,NSTRMS                                                               $111  154
350   TANEPS(J)=XL(J,I)                                                               $111  155
      GO TO 340                                                                       $111  156
360   DO 370 J=1,NSTRMS                                                               $111  157
370   TANEPS(J)=XL(J,I)/XL(NSTRMS,I)                                                  $111  158
380   L1=IS2(I)                                                                       $111  159
      IF(NWORK(I).EQ.5.OR.NWORK(I).EQ.6)                                              $111  160
     1CALL UDU301(DATA6(L1),DATA6(L1),NDATA(I),TANEPS,DELTB,X1,NSTRMS,NT              $111  161
     2ERR(I),0)                                                                       $111  162
      CALL UDU301(DATA6(L1),DATA5(L1),NDATA(I),TANEPS,SOLID,X1,NSTRMS,NT              $111  163
     1ERR(I),0)                                                                       $111  164
      CALL UDU301(DATA6(L1),DATA3(L1),NDATA(I),TANEPS,TANEPS,X1,NSTRMS,N              $111  165
     1TERR(I),0)                                                                      $111  166
      L1=I+NL1(I)                                                                     $111  167
      L2=L1                                                                           $111  168
      IF(NLOSS(I).EQ.1.OR.NLOSS(I).EQ.4.OR.NWORK(I).EQ.7)L2=I+NL2(I)                  $111  169
      XN=XN*PI/(30.0*SOLFAC)                                                          $111  170
      DO 430 J=1,NSTRMS                                                               $111  171
      U=XN*R(J,I)                                                                     $111  172
      VR=SQRT(VM(J,I)**2+(VW(J,I)-U)**2)                                              $111  173
      XMR=XM(J)*VR/V(J)                                                               $111  174
      BETA=ATAN(TBETA(J,I))*C1                                                        $111  175
      BBETA=0.0                                                                       $111  176
      IF(NWORK(I).EQ.5.OR.NWORK(I).EQ.6)BBETA=BETA-DELTB(J)                           $111  177
      DELTB(J)=DELTB(J)*D                                                             $111  178
      DELP=0.0                                                                        $111  179
      IF(I.EQ.NSTNS.OR.NWORK(I+1).EQ.0.OR.SPEED(I).NE.SPEED(I+1))GO TO 3              $111  180
     190                                                                              $111  181
      X1=SQRT((R(J,I+1)-R(J,I))**2+(X(J,I+1)-X(J,I))**2)                              $111  182
      X2=SQRT((R(J,I)-R(J,I-1))**2+(X(J,I)-X(J,I-1))**2)                              $111  183
      X3=XBLADE                                                                       $111  184
      DELP=PI*S(J,I)*WT(J)/(SOLFAC**2*X3*G)*(TBETA(J,I)/(1.0+TBETA(J,I)*              $111  185
     1*2)*TS(J)*G*EJ*((S(J,I+1)-S(J,I))/X1+(S(J,I)-S(J,I-1))/X2)+VM(J,I)              $111  186
     2/R(J,I)*((R(J,I+1)*VW(J,I+1)-R(J,I)*VW(J,I))/X1+(R(J,I)*VW(J,I)-R(              $111  187
     3J,I-1)*VW(J,I-1))/X2))                                                          $111  188
      DELTP(J,I)=DELP                                                                 $111  189
390   HRI=H(J,I)-(V(J)**2-VR**2)/(2.0*G*EJ)                                           $111  190
      PRO=UDG4(HRI,S(J,L1))                                                           $111  191
      PR=UDG4(HRI,S(J,I))                                                             $111  192
      PRL2=PR                                                                         $111  193
      PSL2=PS(J)*SOLFAC**2                                                            $111  194
      IF(L2.EQ.I)GO TO 400                                                            $111  195
      PRL2=H(J,L2)-(VW(J,L2)**2-(VW(J,L2)-XN*R(J,L2))**2)/(2.0*G*EJ)                  $111  196
      PRL2=UDG4(PRL2,S(J,L2))                                                         $111  197
      PSL2=H(J,L2)-(VW(J,L2)**2+VM(J,L2)**2)/(2.0*G*EJ)                               $111  198
      PSL2=UDG4(PSL2,S(J,L2))                                                         $111  199
400   COEF=(PRO-PR)/(PRL2-PSL2)                                                       $111  200
      CIF=0.0                                                                         $111  201
```

```
      IF(SOLID(J).EQ.0.0)GO TO 410                                                    $11$  202
      X2=VW(J,L1)-XN*R(J,L1)                                                          $11$  203
      X1=SQRT(VM(J,L1)**2+X2**2)                                                      $11$  204
      X3=VW(J,I)-U                                                                    $11$  205
      DIF=1.0-VM/X1+(X2-X3)/(2.0*X1*SOLID(J))*G                                       $11$  206
410   PRL1=PRL2                                                                       $11$  207
      PSL1=PSL2                                                                       $11$  208
      IF(L2.EQ.L1)GO TO 420                                                           $11$  209
      PSL1=H(J,L1)-(VW(J,L1)**2+VM(J,L1)**2)/(2.0*G*EJ)                               $11$  210
      PRL1=PSL1+(V1(J,L1)**2+(VW(J,L1)-XN*R(J,L1))**2)/(2.0*G*EJ)                     $11$  211
      PSL1=UDG4(PSL1,S(J,L1))                                                         $11$  212
      PRL1=UDG4(PRL1,S(J,L1))                                                         $11$  213
420   DPQ=(PS(J)-PSL1)/(PRL1-PSL1)                                                    $11$  214
430   WRITE(LOG2,434)J,U,VR,XMR,BETA,DELTB(J),BBETA,TANEPS(J),DELP,COEF,              $11$  215
     1DIF,DPQ                                                                         $11$  216
434   FORMAT(I6,F11.2,F11.2,F11.4,4F11.3,F11.4,F11.5,F10.4,F11.4)                     $11$  217
      CALL UD0303(LNCT,NSTRMS+5)                                                      $11$  218
      PBAR=0.0                                                                        $11$  219
      HBAR=0.0                                                                        $11$  220
      DO 440 J=1,ITUB                                                                 $11$  221
      X1=(DELF(J+1)-DELF(J))/2.0                                                      $11$  222
      PBAR=PBAR+X1*(PT(J)+PT(J+1))                                                    $11$  223
440   HBAR=HBAR+X1*(H(J,I)+H(J+1,I))                                                  $11$  224
      RBAR1=PBAR/P1BAR                                                                $11$  225
      DH1=(HBAR-H1BAR)/H1BAR                                                          $11$  226
      EFF1=0.0                                                                        $11$  227
      IF(HBAR.NE.H1BAR)EFF1=(UDG2(S1BAR,PBAR)-H1BAR)/(HBAR-H1BAR)                     $11$  228
      DPP=RBAR1                                                                       $11$  229
      IF(EFF1.NE.0.0)DEFF=EFF1                                                        $11$  230
      IF(L1.EQ.L1KEEP)GO TO 460                                                       $11$  231
      L1KEEP=L1                                                                       $11$  232
      PNBAR=0.0                                                                       $11$  233
      HNBAR=0.0                                                                       $11$  234
      DO 444 J=1,NSTRMS                                                               $11$  235
444   PN(J)=UDG4(H(J,L1),S(J,L1))                                                     $11$  236
      DO 450 J=1,ITUB                                                                 $11$  237
      X1=(DELF(J+1)-DELF(J))/2.0                                                      $11$  238
      PNBAR=PNBAR+X1*(PN(J)+PN(J+1))                                                  $11$  239
450   HNBAR=HNBAR+X1*(H(J,L1)+H(J+1,L1))                                              $11$  240
      SNBAR=UDG3(PNBAR,HNBAR)                                                         $11$  241
460   EFFN=0.0                                                                        $11$  242
      IF(HNBAR.NE.HBAR)EFFN=(UDG2(SNBAR,PBAR)-HNBAR)/(HBAR-HNBAR)                     $11$  243
      RBARN=PBAR/PNBAR                                                                $11$  244
      DHN=(HBAR-HNBAR)/HNBAR                                                          $11$  245
      WRITE(LOG2,470)I,L1,I,I,L1,I,RBAR1,RBARN,EFF1,EFFN,DH1,DHN                      $11$  246
470   FORMAT(2X,/,3H  STREAM,7X,21HINLET THROUGH STATION,I3,7X,7HSTATION              $11$  247
     1,I3,16H THROUGH STATION,I3,5X,11HMEAN VALUES,6X,13HINLET TO STA.,I              $11$  248
     2,7H   STA.,I2,8H TO STA.,I2,/,7H  -LINE,6X,81HPRESSURE  ISENTROPI              $11$  249
     3C  DELTA H     PRESSURE  ISENTROPIC  DELTA H     PRESSURE RATIO,F14              $11$  250
     4.4,F19.4,/,13X,74HRATIO.  EFFICIENCY  ON H1        RATIO   EFFICIE              $11$  251
```

```
     5NCY  ON H1        IS N EFFY,2F19.4,/,80X,13HDELTA H ON H1,F15.4,F19
     6.4)
      DO 480 J=1,NSTRMS
      RBAR1=PT(J)/P1(J)
      EFF1=0.0
      IF(H(J,I).NE.H(J,1))EFF1=(UDG2(S(J,1),PT(J))-H(J,1))/(H(J,I)-H(J,1
     1))
      DH1=(H(J,I)-H(J,1))/H(J,1)
      RBARN=PT(J)/PN(J)
      EFFN=0.0
      IF(H(J,I).NE.H(J,L1))EFFN=(UDG2(S(J,L1),PT(J))-H(J,L1))/(H(J,I)-H(
     1J,L1))
      DHN=(H(J,I)-H(J,L1))/H(J,L1)
480   WRITE(LOG2,490)J,RBAR1,EFF1,DH1,RBARN,EFFN,DHN
490   FORMAT(I6,F14.4,F10.4,F11.4,F12.4,F10.4,F11.4)
500   IF(IFLE.EQ.0)GO TO 700
      CALL UD0303(LNCT,NSTRMS+8)
      XN=SPEED(I+1)*SPDFAC(ICASE)
      IP=I+1
      XBLADE=10.0
      IF(NBLADE(IP).NE.0)XBLADE=ABS(FLOAT(NBLADE(IP)))
      L1=XBLADE
      WRITE(LOG2,510)I,XN,L1
510   FORMAT(2X,/,10X,7HSTATION,I3,46H IS AT THE LEADING EDGE OF A BLADE
     1 ROTATING AT,F9.1,31H RPM  NUMBER OF BLADES IN ROW =,I3,/,10X,99(1
     2H*),//,98H  STREAM       BLADE      RELATIVE   RELATIVE   RELATIVE
     3INCIDENCE    BLADE      LEAN     PRESS DIFF,/,100H  -LINE        SPE
     4ED      VELOCITY   MACH NO.  FLOW ANGLE   ANGLE       ANGLE       ANG
     5LE    ACROSS BLADE,/,2X)
      XN=XN*PI/(30.0*SCLFAC)
      Q=1.0
      IF(SPEED(IP).LT.0.0)GO TO 550
      IF(SPEED(IP).GT.0.0)GO TO 540
      IF(IP.LT.3)GO TO 550
      II=IP-1
520   IF(SPEED(II).NE.0.0)GO TO 530
      IF(II.EQ.2)GO TO 550
      II=II-1
      GO TO 520
530   IF(SPEED(II).LT.0.0)Q=-1.0
      GO TO 550
540   Q=-1.0
550   DO 560 J=1,NSTRMS
      CR(J)=0.0
560   TANEPS(J)=0.0
      IF(NWORK(I).NE.0.OR.NDATA(I).EQ.0)GO TO 660
      L1=NDIMEN(I)+1
      GO TO(570,590,610,630),L1
570   DO 580 J=1,NSTRMS
580   TANEPS(J)=R(J,I)
```

```
      GO TO 650
590   DO 600 J=1,NSTRMS
600   TANEPS(J)=R(J,I)/R(NSTRMS,I)
      GO TO 650
610   DO 620 J=1,NSTRMS
620   TANEPS(J)=XL(J,I)
      GO TO 650
630   DO 640 J=1,NSTRMS
640   TANEPS(J)=XL(J,I)/XL(NSTRMS,I)
650   L1=IS2(I)
      CALL UD0301(DATAC(L1),DATA1(L1),NDATA(I),TANEPS,CR,X1,NSTRMS,NTERP
     1(I),0)
      CALL UD0301(DATAC(L1),DATA3(L1),NDATA(I),TANEPS,TANEPS,X1,NSTRMS,N
     1TERP(I),0)
660   BBETA=0.0
      DO 680 J=1,NSTRMS
      U=XN*R(J,I)
      VR=SQRT(VM(J,I)**2+(VW(J,I)-U)**2)
      XMR=XM(J)*VR/V(J)
      BETA=ATAN((VW(J,I)-U)/VM(J,I))*C1
      DELTB(J)=0.0
      IF(NWORK(I).NE.0.OR.NDATA(I).EQ.0)GO TO 670
      BBETA=ATAN((TAN(CR(J)/C1)*(1.0-GAMA(J)*TAN(PHI(J)))-TAN(PHI(J))*TA
     1N(TANEPS(J)/C1)*SQRT(1.0+GAMA(J)**2))*COS(PHI(J)))*C1
      DELTB(J)=(BETA-BBETA)*Q
670   X1=SQRT((R(J,I+1)-R(J,I))**2+(X(J,I+1)-X(J,I))**2)
      DELP=PI*R(J,I)*2.0*WT(J)/(SCLFAC**2*XBLADE*G)*(SIN(BETA/C1)*COS(BE
     1TA/C1)*G*EJ*TS(J)*(S(J,I+1)-S(J,I))/X1+VM(J,I)/(R(J,I)*X1)*(R(J,I+
     21)*VW(J,I+1)-R(J,I)*VW(J,I)))
      DELTP(J,I)=DELP
680   WRITE(LOG2,690)J,U,VR,XMR,BETA,DELTB(J),BBETA,TANEPS(J),DELP
690   FORMAT(I6,F14.2,F11.2,F11.4,4F11.3,F11.4)
700   CONTINUE
      IF(NBL.EQ.0)GO TO 770
      L1=(ILAST-1)/10+1
      CALL UD0303(LNCT,3+5*L1)
      WRITE(LOG2,710)
710   FORMAT(2X,/,10X,47HANNULUS WALL BOUNDARY LAYER CALCULATION RESULTS
     1,/,10X,47(1H*))
      DO 720 K=1,L1
      L2=10*(K-1)+1
      L3=L2+9
      IF(L3.GT.ILAST)L3=ILAST
      WRITE(LOG2,730)(I,I=L2,L3)
      WRITE(LOG2,740)(DELH(I),I=L2,L3)
      WRITE(LOG2,750)(DELT(I),I=L2,L3)
720   WRITE(LOG2,760)(WWBL(I),I=L2,L3)
730   FORMAT(2X,/,15H STATION NUMBER,14X,10I10)
740   FORMAT(27H HUB DISPLACEMENT THICKNESS,4X,10F10.5)
750   FORMAT(28H CASE DISPLACEMENT THICKNESS,3X,10F10.5)
```

```
760    FORMAT(23H BLOCKAGE AREA FRACTION,8X,10F10.5)                          $11$  352
770    CALL UD0303(LNCT,2)                                                    $11$  353
       IF(IVFAIL.EQ.0.AND.IFFAIL.EQ.0)WRITE(LOG2,780)ICASE,IPASS              $11$  354
       IF(IFAILO.NE.0)WRITE(LOG2,790)ICASE,IPASS,IFAILO                       $11$  355
       IF(IFAILO.EQ.0.AND.(IVFAIL.NE.0.OR.IFFAIL.NE.0))WRITE(LOG2,800)ICA     $11$  356
      1SE,IPASS,IVFAIL,IFFAIL                                                 $11$  357
780    FORMAT(2X,/,10X,8HPOINT NO,I3,7H   PASS,I3,31H   THE CALCULATION I     $11$  358
      1S CONVERGED,/,10X,52(1H*))                                             $11$  359
790    FORMAT(2X,/,10X,8HPOINT NO,I3,7H   PASS,I3,36H   THE CALCULATION F     $11$  360
      1AILED AT STATION,I3,/,10X,60(1H*))                                     $11$  361
800    FORMAT(2X,/,10X,8HPOINT NO,I3,7H   PASS,I3,51H   THE CALCULATION I     $11$  362
      1S NOT FULLY CONVERGED  IVFAIL =,I3,10H  IFFAIL =,I3,/,10X,88(1H*))     $11$  363
       POWER=FLOW(ICASE)*(HBAR-H1BAR)*EJ/DFAC                                 $11$  364
       WRITE(LOG2,810)SPDFAC(ICASE),FLOW(ICASE),OPR,DEFF,POWER                $11$  365
810    FORMAT(10X,14HSPEED FACTOR =,F10.3,8H  FLOW =,F8.3,24H  TOTAL PRES     $11$  366
      1SURE RATIO =,F7.3,25H  ISENTROPIC EFFICIENCY =,F6.4,9H  POWER =,E1     $11$  367
      21.4)                                                                   $11$  368
       IF(IFAILO.NE.0)GO TO 920                                               $11$  369
       L1=2                                                                   $11$  370
920    DO 830 I=L1,NSTNS                                                      $11$  371
       IF(NOUT3(I).EQ.1.OR.NOUT3(I).EQ.3)GO TO 840                            $11$  372
830    CONTINUE                                                               $11$  373
       GO TO 920                                                              $11$  374
840    L2=I                                                                   $11$  375
       L3=I+1                                                                 $11$  376
       DO 850 I=L3,NSTNS                                                      $11$  377
       IF(NOUT3(I).EQ.2.OR.NOUT3(I).EQ.3)GO TO 860                            $11$  378
850    CONTINUE                                                               $11$  379
860    L3=I                                                                   $11$  380
       CALL UD0303(LNCT,10)                                                   $11$  381
       WRITE(LOG2,870)L2,L3                                                   $11$  382
870    FORMAT(2X,/,10X,31HDATA FOR NASTRAN PROGRAM FOR BLADE BETWEEN STAT     $11$  383
      1IONS,I3,4H AND,I3,/,10X,61(1H*),//,33H NAME   CODE    DELTA P   EL     $11$  384
      2EMENT,7X,13HGRIDPOINTS -  J   I,9X,5HJ   I,9X,5HJ   I,/,2X)           $11$  385
       LNCT=LNCT-4                                                            $11$  386
       IELEM=0                                                                $11$  387
       L4=L2+1                                                                $11$  388
       DO 890 J=1,ITUB                                                        $11$  389
       DO 890 I=L4,L3                                                         $11$  390
       CALL UD0303(LNCT,2)                                                    $11$  391
       IELEM=IELEM+1                                                          $11$  392
       L5=I-1                                                                 $11$  393
       L6=J+1                                                                 $11$  394
       IF(I.EQ.L3)GO TO 890                                                   $11$  395
       PLOAD=(DELTP(J,L5)+DELTP(L6,L5)+DELTP(L6,I))/3.0                       $11$  396
       IF(NBLADE(I).LT.0)PLOAD=(DELTP(J,L5)+DELTP(J,I)+DELTP(L6,L5)+DELTP     $11$  397
      1(L6,I))*0.25                                                           $11$  398
       WRITE(LOG2,900)PLOAD,IELEM,L6,L5,L6,I,J,L5                             $11$  399
       WRITE(LOG3,910)PLOAD,IELEM                                                 400
       IELEM=IELEM+1                                                              401
```

```
      IF(NBLADE(I).GE.0)PLOAD=(DELTP(J,L5)+DELTP(L6,I)+DELTP(J,I))/3.0
      WRITE(LOG2,900)PLOAD,IELEM,J,L5,L6,I,J,I
      WRITE(LOG3,910)PLOAD,IELEM
      GO TO 890
  880 PLOAD=(DELTP(J,L5)+DELTP(L6,L5))/3.0
      IF(NBLADE(I).LT.0)PLOAD=PLOAD*0.75
      WRITE(LOG2,900)PLOAD,IELEM,J,L5,L6,L5,L6,I
      WRITE(LOG3,910)PLOAD,IELEM
      IELEM=IELEM+1
      IF(NBLADE(I).GE.0)PLOAD=DELTP(J,L5)/3.0
      WRITE(LOG2,900)PLOAD,IELEM,J,L5,L6,I,J,I
      WRITE(LOG3,910)PLOAD,IELEM
  890 CONTINUE
  900 FORMAT(12H PLOAD2   ,60,F12.5,I7,14X,3(I10),I4))
  910 FORMAT(11HPLOAD2    ,60,F13.5,I8)
      L1=L3
      GO TO 820
  920 CONTINUE
      RETURN
      END
```

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      SUBROUTINE UC6312                                                 $12$
      REAL LOSS,LAMI,LAMIP1,LAMIM1                                      $12$
      COMMON NSTNS,NSTRMS,NMAX,NFORCE,NBL,NCASE,NSPLIT,NREAD,NPUNCH,NPAG$12$
     1E,NSET1,NSET2,ISTAG,ICASE,IFAILO,IPASS,I,IVFAIL,IFFAIL,NMIX,NTRANS$12$
     2,NPLOT,ILOSS,LNCT,ITUB,IMID,IFAIL,ITER,LOG1,LOG2,LOG3,LOG4,LOG5,LO$12$
     3G6,IPRINT,NMANY,NSTPLT,NEQN                                       $12$
      COMMON NSPEC(30),NWORK(30),NLOSS(30),NDATA(30),NTERP(30),NMACH(30)$12$
     1,NL1(30),NL2(30),NDIMEN(30),IS1(30),IS2(30),IS3(30),NEVAL(30),NDIF$12$
     2F(4),NDEL(30),NLITER(30),NM(2),NRAD(2),NCURVE(30),NWHICH(30),NOUT1$12$
     3(30),NOUT2(30),NOUT3(30),NPLADE(30)                               $12$
      COMMON DM(11,5,2),WFRAC(11,5,2)                                   $12$
      COMMON R(21,30),XL(21,30),X(21,30),H(21,30),S(21,30),VM(21,30),VW($12$
     121,30),TBETA(21,30),DIFF(15,4),FDHUB(15,4),FDMID(15,4),FDTIP(15,4)$12$
     2,TERAD(5,2)                                                       $12$
      COMMON DATAC(100),DATA1(100),DATA2(100),DATA3(100),DATA4(100),DATA$12$
     15(100),DATA6(100),DATA7(100),DATA8(100),DATA9(100),FLOW(10),SPEED($12$
     230),SPDFAC(10),BBLOCK(30),BDIST(30),WBLOCK(30),WWBL(30),XSTN(150),$12$
     3RSTN(150),DELF(30),DELC(100),DELTA(100),TITLE(18),DROM2(30),RIM1(3$12$
     40),XIM1(30),WORK(21),LOSS(21),TANEPS(21),XI(21),VV(21),DELW(21),LA$12$
     5MI(21),LAMIM1(21),LAMIP1(21),PHI(21),CR(21),GAMA(21),SPPG(21),CPPG$12$
     6(21),HKEEP(21),SKEEP(21),VWKEEP(21),DELH(30),DELT(30)             $12$
      COMMON VISK,SHAPE,SCLFAC,EJ,G,TOLNCE,XSCALE,PSCALE,PLOW,RLOW,XMMAX$12$
     1,RCONST,FM2,HMIN,C1,PI,CONTR,CONMX                                $12$
      DIMENSION PSTAT(32),XX(32)                                        $12$
      XMAX=X(1,NSTNS)                                                   $12$
      XMIN=X(1,1)                                                       $12$
      DO 100 J=2,NSTRMS                                                 $12$
      IF(X(J,1).LT.XMIN)XMIN=X(J,1)                                     $12$
      IF(X(J,NSTNS).GT.XMAX)XMAX=X(J,NSTNS)                             $12$
100   CONTINUE                                                          $12$
      IF(XMIN.LT.0.0)XMIN=XMIN-1.0                                      $12$
      L1=XMIN-1.0                                                       $12$
      XMIN=FLOAT(L1)                                                    $12$
      L1=XMAX+1.0                                                       $12$
      XMAX=FLOAT(L1)                                                    $12$
      DELX=(XMAX-XMIN)/XSCALE+0.01                                      $12$
      XX(NSTNS+1)=XMIN                                                  $12$
      XX(NSTNS+2)=XSCALE                                                $12$
      CALL PLOT(1.0,-12.0,-3)                                           $12$
      CALL PLOT(0.0,1.0,-3)                                             $12$
      IF(NPLOT.EQ.2)GO TO 134                                           $12$
      CALL AXIS(0.0,0.0,16HAXIAL COORDINATE,-16,DELX,0.0,XMIN,XSCALE)   $12$
      CALL AXIS(0.0,0.0,15HSTATIC PRESSURE,15,9.01,90.0,PLOW,PSCALE)    $12$
      PSTAT(NSTNS+1)=PLOW                                               $12$
      PSTAT(NSTNS+2)=PSCALE                                             $12$
      J=1                                                               $12$
      K=1                                                               $12$
110   DO 120 I=1,NSTNS                                                  $12$
      HS=H(J,I)-(VW(J,I)**2+VM(J,I)**2)/(2.0*G*EJ)                      $12$
      IF(HS.LT.HMIN)HS=HMIN                                             $12$
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```
      PSTAT(I)=UDG4(HS,S(J,I))/SCLFAC**2                                $12$   52
120   XX(I)=X(J,I)                                                      $12$   53
      CALL LINE(XX,PSTAT,NSTNS,1,1,K)                                   $12$   54
      IF(J.EQ.NSTRMS)GO TO 130                                          $12$   55
      K=K+1                                                             $12$   56
      IF(J.EQ.IMID)J=NSTRMS                                             $12$   57
      IF(J.EQ.1)J=IMID                                                  $12$   58
      GO TO 110                                                         $12$   59
130   CALL PLOT(DELX+2.0,-11.0,-3)                                      $12$   60
      CALL PLOT(0.0,1.0,-3)                                             $12$   61
      IF(NPLOT.EQ.1)GO TO 180                                           $12$   62
134   CALL AXIS(0.0,0.0,16HAXIAL COORDINATE,-16,DELX,0.0,XMIN,XSCALE)   $12$   63
      CALL AXIS(0.0,0.0,6HRADIUS,6,9.0,90.0,RLOW,XSCALE)                $12$   64
      PSTAT(NSTNS+1)=RLOW                                               $12$   65
      PSTAT(NSTNS+2)=XSCALE                                             $12$   66
      DO 150 J=1,NSTRMS                                                 $12$   67
      DO 140 I=1,NSTNS                                                  $12$   68
      XX(I)=X(J,I)                                                      $12$   69
140   PSTAT(I)=R(J,I)                                                   $12$   70
150   CALL LINE(XX,PSTAT,NSTNS,1,0,0)                                   $12$   71
      PSTAT(NSTRMS+1)=RLOW                                              $12$   72
      PSTAT(NSTRMS+2)=XSCALE                                            $12$   73
      XX(NSTRMS+1)=XMIN                                                 $12$   74
      XX(NSTRMS+2)=XSCALE                                               $12$   75
      DO 170 I=1,NSTNS                                                  $12$   76
      DO 160 J=1,NSTRMS                                                 $12$   77
      PSTAT(J)=R(J,I)                                                   $12$   78
160   XX(J)=X(J,I)                                                      $12$   79
170   CALL LINE(XX,PSTAT,NSTRMS,1,0,0)                                  $12$   80
      CALL PLOT(DELX+2.0,0.0,-3)                                        $12$   81
180   RETURN                                                            $12$   82
      END                                                               $12$   83
```

```
      SUBROUTINE UDG1(LNCT)                                             $GN$
      COMMON/GAS/G,EJ,R,CP,GAMMA,ROJCP                                  $GN$
      LOG1=1                                                            $GN$
      LOG2=2                                                            $GN$
      READ(LOG1,100)CP,R,G,EJ                                           $GN$
100   FORMAT(4F12.0)                                                    $GN$
      IF(CP.EQ.0.0)CP=0.24                                              $GN$
      IF(R.EQ.0.0)R=53.32                                               $GN$
      IF(G.EQ.0.0)G=32.174                                              $GN$
      IF(EJ.EQ.0.0)EJ=778.16                                            $GN$
      WRITE(LOG2,110)CP,R,G,EJ                                          $GN$
110   FORMAT(2X,/,10X,34HSPECIFIC HEAT AT CONSTANT PRESSURE,5X,1H=,F8.5,$GN$
     1/,10X,12HGAS CONSTANT,27X,1H=,F8.4,/,10X,22HGRAVITATIONAL CONSTANT$GN$
     2,17X,1H=,F8.4,/,10X,17HJOULES EQUIVALENT,22X,1H=,F8.3)            $GN$
      LNCT=LNCT+5                                                       $GN$
      ROJCP=R/(EJ*CP)                                                   $GN$
      GAMMA=1.0/(1.0-ROJCP)                                             $GN$
      RETURN                                                            $GN$
      END                                                               $GN$
      FUNCTION UDG2(S,P)                                                $GN$
      COMMON/GAS/G,EJ,R,CP,GAMMA,ROJCP                                  $GN$
      UDG2=CP*EXP(S/CP+ROJCP*ALOG(P))                                   $GN$
      RETURN                                                            $GN$
      END                                                               $GN$
      FUNCTION UDG3(P,H)                                                $GN$
      COMMON/GAS/G,EJ,R,CP,GAMMA,ROJCP                                  $GN$
      UDG3=CP*ALOG(H/CP)-R/EJ*ALOG(P)                                   $GN$
      RETURN                                                            $GN$
      END                                                               $GN$
      FUNCTION UDG4(H,S)                                                $GN$
      COMMON/GAS/G,EJ,R,CP,GAMMA,ROJCP                                  $GN$
      UDG4=EXP(ALOG(H/CP)/ROJCP-EJ/R*S)                                 $GN$
      RETURN                                                            $GN$
      END                                                               $GN$
      FUNCTION UDG5(H,S)                                                $GN$
      COMMON/GAS/G,EJ,R,CP,GAMMA,ROJCP                                  $GN$
      UDG5=UDG4(H,S)/(R*H)*CP                                           $GN$
      RETURN                                                            $GN$
      END                                                               $GN$
      FUNCTION UDG6(P,T)                                                $GN$
      COMMON/GAS/G,EJ,R,CP,GAMMA,ROJCP                                  $GN$
      UDG6=CP*T                                                         $GN$
      RETURN                                                            $GN$
      END                                                               $GN$
      FUNCTION UDG7(H,S)                                                $GN$
      COMMON/GAS/G,EJ,R,CP,GAMMA,ROJCP                                  $GN$
      UDG7=H/CP                                                         $GN$
      RETURN                                                            $GN$
      END                                                               $GN$
      FUNCTION UDG8(H,S)                                                $GN$
```

```
      COMMON/GAS/G,CJ,P,CP,GAMMA,ROJCP                                  $GN    52
      UDGG=GAMMA                                                        $GN    53
      RETURN                                                            $GN    54
      END                                                               $GN    55
      FUNCTION UDGG(H,G,V2)                                             $GN    56
      COMMON/GAS/G,CJ,R,CP,GAMMA,ROJCP                                  $GN    57
      UDGG=CP*V2/(GAMMA*G*R*H)                                          $GN    58
      RETURN                                                            $GN    59
      END                                                               $GN    60
```

```
      SUBROUTINE UDJ325(IX,LX,LOG1,X,Y1)
      DIMENSION X(1),Y1(1),SYMBOL(1),LINE(121),XNUM(13)
      REAL LINE
      DATA SYMBOL/1H*/,DASH/1H-/,CROSS/1H+/,BLANK/1H /,XI/1HI/
      YMIN=Y1(1)
      YMAX=YMIN
      DO 200 I=1,IX
185   IF(Y 1(I).LT.YMIN)YMIN=Y 1(I)
      IF(Y 1(I).GT.YMAX)YMAX=Y 1(I)
200   CONTINUE
      IF(YMIN.EQ.YMAX)GO TO 900
      YH=YMAX+(YMAX-YMIN)/18.0
      YL=YMIN-(YMAX-YMIN)/18.0
      XH=60.0
      IF(LX.GT.59)XH=FLOAT(LX)+1.0
      XL=XH-60.0
      XMAX=ABS(XH)
      XMIN=ABS(XL)
      YMIN=ABS(YL)
      YMAX=ABS(YH)
      IF(XMIN.GT.XMAX)XMAX=XMIN
      IF(YMIN.GT.YMAX)YMAX=YMIN
      XMAX=ALOG10(XMAX)
      YMAX=ALOG10(YMAX)
      IF(XMAX.LT.0.0)XMAX=XMAX-1.0
      IF(YMAX.LT.0.0)YMAX=YMAX-1.0
      MX=-XMAX
      MY=-YMAX
      WRITE(LOG1,250)MX,MY
250   FORMAT(20X,48HSCALES - 'X' IS SHOWN TIMES 10 TO THE POWER OF,I3,40
     1H    'Y' IS SHOWN TIMES 10 TO THE POWER OF,I3,/)
      YINC=(YH-YL)/54.0
      YINC2=YINC/2.0
      XRANGE=XH-XL
      DO 750 KLINE=1,55
      IF(KLINE.EQ.1.OR.KLINE.EQ.55)GO TO 350
      DO 265 L=2,120
265   LINE(L)=BLANK
      IF(KLINE.EQ.7.OR.KLINE.EQ.13.OR.KLINE.EQ.19.OR.KLINE.EQ.25.OR.KLIN
     1E.EQ.31.OR.KLINE.EQ.37.OR.KLINE.EQ.43.OR.KLINE.EQ.49)GO TO 300
      LINE(1)=XI
      LINE(121)=XI
      GO TO 400
300   LINE(1)=DASH
      LINE(121)=DASH
      GO TO 400
350   DO 360 L=2,120
360   LINE(L)=DASH
      LINE(1)=CROSS
      LINE(121)=CROSS
```

```
      DO 365 L=11,111,10                                                        $25$   52
365   LINE(L)=XI                                                                $25$   53
      GO TO 650                                                                 $25$   54
400   DO 600 I=1,IX                                                             $25$   55
      IF(Y1(I).GT.YH+YINC2.OR.Y1(I).LE.YH-YINC2)GO TO 600                       $25$   56
      L=(X(I)-XL)/XRANGE*120.0+1.5                                              $25$   57
      LINE(L)=SYMBOL( 1)                                                        $25$   58
600   CONTINUE                                                                  $25$   59
      IF(KLINE.EQ.1.OR.KLINE.EQ.7.OR.KLINE.EQ.13.OR.KLINE.EQ.19.OR.KLINE        $25$   60
     1.EQ.25.OR.KLINE.EQ.31.OR.KLINE.EQ.37.OR.KLINE.EQ.43.OR.KLINE.EQ.49       $25$   61
     2.OR.KLINE.EQ.55)GO TO 650                                                 $25$   62
      WRITE(LOG1,610)LINE                                                       $25$   63
610   FORMAT(5X,121A1)                                                          $25$   64
      GO TO 750                                                                 $25$   65
650   YNUM=YH*10.0**MY                                                          $25$   66
      WRITE(LOG1,655)YNUM,LINE                                                  $25$   67
655   FORMAT(1X,Fe.3,1X,121A1)                                                  $25$   68
750   YH=YH-YINC                                                                $25$   69
      XNUM(1)=XL*10.0**MX                                                       $25$   70
      XINC=((XH-XL)/12.0)*10.0**MX                                              $25$   71
      DO 800 I=2,13                                                             $25$   72
800   XNUM(I)=XNUM(I-1)+XINC                                                    $25$   73
      WRITE(LOG1,820)XNUM                                                       $25$   74
820   FORMAT(6X,12(Fe.3,4X),Fe.3)                                               $25$   75
      RETURN                                                                    $25$   76
900   WRITE(LOG1,910)                                                           $25$   77
910   FORMAT(//,35X,54HNO PLOT HAS BEEN MADE BECAUSE 'X' OR 'Y' RANGE IS        $25$   78
     1 ZERO)                                                                    $25$   79
      RETURN                                                                    $25$   80
      END                                                                       $25$   81
```

```
      OVERLAY(UD300,1,1)                                                $08$
      PROGRAM UD308                                                     $08$
      REAL LOSS,LAMI,LAMIP1,LAMIM1                                      $08$
      COMMON NSTNS,NSTRMS,NMAX,NFORCE,NBL,NCASE,NSPLIT,NREAD,NPUNCH,NPAG$08$
     1E,NSET1,NSET2,ISTAG,ICASE,IFAILD,IPASS,I,IVFAIL,IFFAIL,NMIX,NTRANS$08$
     2,NPLOT,ILOSS,LNCT,ITUB,IMID,IFAIL,ITER,LOG1,LOG2,LOG3,LOG4,LOG5,LO$08$
     3G6,IPRINT,NMANY,NSTPLT,NEQN                                       $08$
      COMMON NSPEC(30),NWORK(30),NLOSS(30),NDATA(30),NTERP(30),NMACH(30)$08$
     1,NL1(30),NL2(30),NDIMEN(30),IS1(30),IS2(30),IS3(30),NEVAL(30),NDIF$08$
     2F(4),NDEL(30),NLITER(30),NM(2),NRAD(2),NCURVE(30),NWHICH(30),NOUT1$08$
     3(30),NOUT2(30),NOUT3(30),NBLADE(30)                               $08$
      COMMON DM(11,5,2),WFRAC(11,5,2)                                   $08$
      COMMON R(21,30),XL(21,30),X(21,30),H(21,30),S(21,30),VM(21,30),VW($08$
     121,30),TBETA(21,30),DIFF(15,4),FDHUB(15,4),FDMID(15,4),FDTIP(15,4)$08$
     2,TERAD(5,2)                                                       $08$
      COMMON DATAC(100),DATA1(100),DATA2(100),DATA3(100),DATA4(100),DATA$08$
     15(100),DATA6(100),DATA7(100),DATA8(100),DATA9(100),FLOW(10),SPEED($08$
     230),SPDFAC(10),BBLOCK(30),BDIST(30),WBLOCK(30),WWBL(30),XSTN(150),$08$
     3RSTN(150),DELF(30),DELC(100),DELTA(100),TITLE(18),DPDM2(30),RIM1(3$08$
     40),XIM1(30),WORK(21),LOSS(21),TANEPS(21),XI(21),VV(21),DELW(21),LA$08$
     5MI(21),LAMIM1(21),LAMIP1(21),PHI(21),CR(21),GAMA(21),SPPG(21),CPPG$08$
     6(21),HKEEP(21),SKEEP(21),VWKEEP(21),DELH(30),DELT(30)             $08$
      COMMON VISK,SHAPE,SCLFAC,EJ,G,TOLNCE,XSCALE,PSCALE,FLOW,RLOW,XMMAX$08$
     1,RCONST,FM2,HMIN,C1,PI,CONTP,CONMX                                $08$
      DIMENSION XX1(21),DLADM(21),DSDM(21),DRVNDM(21),DL(21),DSDL(21),DP$08$
     1HIDL(21),FX1(21),FX2(21),VVOLD(21),AFUN(20),BFUN(20),HS(20),XM2(20$08$
     2),VMMAX(21),DVMDVM(20),TEIP1(21),TBIP1(21)                        $08$
      ITMAX=20                                                          $08$
      LPMAX=10                                                          $08$
      K=1                                                               $08$
      IF(I.EQ.ISTAG)K=2                                                 $08$
      XN=SPEED(I)*SPDFAC(ICASE)*PI/(30.0*SCLFAC)                        $08$
      IF(I.EQ.1)GO TO 234                                               $08$
      DO 100 J=1,NSTRMS                                                 $08$
      LAMIM1(J)=LAMI(J)                                                 $08$
      LAMI(J)=LAMIP1(J)                                                 $08$
100   LAMIP1(J)=1.0                                                     $08$
      IF(I.EQ.NSTNS)GO TO 234                                           $08$
      IF(NDATA(I+1).EQ.0)GO TO 210                                      $08$
      L1=NDIMEN(I+1)+1                                                  $08$
      GO TO(110,130,150,170),L1                                         $08$
110   DO 120 J=1,NSTRMS                                                 $08$
120   XX1(J)=R(J,I+1)                                                   $08$
      GO TO 190                                                         $08$
130   DO 140 J=1,NSTRMS                                                 $08$
140   XX1(J)=R(J,I+1)/R(NSTRMS,I+1)                                     $08$
      GO TO 190                                                         $08$
150   DO 160 J=1,NSTRMS                                                 $08$
160   XX1(J)=XL(J,I+1)                                                  $08$
      GO TO 190                                                         $08$
```

```
170   DO 180 J=1,NSTRMS
180   XX1(J)=XL(J,I+1)/XL(NSTRMS,I+1)
190   L1=IS2(I+1)
      CALL UD0301(DATAC(L1),DATA4(L1),NDATA(I+1),XX1,XX1,X1,NSTRMS,NTERP
     1(I+1),0)
      DO 200 J=1,NSTRMS
200   LAMIP1(J)=1.0-XX1(J)
210   DO 220 J=1,NSTRMS
      X1=SQRT((R(J,I+1)-R(J,I))**2+(X(J,I+1)-X(J,I))**2)
      X2=SQRT((R(J,I)-RIM1(J))**2+(X(J,I)-XIM1(J))**2)
      X3=ATAN2(R(J,I+1)-R(J,I),X(J,I+1)-X(J,I))
      X4=ATAN2(R(J,I)-RIM1(J),X(J,I)-XIM1(J))
      PHI(J)=(X3+X4)/2.0
      CR(J)=(X3-X4)/(X1+X2)*2.0
      DSDM(J)=0.0
      DRVWDM(J)=0.0
      DLADM(J)=((LAMIP1(J)-LAMI(J))/X1+(LAMI(J)-LAMIM1(J))/X2)/2.0
      IF(IPASS.EQ.1)GO TO 220
      DSDM(J)=((S(J,I+1)-S(J,I))/X1+(S(J,I)-S(J,I-1))/X2)/2.0*G*EJ
      DRVWDM(J)=((R(J,I+1)*VW(J,I+1)-R(J,I)*VW(J,I))/X1+(R(J,I)*VW(J,I)-
     1RIM1(J)*VW(J,I-1))/X2)/(2.0*R(J,I))
220   CONTINUE
      IF(IPASS.EQ.1.OR.NDATA(I).EQ.0.OR.NEQN.EQ.1.OR.NWORK(I).NE.0.OR.NW
     1ORK(I+1).EQ.0)GO TO 390
      L1=NDIMEN(I)+1
      GO TO(221,223,225,227),L1
221   DO 222 J=1,NSTRMS
222   TEIP1(J)=R(J,I)
      GO TO 229
223   DO 224 J=1,NSTRMS
224   TEIP1(J)=R(J,I)/R(NSTRMS,I)
      GO TO 229
225   DO 226 J=1,NSTRMS
226   TEIP1(J)=XL(J,I)
      GO TO 229
227   DO 228 J=1,NSTRMS
228   TEIP1(J)=XL(J,I)/XL(NSTRMS,I)
229   L1=IS2(I)
      CALL UD0301(DATAC(L1),DATA3(L1),NDATA(I),TEIP1,TEIP1,X1,NSTRMS,NTE
     1RP(I),0)
      X1=SPEED(I+1)*SPDFAC(ICASE)*PI/(30.0*SCLFAC)
      DO 230 J=1,NSTRMS
      TEIP1(J)=TAN(TEIP1(J)/C1)
230   TBIP1(J)=(VW(J,I)-X1*R(J,I))/VM(J,I)
      GO TO 390
234   DO 240 J=1,NSTRMS
      DLADM(J)=0.0
      DSDM(J)=0.0
      DRVWDM(J)=0.0
240   CR(J)=0.0
```

```
      IF(I.EQ.1)GO TO 244                                                       $0085  102
      DO 240 J=1,NSTRMS                                                         $0085  103
245   PHI(J)=ATAN2(R(J,I)-RIM1(J),X(J,I)-XIM1(J))                               $0085  104
      GO TO 390                                                                 $0085  105
244   DO 260 J=1,NSTRMS                                                         $0085  106
260   PHI(J)=ATAN2(R(J,2)-R(J,1),X(J,2)-X(J,1))                                 $0085  107
      DO 270 J=1,NSTRMS                                                         $0085  108
      XI(J)=H(J,1)                                                              $0085  109
      LAMI(J)=1.0                                                               $0085  110
270   LAMIP1(J)=1.J                                                             $0085  111
      IF(NDATA(2).EQ.0)GO TO 390                                                $0085  112
      L2=NDIMEN(2)+1                                                            $0085  113
      GO TO(280,310,330,350),L2                                                 $0085  114
280   DO 300 J=1,NSTRMS                                                         $0085  115
300   XX1(J)=R(J,2)                                                             $0085  116
      GO TO 370                                                                 $0085  117
310   DO 320 J=1,NSTRMS                                                         $0085  118
320   XX1(J)=R(J,2)/R(NSTRMS,2)                                                 $0085  119
      GO TO 370                                                                 $0085  120
330   DO 340 J=1,NSTRMS                                                         $0085  121
340   XX1(J)=XL(J,2)                                                            $0085  122
      GO TO 370                                                                 $0085  123
350   DO 360 J=1,NSTRMS                                                         $0085  124
360   XX1(J)=XL(J,2)/XL(NSTRMS,2)                                               $0085  125
370   L1=IS2(2)                                                                 $0085  126
      CALL UD0301(DATAC(L1),DATA4(L1),NDATA(2),XX1,XX1,X1,NSTRMS,NTERP(2        $0085  127
     1),0)                                                                      $0085  128
      DO 380 J=1,NSTRMS                                                         $0085  129
380   LAMIP1(J)=1.J-XX1(J)                                                      $0085  130
390   CALL UD0301(R(1,I),X(1,I),NSTRMS,P(1,I),X1,GAMA,NSTRMS,0,1)               $0085  131
      DO 400 J=1,NSTRMS                                                         $0085  132
      GAMA(J)=ATAN(GAMA(J))                                                     $0085  133
      SPPG(J)=GAMA(J)+PHI(J)                                                    $0085  134
      CPPG(J)=COS(SPPG(J))                                                      $0085  135
      SPPG(J)=SIN(SPPG(J))                                                      $0085  136
400   VV(J)=VM(J,I)                                                             $0085  137
      DO 410 J=1,ITUB                                                           $0085  138
      DL(J)=XL(J+1,I)-XL(J,I)                                                   $0085  139
      DSDL(J)=(S(J+1,I)-S(J,I))/DL(J)*G*EJ                                      $0085  140
410   DPHIDL(J)=(PHI(J+1)-PHI(J))/DL(J)                                         $0085  141
      IF(I.EQ.1.OR.NWORK(I).GE.5)GO TO 430                                      $0085  142
      DO 420 J=1,ITUP                                                           $0085  143
      DVMDVM(J)=0.0                                                             $0085  144
      FX1(J)=(VW(J+1,I)+VW(J,I))/(R(J+1,I)+R(J,I))*(R(J+1,I)*VW(J+1,I)-R        $0085  145
     1(J,I)*VW(J,I))/DL(J)                                                      $0085  146
420   FX2(J)=(H(J+1,I)-H(J,I))/DL(J)*G*EJ                                       $0085  147
      DO 426 J=1,NSTRMS                                                         $0085  148
      X1=UD69(H(J,I),S(J,I))                                                    $0085  149
      X1=(2.0/UD69(H(J,I),S(J,I),1.0)-VW(J,I)**2*(X1-1.0))/(X1+1.0)             $0085  150
      IF(X1.GT.1.0)GO TO 425                                                    $0085  151
```

```
      IF(IPASS.LE.NFORCE)GO TO 424                                              $08$  152
      CALL UD0303(LNCT,1)                                                       $08$  153
      WRITE(LOG2,422)IPASS,I,J,X1                                               $08$  154
422   FORMAT(5X,4HPASS,I3,9H  STATION,I3,12H  STREAMLINE,I3,40H  LIMITIN$08$  155
     1G MERIDIONAL VELOCITY SQUARED =,E12.5)                                    $08$  156
424   X1=6250000.0                                                              $08$  157
      IF(IFAILO.EQ.0)IFAILO=I                                                   $08$  158
420   VMMAX(J)=SQRT(X1)                                                         $08$  159
      GO TO 450                                                                 $08$  160
430   DO 440 J=1,ITUB                                                          $08$  161
      FX1(J)=(TBETA(J+1,I)+TBETA(J,I))/(R(J+1,I)+R(J,I))*(R(J+1,I)*TBETA$08$  162
     1(J+1,I)-R(J,I)*TBETA(J,I))/DL(J)                                          $08$  163
440   FX2(J)=(XI(J+1)-XI(J))/DL(J)*G*EJ                                         $08$  164
      DO 446 J=1,NSTRMS                                                         $08$  165
      X1=XI(J)+(XN*S(J,I))**2/(2.0*G*EJ)                                        $08$  166
      X1=1.0/(UDG9(X1,S(J,I),1.0)*(1.0+(UDG8(X1,S(J,I))-1.0)*(1.0+TBETA($08$  167
     1J,I)**2)/2.0))                                                            $08$  168
      IF(X1.GT.1.0)GO TO 446                                                    $08$  169
      IF(IPASS.LE.NFORCE)GO TO 442                                              $08$  170
      CALL UD0303(LNCT,1)                                                       $08$  171
      WRITE(LOG2,422)IPASS,I,J,X1                                               $08$  172
442   X1=6250000.0                                                              $08$  173
      IF(IFAILO.EQ.0)IFAILO=I                                                   $08$  174
446   VMMAX(J)=SQRT(X1)                                                         $08$  175
450   VMAX=0.0                                                                  $08$  176
      VMIN=1.05*VMMAX(IMID)                                                     $08$  177
      ITER=0                                                                    $08$  178
460   ITER=ITER+1                                                               $08$  179
      IFAIL=0                                                                   $08$  180
      ICONF1=0                                                                  $08$  181
      DO 470 J=1,NSTRMS                                                         $08$  182
470   VVOLD(J)=VV(J)                                                            $08$  183
      IF(I.EQ.1.OR.NWORK(I).GE.5)GO TO 810                                      $08$  184
      DO 580 J=1,ITUB                                                           $08$  185
      X1=(H(J,I)+H(J+1,I))/2.0-(((VVOLD(J)+VVOLD(J+1))/2.0)**2+((VW(J,I)$08$  186
     1+VW(J+1,I))/2.0)**2)/(2.0*G*EJ)                                           $08$  187
      IF(X1.GE.HMIN)GO TO 520                                                   $08$  188
      IF(IPASS.LE.NFORCE)GO TO 510                                              $08$  189
      IF(LNCT.LT.NPAGE)GO TO 480                                                $08$  190
      WRITE(LOG2,500)                                                           $08$  191
      LNCT=1                                                                    $08$  192
480   LNCT=LNCT+1                                                               $08$  193
      WRITE(LOG2,490)IPASS,I,ITER,J,X1                                          $08$  194
490   FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMTU$08$  195
     1BE,I3,53H  STATIC ENTHALPY BELOW LIMIT IN MOMENTUM EQUATION AT,E13$08$  196
     2.5)                                                                       $08$  197
500   FORMAT(1H1)                                                               $08$  198
510   IFAIL=1                                                                   $08$  199
      X1=HMIN                                                                   $08$  200
520   X2=(S(J,I)+S(J+1,I))/2.0                                                  $08$  201
```

```
      X6=UDG8(X1,X2)                                                    0088  202
      X7=UDG7(X1,X2)                                                    0088  203
      X1=UDG9(X1,X2,((VVOLD(J)+VVOLD(J+1))/2.0)**2)                     0088  204
      XQ=X1                                                             0088  205
      IF(X1.LE.0.9801)GO TO 560                                         0088  206
      IF(IPASS.LE.NFORCE)GO TO 550                                      0088  207
      IF(LNCT.LT.NPAGE)GO TO 530                                        0088  208
      WRITE(LOG2,500)                                                   0088  209
      LNCT=1                                                            0088  210
  530 LNCT=LNCT+1                                                       0088  211
      X1=SQRT(X1)                                                       0088  212
      WRITE(LOG2,540)IPASS,I,ITER,J,X1                                  0088  213
  540 FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMTU 0088  214
     1BE,I3,39H  MERIDIONAL MACH NUMBER ABOVE LIMIT AT,E13.5)           0088  215
  550 IFAIL=1                                                           0088  216
      X1=0.9801                                                         0088  217
  560 X2=(SPPG(J)+SPPG(J+1))/2.0                                        0088  218
      X3=(SPPG(J)+SPPG(J+1))/2.0                                        0088  219
      AFUN(J)=-2.0/(1.0-X1)*((1.0-X2*X2*XQ)*(CR(J)+CR(J+1))/(2.0*X2)-X3/ 0088  220
     1X2*DPHIDL(J)-X3*(SIN((PHI(J)+PHI(J+1))/2.0)/(R(J,I)+R(J+1,I))*2.0* 0088  221
     2(1.0+X1*((VW(J,I)+VW(J+1,I))/(VVOLD(J)+VVOLD(J+1)))**2)+(DLADM(J)+ 0088  222
     3DLADM(J+1))/(LAMI(J)+LAMI(J+1))))                                 0088  223
      BFUN(J)=2.0*(FX2(J)-X7*DSDL(J)-FX1(J))                            0088  224
      IF(I.EQ.NSTNS.OR.IPASS.EQ.1)GO TO 580                             0088  225
      IF(NEQN.EQ.1.OR.NDATA(I).EQ.0.OR.(NWORK(I).EQ.J.AND.NWORK(I+1).EQ. 0088  226
     10))GO TO 570                                                      0088  227
      IF(NWORK(I).EQ.0)GO TO 564                                        0088  228
      X4=(TBETA(J,I)+TBETA(J+1,I))/2.0                                  0088  229
      X5=(TANEPS(J)+TANEPS(J+1))/2.0                                    0088  230
  562 BFUN(J)=BFUN(J)+2.0*(X7*(DSDM(J)+DSDM(J+1))/2.0*(X3*(1.0/(1.0+X4*X 0088  231
     14)+X5*X1/(1.0-X1))-X5*X4/(1.0-X4*X4))-(VVOLD(J)+VVOLD(J+1))/4.0*(D 0088  232
     2*VWDM(J)+DRVWDM(J+1))*(X5-X3*X1/(1.0-X1)*X4))                     0088  233
      GO TO 566                                                         0088  234
  564 X4=(TBIP1(J)+TBIP1(J+1))*0.5                                      0088  235
      X5=(TEIP1(J)+TEIP1(J+1))*0.5                                      0088  236
      GO TO 562                                                         0088  237
  570 BFUN(J)=BFUN(J)+X7*(DSDM(J)+DSDM(J+1))*X3*(1.0-X1*(X6-1.0))/(1.0-X 0088  238
     11)                                                                0088  239
  580 CONTINUE                                                          0088  240
      VV(IMID)=VVOLD(IMID)**2                                           0088  241
      J=IMID                                                            0088  242
      JINC=1                                                            0088  243
  590 JOLD=J                                                            0088  244
      J=J+JINC                                                          0088  245
      JJ=JOLD                                                           0088  246
      IF(JINC.EQ.-1)JJ=J                                                0088  247
      IF(ABS(AFUN(JJ)).LE.1.0E-10)GO TO 660                             0088  248
      X1=-AFUN(JJ)*(XL(J,I)-XL(JOLD,I))                                 0088  249
      IF(X1.LE.0.0)GO TO 630                                            0088  250
      IF(IPASS.LE.NFORCE)GO TO 620                                      0088  251
```

```
      IF(LNCT.LT.NPAGE)GO TO 600                                        $08$  252
      WRITE(LOG2,5)0)                                                   $08$  253
      LNCT=1                                                            $08$  254
  600 LNCT=LNCT+1                                                       $08$  255
      WRITE(LOG2,610)IPASS,I,ITER,JJ,X1                                 $08$  256
  610 FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMTU$08$  257
     1BE,I3,43H  MOMENTUM EQUATION EXPONENT ABOVE LIMIT AT,E13.5)       $08$  258
  620 IFAIL=1                                                           $08$  259
      X1=88.0                                                           $08$  260
  630 X1=EXP(X1)                                                        $08$  261
      VV(J)=VV(JOLD)*X1+(1.0-X1)*BFUN(JJ)/AFUN(JJ)                      $08$  262
  640 IF(J.EQ.K)GO TO 670                                               $08$  263
      IF(J.EQ.NSTRMS)GO TO 650                                          $08$  264
      GO TO 590                                                         $08$  265
  650 J=IMID                                                            $08$  266
      JINC=-1                                                           $08$  267
      GO TO 590                                                         $08$  268
  660 VV(J)=VV(JOLD)+BFUN(JJ)*(XL(J,I)-XL(JOLD,I))                      $08$  269
      GO TO 640                                                         $08$  270
  670 DO 710 J=K,NSTRMS                                                 $08$  271
      IF(VV(J).LE.4.0*VVOLD(IMID)**2)GO TO 676                          $08$  272
      IFAIL=1                                                           $08$  273
      IF(IPASS.LE.NFORCE)GO TO 674                                      $08$  274
      CALL UD0303(LNCT,1)                                               $08$  275
      WRITE(LOG2,672)IPASS,I,ITER,J                                     $08$  276
  672 FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMLI$08$  277
     1NE,I3,50H  MERIDIONAL VELOCITY GREATER THAN TWICE MID VALUE)      $08$  278
  674 VV(J)=4.0*VVOLD(IMID)**2                                          $08$  279
  676 IF(VV(J).GE.1.0)GO TO 702                                         $08$  280
      IF(IPASS.LE.NFORCE)GO TO 700                                      $08$  281
      IF(LNCT.LT.NPAGE)GO TO 680                                        $08$  282
      WRITE(LOG2,500)                                                   $08$  283
      LNCT=1                                                            $08$  284
  680 LNCT=LNCT+1                                                       $08$  285
      WRITE(LOG2,690)IPASS,I,ITER,J,VV(J)                               $08$  286
  690 FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMLI$08$  287
     1NE,I3,46H  (MERIDIONAL VELOCITY) SQUARED BELOW LIMIT AT,E13.5)    $08$  288
  700 VV(J)=1.0                                                         $08$  289
      IFAIL=1                                                           $08$  290
      GO TO 710                                                         $08$  291
  702 VV(J)=SQRT(VV(J))                                                 $08$  292
      IF(VV(J).LE.VMMAX(J))GO TO 710                                    $08$  293
      IFAIL=1                                                           $08$  294
      IF(IPASS.LE.NFORCE)GO TO 708                                      $08$  295
      CALL UD0303(LNCT,1)                                               $08$  296
      WRITE(LOG2,706)IPASS,I,ITER,J,VV(J),VMMAX(J)                      $08$  297
  706 FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMLI$08$  298
     1NE,I3,44H  MERIDIONAL VELOCITY ABOVE SOUND SPEED  VM=,F8.2,3H A=,F$08$  299
     28.2)                                                              $08$  300
  708 VV(J)=VMMAX(J)                                                    $08$  301
```

```
710   CONTINUE                                                                  $08$  302
      X1=0.0                                                                    $08$  303
      DO 712 J=K,IMID                                                           $08$  304
712   X1=X1+(XL(J+1,I)-XL(J,I))*ABS((VV(J+1)+VV(J))/(VVOLD(J+1)+VVOLD(J))      $08$  305
     1)-1.0)                                                                    $08$  306
      X1=X1/(XL(NSTRMS,I)-XL(K,I))                                              $08$  307
      X2=0.1                                                                    $08$  308
      IF(X1.LT.0.2)X2=EXP(-11.52*X1)                                            $08$  309
      DO 715 J=K,NSTRMS                                                         $08$  310
715   VV(J)=VVOLD(J)+X2*(VV(J)-VVOLD(J))                                        $08$  311
      IF(NLOSS(I).EQ.1.AND.NL2(I).EQ.J)CALL UU9307                              $08$  312
      DO 800 J=1,IMID                                                           $08$  313
      HS(J)=(H(J,I)+H(J+1,I))/2.0-(((VV(J)+VV(J+1))/2.0)**2+((VW(J,I)+VW        $08$  314
     1(J+1,I))/2.0)**2)/(2.0*G*EJ)                                              $08$  315
      IF(HS(J).GE.HMIN)GO TO 800                                                $08$  316
      IF(IPASS.LE.NFORCE)GO TO 790                                              $08$  317
      IF(LNCT.LT.NPAGE)GO TO 770                                                $08$  318
      WRITE(LOG2,500)                                                           $08$  319
      LNCT=1                                                                    $08$  320
770   LNCT=LNCT+1                                                               $08$  321
      WRITE(LOG2,780)IPASS,I,ITER,J,HS(J)                                       $08$  322
780   FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMTU        $08$  323
     1BE,I3,56H  STATIC ENTHALPY BELOW LIMIT IN CONTINUITY EQUATION AT,E        $08$  324
     213.5)                                                                     $08$  325
790   IFAIL=1                                                                   $08$  326
      HS(J)=HMIN                                                                $08$  327
800   XM2(J)=UUG9(HS(J),(S(J,I)+S(J+1,I))/2.0,((VV(J)+VV(J+1))/2.0)**2)         $08$  328
      GO TO 1100                                                                $08$  329
810   J=IMID                                                                    $08$  330
      JINC=1                                                                    $08$  331
820   LOOP=1                                                                    $08$  332
      JOLD=J                                                                    $08$  333
      J=J+JINC                                                                  $08$  334
      JJ=JOLD                                                                   $08$  335
      IF(JINC.EQ.-1)JJ=J                                                        $08$  336
830   VOLD=VV(J)                                                                $08$  337
      VAV=(VOLD+VV(JOLD))/2.0                                                   $08$  338
      IFAIL=0                                                                   $08$  339
      ICONF2=0                                                                  $08$  340
      X2=(TBETA(J,I)+TBETA(JOLD,I))/2.0                                         $08$  341
      X1=(XI(J)+XI(JOLD))/2.0+((XN*(R(J,I)+R(JOLD,I))/2.0)**2-VAV**2*(1.        $08$  342
     1J+X2*X2))/(2.J*G*EJ)                                                      $08$  343
      IF(X1.GE.HMIN)GO TO 870                                                   $08$  344
      IF(IPASS.LE.NFORCE)GO TO 860                                              $08$  345
      IF(LNCT.LT.NPAGE)GO TO 840                                                $08$  346
      WRITE(LOG2,500)                                                           $08$  347
      LNCT=1                                                                    $08$  348
840   LNCT=LNCT+1                                                               $08$  349
      WRITE(LOG2,850)IPASS,I,ITER,JJ,LOOP,X1                                    $08$  350
850   FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMTU        $08$  351
```

```
     1BE,I3,6H  LOOP,I3,43H  STATIC H IN MOMENTUM EQUN. BELOW LIMIT AT,E$08$
     213.5)                                                              $08$
860   IFAIE=1                                                            $08$
      IFCONF2=1                                                          $08$
      X1=HMIN                                                            $08$
870   X3=(S(J,I)+S(JOLD,I))/2.0                                          $08$
      X6=UDG8(X1,X3)                                                     $08$
      X7=UDG7(X1,X3)                                                     $08$
      X1=UDG9(X1,X3,VAV*VAV)                                             $08$
      IF(X1.LE.0.9801)GO TO 910                                          $08$
      IF(IPASS.LE.NFORCE)GO TO 900                                       $08$
      IF(LNCT.LT.NPAGE)GO TO 880                                         $08$
      WRITE(LOG2,500)                                                    $08$
      LNCT=1                                                             $08$
880   LNCT=LNCT+1                                                        $08$
      X1=SQRT(X1)                                                        $08$
      WRITE(LOG2,890)IPASS,I,ITER,JJ,LOOP,X1                             $08$
890   FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMTU$08$
     1BE,I3,6H  LOOP,I3,39H  MERIDIONAL MACH NUMBER ABOVE LIMIT AT,E13.5$08$
     2)                                                                  $08$
900   IFAIE=1                                                            $08$
      ICONF2=1                                                           $08$
      X1=0.9801                                                          $08$
910   X4=(SPPG(J)+SPPG(JOLD))/2.0                                        $08$
      X5=(CPPG(J)+CPPG(JOLD))/2.0                                        $08$
      X9=(R(J,I)+R(JOLD,I))*0.5                                          $08$
      X10=SIN((PHI(J)+PHI(JOLD))*0.5)                                    $08$
      X11=(1.0-X5*X6*X1)*(CR(J)+CR(JOLD))*0.5/X5-X4/X5*DPHIDL(JJ)-X4*(X1$08$
     1J/X9*(1.0+X1*(X2+XN*X9/VAV)**2)+(DLADM(J)+DLADM(JOLD))/(LAMI(J)+LA$08$
     2MI(JOLD)))                                                         $08$
      DV2DL=FX2(JJ)-X7*DSDL(JJ)-2.0*XN*VAV*X2*COS((GAMA(J)+GAMA(JOLD))*J$08$
     1.5)+VAV*VAV*(X11/(1.0-X1)-FX1(JJ))                                 $08$
      X12=1.0/(1.0+X2*X2)                                                $08$
      DVMDVM(JJ)=X12*((X7*DSDL(JJ)-FX2(JJ))/VAV**2-FX1(JJ)+X11/(1.0-X1))$08$
      IF(I.EQ.1.OR.I.EQ.NSTNS.OR.IPASS.EQ.1)GO TO 920                    $08$
      IF(NEQN.EQ.1)GO TO 914                                             $08$
      X8=(TANEPS(J)+TANEPS(JOLD))*0.5                                    $08$
      X5=0.5*(DSDM(J)+DSDM(JOLD))*X7*(X4*(X12+X6*X1/(1.0-X1))-X8*X2*X12)$08$
      DV2DL=DV2DL+X5-VAV*(DRVWDM(J)+DRVWDM(JOLD))*0.5*(X8-X4*X1*X2/(1.0-$08$
     1X1))                                                               $08$
      DVMDVM(JJ)=DVMDVM(JJ)-X5*X12/VAV**2                                $08$
      GO TO 920                                                          $08$
914   X5=0.5*(DSDM(J)+DSDM(JOLD))*X7*X4*(1.0-X1*(X6-1.0))/(1.0-X1)       $08$
      DV2DL=DV2DL+X5                                                     $08$
      DVMDVM(JJ)=DVMDVM(JJ)-X5*X12/VAV**2                                $08$
920   DV2DL=DV2DL*2.0*X12                                                $08$
      X1=VV(JOLD)**2+DV2DL*(XL(J,I)-XL(JOLD,I))                          $08$
      IF(X1.LE.9.0*VVOLD(IMID)**2)GO TO 938                              $08$
      ICONF2=1                                                           $08$
      IFAIE=1                                                            $08$
```

```
      IF(IPASS.LE.NFORCE)GO TO 936                                          $08$  402
      CALL UD0303(LNCT,1)                                                   $08$  403
      X1=SQRT(X1)                                                           $08$  404
      X2=3.0*VVOLD(IMID)                                                    $08$  405
      WRITE(LOG2,933)IPASS,I,ITER,J,LOOP,X1,X2                              $08$  406
  934 FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMLI$08$  407
     1NE,I3,6H  LOOP,I3,33H  MERIDIONAL VELOCITY ABOVE LIMIT,E13.5,9H  L$08$  408
     2IMIT =,E13.5)                                                       $08$  409
  936 X1=9.0*VVOLD(IMID)**2                                               $08$  410
  938 IF(X1.GE.1.0)GO TO 950                                              $08$  411
      IF(IPASS.LE.NFORCE)GO TO 944                                        $08$  412
      IF(LNCT.LT.NPAGE)GO TO 930                                          $08$  413
      WRITE(LOG2,500)                                                     $08$  414
      LNCT=1                                                              $08$  415
  930 LNCT=LNCT+1                                                         $08$  416
      WRITE(LOG2,940)IPASS,I,ITER,J ,LOOP,X1                              $08$  417
  940 FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMLI$08$  418
     1NE,I3,6H  LOOP,I3,46H  (MERIDIONAL VELOCITY) SQUARED BELOW LIMIT A$08$  419
     2T,E13.5)                                                            $08$  420
  944 X1=1.0                                                              $08$  421
      IFAIL=1                                                             $08$  422
      ICONF2=1                                                            $08$  423
  950 VV(J)=SQRT(X1)                                                      $08$  424
      IF(VV(J).LE.VMMAX(J))GO TO 958                                      $08$  425
      IFAIL=1                                                             $08$  426
      ICONF2=1                                                            $08$  427
      IF(IPASS.LE.NFORCE)GO TO 956                                        $08$  428
      CALL UD0303(LNCT,1)                                                 $08$  429
      WRITE(LOG2,705)IPASS,I,ITER,J,VV(J),VMMAX(J)                        $08$  430
  956 VV(J)=VMMAX(J)                                                      $08$  431
  958 IF(ABS(VV(J)/VOLD-1.0).LE.TOLNCE*0.2)GO TO 990                      $08$  432
      IF(LOOP.GE.LPMAX)GO TO 960                                          $08$  433
      LOOP=LOOP+1                                                         $08$  434
      GO TO 830                                                           $08$  435
  960 ICONF2=1                                                            $08$  436
      IF(IPASS.LE.NFORCE)GO TO 990                                        $08$  437
      IF(LNCT.LT.NPAGE)GO TO 970                                          $08$  438
      WRITE(LOG2,500)                                                     $08$  439
      LNCT=1                                                              $08$  440
  970 LNCT=LNCT+1                                                         $08$  441
      WRITE(LOG2,980)IPASS,I,ITER,J,VV(J),VOLD                            $08$  442
  980 FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMLI$08$  443
     1NE,I3,38H  MERIDIONAL VELOCITY UNCONVERGED  VM=,E13.6,9H VM(OLD)=,$08$  444
     2E13.6)                                                              $08$  445
  990 IF(IFAIL.EQ.1)IFAIL=1                                               $08$  446
      IF(ICONF2.EQ.1)ICONF1=1                                             $08$  447
      IF(J.EQ.NSTRMS)GO TO 1000                                           $08$  448
      IF(J.EQ.1)GO TO 1010                                                $08$  449
      GO TO 820                                                           $08$  450
 1000 J=IMID                                                              $08$  451
```

```
      JINC=-1                                                                    $08$  452
      GO TO 820                                                                  $08$  453
1010  IF(I.EQ.1)GO TO 1014                                                       $08$  454
      IF(NLOSS(I).EQ.2.OR.(NLOSS(I).EQ.1.AND.NL2(I).EQ.0))CALL UD0307            $08$  455
1014  DO 1090 J=1,ITUB                                                           $08$  456
      X1=((VV(J)+VV(J+1))/2.0)**2*(1.0+((TBETA(J,I)+TBETA(J+1,I))/2.0)**         $08$  457
     12)                                                                         $08$  458
      HS(J)=(XI(J)+XI(J+1))/2.0+((XN*(R(J,I)+R(J+1,I))/2.0)**2-X1)/(2.0*         $08$  459
     1G*EJ)                                                                      $08$  460
      IF(HS(J).GE.HMIN)GO TO 1080                                                $08$  461
      IF(IPASS.LE.NFORCE)GO TO 1070                                              $08$  462
      IF(LNCT.LT.NPAGE)GO TO 1060                                                $08$  463
      WRITE(LOG2,500)                                                            $08$  464
      LNCT=1                                                                     $08$  465
1060  LNCT=LNCT+1                                                                $08$  466
      WRITE(LOG2,710)IPASS,I,ITER,J,HS(J)                                        $08$  467
1070  IFAIL=1                                                                    $08$  468
      HS(J)=HMIN                                                                 $08$  469
1080  XM2(J)=UDG9(HS(J),(S(J,I)+S(J+1,I))/2.0,X1)                                $08$  470
      IF(I.EQ.1.OR.NLOSS(I).NE.1.OR.NL2(I).NE.0)GO TO 1090                       $08$  471
      X1=(S(J,I)+S(J+1,I))/2.0                                                   $08$  472
      X2=UDG4(HS(J),X1)                                                          $08$  473
      X4=UDG8(HS(J),X1)                                                          $08$  474
      X3=(XI(J)+XI(J))/2.0+(XN*((R(J,I)+R(J+1,I))/2.0))**2/(2.0*G*EJ)            $08$  475
      X3=UDG4(X3,X1)                                                             $08$  476
      XM2(J)=XM2(J)*(1.0+X4*(LOSS(J)+LOSS(J+1))/2.0*X2/(X3*(1.0+(LOSS(J)         $08$  477
     1+LOSS(J+1))/2.0*(1.0-X2/X3))))                                             $08$  478
1090  CONTINUE                                                                   $08$  479
1100  DELW(1)=0.0                                                                $08$  480
      CWDV=0.0                                                                   $08$  481
      X2=BBLOCK(I)*BDIST(I)                                                      $08$  482
      X3=BBLOCK(I)*(1.0-BDIST(I))*2.0/XL(NSTRMS,I)                               $08$  483
      DO 1200 J=1,ITUB                                                           $08$  484
      X1=DL(J)*(R(J+1,I)+R(J,I))*UDG5(HS(J),(S(J,I)+S(J+1,I))/2.0)*(VV(J         $08$  485
     1)+VV(J+1))*(CPPG(J)+CPPG(J+1))*PI/(4.0*SCLFAC**2)                          $08$  486
      X1=X1*((LAMI(J)+LAMI(J+1))/2.0-WWBL(I)-X2-X3*(XL(J,I)+XL(J+1,I)))          $08$  487
      DELW(J+1)=DELW(J)+X1                                                       $08$  488
      X4=0.0                                                                     $08$  489
      IF(J.GE.IMID)GO TO 1130                                                    $08$  490
      L1=J                                                                       $08$  491
1110  X4=X4+DVMDVM(L1)                                                           $08$  492
      IF(L1.GE.IMID-1)GO TO 1120                                                 $08$  493
      L1=L1+1                                                                    $08$  494
      GO TO 1110                                                                 $08$  495
1120  X4=X4/FLOAT(IMID-J)                                                        $08$  496
      GO TO 1200                                                                 $08$  497
1130  L1=IMID+1                                                                  $08$  498
1140  X4=X4+DVMDVM(L1)                                                           $08$  499
      IF(L1.GE.J)GO TO 1150                                                      $08$  500
      L1=L1+1                                                                    $08$  501
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      GO TO 1140                                                                $088  502
1150  X4=X4/FLOAT(J-IMID+1)                                                     $088  503
1200  DWDV=DWDV+X1*(1.0-XM2(J))*2.0/((VV(J)+VV(J+1))*(1.0-((XL(J,I)+XL(J$088  504
     1+1,I))*0.5-XL(IMID,I))*X4))                                             $088  505
      W=DELW(NSTRMS)                                                           $088  506
      FM2=DWDV/W*VV(IMID)                                                      $088  507
      DO 1210 J=2,NSTRMS                                                       $088  508
1210  DELW(J)=DELW(J)/W                                                        $088  509
      IF(DWDV.LE.0.0)GO TO 1250                                                $088  510
      IF(NMACH(I).EQ.1)GO TO 1330                                              $088  511
      IF(W.LT.FLOW(ICASE).AND.ICONF1.EQ.0)VMAX=VV(IMID)                        $088  512
1220  DV=(FLOW(ICASE)-W)/DWDV                                                  $088  513
      IF(DV.LT.-0.1*VV(IMID))DV=-0.1*VV(IMID)                                  $088  514
      IF(DV.GT. 0.1*VV(IMID))DV= 0.1*VV(IMID)                                  $088  515
1230  IF(IPASS.EQ.1.OR.(I.NE.1.AND.NWORK(I).LE.4))GO TO 1234                   $088  516
      IF(VV(IMID)+DV.LT.VMIN)GO TO 1232                                        $088  517
      DV=(VMIN-VV(IMID))*0.5                                                   $088  518
1232  IF(VV(IMID)+DV.GT.VMAX)GO TO 1234                                        $088  519
      DV=(VMAX-VV(IMID))*0.5                                                   $088  520
1234  DO 1270 J=K,NSTRMS                                                       $088  521
      VV(J)=VV(J)+DV                                                           $088  522
      IF(VV(J).LE.VMMAX(J))GO TO 1238                                          $088  523
      IFAIL=1                                                                  $088  524
      VV(J)=VMMAX(J)                                                           $088  525
1238  IF(VV(J).GE.1.0)GO TO 1270                                               $088  526
      IF(IPASS.LE.NFORCE)GO TO 1260                                            $088  527
      IF(LNCT.LT.NPAGE)GO TO 1240                                              $088  528
      WRITE(LOG2,500)                                                          $088  529
      LNCT=1                                                                   $088  530
1240  LNCT=LNCT+1                                                              $088  531
      WRITE(LOG2,1250)IPASS,I,ITER,J,VV(J)                                     $088  532
1250  FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H 'STREAMLI$088  533
     1NE,I3,50H  MERIDIONAL VELOCITY BELOW LIMIT IN CONTINUITY AT,E13.5)       $088  534
1260  VV(J)=1.0                                                                $088  535
      IFAIL=1                                                                  $088  536
1270  CONTINUE                                                                 $088  537
      GO TO 1340                                                               $088  538
1280  IF(NMACH(I).EQ.0)GO TO 1290                                              $088  539
      IF(W.LT.FLOW(ICASE).AND.ICONF1.EQ.0)VMIN=VV(IMID)                        $088  540
      GO TO 1220                                                               $088  541
1290  IF(VV(IMID).LT.VMIN.AND.ICONF1.EQ.0)VMIN=VV(IMID)                        $088  542
      DV=-.1*VV(IMID)                                                          $088  543
1300  IFAIL=1                                                                  $088  544
      IF(IPASS.LE.NFORCE)GO TO 1230                                            $088  545
      IF(LNCT.LT.NPAGE)GO TO 1310                                              $088  546
      WRITE(LOG2,500)                                                          $088  547
      LNCT=1                                                                   $088  548
1310  LNCT=LNCT+1                                                              $088  549
      WRITE(LOG2,1320)IPASS,I,ITER                                             $088  550
1320  FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,43H  OTHER CO$088  551
```

```
     1NTINUITY EQUATION BRANCH REQUIRED)                                                $08$  552
      GO TO 1230                                                                        $08$  553
1330  IF(VV(IMID).GT.VMAX.AND.ICONF1.EQ.0)VMAX=VV(IMID)                                 $08$  554
      DV=0.1*VV(IMID)                                                                   $08$  555
      GO TO 1300                                                                        $08$  556
1340  X1=TOLNCE/5.0                                                                     $08$  557
      IF(NEVAL(I).GT.0)X1=X1/2.0                                                        $08$  558
      IF(ABS(W/FLOW(ICASE)-1.0).GT.X1)GO TO 1354                                        $08$  559
      DO 1350 J=K,NSTRMS                                                                $08$  560
      IF(ABS(VV(J)/VVOLD(J)-1.0).GT.X1)GO TO 1354                                       $08$  561
1350  CONTINUE                                                                          $08$  562
      GO TO 1390                                                                        $08$  563
1354  IF(ITER.GE.ITMAX)GO TO 1360                                                       $08$  564
      IF(I.EQ.1)GO TO 460                                                               $08$  565
      IF((NLOSS(I).EQ.1.AND.NL2(I).EQ.0).OR.(NWORK(I).GE.5.AND.NLOSS(I).               $08$  566
     1EQ.2))CALL UD0307                                                                 $08$  567
      GO TO 460                                                                         $08$  568
1360  IF(IPASS.LE.NFORCE)GO TO 1390                                                     $08$  569
      IF(LNCT.LT.NPAGE)GO TO 1370                                                       $08$  570
      WRITE(LOG2,500)                                                                   $08$  571
      LNCT=1                                                                            $08$  572
1370  LNCT=LNCT+1                                                                       $08$  573
      X1=W/FLOW(ICASE)                                                                  $08$  574
      X2=VV(K)/VVOLD(K)                                                                 $08$  575
      X3=VV(IMID)/VVOLD(IMID)                                                           $08$  576
      X4=VV(NSTRMS)/VVOLD(NSTRMS)                                                       $08$  577
      WRITE(LOG2,1380)IPASS,I,X1,X2,X3,X4                                               $08$  578
1380  FORMAT(5X,4HPASS,I3,9H  STATION,I3,49H  MOMENTUM AND/OR CONTINUITY                $08$  579
     1 UNCONVERGED W/WSPEC=,F8.5,16H VM/VM(OLD) HUB=,F8.5,5H MID=,F8.5,5                $08$  580
     2H TIP=,F8.5)                                                                      $08$  581
1390  IF(IFAIL.NE.0.AND.IFAILO.EQ.0)IFAILO=I                                            $08$  582
      DO 1400 J=1,NSTRMS                                                                $08$  583
1400  VM(J,I)=VV(J)                                                                     $08$  584
      IF(I.NE.1)GO TO 1420                                                              $08$  585
      DO 1410 J=1,NSTRMS                                                                $08$  586
1410  VW(J,1)=VV(J)*TBETA(J,1)                                                          $08$  587
      GO TO 1480                                                                        $08$  588
1420  IF(NMIX.NE.1)GO TO 1440                                                           $08$  589
      DO 1430 J=1,NSTRMS                                                                $08$  590
      S(J,I-1)=SKEEP(J)                                                                 $08$  591
      H(J,I-1)=HKEEP(J)                                                                 $08$  592
1430  VW(J,I-1)=VWKEEP(J)                                                               $08$  593
1440  IF(NWORK(I).GE.5)GO TO 1460                                                       $08$  594
      TBETA(1,I)=0.0                                                                    $08$  595
      DO 1450 J=K,NSTRMS                                                                $08$  596
1450  TBETA(J,I)=(VW(J,I)-XN*R(J,I))/VV(J)                                              $08$  597
      GO TO 1480                                                                        $08$  598
1460  DO 1470 J=1,NSTRMS                                                                $08$  599
      VW(J,I)=VV(J)*TBETA(J,I)+XN*R(J,I)                                                $08$  600
1470  H(J,I)=XI(J)+XN*R(J,I)*VW(J,I)/(G*EJ)                                             $08$  601
```

```
 1480  CONTINUE                                                    $08$ 602
       END                                                         $08$ 603
```

```
      OVERLAY(UD300,1,2)
      PROGRAM UD0326
      REAL LOSS,LAMI,LAMIP1,LAMIM1
      COMMON NSTNS,NSTRMS,NMAX,NFORCE,NBL,NCASE,NSPLIT,NREAD,NPUNCH,NPAG
     1E,NSET1,NSET2,ISTAG,ICASE,IFAILO,IPASS,I,IVFAIL,IFFAIL,NMIX,NTRANS
     2,NPLOT,ILOSS,LNCT,ITUB,IMID,IFAIL,ITER,LOG1,LOG2,LOG3,LOG4,LOG5,LO
     3G6,IPRINT,NMANY,NSTPLT,NEQN
      COMMON NSPEC(30),NWORK(30),NLOSS(30),NDATA(30),NTERP(30),NMACH(30)
     1,NL1(30),NL2(30),NDIMEN(30),IS1(30),IS2(30),IS3(30),NEVAL(30),NDIF
     2F(4),NDEL(30),NLITER(30),NM(2),NRAD(2),NCURVE(30),NWHICH(30),NOUT1
     3(30),NOUT2(30),NOUT3(30),NBLADE(30)
      COMMON DM(11,5,2),WFRAC(11,5,2)
      COMMON R(21,30),XL(21,30),X(21,30),H(21,30),S(21,30),VM(21,30),VW(
     121,30),TBETA(21,30),DIFF(15,4),FDHUB(15,4),FDMID(15,4),FDTIP(15,4)
     2,TERAD(5,2)
      COMMON DATAC(100),DATA1(100),DATA2(100),DATA3(100),DATA4(100),DATA
     15(100),DATA6(100),DATA7(100),DATA8(100),DATA9(100),FLOW(10),SPEED(
     230),SPDFAC(10),BBLOCK(30),BDIST(30),WBLOCK(30),WWBL(30),XSTN(150),
     3RSTN(150),DELF(30),DELC(100),DELTA(100),TITLE(18),DROM2(30),RIM1(3
     40),XIM1(30),WORK(21),LOSS(21),TANEPS(21),XI(21),VV(21),DELW(21),LA
     5MI(21),LAMIM1(21),LAMIP1(21),PHI(21),CR(21),GAMA(21),SPPG(21),CPPG
     6(21),HKEEP(21),SKEEP(21),VWKEEP(21),DELH(30),DELT(30)
      COMMON VISK,SHAPE,SCLFAC,EJ,G,TOLNCE,XSCALE,PSCALE,PLOW,RLOW,XMMAX
     1,RCONST,FM2,HMIN,C1,PI,CONTR,CONMX
      DIMENSION XX1(21),DSDM(21),DRVWDM(21),DL(21),DSDL(21),FX1(21),FX2(
     121),VVOLD(21),AFUN(20),BFUN(20),HS(20),XM2(20),DVMDVM(20),DVMDM(21
     2),TBIP1(21),TBIP1(21)
      ITMAX=20
      LPMAX=10
      K=1
      IF(I.EQ.ISTAG)K=2
      XN=SPEED(I)*SPDFAC(ICASE)*PI/(30.0*SCLFAC)
      IF(I.EQ.1)GO TO 234
      DO 100 J=1,NSTRMS
      LAMI(J)=LAMIP1(J)
100   LAMIP1(J)=1.0
      IF(I.EQ.NSTNS)GO TO 234
      IF(NDATA(I+1).EQ.0)GO TO 210
      L1=NDIMEN(I+1)+1
      GO TO(110,130,150,170),L1
110   DO 120 J=1,NSTRMS
120   XX1(J)=R(J,I+1)
      GO TO 190
130   DO 140 J=1,NSTRMS
140   XX1(J)=R(J,I+1)/R(NSTRMS,I+1)
      GO TO 190
150   DO 160 J=1,NSTRMS
160   XX1(J)=XL(J,I+1)
      GO TO 190
170   DO 180 J=1,NSTRMS
```

```
180   XX1(J)=XL(J,I+1)/XL(NSTRMS,I+1)
190   L1=IS2(I+1)
      CALL UD0301(DATAC(L1),DATA4(L1),NDATA(I+1),XX1,XX1,X1,NSTRMS,NTERP
     1(I+1),0)
      DO 200 J=1,NSTRMS
200   LAMIP1(J)=1.0-XX1(J)
210   DO 220 J=1,NSTRMS
      X1=SQRT((R(J,I+1)-R(J,I))**2+(X(J,I+1)-X(J,I))**2)
      X2=SQRT((R(J,I)-RIM1(J))**2+(X(J,I)-XIM1(J))**2)
      X3=ATAN2(R(J,I+1)-R(J,I),X(J,I+1)-X(J,I))
      X4=ATAN2(R(J,I)-RIM1(J),X(J,I)-XIM1(J))
      PHI(J)=(X3+X4)/2.0
      CR(J)=(X3-X4)/(X1+X2)*2.0
      DSDM(J)=0.0
      DRVWDM(J)=0.0
      CVMDM(J)=0.0
      IF(IPASS.EQ.1)GO TO 220
      DSDM(J)=((S(J,I+1)-S(J,I))/X1+(S(J,I)-S(J,I-1))/X2)/2.0*G*EJ
      DRVWDM(J)=((R(J,I+1)*VW(J,I+1)-R(J,I)*VW(J,I))/X1+(R(J,I)*VW(J,I)-
     1RIM1(J)*VW(J,I-1))/X2)/(2.0*R(J,I))
      CVMDM(J)=((VM(J,I+1)-VM(J,I))/X1+(VM(J,I)-VM(J,I-1))/X2)*0.5
220   CONTINUE
      IF(IPASS.EQ.1.OR.NDATA(I).EQ.0.OR.NEQN.EQ.3.OR.NWORK(I).NE.0.OR.NW
     1ORK(I+1).EQ.0)GO TO 390
      L1=NDIMEN(I)+1
      GO TO(221,223,225,227),L1
221   DO 222 J=1,NSTRMS
222   TEIP1(J)=R(J,I)
      GO TO 229
223   DO 224 J=1,NSTRMS
224   TEIP1(J)=R(J,I)/R(NSTRMS,I)
      GO TO 229
225   DO 226 J=1,NSTRMS
226   TEIP1(J)=XL(J,I)
      GO TO 229
227   DO 228 J=1,NSTRMS
228   TEIP1(J)=XL(J,I)/XL(NSTRMS,I)
229   L1=IS2(I)
      CALL UD0301(DATAC(L1),DATA3(L1),NDATA(I),TEIP1,TEIP1,X1,NSTRMS,NTE
     1RP(I),0)
      X1=SPEED(I+1)*SPDFAC(ICASE)*PI/(30.0*SCLFAC)
      DO 230 J=1,NSTRMS
      TEIP1(J)=TAN(TEIP1(J)/C1)
230   TBIP1(J)=(VW(J,I)-X1*R(J,I))/VM(J,I)
      GO TO 390
234   DO 240 J=1,NSTRMS
      DVMDM(J)=0.0
      DSDM(J)=0.0
      DRVWDM(J)=0.0
240   CR(J)=0.0
```

```
      IF(I.EQ.1)GO TO 244
      DO 246 J=1,NSTRMS
246   PHI(J)=ATAN2(R(J,I)-RIM1(J),X(J,I)-XIM1(J))
      GO TO 390
244   DO 260 J=1,NSTRMS
260   PHI(J)=ATAN2(R(J,2)-R(J,1),X(J,2)-X(J,1))
      DO 270 J=1,NSTRMS
      XI(J)=H(J,1)
      LAMI(J)=1.0
270   LAMIP1(J)=1.0
      IF(NDATA(2).EQ.0)GO TO 390
      L2=NDIMEN(2)+1
      GO TO(290,310,330,350),L2
290   DO 300 J=1,NSTRMS
300   XX1(J)=R(J,2)
      GO TO 370
310   DO 320 J=1,NSTRMS
320   XX1(J)=R(J,2)/R(NSTRMS,2)
      GO TO 370
330   DO 340 J=1,NSTRMS
340   XX1(J)=XL(J,2)
      GO TO 370
350   DO 360 J=1,NSTRMS
360   XX1(J)=XL(J,2)/XL(NSTRMS,2)
370   L1=IS2(2)
      CALL UD0301(DATAC(L1),DATA4(L1),NDATA(2),XX1,XX1,X1,NSTRMS,NTERP(2
     1),0)
      DO 380 J=1,NSTRMS
380   LAMIP1(J)=1.0-XX1(J)
390   CALL UD0301(R(1,I),X(1,I),NSTRMS,R(1,I),X1,GAMA,NSTRMS,0,1)
      DO 400 J=1,NSTRMS
      GAMA(J)=ATAN(GAMA(J))
      SPPG(J)=GAMA(J)+PHI(J)
      CPPG(J)=COS(SPPG(J))
      SPPG(J)=SIN(SPPG(J))
400   VV(J)=VM(J,I)
      DO 410 J=1,ITUB
      DL(J)=XL(J+1,I)-XL(J,I)
410   DSDL(J)=(S(J+1,I)-S(J,I))*G*EJ/DL(J)
      IF(I.EQ.1.OR.NWORK(I).GE.5)GO TO 430
      DO 420 J=1,ITUB
      DVMDVM(J)=0.0
      FX1(J)=(VW(J+1,I)+VW(J,I))/(R(J+1,I)+R(J,I))*(R(J+1,I)*VW(J+1,I)-R
     1(J,I)*VW(J,I))/DL(J)
420   FX2(J)=(H(J+1,I)-H(J,I))/DL(J)*G*EJ
      GO TO 450
430   DO 440 J=1,ITUB
      FX1(J)=(TBETA(J+1,I)+TBETA(J,I))/(R(J+1,I)+R(J,I))*(R(J+1,I)*TBETA
     1(J+1,I)-R(J,I)*TBETA(J,I))/DL(J)
440   FX2(J)=(XI(J+1)-XI(J))/DL(J)*G*EJ
```

```
450   VMAX=0.0
      VMIN=2500.0
      ITER=0
460   ITER=ITER+1
      IFAIL=0
      ICONF1=0
      DO 470 J=1,NSTRMS
470   VVOLD(J)=VV(J)
      IF(I.EQ.1.OR.NWORK(I).GE.5)GO TO 610
      DO 580 J=1,ITUB
      X1=(H(J,I)+H(J+1,I))/2.0-(((VVOLD(J)+VVOLD(J+1))/2.0)**2+((VW(J,I)
     1+VW(J+1,I))/2.0)**2)/(2.0*G*EJ)
      IF(X1.GE.HMIN)GO TO 520
      IF(IPASS.LE.NFORCE)GO TO 510
      IF(LNCT.LT.NPAGE)GO TO 480
      WRITE(LOG2,500)
      LNCT=1
480   LNCT=LNCT+1
      WRITE(LOG2,490)IPASS,I,ITER,J,X1
490   FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMTU
     1BE,I3,53H  STATIC ENTHALPY BELOW LIMIT IN MOMENTUM EQUATION AT,E13
     2.5)
500   FORMAT(1H1)
510   IFAIL=1
      X1=HMIN
520   X2=(S(J,I)+S(J+1,I))/2.0
      X7=UDG7(X1,X2)
      X2=(CPPG(J)+CPPG(J+1))*0.5
      X3=(SPPG(J)+SPPG(J+1))*0.5
      AFUN(J)=-2.0*X3*(DVMDM(J)+DVMDM(J+1))/(VVOLD(J)+VVOLD(J+1))-X2*(CR
     1(J)+CR(J+1))
      BFUN(J)=2.0*(FX2(J)-X7*DSDL(J)-FX1(J))
      IF(IPASS.EQ.1.OR.I.EQ.NSTNS)GO TO 580
      IF(NDATA(I).EQ.0.OR.NEQN.EQ.3.OR.(NWORK(I).EQ.0.AND.NWORK(I+1).EQ.
     10))GO TO 560
      IF(NWORK(I).EQ.0)GO TO 540
      X4=(TBETA(J,I)+TBETA(J+1,I))*0.5
      X5=TANEPS(J)+TANEPS(J+1)
530   BFUN(J)=BFUN(J)+X7*(DSDM(J)+DSDM(J+1))*(X3/(1.0+X4*X4)-X5*X4/(1.0+
     1X4*X4)*0.5)-X5*(DRVWDM(J)+DRVWDM(J+1))*(VVOLD(J)+VVOLD(J+1))
      GO TO 580
540   X4=(TBIP1(J)+TBIP1(J+1))*0.5
      X5=TEIP1(J)+TEIP1(J+1)
      GO TO 530
560   BFUN(J)=BFUN(J)+X7*(DSDM(J)+DSDM(J+1))*X3
580   VV(IMID)=VVOLD(IMID)**2
      J=IMID
      JINC=1
590   JOLD=J
      J=J+JINC
```

```
      JJ=JOLD
      IF(JINC.EQ.-1)JJ=J
      IF(ABS(AFUN(JJ)).LE.1.0E-10)GO TO 660
      X1=-AFUN(JJ)*(XL(J,I)-XL(JOLD,I))
      IF(ABS(X1).LE.1.0E-10)GO TO 660
      IF(X1.LE.88.0)GO TO 630
      IF(IPASS.LE.NFORCE)GO TO 620
      IF(LNCT.LT.NPAGE)GO TO 600
      WRITE(LOG2,500)
      LNCT=1
600   LNCT=LNCT+1
      WRITE(LOG2,610)IPASS,I,ITER,JJ,X1
610   FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMTU
     1BE,I3,43H  MOMENTUM EQUATION EXPONENT ABOVE LIMIT AT,E13.5)
620   IFAIL=1
      X1=88.0
630   X1=EXP(X1)
      VV(J)=VV(JOLD)*X1+(1.0-X1)*BFUN(JJ)/AFUN(JJ)
640   IF(J.EQ.K)GO TO 670
      IF(J.EQ.NSTRMS)GO TO 650
      GO TO 590
650   J=IMID
      JINC=-1
      GO TO 590
660   VV(J)=VV(JOLD)+BFUN(JJ)*(XL(J,I)-XL(JOLD,I))
      GO TO 640
670   DO 710 J=K,NSTRMS
      IF(VV(J).LE.4.0*VVOLD(IMID)**2)GO TO 676
      IFAIL=1
      IF(IPASS.LE.NFORCE)GO TO 674
      CALL UD0303(LNCT,1)
      WRITE(LOG2,672)IPASS,I,ITER,J
672   FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMLI
     1NE,I3,50H  MERIDIONAL VELOCITY GREATER THAN TWICE MID VALUE)
674   VV(J)=4.0*VVOLD(IMID)**2
676   IF(VV(J).GE.1.0)GO TO 702
      IF(IPASS.LE.NFORCE)GO TO 700
      IF(LNCT.LT.NPAGE)GO TO 680
      WRITE(LOG2,500)
      LNCT=1
680   LNCT=LNCT+1
      WRITE(LOG2,690)IPASS,I,ITER,J,VV(J)
690   FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMLI
     1NE,I3,46H  (MERIDIONAL VELOCITY) SQUARED BELOW LIMIT AT,E13.5)
700   VV(J)=1.0
      IFAIL=1
      GO TO 710
702   VV(J)=SQRT(VV(J))
710   CONTINUE
      X1=0.0
```

```
      DO 712 J=K,ITUB
712   X1=X1+(XL(J+1,I)-XL(J,I))*ABS((VV(J+1)+VV(J))/(VVOLD(J+1)+VVOLD(J)
     1)-1.0)
      X1=X1/(XL(NSTRMS,I)-XL(K,I))
      X2=0.1
      IF(X1.LT.0.2)X2=EXP(-11.52*X1)
      DO 715 J=K,NSTRMS
715   VV(J)=VVOLD(J)+X2*(VV(J)-VVOLD(J))
      IF(NLOSS(I).EQ.1.AND.NL2(I).EQ.0)CALL UD0307
      DO 800 J=1,ITUB
      HS(J)=(H(J,I)+H(J+1,I))/2.0-(((VV(J)+VV(J+1))/2.0)**2+((VW(J,I)+VW
     1(J+1,I))/2.0)**2)/(2.0*G*EJ)
      IF(HS(J).GE.HMIN)GO TO 800
      IF(IPASS.LE.NFORCE)GO TO 790
      IF(LNCT.LT.NPAGE)GO TO 770
      WRITE(LOG2,500)
      LNCT=1
770   LNCT=LNCT+1
      WRITE(LOG2,780)IPASS,I,ITER,J,HS(J)
780   FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMTU
     1BE,I3,55H  STATIC ENTHALPY BELOW LIMIT IN CONTINUITY EQUATION AT,E
     213.5)
790   IFAIL=1
      HS(J)=HMIN
800   XM2(J)=UDG9(HS(J),(S(J,I)+S(J+1,I))/2.0,((VV(J)+VV(J+1))/2.0)**2)
      GO TO 1100
810   J=IMID
      JINC=1
820   LOOP=1
      JOLD=J
      J=J+JINC
      JJ=JOLD
      IF(JINC.EQ.-1)JJ=J
830   VOLD=VV(J)
      VAV=(VOLD+VV(JOLD))/2.0
      IFAIF=0
      ICONF2=0
      X2=(TBETA(J,I)+TBETA(JOLD,I))/2.0
      X1=(XI(J)+XI(JOLD))/2.0+((XN*(R(J,I)+R(JOLD,I))/2.0)**2-VAV**2*(1.
     10+X2*X2))/(2.0*G*EJ)
      IF(X1.GE.HMIN)GO TO 870
      IF(IPASS.LE.NFORCE)GO TO 860
      IF(LNCT.LT.NPAGE)GO TO 840
      WRITE(LOG2,500)
      LNCT=1
840   LNCT=LNCT+1
      WRITE(LOG2,850)IPASS,I,ITER,JJ,LOOP,X1
850   FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMTU
     1BE,I3,6H  LOOP,I3,43H  STATIC H IN MOMENTUM EQUN. BELOW LIMIT AT,E
     213.5)
```

```
860   IFAIE=1
      IFCONF2=1
      X1=HMIN
870   X3=(S(J,I)+S(JOLD,I))/2.0
      X7=UDG7(X1,X3)
      X4=(SPPG(J)+SPPG(JOLD))*0.5
      X5=(CPPG(J)+CPPG(JOLD))*0.5
      X1=X5*(CR(J)+CR(JOLD))*0.5-FX1(JJ)
      X12=1.0/(1.0+X2*X2)
      X8=(TANEPS(J)+TANEPS(JOLD))*0.5
      X11=FX2(JJ)-X7*DSUL(JJ)
      X6=X4*(DVMDM(J)+DVMDM(JOLD))*0.5-2.0*XN*X2*COS((GAMA(J)+GAMA(JOLD)
     1)*0.5)
      IF(IPASS.EQ.1.OR.I.EQ.1.OR.I.EQ.NSTNS)GO TO 920
      IF(NEQN.EQ.3)GO TO 900
      X11=X11+X7*(DSDM(J)+DSDM(JOLD))*0.5*(X4*X12-X8*X2*X12)
      X6=X6-X5*(DRVWDM(J)+DRVWDM(JOLD))*0.5
      GO TO 920
900   X11=X11+X7*(DSDM(J)+DSDM(JOLD))*0.5*X4
920   DV2DL=2.0*X12*(VAV*(X6+VAV*X1)+X11)
      DVMDVM(JJ)=X12*(X1-X11/VAV**2)
      X1=VV(JOLD)**2+DV2DL*(XL(J,I)-XL(JOLD,I))
      IF(X1.LE.9.0*VVOLD(IMID)**2)GO TO 938
      ICONF2=1
      IFAIE=1
      IF(IPASS.LE.NFORCE)GO TO 936
      CALL UD0303(LNCT,1)
      X1=SQRT(X1)
      X2=3.0*VVOLD(IMID)
      WRITE(LOG2,934)IPASS,I,ITER,J,LOOP,X1,X2
934   FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMLI
     1NE,I3,6H  LOOP,I3,33H  MERIDIONAL VELOCITY ABOVE LIMIT,E13.5,9H  L
     2IMIT =,E13.5)
936   X1=9.0*VVOLD(IMID)**2
938   IF(X1.GE.1.0)GO TO 950
      IF(IPASS.LE.NFORCE)GO TO 944
      IF(LNCT.LT.NPAGE)GO TO 930
      WRITE(LOG2,500)
      LNCT=1
930   LNCT=LNCT+1
      WRITE(LOG2,940)IPASS,I,ITER,J ,LOOP,X1
940   FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMLI
     1NE,I3,6H  LOOP,I3,46H  (MERIDIONAL VELOCITY) SQUARED BELOW LIMIT A
     2T,E13.5)
944   X1=1.0
      IFAIE=1
      ICONF2=1
950   VV(J)=SQRT(X1)
      IF(ABS(VV(J)/VOLD-1.0).LE.TOLNCE/5.0)GO TO 990
      IF(LOOP.GE.LPMAX)GO TO 960
```

```
      LOOP=LOOP+1
      GO TO 930
960   ICONF2=1
      IF(IPASS.LE.NFORCE)GO TO 990
      IF(LNCT.LT.NPAGE)GO TO 970
      WRITE(LOG2,500)
      LNCT=1
970   LNCT=LNCT+1
      WRITE(LOG2,980)IPASS,I,ITER,J,VV(J),VOLD
980   FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMLI
     1NE,I3,38H  MERIDIONAL VELOCITY UNCONVERGED  VM=,E13.6,9H VM(OLD)=,
     2E13.6)
990   IF(IFAIL.EQ.1)IFAIL=1
      IF(ICONF2.EQ.1)ICONF1=1
      IF(J.EQ.NSTRMS)GO TO 1000
      IF(J.EQ.1)GO TO 1010
      GO TO 820
1000  J=IMID
      JINC=-1
      GO TO 820
1010  IF(I.EQ.1)GO TO 1014
      IF(NLOSS(I).EQ.2.OR.(NLOSS(I).EQ.1.AND.NL2(I).EQ.0))CALL UD0307
1014  DO 1090 J=1,ITUB
      X1=((VV(J)+VV(J+1))/2.0)**2*(1.0+((TBETA(J,I)+TBETA(J+1,I))/2.0)**
     12)
      HS(J)=(XI(J)+XI(J+1))/2.0+((XN*(R(J,I)+R(J+1,I))/2.0)**2-X1)/(2.0*
     1G*EJ)
      IF(HS(J).GE.HMIN)GO TO 1080
      IF(IPASS.LE.NFORCE)GO TO 1070
      IF(LNCT.LT.NPAGE)GO TO 1060
      WRITE(LOG2,500)
      LNCT=1
1060  LNCT=LNCT+1
      WRITE(LOG2,780)IPASS,I,ITER,J,HS(J)
1070  IFAIL=1
      HS(J)=HMIN
1080  XM2(J)=UDG9(HS(J),(S(J,I)+S(J+1,I))/2.0,X1)
      IF(I.EQ.1.OR.NLOSS(I).NE.1.OR.NL2(I).NE.0)GO TO 1090
      X1=(S(J,I)+S(J+1,I))/2.0
      X2=UDG4(HS(J),X1)
      X4=UDG8(HS(J),X1)
      X3=(XI(J)+XI(J))/2.0+(XN*((R(J,I)+R(J+1,I))/2.0))**2/(2.0*G*EJ)
      X3=UDG4(X3,X1)
      XM2(J)=XM2(J)*(1.0+X4*(LOSS(J)+LOSS(J+1))/2.0*X2/(X3*(1.0+(LOSS(J)
     1+LOSS(J+1))/2.0*(1.0-X2/X3))))
1090  CONTINUE
1100  DELW(1)=0.0
      DWDV=0.0
      X2=BBLOCK(I)*BDIST(I)
      X3=BBLOCK(I)*(1.0-BDIST(I))*2.0/XL(NSTRMS,I)
```

```
      DO 1200 J=1,ITOP                                                                  $265$  402
      X1=DL(J)*(R(J+1,I)+R(J,I))*UDGS(HS(J),(S(J,I)+S(J+1,I))/2.0)*(VV(J$265$  403
     1)+VV(J+1))*(CPFG(J)+CPPG(J+1))*.5I/(4.0*SCLFAC**2)                                $265$  404
      X1=X1*((LAMI(J)+LAMI(J+1))/2.0-WWBL(I)-X2-X3*(XL(J,I)+XL(J+1.I)))                 $265$  405
      DELW(J+1)=DELW(J)+X1                                                              $265$  406
      X4=0.0                                                                            $265$  407
      IF(J.GE.IMID)GO TO 1130                                                           $265$  408
      L1=J                                                                              $265$  409
1110  X4=X4+DVMDVM(L1)                                                                  $265$  410
      IF(L1.GE.IMID-1)GO TO 1120                                                        $265$  411
      L1=L1+1                                                                           $265$  412
      GO TO 1110                                                                        $265$  413
1120  X4=X4/FLOAT(IMID-J)                                                               $265$  414
      GO TO 1200                                                                        $265$  415
1130  L1=IMID+1                                                                         $265$  416
1140  X4=X4+DVMDVM(L1)                                                                  $265$  417
      IF(L1.GE.J)GO TO 1150                                                             $265$  418
      L1=L1+1                                                                           $265$  419
      GO TO 1140                                                                        $265$  420
1150  X4=X4/FLOAT(J-IMID+1)                                                             $265$  421
1200  DWDV=DWDV+X1*(1.0-XM2(J))*2.0/((VV(J)+VV(J+1))*(1.0-((XL(J,I)+XL(J$265$  422
     1+1,I))*0.5-XL(IMID,I))*X4))                                                       $265$  423
      W=DELW(NSTRMS)                                                                    $265$  424
      FM2=DWDV/W*VV(IMID)                                                               $265$  425
      DO 1210 J=2,NSTRMS                                                                $265$  426
1210  DELW(J)=DELW(J)/W                                                                 $265$  427
      IF(DWDV.LE.0.0)GO TO 1250                                                         $265$  428
      IF(NMACH(1).EQ.1)GO TO 1330                                                       $265$  429
      IF(W.LT.FLOW(ICASE).AND.ICONF1.EQ.0)VMAX=VV(IMID)                                 $265$  430
1220  DV=(FLOW(ICASE)-W)/DWDV                                                           $265$  431
      IF(DV.LT.-0.1*VV(IMID))DV=-0.1*VV(IMID)                                           $265$  432
      IF(DV.GT. 0.1*VV(IMID))DV= 0.1*VV(IMID)                                           $265$  433
1230  IF(IPASS.EQ.1.OR.(I.NE.1.AND.JWORK(I).LE.4))GO TO 1234                            $265$  434
      IF(VV(IMID)+DV.LT.VMIN)GO TO 1232                                                 $265$  435
      DV=(VMIN-VV(IMID))*0.5                                                            $265$  436
1232  IF(VV(IMID)+DV.GT.VMAX)GO TO 1234                                                 $265$  437
      DV=(VMAX-VV(IMID))*0.5                                                            $265$  438
1234  DO 1270 J=K,NSTRMS                                                                $265$  439
      VV(J)=VV(J)+DV                                                                    $265$  440
      IF(VV(J).GE.1.0)GO TO 1270                                                        $265$  441
      IF(IPASS.LE.NFORCE)GO TO 1260                                                     $265$  442
      IF(LNCT.LT.NPAGE)GO TO 1240                                                       $265$  443
      WRITE(LOG2,500)                                                                   $265$  444
      LNCT=1                                                                            $265$  445
1240  LNCT=LNCT+1                                                                       $265$  446
      WRITE(LOG2,1250)IPASS,I,ITER,J,VV(J)                                              $265$  447
1250  FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,12H  STREAMLI$265$  448
     1NE,I3,50H  MERIDIONAL VELOCITY BELOW LIMIT IN CONTINUITY AT,E13.5)                $265$  449
1260  VV(J)=1.0                                                                         $265$  450
      IFAIL=1                                                                           $265$  451
```

```
1270  CONTINUE
      GO TO 1340
1280  IF(NMACH(I).EQ.0)GO TO 1290
      IF(W.LT.FLOW(ICASE).AND.ICONF1.EQ.0)VMIN=VV(IMID)
      GO TO 1220
1290  IF(VV(IMID).LT.VMIN.AND.ICONF1.EQ.0)VMIN=VV(IMID)
      DV=-.1*VV(IMID)
1300  IFAIL=1
      IF(IPASS.LE.NFORCE)GO TO 1230
      IF(LNCT.LT.NPAGE)GO TO 1310
      WRITE(LOG2,500)
      LNCT=1
1310  LNCT=LNCT+1
      WRITE(LOG2,1320)IPASS,I,ITER
1320  FORMAT(5X,4HPASS,I3,9H  STATION,I3,11H  ITERATION,I3,43H  OTHER CO
     1NTINUITY EQUATION BRANCH REQUIRED)
      GO TO 1230
1330  IF(VV(IMID).GT.VMAX.AND.ICONF1.EQ.0)VMAX=VV(IMID)
      DV=0.1*VV(IMID)
      GO TO 1300
1340  X1=TOLNCE/5.0
      IF(NEVAL(I).GT.0)X1=X1/2.0
      IF(ABS(W/FLOW(ICASE)-1.0).GT.X1)GO TO 1354
      DO 1350 J=K,NSTRMS
      IF(ABS(VV(J)/VVOLD(J)-1.0).GT.X1)GO TO 1354
1350  CONTINUE
      GO TO 1390
1354  IF(ITER.GE.ITMAX)GO TO 1360
      IF(I.EQ.1)GO TO 460
      IF((NLOSS(I).EQ.1.AND.NL2(I).EQ.0).OR.(NWORK(I).GE.5.AND.NLOSS(I)
     1EQ.2))CALL UDD307
      GO TO 460
1360  IF(IPASS.LE.NFORCE)GO TO 1390
      IF(LNCT.LT.NPAGE)GO TO 1370
      WRITE(LOG2,500)
      LNCT=1
1370  LNCT=LNCT+1
      X1=W/FLOW(ICASE)
      X2=VV(K)/VVOLD(K)
      X3=VV(IMID)/VVOLD(IMID)
      X4=VV(NSTRMS)/VVOLD(NSTRMS)
      WRITE(LOG2,1380)IPASS,I,X1,X2,X3,X4
1380  FORMAT(5X,4HPASS,I3,9H  STATION,I3,49H  MOMENTUM AND/OR CONTINUITY
     1 UNCONVERGED W/WSPEC=,F8.5,16H VM/VM(OLD) HUB=,F8.5,5H MID=,F8.5,5
     2H TIP=,F8.5)
1390  IF(IFAIL.NE.0.AND.IFAILO.EQ.0)IFAILO=I
      DO 1400 J=1,NSTRMS
1400  VM(J,I)=VV(J)
      IF(I.NE.1)GO TO 1420
      DO 1410 J=1,NSTRMS
```

```
1410    VW(J,1)=VV(J)*TBETA(J,1)                                        $26$  502
        GO TO 1480                                                      $26$  503
1420    IF(NMIX.NE.1)GO TO 1440                                         $26$  504
        DO 1430 J=1,NSTRMS                                              $26$  505
        S(J,I-1)=SKEEP(J)                                               $26$  506
        H(J,I-1)=HKEEP(J)                                               $26$  507
1430    VW(J,I-1)=VWKEEP(J)                                             $26$  508
1440    IF(NWORK(I).GE.5)GO TO 1460                                     $26$  509
        TBETA(1,I)=0.0                                                  $26$  510
        DO 1450 J=K,NSTRMS                                              $26$  511
1450    TBETA(J,I)=(VW(J,I)-XN*R(J,I))/VV(J)                            $26$  512
        GO TO 1480                                                      $26$  513
1460    DO 1470 J=1,NSTRMS                                              $26$  514
        VW(J,I)=VV(J)*TBETA(J,I)+XN*R(J,I)                              $26$  515
1470    H(J,I)=XI(J)+XN*R(J,I)*VW(J,I)/(G*EJ)                           $26$  516
1480    CONTINUE                                                        $26$  517
        END                                                             $26$  518
```

```
      OVERLAY(UDO300,2,0)
      PROGRAM
      COMMON /CONTRL/ ANAL,NAERO,NAMBIT,LOG1,LOG2,LOG3,LOG4,LOG5,LOGG
     1,NOUT(21),NPU(21),NSI(21),NSO(21),NPL(21),NPR(21),NPP(21),NPS(21)
     2,NPA(21),NPB(21),NPC(21),NPD(21),NPE(21),NPF(21),NPG(21),NPH(21)
     3,NPI(21),NPJ(21),NPK(21),NPM(21),NPN(21),NPO(21),NPT(21),NPV(21)
     4,NPW(21),NPX(21),NPY(21),NPZ(21),NSS(21),NSV(21),NSW(21),NSX(21)
     5,NSY(21),NSZ(21),NTA(21),NTB(21),NTC(21),NTD(21),NTE(21),NTF(21)
     6,NTG(21),NTH(21),NTI(21),NTJ(21),NTK(21),NTL(21),NTM(21),NTN(21)
     7,NTO(21),NTP(21),NTQ(21),NTR(21),NTS(21),NTT(21),NTU(21),NTV(21)
     8,NTW(21),NTX(21),NTY(21),NTZ(21),NSA(21),NSB(21),NSC(21),NSD(21)
     9,NSE(21),NSF(21),NSG(21),NSH(21),NSI(21),NSJ(21),NSK(21),NSL(21)
     A,NSM(21),NSN(21),NSO(21),NSP(21),NSQ(21),NSR(21),NSS(21),NST(21)
     B,NSU(21),NSV(21),NSW(21),NSX(21),NSY(21),NSZ(21),NTA(21),NTB(21)
     C,NTC(21),NTD(21),NTE(21),NTF(21),NTG(21),NTH(21),NTI(21),NTJ(21)
     D,NTK(21),NTL(21),NTM(21),NTN(21),NTO(21),NTP(21),NTQ(21),NTR(21)
     E,NTS(21),NTT(21),NTU(21),NTV(21),NTW(21),NTX(21),NTY(21),NTZ(21)
     F,NSA(21),NSB(21),NSC(21),NSD(21),NSE(21),NSF(21),NSG(21),NSH(21)
     G,NSI(21),NSJ(21),NSK(21),NSL(21),NSM(21),NSN(21),NSO(21),NSP(21)
     H,NSQ(21),NSR(21),NSS(21),NST(21),NSU(21),NSV(21),NSW(21),NSX(21)
     I,NSY(21),NSZ(21),NTA(21),NTB(21),NTC(21),NTD(21),NTE(21),NTF(21)
     J,NTG(21),NTH(21),NTI(21),NTJ(21),NTK(21),NTL(21),NTM(21),NTN(21)
     K,NTO(21),NTP(21),NTQ(21),NTR(21),NTS(21),NTT(21),NTU(21),NTV(21)
     L,NTW(21),NTX(21),NTY(21),NTZ(21),NSA(21),NSB(21),NSC(21),NSD(21)
     M,NSE(21),NSF(21),NSG(21),NSH(21),NSI(21),NSJ(21),NSK(21),NSL(21)
     N,NSM(21),NSN(21),NSO(21),NSP(21),NSQ(21),NSR(21),NSS(21),NST(21)
     O,NSU(21),NSV(21),NSW(21),NSX(21),NSY(21),NSZ(21),NTA(21),NTB(21)
     P,NTC(21),NTD(21),NTE(21),NTF(21),NTG(21),NTH(21),NTI(21),NTJ(21)
     Q,NTK(21),NTL(21),NTM(21),NTN(21),NTO(21),NTP(21),NTQ(21),NTR(21)
     R,NTS(21),NTT(21),NTU(21),NTV(21),NTW(21),NTX(21),NTY(21),NTZ(21)
     S,NSA(21),NSB(21),NSC(21),NSD(21),NSE(21),NSF(21),NSG(21),NSH(21)
     T,NSI(21),NSJ(21),NSK(21),NSL(21),NSM(21),NSN(21),NSO(21),NSP(21)
     U,NSQ(21),NSR(21),NSS(21),NST(21),NSU(21),NSV(21),NSW(21),NSX(21)
     V,NSY(21),NSZ(21),NTA(21),NTB(21),NTC(21),NTD(21),NTE(21),NTF(21)
     W,NTG(21),NTH(21),NTI(21),NTJ(21),NTK(21),NTL(21),NTM(21),NTN(21)
     X,NTO(21),NTP(21),NTQ(21),NTR(21),NTS(21),NTT(21),NTU(21),NTV(21)
     Y,NTW(21),NTX(21),NTY(21),NTZ(21),NSA(21),NSB(21),NSC(21),NSD(21)
     Z,NSE(21),NSF(21),NSG(21),NSH(21),NSI(21),NSJ(21),NSK(21),NSL(21)
     $,NSM(21),NSN(21),NSO(21),NSP(21),NSQ(21),NSR(21),NSS(21),NST(21)
     %,NSU(21),NSV(21),NSW(21),NSX(21),NSY(21),NSZ(21),NTA(21),NTB(21)
     &,NTC(21),NTD(21),NTE(21),NTF(21),NTG(21),NTH(21),NTI(21),NTJ(21)
     *,NTK(21),NTL(21),NTM(21),NTN(21),NTO(21),NTP(21),NTQ(21),NTR(21)
     +,NTS(21),NTT(21),NTU(21),NTV(21),NTW(21),NTX(21),NTY(21),NTZ(21)
     -,NSA(21),NSB(21),NSC(21),NSD(21),NSE(21),NSF(21),NSG(21),NSH(21)
     /,NSI(21),NSJ(21),NSK(21),NSL(21),NSM(21),NSN(21),NSO(21),NSP(21)
     =,NSQ(21),NSR(21),NSS(21),NST(21),NSU(21),NSV(21),NSW(21),NSX(21)
     1,NSY(21),NSZ(21),NTA(21),NTB(21),NTC(21),NTD(21),NTE(21),NTF(21)
     2,NTG(21),NTH(21),NTI(21),NTJ(21),NTK(21),NTL(21),NTM(21),NTN(21)
     3,NTO(21),NTP(21),NTQ(21),NTR(21),NTS(21),NTT(21),NTU(21),NTV(21)
     4,NTW(21),NTX(21),NTY(21),NTZ(21),NSA(21),NSB(21),NSC(21),NSD(21)
     5,NSE(21),NSF(21),NSG(21),NSH(21),NSI(21),NSJ(21),NSK(21),NSL(21)
     6,NSM(21),NSN(21),NSO(21),NSP(21),NSQ(21),NSR(21),NSS(21),NST(21)
     7,NSU(21),NSV(21),NSW(21),NSX(21),NSY(21),NSZ(21),NTA(21),NTB(21)
     8,NTC(21),NTD(21),NTE(21),NTF(21),NTG(21),NTH(21),NTI(21),NTJ(21)
     9,NTK(21),NTL(21),NTM(21),NTN(21),NTO(21),NTP(21),NTQ(21),NTR(21)
     A,NTS(21),NTT(21),NTU(21),NTV(21),NTW(21),NTX(21),NTY(21),NTZ(21)
     B,NSA(21),NSB(21),NSC(21),NSD(21),NSE(21),NSF(21),NSG(21),NSH(21)
     C,NSI(21),NSJ(21),NSK(21),NSL(21),NSM(21),NSN(21),NSO(21),NSP(21)
     D,NSQ(21),NSR(21),NSS(21),NST(21),NSU(21),NSV(21),NSW(21),NSX(21)
     E,NSY(21),NSZ(21),NTA(21),NTB(21),NTC(21),NTD(21),NTE(21),NTF(21)
     F,NTG(21),NTH(21),NTI(21),NTJ(21),NTK(21),NTL(21),NTM(21),NTN(21)
     G,NTO(21),NTP(21),NTQ(21),NTR(21),NTS(21),NTT(21),NTU(21),NTV(21)
     H,NTW(21),NTX(21),NTY(21),NTZ(21),NSA(21),NSB(21),NSC(21),NSD(21)
     I,NSE(21),NSF(21),NSG(21),NSH(21),NSI(21),NSJ(21),NSK(21),NSL(21)
     J,NSM(21),NSN(21),NSO(21),NSP(21),NSQ(21),NSR(21),NSS(21),NST(21)
     K,NSU(21),NSV(21),NSW(21),NSX(21),NSY(21),NSZ(21),NTA(21),NTB(21)
     L,NTC(21),NTD(21),NTE(21),NTF(21),NTG(21),NTH(21),NTI(21),NTJ(21)
     M,NTK(21),NTL(21),NTM(21),NTN(21),NTO(21),NTP(21),NTQ(21),NTR(21)
     N,NTS(21),NTT(21),NTU(21),NTV(21),NTW(21),NTX(21),NTY(21),NTZ(21)
     O,NSA(21),NSB(21),NSC(21),NSD(21),NSE(21),NSF(21),NSG(21),NSH(21)
     P,NSI(21),NSJ(21),NSK(21),NSL(21),NSM(21),NSN(21),NSO(21),NSP(21)
     Q,NSQ(21),NSR(21),NSS(21),NST(21),NSU(21),NSV(21),NSW(21),NSX(21)
     R,NSY(21),NSZ(21),NTA(21),NTB(21),NTC(21),NTD(21),NTE(21),NTF(21)
     S,NTG(21),NTH(21),NTI(21),NTJ(21),NTK(21),NTL(21),NTM(21),NTN(21)
     T,NTO(21),NTP(21),NTQ(21),NTR(21),NTS(21),NTT(21),NTU(21),NTV(21)
     U,NTW(21),NTX(21),NTY(21),NTZ(21),NSA(21),NSB(21),NSC(21),NSD(21)
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     %,NSY(21),NSZ(21),NTA(21),NTB(21),NTC(21),NTD(21),NTE(21),NTF(21)
     &,NTG(21),NTH(21),NTI(21),NTJ(21),NTK(21),NTL(21),NTM(21),NTN(21)
     *,NTO(21),NTP(21),NTQ(21),NTR(21),NTS(21),NTT(21),NTU(21),NTV(21)
     +,NTW(21),NTX(21),NTY(21),NTZ(21),NSA(21),NSB(21),NSC(21),NSD(21)
     -,NSE(21),NSF(21),NSG(21),NSH(21),NSI(21),NSJ(21),NSK(21),NSL(21)
     /,NSM(21),NSN(21),NSO(21),NSP(21),NSQ(21),NSR(21),NSS(21),NST(21)
     =,NSU(21),NSV(21),NSW(21),NSX(21),NSY(21),NSZ(21),NTA(21),NTB(21)
     1,NTC(21),NTD(21),NTE(21),NTF(21),NTG(21),NTH(21),NTI(21),NTJ(21)
     2,NTK(21),NTL(21),NTM(21),NTN(21),NTO(21),NTP(21),NTQ(21),NTR(21)
     3,NTS(21),NTT(21),NTU(21),NTV(21),NTW(21),NTX(21),NTY(21),NTZ(21)
     4,NSA(21),NSB(21),NSC(21),NSD(21),NSE(21),NSF(21),NSG(21),NSH(21)
     5,NSI(21),NSJ(21),NSK(21),NSL(21),NSM(21),NSN(21),NSO(21),NSP(21)
     6,NSQ(21),NSR(21),NSS(21),NST(21),NSU(21),NSV(21),NSW(21),NSX(21)
     7,NSY(21),NSZ(21),NTA(21),NTB(21),NTC(21),NTD(21),NTE(21),NTF(21)
     8,NTG(21),NTH(21),NTI(21),NTJ(21),NTK(21),NTL(21),NTM(21),NTN(21)
     9,NTO(21),NTP(21),NTQ(21),NTR(21),NTS(21),NTT(21),NTU(21),NTV(21)
     A,NTW(21),NTX(21),NTY(21),NTZ(21),NSA(21),NSB(21),NSC(21),NSD(21)
     B,NSE(21),NSF(21),NSG(21),NSH(21),NSI(21),NSJ(21),NSK(21),NSL(21)
     C,NSM(21),NSN(21),NSO(21),NSP(21),NSQ(21),NSR(21),NSS(21),NST(21)
     D,NSU(21),NSV(21),NSW(21),NSX(21),NSY(21),NSZ(21),NTA(21),NTB(21)
     E,NTC(21),NTD(21),NTE(21),NTF(21),NTG(21),NTH(21),NTI(21),NTJ(21)
     F,NTK(21),NTL(21),NTM(21),NTN(21),NTO(21),NTP(21),NTQ(21),NTR(21)
     G,NTS(21),NTT(21),NTU(21),NTV(21),NTW(21),NTX(21),NTY(21),NTZ(21)
     H,NSA(21),NSB(21),NSC(21),NSD(21),NSE(21),NSF(21),NSG(21),NSH(21)
     I,NSI(21),NSJ(21),NSK(21),NSL(21),NSM(21),NSN(21),NSO(21),NSP(21)
     J,NSQ(21),NSR(21),NSS(21),NST(21),NSU(21),NSV(21),NSW(21),NSX(21)
     K,NSY(21),NSZ(21),NTA(21),NTB(21),NTC(21),NTD(21),NTE(21),NTF(21)
     L,NTG(21),NTH(21),NTI(21),NTJ(21),NTK(21),NTL(21),NTM(21),NTN(21)
     M,NTO(21),NTP(21),NTQ(21),NTR(21),NTS(21),NTT(21),NTU(21),NTV(21)
     N,NTW(21),NTX(21),NTY(21),NTZ(21),NSA(21),NSB(21),NSC(21),NSD(21)
     O,NSE(21),NSF(21),NSG(21),NSH(21),NSI(21),NSJ(21),NSK(21),NSL(21)
     P,NSM(21),NSN(21),NSO(21),NSP(21),NSQ(21),NSR(21),NSS(21),NST(21)
     Q,NSU(21),NSV(21),NSW(21),NSX(21),NSY(21),NSZ(21),NTA(21),NTB(21)
     R,NTC(21),NTD(21),NTE(21),NTF(21),NTG(21),NTH(21),NTI(21),NTJ(21)
     S,NTK(21),NTL(21),NTM(21),NTN(21),NTO(21),NTP(21),NTQ(21),NTR(21)
     T,NTS(21),NTT(21),NTU(21),NTV(21),NTW(21),NTX(21),NTY(21),NTZ(21)
     U,NSA(21),NSB(21),NSC(21),NSD(21),NSE(21),NSF(21),NSG(21),NSH(21)
     V,NSI(21),NSJ(21),NSK(21),NSL(21),NSM(21),NSN(21),NSO(21),NSP(21)
     W,NSQ(21),NSR(21),NSS(21),NST(21),NSU(21),NSV(21),NSW(21),NSX(21)
     X,NSY(21),NSZ(21),NTA(21),NTB(21),NTC(21),NTD(21),NTE(21),NTF(21)
     Y,NTG(21),NTH(21),NTI(21),NTJ(21),NTK(21),NTL(21),NTM(21),NTN(21)
     Z,NTO(21),NTP(21),NTQ(21),NTR(21),NTS(21),NTT(21),NTU(21),NTV(21)
     $,NTW(21),NTX(21),NTY(21),NTZ(21),NSA(21),NSB(21),NSC(21),NSD(21)
     %,NSE(21),NSF(21),NSG(21),NSH(21),NSI(21),NSJ(21),NSK(21),NSL(21)
     &,NSM(21),NSN(21),NSO(21),NSP(21),NSQ(21),NSR(21),NSS(21),NST(21)
     *,NSU(21),NSV(21),NSW(21),NSX(21),NSY(21),NSZ(21),NTA(21),NTB(21)
     +,NTC(21),NTD(21),NTE(21),NTF(21),NTG(21),NTH(21),NTI(21),NTJ(21)
     -,NTK(21),NTL(21),NTM(21),NTN(21),NTO(21),NTP(21),NTQ(21),NTR(21)
     /,NTS(21),NTT(21),NTU(21),NTV(21),NTW(21),NTX(21),NTY(21),NTZ(21)
     =,NSA(21),NSB(21),NSC(21),NSD(21),NSE(21),NSF(21),NSG(21),NSH(21)
     1,NSI(
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      READ (LOG1,190) (XSTA(K,I),RSTA(K,I),K=1,KPT)                     $AN$
      IF (KPTS(I).GE.2) GO TO 170                                       $AN$
      KPTS(I)=2                                                         $AN$
      XSTA(2,I)=XSTA(1,I)                                               $AN$
      RSTA(2,I)=RSTA(1,I)+1.0                                           $AN$
170   READ (LOG1,190) (R(I,J),BLAFOR(I,J),J=1,NLINES)                   $AN$
180   FORMAT (2I3)                                                      $AN$
190   FORMAT (2F12.0)                                                   $AN$
      IDUM=KPTS(I)                                                      $AN$
      IF (NLINES.GT.IDUM) IDUM=NLINES                                   $AN$
      IF (LNCT.LE.54-IDUM) GO TO 210                                    $AN$
      WRITE (LOG2,200)                                                  $AN$
200   FORMAT (1H1)                                                      $AN$
      LNCT=2                                                            $AN$
210   LNCT=LNCT+IDUM+7                                                  $AN$
      IF (INAST.NE.0) GO TO 240                                         $AN$
      WRITE (LOG2,220) I,KPTS(I),I,IFANGS(I)                            $AN$
220   FORMAT (2X,/,10X,17HCOMPUTING STATION,I3,5X,28HNUMBER OF DESCRIBIN$AN$
     1G POINTS=,I3,6X,7HIFANGS(,I2,2H)=,I3,//6X,11HDESCRIPTION,9X,10HSTR$AN$
     2EAMLINE,5X,5HRADII,/,6X,1HX,9X,1HR,11X,6HNUMBER,//,2X)            $AN$
      DO 230 K=1,IDUM                                                   $AN$
      IF (K.LE.KPTS(I).AND.K.LE.NLINES) WRITE (LOG2,260) XSTA(K,I),RSTA($AN$
     1K,I),K,R(I,K)                                                     $AN$
      IF (K.LE.KPTS(I).AND.K.GT.NLINES) WRITE (LOG2,270) XSTA(K,I),RSTA($AN$
     1K,I)                                                              $AN$
      IF (K.GT.KPTS(I).AND.K.LE.NLINES) WRITE (LOG2,280) K,R(I,K)       $AN$
230   CONTINUE                                                          $AN$
      IF (INAST.EQ.0) GO TO 300                                         $AN$
240   WRITE (LOG2,290) I,KPTS(I),I,IFANGS(I)                            $AN$
      DO 250 K=1,IDUM                                                   $AN$
      IF (K.LE.KPTS(I).AND.K.LE.NLINES) WRITE (LOG2,260) XSTA(K,I),RSTA($AN$
     1K,I),K,R(I,K),BLAFOR(I,K)                                         $AN$
      IF (K.LE.KPTS(I).AND.K.GT.NLINES) WRITE (LOG2,270) XSTA(K,I),RSTA($AN$
     1K,I)                                                              $AN$
      IF (K.GT.KPTS(I).AND.K.LE.NLINES) WRITE (LOG2,280) K,R(I,K),BLAFOR$AN$
     1(I,K)                                                             $AN$
250   CONTINUE                                                          $AN$
260   FORMAT (3X,F8.4,2X,F8.4,8X,I2,9X,F8.4,9X,F8.4)                    $AN$
270   FORMAT (3X,F8.4,2X,F8.4)                                          $AN$
280   FORMAT (29X,I2,9X,F8.4,9X,F8.4)                                   $AN$
290   FORMAT (2X,/,10X,17HCOMPUTING STATION,I3,5X,28HNUMBER OF DESCRIBIN$AN$
     1G POINTS=,I3,6X,7HIFANGS(,I2,2H)=,I3,//6X,11HDESCRIPTION,9X,10HSTR$AN$
     2EAMLINE,5X,5HRADII,9X,14HDELTA PRESSURE,/,6X,1HX,9X,1HR,11X,6HNUMB$AN$
     3ER,//,2X)                                                         $AN$
300   CONTINUE                                                          $AN$
      IF (ISECN.EQ.1.OR.ISECN.EQ.3) GO TO 340                           $AN$
      IF (LNCT.LE.54-NSPEC) GO TO 310                                   $AN$
      WRITE (LOG2,200)                                                  $AN$
      LNCT=1                                                            $AN$
310   LNCT=LNCT+NSPEC+6                                                 $AN$
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      READ (LOG1,320) (ZR(J),B1(J),B2(J),PP(J),QQ(J),RLE(J),TC(J),TE(J),$AN$  102
     1ZZ(J),CORD(J),DELX(J),DELY(J),J=1,NSPEC)                              $AN$  103
  320 FORMAT (6F12.3)                                                       $AN$  104
      WRITE (LOG2,330) (ZR(J),B1(J),B2(J),PP(J),QQ(J),RLE(J),TC(J),TE(J)$AN$  105
     1,ZZ(J),CORD(J),DELX(J),DELY(J),J=1,NSPEC)                             $AN$  106
  330 FORMAT (2X,/,20X,30HSECTION GEOMETRY SPECIFICATION,//,10X,10HSTREA$AN$  107
     1MLINE,2X,5HINLET,5X,5HOUTLET,4X,5HY2 LE/,4X,6HY2 TE/,3X,4RHLE RADI$AN$  108
     2US MAX THICK TE THICK  POINT OF  CHORD OR,3X,7HX STACK,3X,7HY STAC$AN$  109
     3K,/,11X,6HNUMBER,2X,5HANGLE,5X,5HANGLE,3X,19HMAX VALUE MAX VALUE,3$AN$  110
     4X,8H/CHORD,4X,6H/CHORD,3X,8H/2*CHORD,2X,16HMAX THICK AXIAL CO,4X,6$AN$  111
     5HOFFSET,6X,6HOFFSET,//,(10X,F7.2,3X,F8.3,F10.3,2F10.4,3F10.5,2F10.$AN$  112
     64,F11.6,F10.5))                                                       $AN$  113
      GO TO 390                                                             $AN$  114
  340 IF (LNCT.LE.60-2*NSPEC) GO TO 350                                     $AN$  115
      WRITE (LOG2,200)                                                      $AN$  116
      LNCT=1                                                                $AN$  117
  350 LNCT=LNCT+10+2*NSPEC                                                  $AN$  118
      READ (LOG1,360) (ZR(J),B1(J),B2(J),PP(J),QQ(J),RLE(J),TC(J),TE(J),$AN$  119
     1ZZ(J),CORD(J),DELX(J),DELY(J),S(J),BS(J),J=1,NSPEC)                    $AN$  120
  360 FORMAT (6F12.0,/,6F12.0,/,2F12.0)                                     $AN$  121
      WRITE (LOG2,330) (ZR(J),B1(J),B2(J),PP(J),QQ(J),RLE(J),TC(J),TE(J)$AN$  122
     1,ZZ(J),CORD(J),DELX(J),DELY(J),J=1,NSPEC)                             $AN$  123
      IF (ISECN.EQ.1) WRITE (LOG2,370) (ZR(J),S(J),BS(J),J=1,NSPEC)         $AN$  124
  370 FORMAT (2X,/,10X,34HSTREAMLINE  INFLECTION  INFLECTION,/,11X,6HNUM$AN$  125
     1BER,8X,5HPOINT,7X,5HANGLE,//,(10X,F7.2,F14.5,F11.3))                  $AN$  126
      IF (ISECN.EQ.3) WRITE (LOG2,380) (ZR(J),S(J),BS(J),J=1,NSPEC)         $AN$  127
  380 FORMAT (2X,/,10X,33HSTREAMLINE  TRANSITION  DEL ANGLE,/,11X,6HNUMB$AN$  128
     1ER,8X,5HPOINT,6X,7HFROM LE,//,(10X,F7.2,F14.5,F11.3))                 $AN$  129
  390 IF (ISPLIT.EQ.0) GO TO 430                                            $AN$  130
      READ (LOG1,400) (RLES(J),TCS(J),TES(J),ZZS(J),PERSPT(J),J=1,NSPEC)$AN$  131
      WRITE (LOG2,410)                                                      $AN$  132
  400 FORMAT (5F12.4)                                                       $AN$  133
  410 FORMAT (2X,/,20X,13HSPLITTER DATA,//,10X,10HSTREAMLINE,2X,47HLE RA$AN$  134
     1DIUS MAX THICK TE THICK  POINT OF PER CENT,/,11X,6HNUMBER,7X,5H/CH$AN$  135
     2ORD,4X,5H/CHORD,3X,8H/2*CHORD,2X,9HMAX THICK,2X,8HSPLITTER,/,2X)   $AN$  136
      WRITE (LOG2,420) (ZR(J),RLES(J),TCS(J),TES(J),ZZS(J),PERSPT(J),J=1$AN$  137
     1,NSPEC)                                                               $AN$  138
  420 FORMAT (10X,F7.2,3X,F8.3,F10.3,3F10.4)                                $AN$  139
  430 CONTINUE                                                              $AN$  140
      IF (IFPLOT.EQ.4) CALL PLOT (0.0,-PLTSZE,-3)                           $AN$  141
      IF (IFPLOT.EQ.0.OR.IFPLOT.EQ.4) GO TO 440                             $AN$  142
      IKOUM=0                                                               $AN$  143
      IF (B1(1).LT.0.0) IKOUM=1                                             $AN$  144
      IF (IFPLOT.EQ.1.OR.IFPLOT.EQ.3) CALL UD0317 (ISTAK,PLTSZE,1,TITLE,$AN$  145
     1IKOUM,IFPLOT)                                                         $AN$  146
  440 NOUM=NPOINT                                                           $AN$  147
      IIOUM=ISECN                                                           $AN$  148
      DO 670 J=1,NLINES                                                     $AN$  149
      NPOINT=NOUM                                                           $AN$  150
      ISECN=IIOUM                                                           $AN$  151
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      DO 450 I=1,NSTNS                                                          $ANS$ 152
      KPT=KPTS(I)                                                               $ANS$ 153
  450 CALL UDU315 (RSTA(1,I),XSTA(1,I),KPT,P(1,J),XHERE(I),1,0)                 $ANS$ 154
      X(1)=XHERE(1)                                                             $ANS$ 155
      X(100)=XHERE(NSTNS)                                                       $ANS$ 156
      AX=(X(100)-X(1))/99.0                                                     $ANS$ 157
      DO 460 I=2,99                                                             $ANS$ 158
  460 X(I)=X(I-1)+AX                                                            $ANS$ 159
      CALL UDU314 (XHERE,R(1,J),NSTNS,X,XDUM,YPRIME,100,1)                      $ANS$ 160
      CALL UDU314 (XHERE,R(1,J),NSTNS,XHERE,XDUM,TANPHI(1,J),NSTNS,1)           $ANS$ 161
      SS(1)=0.0                                                                 $ANS$ 162
      DO 470 I=2,100                                                            $ANS$ 163
  470 SS(I)=SS(I-1)+AX*SQRT(1.0+((YPRIME(I)+YPRIME(I-1))/2.0)**2)                $ANS$ 164
      XJ=J                                                                      $ANS$ 165
      CALL UDU315 (ZR,B1,NSPEC,XJ,BETA1,1,0)                                    $ANS$ 166
      CALL UDU315 (ZR,B2,NSPEC,XJ,BETA2,1,0)                                    $ANS$ 167
      CALL UDU315 (ZR,PP,NSPEC,XJ,P,1,0)                                        $ANS$ 168
      CALL UDU315 (ZR,QQ,NSPEC,XJ,Q,1,0)                                        $ANS$ 169
      CALL UDU315 (ZR,RLE,NSPEC,XJ,YZERO,1,0)                                   $ANS$ 170
      CALL UDU315 (ZR,TC,NSPEC,XJ,T,1,0)                                        $ANS$ 171
      CALL UDU315 (ZR,TE,NSPEC,XJ,YONE,1,0)                                     $ANS$ 172
      CALL UDU315 (ZR,DELX,NSPEC,XJ,XDEL,1,0)                                   $ANS$ 173
      CALL UDU315 (ZR,DELY,NSPEC,XJ,YDEL,1,0)                                   $ANS$ 174
      CALL UDU315 (ZR,ZZ,NSPEC,XJ,Z,1,0)                                        $ANS$ 175
      CALL UDU315 (ZR,CORD,NSPEC,XJ,CHD,1,0)                                    $ANS$ 176
      IF (ISECN.EQ.0.OR.ISECN.EQ.2) GO TO 480                                   $ANS$ 177
      CALL UDU315 (ZR,S,NSPEC,XJ,SQ,1,0)                                        $ANS$ 178
      CALL UDU315 (ZR,SB,NSPEC,XJ,SB,1,0)                                       $ANS$ 179
  480 IF (ISPLIT.EQ.0) GO TO 490                                                $ANS$ 180
      CALL UDU315 (ZR,PLES,NSPEC,XJ,YZEROS,1,1)                                 $ANS$ 181
      CALL UDU315 (ZR,TCS,NSPEC,XJ,TS,1,1)                                      $ANS$ 182
      CALL UDU315 (ZR,TES,NSPEC,XJ,YONES,1,1)                                   $ANS$ 183
      CALL UDU315 (ZR,ZZS,NSPEC,XJ,ZSPMXT,1,1)                                  $ANS$ 184
      CALL UDU315 (ZR,PERSPT,NSPEC,XJ,PERSPJ,1,1)                               $ANS$ 185
  490 CALL UDU315 (X,SS,100,STACKX,BX,1,1)                                      $ANS$ 186
      CALL UDU313 (J,YS,YP,XS,XP,YSEMI,XSEMI,LOG1,LOG2,NPOINT,IPRINT,BET$ANS$ 187
     1A1,BETA2,P,Q,YZERO,T,YONE,XDEL,YDEL,Z,CHD,LNCT,IFCORD,SQ,SB,ISECN,$ANS$ 188
     2XSEMJ,YSEMJ,ISTAK,XHERE,X,SS,NSTNS,R,XTEMP,YPRIME,RAD,EPZ,BX,SIGMA$ANS$ 189
     3,CCORD,ISPLIT,YZEROS,TS,YONES,ZSPMXT,PERSPJ,INAST,IRLE,IRTE,THAKR)$ANS$ 190
      CALL UDU315 (X,SS,100,STACKX,BX,1,1)                                      $ANS$ 191
      DO 500 I=1,100                                                            $ANS$ 192
      X(I)=X(I)-STACKX                                                          $ANS$ 193
  500 SS(I)=SS(I)-BX                                                            $ANS$ 194
      DO 510 I=1,NSTNS                                                          $ANS$ 195
  510 XHERE(I)=XHERE(I)-STACKX                                                  $ANS$ 196
      IF (IFPLOT.EQ.0.OR.IFPLOT.EQ.2.OR.IFPLOT.EQ.4) GO TO 570                  $ANS$ 197
      XPLOT=XS(J,1)*SCALE                                                       $ANS$ 198
      YPLOT=YS(J,1)*SCALE                                                       $ANS$ 199
      CALL PLOT (XPLOT,YPLOT,3)                                                 $ANS$ 200
      DO 520 I=2,NPOINT                                                         $ANS$ 201
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      XPLOT=XS(J,I)*SCALE                                                $ANS$  202
      YPLOT=YS(J,I)*SCALE                                                $ANS$  203
  520 CALL PLOT (XPLOT,YPLOT,2)                                          $ANS$  204
      IF (ISECN.NE.2) GO TO 540                                          $ANS$  205
      DO 530 I=2,3                                                       $ANS$  206
      XPLOT=XSEMJ(J,I)*SCALE                                             $ANS$  207
      YPLOT=YSEMJ(J,I)*SCALE                                             $ANS$  208
  530 CALL PLOT (XPLOT,YPLOT,2)                                          $ANS$  209
  540 DO 550 II=1,NPOINT                                                 $ANS$  210
      I=NPOINT-II+1                                                      $ANS$  211
      XPLOT=XP(J,I)*SCALE                                                $ANS$  212
      YPLOT=YP(J,I)*SCALE                                                $ANS$  213
  550 CALL PLOT (XPLOT,YPLOT,2)                                          $ANS$  214
      DO 560 I=2,3                                                       $ANS$  215
      XPLOT=XSEMI(J,I)*SCALE                                             $ANS$  216
      YPLOT=YSEMI(J,I)*SCALE                                             $ANS$  217
  560 CALL PLOT (XPLOT,YPLOT,2)                                          $ANS$  218
      XPLOT=XS(J,1)*SCALE                                                $ANS$  219
      YPLOT=YS(J,1)*SCALE                                                $ANS$  220
      CALL PLOT (XPLOT,YPLOT,2)                                          $ANS$  221
  570 IJDUM=0                                                            $ANS$  222
      DO 580 I=1,NSTNS                                                   $ANS$  223
      IF (IFANGS(I).GE.1) IJDUM=1                                        $ANS$  224
  580 CONTINUE                                                           $ANS$  225
      IF (IJDUM.EQ.0) GO TO 600                                          $ANS$  226
      CALL UD0315 (SS,X,100,XTEMP,XTEMP,100,1)                           $ANS$  227
      DO 590 I=1,NSTNS                                                   $ANS$  228
      CALL UD0315 (XTEMP,SIGMA,100,XHERE(I),THETA(J,I),1,1)              $ANS$  229
      CALL UD0315 (XTEMP,YPRIME,100,XHERE(I),ALPHA(J,I),1,1)             $ANS$  230
      ZCAMB(J,I)=R(I,J)*COS(THETA(J,I))                                  $ANS$  231
      XCAMB(J,I)=XHERE(I)                                                $ANS$  232
  590 YCAMB(J,I)=R(I,J)*SIN(THETA(J,I))                                  $ANS$  233
  600 DO 610 I=1,NPOINT                                                  $ANS$  234
  610 XTEMP(I)=XS(J,I)                                                   $ANS$  235
      CALL UD0315 (SS,X,100,XTEMP,XTEMP,NPOINT,1)                        $ANS$  236
      CALL UD0315 (XHERE,R(1,J),NSTNS,XTEMP,RAD,NPOINT,0)                $ANS$  237
      K=1                                                                $ANS$  238
      DO 620 I=1,NPOINT                                                  $ANS$  239
      EPS=EPZ(I,K)                                                       $ANS$  240
      ZS(J,I)=RAD(I)*COS(EPS)                                            $ANS$  241
      YS(J,I)=RAD(I)*SIN(EPS)                                            $ANS$  242
  620 XS(J,I)=XTEMP(I)                                                   $ANS$  243
      DO 630 I=1,NPOINT                                                  $ANS$  244
  630 XTEMP(I)=XP(J,I)                                                   $ANS$  245
      CALL UD0315 (SS,X,100,XTEMP,XTEMP,NPOINT,1)                        $ANS$  246
      CALL UD0315 (XHERE,R(1,J),NSTNS,XTEMP,RAD,NPOINT,0)                $ANS$  247
      K=2                                                                $ANS$  248
      DO 640 I=1,NPOINT                                                  $ANS$  249
      EPS=EPZ(I,K)                                                       $ANS$  250
      ZP(J,I)=RAD(I)*COS(EPS)                                            $ANS$  251
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      YP(J,1)=RAD(I)*SIN(EPS)                                                    $ANS$  252
640   XP(J,I)=XTEMP(I)                                                           $ANS$  253
      DO 650 I=1,31                                                              $ANS$  254
650   XTEMP(I)=XSEMI(J,I)                                                        $ANS$  255
      CALL UDO315 (SS,X,100,XTEMP,XTEMP,31,1)                                    $ANS$  256
      CALL UDO315 (XHERE,R(1,J),NSTNS,XTEMP,RAD,31,0)                            $ANS$  257
      K=3                                                                        $ANS$  258
      DO 660 I=1,31                                                              $ANS$  259
      EPS=EPZ(I,K)                                                               $ANS$  260
      ZSEMI(J,I)=RAD(I)*COS(EPS)                                                 $ANS$  261
      YSEMI(J,I)=RAD(I)*SIN(EPS)                                                 $ANS$  262
660   XSEMI(J,I)=XTEMP(I)                                                        $ANS$  263
      IF (ISECN.NE.2) GO TO 690                                                  $ANS$  264
      DO 670 I=1,31                                                              $ANS$  265
670   XTEMP(I)=XSEMJ(J,I)                                                        $ANS$  266
      CALL UDO315 (SS,X,100,XTEMP,XTEMP,31,1)                                    $ANS$  267
      CALL UDO315 (XHERE,R(1,J),NSTNS,XTEMP,RAD,31,0)                            $ANS$  268
      K=4                                                                        $ANS$  269
      DO 690 I=1,31                                                              $ANS$  270
      EPS=EPZ(I,K)                                                               $ANS$  271
      ZSEMJ(J,I)=RAD(I)*COS(EPS)                                                 $ANS$  272
      YSEMJ(J,I)=RAD(I)*SIN(EPS)                                                 $ANS$  273
680   XSEMJ(J,I)=XTEMP(I)                                                        $ANS$  274
690   IF (IPRINT.GE.2) GO TO 870                                                 $ANS$  275
      IF (LNCT.LE.50) GO TO 700                                                  $ANS$  276
      WRITE (LOG2,200)                                                           $ANS$  277
      LNCT=1                                                                     $ANS$  278
700   LNCT=LNCT+5                                                                $ANS$  279
      WRITE (LOG2,710) J                                                         $ANS$  280
710   FORMAT (2X,/,10X,38HCARTESIAN COORDINATES ON STREAMSURFACE,I3,//,1$ANS$  281
     10X,8HPOINT NO,5X,2HZ1,12X,2HX1,12X,2HY1,16X,2HZ2,12X,2HX2,12X,2HY2$ANS$  282
     2,/,2X)                                                                     $ANS$  283
      I=1                                                                        $ANS$  284
720   WRITE (LOG2,730) I,ZS(J,I),XS(J,I),YS(J,I),ZP(J,I),XP(J,I),YP(J,I)$ANS$  285
730   FORMAT (10X,I5,3X,1P3E14.5,4X,1P3E14.5)                                    $ANS$  286
      I=I+1                                                                      $ANS$  287
      LNCT=LNCT+1                                                                $ANS$  288
      IF (I.GT.NPOINT) GO TO 750                                                 $ANS$  289
      IF (LNCT.LT.50) GO TO 720                                                  $ANS$  290
      WRITE (LOG2,740)                                                           $ANS$  291
740   FORMAT(1H1,9X,8HPOINT NO,5X,2HZ1,12X,2HX1,12X,2HY1,16X,2HZ2,12X,2H$ANS$  292
     1X2,12X,2HY2,/,2X)                                                          $ANS$  293
      LNCT=2                                                                     $ANS$  294
      GO TO 720                                                                  $ANS$  295
750   IF (LNCT.LE.50) GO TO 760                                                  $ANS$  296
      WRITE (LOG2,200)                                                           $ANS$  297
      LNCT=1                                                                     $ANS$  298
760   LNCT=LNCT+3                                                                $ANS$  299
      IF (ISECN.NE.2) GO TO 770                                                  $ANS$  300
      GO TO 820                                                                  $ANS$  301
```

```
770   WRITE (LOG2,780)                                                  $AN$
780   FORMAT (2X,/,10X,5HPOINT NO,4X,5HZSEMI,9X,5HXSEMI,9X,5HYSEMI,/,2X)$AN$
790   FORMAT (2X,/,10X,5HPOINT NO,4X,5HZSEMI,9X,5HXSEMI,9X,5HYSEMI,13X,5$AN$
     1HZSEMJ,9X,5HXSEMJ,9X,5HYSEMJ,/,2X)                                $AN$
      I=1                                                               $AN$
800   WRITE (LOG2,810) I,ZSEMI(J,I),XSEMI(J,I),YSEMI(J,I)               $AN$
810   FORMAT (10X,I5,3X,1P3E14.5)                                       $AN$
      GO TO 850                                                         $AN$
820   WRITE (LOG2,790)                                                  $AN$
      I=1                                                               $AN$
830   WRITE (LOG2,840) I,ZSEMI(J,I),XSEMI(J,I),YSEMI(J,I),ZSEMJ(J,I),XSE$AN$
     1MJ(J,I),YSEMJ(J,I)                                                $AN$
840   FORMAT (10X,I5,3X,1P3E14.5,4X,1P3E14.5)                           $AN$
850   I=I+1                                                             $AN$
      LNCT=LNCT+1                                                       $AN$
      IF (I.GT.31) GO TO 870                                            $AN$
      IF (LNCT.LE.59.AND.ISECN.EQ.2) GO TO 830                          $AN$
      IF (ISECN.NE.2) GO TO 860                                         $AN$
      WRITE (LOG2,200)                                                  $AN$
      WRITE (LOG2,780)                                                  $AN$
      LNCT=4                                                            $AN$
      GO TO 830                                                         $AN$
860   IF (LNCT.LE.59) GO TO 800                                         $AN$
      WRITE (LOG2,200)                                                  $AN$
      WRITE (LOG2,780)                                                  $AN$
      LNCT=4                                                            $AN$
      GO TO 800                                                         $AN$
870   CONTINUE                                                          $AN$
      IF (IPRINT.EQ.1) GO TO 1030                                       $AN$
      VOL=0.0                                                           $AN$
      DO 880 J=2,NLINES                                                 $AN$
      VOL=VOL+(((XS(J,1)-XP(J,1))**2+(YS(J,1)-YP(J,1))**2)+((XS(J-1,1)-X$AN$
     1P(J-1,1))**2+(YS(J-1,1)-YP(J-1,1))**2))*(ZS(J,1)+ZP(J,1)-ZS(J-1,1)$AN$
     2-ZP(J-1,1))*PI/32.0                                               $AN$
      DO 880 I=2,NPOINT                                                 $AN$
880   VOL=VOL+((SQRT((XS(J,I)-XP(J,I))**2+(YS(J,I)-YP(J,I))**2)+SQRT((XS$AN$
     1(J,I-1)-XP(J,I-1))**2+(YS(J,I-1)-YP(J,I-1))**2))*(SQRT((XS(J,I-1)-$AN$
     2XS(J,I))**2+(YS(J,I-1)-YS(J,I))**2)+SQRT((XP(J,I-1)-XP(J,I))**2+(Y$AN$
     3P(J,I-1)-YP(J,I))**2))+(SQRT((XS(J-1,I)-XP(J-1,I))**2+(YS(J-1,I)-Y$AN$
     4P(J-1,I))**2)+SQRT((XS(J-1,I-1)-XP(J-1,I-1))**2+(YS(J-1,I-1)-YP(J-$AN$
     51,I-1))**2))*(SQRT((XS(J-1,I-1)-XS(J-1,I))**2+(YS(J-1,I-1)-YS(J-1,$AN$
     6I))**2)+SQRT((XP(J-1,I-1)-XP(J-1,I))**2+(YP(J-1,I-1)-YP(J-1,I))**2$AN$
     7)))*(ZS(J,I)+ZS(J,I-1)+ZP(J,I)+ZP(J,I-1)-ZS(J-1,I)-ZS(J-1,I-1)-ZP($AN$
     8J-1,I)-ZP(J-1,I-1))/32.0                                          $AN$
      IF (LNCT.LE.59) GO TO 890                                         $AN$
      LNCT=1                                                            $AN$
      WRITE (LOG2,200)                                                  $AN$
890   LNCT=LNCT+4                                                       $AN$
      WRITE (LOG2,900) VOL                                              $AN$
900   FORMAT (2X,/,2X,/,40X,25HVOLUME OF BLADE SECTION =,1PE11.4,/,40X,3$AN$
```

```
     16(1H*))                                                                          $AN$$  352
      IF (IJDUM.EQ.0) GO TO 1030                                                       $AN$$  353
      IF (IPRINT.NE.3) WRITE (LOG2,200)                                                $AN$$  354
      IF (IPRINT.EQ.3) WRITE (LOG2,910)                                                $AN$$  355
  910 FORMAT (2X,/,2X)                                                                 $AN$$  356
      WRITE (LOG2,920)                                                                 $AN$$  357
  920 FORMAT (43X,43HBLADE CALCULATIONS FOR AERODYNAMIC ANALYSIS,/,43X,4               $AN$$  358
     13(1H*))                                                                          $AN$$  359
      IDUM=7                                                                           $AN$$  360
      LNCT=LNCT+4                                                                      $AN$$  361
      IF (IPRINT.NE.3) LNCT=3                                                          $AN$$  362
      DO 1020 I=1,NSTNS                                                                $AN$$  363
      IF (IFANGS(I).EQ.0.OR.(ISPLIT.GE.1.AND.IFANGS(I).EQ.1)) GO TO 1020               $AN$$  364
      DO 940 J=1,NLINES                                                                $AN$$  365
      CALL UD0315 (RSTA(1,I),XSTA(1,I),KPTS(I),R(I,J),XDUM,1,0)                        $AN$$  366
      CALL UD0314 (RSTA(1,I),XSTA(1,I),KPTS(I),R(I,J),XDUM,ZQ(J),1,1)                  $AN$$  367
      DO 930 K=1,NPOINT                                                                $AN$$  368
      SS(K)=XS(J,K)                                                                    $AN$$  369
      RAD(K)=YS(J,K)                                                                   $AN$$  370
      XTEMP(K)=XP(J,K)                                                                 $AN$$  371
  930 X(K)=YP(J,K)                                                                     $AN$$  372
      XDUM=XDUM-STACKX                                                                 $AN$$  373
      CALL UD0315 (SS,RAD,NPOINT,XDUM,YY1,1,1)                                         $AN$$  374
      CALL UD0315 (XTEMP,X,NPOINT,XDUM,YY2,1,1)                                        $AN$$  375
      W1=YY1/R(I,J)                                                                    $AN$$  376
      W2=YY2/R(I,J)                                                                    $AN$$  377
      TQ(J)=ABS(ATAN(W1/SQRT(1.-W1**2))-ATAN(W2/SQRT(1.-W2**2)))/(2.*PI)               $AN$$  378
     1*FLOAT(NBLADE)                                                                   $AN$$  379
  940 CONTINUE                                                                         $AN$$  380
      CALL UD0314 (XCAMB(1,I),YCAMB(1,I),NLINES,ZCAMB(1,I),XDUM,RLE,NLIN               $AN$$  381
     1ES,1)                                                                            $AN$$  382
      IF (LNCT+IDUM+NLINES.LE.59) GO TO 950                                            $AN$$  383
      WRITE (LOG2,200)                                                                 $AN$$  384
      LNCT=2                                                                           $AN$$  385
  950 LNCT=LNCT+IDUM+NLINES                                                            $AN$$  386
      WRITE (LOG2,960) I,NLINES                                                        $AN$$  387
  960 FORMAT (///,48X,8HSTATION ,I2,5X,17HNUMBER OF RADII= ,I2,//,36X,6H               $AN$$  388
     1RADIUS,5X,7HSECTION,6X,4HLEAN,9X,5HBLADE,7X,5HTHETA,/,48X,5HANGLE,              $AN$$  389
     2 6X,5HANGLE,7X,8HBLOCKAGE,/,2X)                                                  $AN$$  390
      DO 1000 J=1,NLINES                                                               $AN$$  391
      EPS=(THETA(J,I)-ATAN(RLE(J)))*C1                                                 $AN$$  392
      ALPHB=ALPHA(J,I)                                                                 $AN$$  393
      ALP=(ATAN((TANPHI(I,J)*TAN(EPS/C1)+ALPHB*SQRT(1.+TANPHI(I,J)**2))/               $AN$$  394
     1(1.-TANPHI(I,J)*ZQ(J))))*C1                                                      $AN$$  395
      ALPHA(I,J)=ALP                                                                   $AN$$  396
      EPSLON(I,J)=ATAN(TAN(EPS/C1)/SQRT(1.0+ZQ(J)**2))*C1                              $AN$$  397
      IF (ISPLIT.LT.1) GO TO 990                                                       $AN$$  398
      READ(LOG1,970)X3                                                                 $AN$$  399
  970 FORMAT(36X,F12.0)                                                                $AN$$  400
      WRITE(LOG2,980)X3,I,J                                                            $AN$$  401
```

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980    FORMAT(90X,14HADDIT. BLOCK =,F7.5,3H I=,I2,3H J=,I2)                    $ANS  402
       TQ(J)=TQ(J)+X2                                                          $ANS  403
990    WRITE (LOG2,1010) R(I,J),ALP,EPS,TQ(J),THETA(J,I)                       $ANS  404
1000   BLOCK(I,J)=TQ(J)                                                        $ANS  405
1010   FORMAT (30X,6F12.4)                                                     $ANS  406
1020   CONTINUE                                                                $ANS  407
1030   IF (IFPLOT.LT.2.OR.IFPLOT.EQ.4) GO TO 1040                              $ANS  408
       CALL UD0317 (ISTAK,PLTSZE,2,TITLE,IKOUM,IFPLOT)                         $ANS  409
1040   IF (IPRINT.EQ.1.OR.IPRINT.EQ.3) GO TO 1060                              $ANS  410
       LNCT=2                                                                  $ANS  411
       WRITE (LOG2,1050)                                                       $ANS  412
1050   FORMAT (1H1,27X,74HBLADE SURFACE GEOMETRY IN CARTESIAN COORDINATES      $ANS  413
      1 AT SPECIFIED VALUES OF (Z(,/,28X,74H**************************       $ANS  414
      2**************************************)                                 $ANS  415
1060   IF (IPRINT.EQ.1.AND.IFPLOT.LE.1) GO TO 1470                             $ANS  416
       XZ=NZ-1                                                                 $ANS  417
       DZ=(ZOUTER-ZINNER)/XZ                                                   $ANS  418
       ZOUT(1)=ZINNER                                                          $ANS  419
       DO 1070 J=3,NZ                                                          $ANS  420
1070   ZOUT(J-1)=ZOUT(J-2)+DZ                                                  $ANS  421
       ZOUT(NZ)=ZOUTER                                                         $ANS  422
       DO 1080 I=1,NPOINT                                                      $ANS  423
       CALL UD0315 (ZS(1,I),XS(1,I),NLINES,ZOUT,TEMP1,NZ,0)                    $ANS  424
       CALL UD0315 (ZS(1,I),YS(1,I),NLINES,ZOUT,TEMP2,NZ,0)                    $ANS  425
       CALL UD0315 (ZP(1,I),XP(1,I),NLINES,ZOUT,TEMP3,NZ,0)                    $ANS  426
       CALL UD0315 (ZP(1,I),YP(1,I),NLINES,ZOUT,TEMP4,NZ,0)                    $ANS  427
       DO 1080 J=1,NZ                                                          $ANS  428
       XS(J,I)=TEMP1(J)                                                        $ANS  429
       YS(J,I)=TEMP2(J)                                                        $ANS  430
       XP(J,I)=TEMP3(J)                                                        $ANS  431
1080   YP(J,I)=TEMP4(J)                                                        $ANS  432
       DO 1090 I=1,31                                                          $ANS  433
       CALL UD0315 (ZSEMI(1,I),XSEMI(1,I),NLINES,ZOUT,TEMP1,NZ,0)              $ANS  434
       CALL UD0315 (ZSEMI(1,I),YSEMI(1,I),NLINES,ZOUT,TEMP2,NZ,0)              $ANS  435
       DO 1090 J=1,NZ                                                          $ANS  436
       XSEMI(J,I)=TEMP1(J)                                                     $ANS  437
1090   YSEMI(J,I)=TEMP2(J)                                                     $ANS  438
       IF (ISECN.NE.2) GO TO 1110                                              $ANS  439
       DO 1100 I=1,31                                                          $ANS  440
       CALL UD0315 (ZSEMJ(1,I),XSEMJ(1,I),NLINES,ZOUT,TEMP1,NZ,0)              $ANS  441
       CALL UD0315 (ZSEMJ(1,I),YSEMJ(1,I),NLINES,ZOUT,TEMP2,NZ,0)              $ANS  442
       DO 1100 J=1,NZ                                                          $ANS  443
       XSEMJ(J,I)=TEMP1(J)                                                     $ANS  444
1100   YSEMJ(J,I)=TEMP2(J)                                                     $ANS  445
1110   DO 1480 J=1,NZ                                                          $ANS  446
       RO=SQRT((XS(J,1)-XP(J,1))**2+(YS(J,1)-YP(J,1))**2)/2.0                  $ANS  447
       AREA=PI*RO**2/2.0                                                       $ANS  448
       BETA1=ATAN((YS(J,2)+YP(J,2)-YS(J,1)-YP(J,1))/(XS(J,2)+XP(J,2)-XS(J      $ANS  449
      1,1)-XP(J,1)))                                                           $ANS  450
       XINT=AREA*((XP(J,1)+XS(J,1))/2.0-COS(BETA1)*4.0/(3.0*PI)*RO)            $ANS  451
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      YINT=AREA*((YP(J,1)+YS(J,1))/2.0-SIN(BETA1)*4.0/(3.0*PI)*RD)          $AN$  452
      IF (ISECON.NE.2) GO TO 1120                                           $AN$  453
      N1=NPOINT                                                             $AN$  454
      N=N1                                                                  $AN$  455
      N2=N1-1                                                               $AN$  456
      BETA2=ATAN((YS(J,N1)+YP(J,N1)-YS(J,N2)-YP(J,N2))/(XS(J,N1)+XP(J,N1$AN$  457
     1)-XS(J,N2)-XP(J,N2)))                                                 $AN$  458
      XINT=XINT+AREA*((XP(J,N)+XS(J,N))/2.+COS(BETA2)*4./(3.*PI)*RD)        $AN$  459
      YINT=YINT+AREA*((YP(J,N)+YS(J,N))/2.+SIN(BETA2)*4./(3.*PI)*RD)        $AN$  460
      AREA=2.*AREA                                                          $AN$  461
 1120 DO 1130 I=2,NPOINT                                                    $AN$  462
      DELA=(SQRT((XS(J,I-1)-XP(J,I))**2+(YS(J,I)-YP(J,I))**2)+SQRT((XS(J,I$AN$  463
     1-1)-XP(J,I-1))**2+(YS(J,I-1)-YP(J,I-1))**2))*(SQRT((XS(J,I-1)-XS(J$AN$  464
     2,I))**2+(YS(J,I-1)-YS(J,I))**2)+SQRT((XP(J,I-1)-XP(J,I))**2+(YP(J,$AN$  465
     3I-1)-YP(J,I))**2))/4.0                                                $AN$  466
      AREA=AREA+DELA                                                        $AN$  467
      XINT=XINT+DELA*(XS(J,I)+XS(J,I-1)+XP(J,I)+XP(J,I-1))/4.0              $AN$  468
 1130 YINT=YINT+DELA*(YS(J,I)+YS(J,I-1)+YP(J,I)+YP(J,I-1))/4.0              $AN$  469
      YINT=YINT/AREA                                                        $AN$  470
      XINT=XINT/AREA                                                        $AN$  471
      X1=(XS(J,1)+XP(J,1))/2.                                               $AN$  472
      Y1=(YS(J,1)+YP(J,1))/2.                                               $AN$  473
      T1=SQRT((XS(J,1)-XP(J,1))**2+(YS(J,1)-YP(J,1))**2)                    $AN$  474
      F=0.                                                                  $AN$  475
      U=0.                                                                  $AN$  476
      DO 1140 I=2,NPOINT                                                    $AN$  477
      T2=SQRT((XS(J,I)-XP(J,I))**2+(YS(J,I)-YP(J,I))**2)                    $AN$  478
      X2=(XS(J,I)+XP(J,I))/2.                                               $AN$  479
      Y2=(YS(J,I)+YP(J,I))/2.                                               $AN$  480
      DELU=SQRT((X2-X1)**2+(Y2-Y1)**2)                                      $AN$  481
      U=U+DELU                                                              $AN$  482
      TAV3=(T1**3+T2**3)/2.                                                 $AN$  483
      F=F+TAV3*DELU                                                         $AN$  484
      X1=X2                                                                 $AN$  485
      Y1=Y2                                                                 $AN$  486
 1140 T1=T2                                                                 $AN$  487
      TORCON=((1./3.)*F)/(1.+(4./3.)*F/AREA/U**2)                           $AN$  488
      IX=0.0                                                                $AN$  489
      IY=0.0                                                                $AN$  490
      IXY=0.0                                                               $AN$  491
      DO 1150 I=2,NPOINT                                                    $AN$  492
      XD=(SQRT((XS(J,I-1)-XP(J,I-1))**2+(YS(J,I-1)-YP(J,I-1))**2)+SQRT((($AN$  493
     1XS(J,I)-XP(J,I))**2+(YS(J,I)-YP(J,I))**2))/2.0                        $AN$  494
      YD=(SQRT((XS(J,I)-XS(J,I-1))**2+(YS(J,I)-YS(J,I-1))**2)+SQRT((XP(J$AN$  495
     1,I)-XP(J,I-1))**2+(YP(J,I)-YP(J,I-1))**2))/2.0                        $AN$  496
      IXD=YD*YD*YD*XD/12.0                                                  $AN$  497
      IYD=XD*XD*XD*YD/12.0                                                  $AN$  498
      ANG=ATAN((YS(J,I)+YP(J,I)-YS(J,I-1)-YP(J,I-1))/(XP(J,I)+XS(J,I)-XP$AN$  499
     1(J,I-1)-XS(J,I-1)))                                                   $AN$  500
      COSANG=COS(2.0*ANG)                                                   $AN$  501
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      IXN=(IXO+IYO+(IXO-IYO)*COSANG)/2.0                                        $ANS  502
      IYN=(IXO+IYO-(IXO-IYO)*COSANG)/2.0                                        $ANS  503
      IXYN=0.0                                                                  $ANS  504
      IF (ANG.NE.0.0) IXYN=((IXN-IYN)*COSANG-IXO+IYO)/(2.0*SIN(2.0*ANG))        $ANS  505
      DELA=XO*YO                                                                $ANS  506
      YMN=(YS(J,I)+YS(J,I-1)+YP(J,I)+YP(J,I-1))/4.0-YINT                        $ANS  507
      XMN=(XS(J,I)+XS(J,I-1)+XP(J,I)+XP(J,I-1))/4.0-XINT                        $ANS  508
      IX=IX+IXN+DELA*YMN*YMN                                                    $ANS  509
      IY=IY+IYN+DELA*XMN*XMN                                                    $ANS  510
1150  IXY=IXY+IXYN+DELA*YMN*XMN                                                 $ANS  511
      ANG=ATAN(2.0*IXY/(IY-IX))                                                 $ANS  512
      IPX=(IX+IY)/2.0+(IX-IY)/2.0*COS(ANG)-IXY*SIN(ANG)                         $ANS  513
      IPY=(IX+IY)/2.0-(IX-IY)/2.0*COS(ANG)+IXY*SIN(ANG)                         $ANS  514
      ANG=ANG/2.0*57.31                                                         $ANS  515
      IF (IPRINT.EQ.1.OR.IPRINT.EQ.3) GO TO 1320                                $ANS  516
      IF (LNCT.LE.49) GO TO 1160                                                $ANS  517
      WRITE (LOG2,200)                                                          $ANS  518
      LNCT=1                                                                    $ANS  519
1160  LNCT=LNCT+16                                                              $ANS  520
      WRITE (LOG2,1170) J,ZOUT(J),AREA,XINT,YINT,IX,IY,IXY,IPX,ANG,IPY,A$ANS  521
     1NG                                                                        $ANS  522
1170  FORMAT (2X,/,50X,14HSECTION NUMBER,I3,3X,5H(Z( =,F9.4,/,50X,34H***$ANS  523
     1**********************,///,20X,18HSECTION PROPERTIES,7X,1$ANS  524
     2HSECTION AREA,26X,1H=,1PE12.4,//,45X,20HLOCATION OF CENTROID,11X,$ANS  525
     34HXBAR,3X,1H=,E12.4,/,45X,22HRELATIVE TO STACK AXIS,9X,4HYBAR,3X,1$ANS  526
     4H=,E12.4,//,45X,22HSECOND MOMENTS OF AREA,9X,2HIX,5X,1H=,E12.4,/,4$ANS  527
     55X,14HABOUT CENTROID,17X,2HIY,5X,1H=,E12.4,/,76X,3HIXY,4X,1H=,E12.$ANS  528
     6,//,45X,24HPRINCIPAL SECOND MOMENTS,7X,3HIPX,4X,1H=,E12.4,4H (AT,$ANS  529
     70PF7.2,21H DEGREES TO (X( AXIS),/,45X,22HOF AREA ABOUT CENTROID,9X$ANS  530
     8,3HIPY,4X,1H=,1PE12.4,4H (AT,0PF7.2,21H DEGREES TO (Y( AXIS))     $ANS  531
      WRITE (LOG2,1180) TORCON                                                  $ANS  532
1180  FORMAT (/,45X,18HTORSIONAL CONSTANT,20X,1H=,1PE12.4,/,2X)                 $ANS  533
      LNCT=LNCT+3                                                               $ANS  534
      IF (LNCT.LE.50) GO TO 1190                                                $ANS  535
      WRITE (LOG2,200)                                                          $ANS  536
      LNCT=1                                                                    $ANS  537
1190  LNCT=LNCT+5                                                               $ANS  538
      WRITE (LOG2,1200)                                                         $ANS  539
1200  FORMAT (2X,/,20X,19HSECTION COORDINATES,/,2X)                             $ANS  540
      WRITE (LOG2,1210)                                                         $ANS  541
1210  FORMAT(31X,8HPOINT NO,5X,2HX1,12X,2HY1,15X,2HX2,12X,2HY2,/,2X)           $ANS  542
      DO 1220 I=1,NPOINT                                                        $ANS  543
      LNCT=LNCT+1                                                               $ANS  544
      IF (LNCT.LE.50) GO TO 1220                                                $ANS  545
      LNCT=4                                                                    $ANS  546
      WRITE (LOG2,200)                                                          $ANS  547
      WRITE (LOG2,1210)                                                         $ANS  548
1220  WRITE (LOG2,1230) I,XS(J,I),YS(J,I),XP(J,I),YP(J,I)                       $ANS  549
1230  FORMAT (31X,I5,3X,1P2E14.5,4X,2E14.5)                                     $ANS  550
      IF (LNCT.LE.50) GO TO 1240                                                $ANS  551
```

```
      LNCT=1                                                                    $ANS  552
      WRITE (LOG2,200)                                                          $ANS  553
1240  LNCT=LNCT+3                                                               $ANS  554
      IF (ISECN.EQ.2) WRITE (LOG2,1260)                                         $ANS  555
      IF (ISECN.EQ.2) GO TO 1270                                                $ANS  556
      WRITE (LOG2,1250)                                                         $ANS  557
1250  FORMAT (2X,/,31X,8HPOINT NO,5X,5HXSEMI,9X,5HYSEMI,/,2X)                   $ANS  558
1260  FORMAT (2X,/,31X,8HPOINT NO,5X,5HXSEMI,9X,5HYSEMI,12X,5HXSEMJ,9X,5$ANS  559
     1HYSEMJ,/,2X)                                                            $ANS  560
1270  DO 1300 I=1,31                                                            $ANS  561
      LNCT=LNCT+1                                                               $ANS  562
      IF (LNCT.LE.50) GO TO 1290                                                $ANS  563
      WRITE (LOG2,200)                                                          $ANS  564
      IF (ISECN.EQ.2) WRITE (LOG2,1260)                                         $ANS  565
      IF (ISECN.EQ.2) GO TO 1280                                                $ANS  566
      WRITE (LOG2,1250)                                                         $ANS  567
1280  LNCT=4                                                                    $ANS  568
1290  IF (ISECN.EQ.2) WRITE (LOG2,1310) I,XSEMI(J,I),YSEMI(J,I),XSEMJ(J,$ANS  569
     1I),YSEMJ(J,I)                                                           $ANS  570
      IF (ISECN.EQ.2) GO TO 1300                                                $ANS  571
      WRITE (LOG2,1310) I,XSEMI(J,I),YSEMI(J,I)                                 $ANS  572
1300  CONTINUE                                                                  $ANS  573
1310  FORMAT (31X,I3,3X,1P2E14.5)                                               $ANS  574
1320  IF (IFPLOT.LT.2) GO TO 1460                                               $ANS  575
      IF (IFPLOT.EQ.4) GO TO 1380                                               $ANS  576
      XPLOT=XS(J,1)*SCALE                                                       $ANS  577
      YPLOT=YS(J,1)*SCALE                                                       $ANS  578
      CALL PLOT (XPLOT,YPLOT,3)                                                 $ANS  579
      DO 1330 I=2,NPOINT                                                        $ANS  580
      XPLOT=XS(J,I)*SCALE                                                       $ANS  581
      YPLOT=YS(J,I)*SCALE                                                       $ANS  582
1330  CALL PLOT (XPLOT,YPLOT,2)                                                 $ANS  583
      IF (ISECN.NE.2) GO TO 1350                                                $ANS  584
      DO 1340 I=2,30                                                            $ANS  585
      XPLOT=XSEMJ(J,I)*SCALE                                                    $ANS  586
      YPLOT=YSEMJ(J,I)*SCALE                                                    $ANS  587
1340  CALL PLOT (XPLOT,YPLOT,2)                                                 $ANS  588
1350  DO 1360 II=1,NPOINT                                                       $ANS  589
      I=NPOINT+1-II                                                             $ANS  590
      XPLOT=XP(J,I)*SCALE                                                       $ANS  591
      YPLOT=YP(J,I)*SCALE                                                       $ANS  592
1360  CALL PLOT (XPLOT,YPLOT,2)                                                 $ANS  593
      DO 1370 I=2,30                                                            $ANS  594
      XPLOT=XSEMI(J,I)*SCALE                                                    $ANS  595
      YPLOT=YSEMI(J,I)*SCALE                                                    $ANS  596
1370  CALL PLOT (XPLOT,YPLOT,2)                                                 $ANS  597
      XPLOT=XS(J,1)*SCALE                                                       $ANS  598
      YPLOT=YS(J,1)*SCALE                                                       $ANS  599
      CALL PLOT (XPLOT,YPLOT,2)                                                 $ANS  600
      GO TO 1460                                                                $ANS  601
```

```
1380  CALL SYMBOL (19.9,2.0,0.175,22HCARTESIAN SECTION NO. ,0.0,22)          $ANS  602
      XJ=J                                                                   $ANS  603
      CALL NUMBER (23.75,2.0,0.175,XJ,0.0,-1)                                $ANS  604
      CALL SYMBOL (20.6,1.0,0.175,10HSTAGGER = ,0.0,10)                      $ANS  605
      STAGER=ATAN((YS(J,NPOINT)+YP(J,NPOINT)-YS(J,1)-YP(J,1))/(XS(J,NPOI     $ANS  606
     1NT)+XP(J,NPOINT)-XS(J,1)-XP(J,1)))*C1                                  $ANS  607
      CALL NUMBER (22.35,1.0,0.175,STAGER,0.0,3)                             $ANS  608
      CALL PLOT (22.0,5.25,-3)                                               $ANS  609
      XSIGN=FLOAT(NSIGN)                                                     $ANS  610
      SINSTG=SIN(STAGER/C1)                                                  $ANS  611
      COSSTG=COS(STAGER/C1)                                                  $ANS  612
      YPLOT=4.75                                                             $ANS  613
      XPLOT=4.75*SINSTG/COSSTG                                               $ANS  614
      IF (ABS(XPLOT).LE.22.0) GO TO 1390                                     $ANS  615
      XPLOT=22.0                                                             $ANS  616
      YPLOT=-22.0/SINSTG*COSSTG                                              $ANS  617
1390  CALL PLOT (XPLOT,YPLOT,3)                                              $ANS  618
      XPLOT=-XPLOT                                                           $ANS  619
      YPLOT=-YPLOT                                                           $ANS  620
      CALL PLOT (XPLOT,YPLOT,2)                                              $ANS  621
      XPLOT=22.0                                                             $ANS  622
      YPLOT=-22.0*SINSTG/COSSTG                                              $ANS  623
      IF (ABS(YPLOT).LE.4.75) GO TO 1400                                     $ANS  624
      YPLOT=-4.75                                                            $ANS  625
      XPLOT=4.75/SINSTG*COSSTG                                               $ANS  626
1400  CALL PLOT (XPLOT,YPLOT,3)                                              $ANS  627
      XPLOT=-XPLOT                                                           $ANS  628
      YPLOT=-YPLOT                                                           $ANS  629
      CALL PLOT (XPLOT,YPLOT,2)                                              $ANS  630
      XPLOT=SCALE*(XS(J,1)*COSSTG+YS(J,1)*SINSTG)                            $ANS  631
      YPLOT=SCALE*(YS(J,1)*COSSTG-XS(J,1)*SINSTG)                            $ANS  632
      CALL PLOT (XPLOT,YPLOT,3)                                              $ANS  633
      DO 1410 I=2,NPOINT                                                     $ANS  634
      XPLOT=SCALE*(XS(J,I)*COSSTG+YS(J,I)*SINSTG)                            $ANS  635
      YPLOT=SCALE*(YS(J,I)*COSSTG-XS(J,I)*SINSTG)                            $ANS  636
1410  CALL PLOT (XPLOT,YPLOT,2)                                              $ANS  637
      IF (ISECN.NE.2) GO TO 1430                                             $ANS  638
      DO 1420 I=2,30                                                         $ANS  639
      XPLOT=SCALE*(XSEMJ(J,I)*COSSTG+YSEMJ(J,I)*SINSTG)                      $ANS  640
      YPLOT=SCALE*(YSEMJ(J,I)*COSSTG-XSEMJ(J,I)*SINSTG)                      $ANS  641
1420  CALL PLOT (XPLOT,YPLOT,2)                                              $ANS  642
1430  DO 1440 II=1,NPOINT                                                    $ANS  643
      I=NPOINT+1-II                                                          $ANS  644
      XPLOT=SCALE*(XP(J,I)*COSSTG+YP(J,I)*SINSTG)                            $ANS  645
      YPLOT=SCALE*(YP(J,I)*COSSTG-XP(J,I)*SINSTG)                            $ANS  646
1440  CALL PLOT (XPLOT,YPLOT,2)                                              $ANS  647
      DO 1450 I=2,30                                                         $ANS  648
      XPLOT=SCALE*(XSEMI(J,I)*COSSTG+YSEMI(J,I)*SINSTG)                      $ANS  649
      YPLOT=SCALE*(YSEMI(J,I)*COSSTG-XSEMI(J,I)*SINSTG)                      $ANS  650
1450  CALL PLOT (XPLOT,YPLOT,2)                                              $ANS  651
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      XPLOT=SCALE*(XS(J,1)*COSSTG+YS(J,1)*SINSTG)                       $AN$ 652
      YPLOT=SCALE*(YS(J,1)*COSSTG-XS(J,1)*SINSTG)                       $AN$ 653
      CALL PLOT (XPLOT,YPLOT,2)                                         $AN$ 654
      CALL PLOT (23.0,-5.25,-3)                                         $AN$ 655
 1460 CONTINUE                                                          $AN$ 656
 1470 CONTINUE                                                          $AN$ 657
      IF (INAST.EQ.0) GO TO 1580                                        $AN$ 658
      NSTAD=IRTE-IRLE+1                                                 $AN$ 659
      JLOOP=0                                                           $AN$ 660
      NELEM=0                                                           $AN$ 661
      NSTRD=NLINES-1                                                    $AN$ 662
      IRT=IRTE-1                                                        $AN$ 663
      NT=1995                                                           $AN$ 664
      DO 1520 J=1,NSTRD                                                 $AN$ 665
      DO 1510 I=IRLE,IRT                                                $AN$ 666
      NELEM=NELEM+1                                                     $AN$ 667
      IGRD1=I-1+JLOOP                                                   $AN$ 668
      IGRD3=IGRD1+NSTAD                                                 $AN$ 669
      IGRD2=IGRD1+NSTAD+1                                               $AN$ 670
      NT=NT+5                                                           $AN$ 671
      WRITE (LOG3,1530) NELEM,NT,IGRD1,IGRD2,IGRD3                      $AN$ 672
      IF(ABS(FLOAT(INAST)).GT.3.5)GO TO 1480                            $AN$ 673
      THCK=(THARR(J,I)+THARR(J+1,I)+THARR(J+1,I+1))/3.                  $AN$ 674
      PRES=-XSIGN*(BLAFOR(I,J)+BLAFOR(I,J+1)+BLAFOR(I+1,J+1))/3.        $AN$ 675
      GO TO 1490                                                        $AN$ 676
 1480 THCK=(THARR(J,I)+THARR(J+1,I)+THARR(J+1,I+1)+THARR(J,I+1))/4.     $AN$ 677
      PRES=-XSIGN*(BLAFOR(I,J)+BLAFOR(I,J+1)+BLAFOR(I+1,J+1)+BLAFOR(I+1,$AN$ 678
     1J))/4.                                                            $AN$ 679
 1490 WRITE (LOG3,1540) NT,THCK                                         $AN$ 680
      IF(INAST.GT.0)WRITE(LOG3,1550)PRES,NELEM                          $AN$ 681
      NELEM=NELEM+1                                                     $AN$ 682
      IGRD3=IGRD2                                                       $AN$ 683
      IGRD2=IGRD1+1                                                     $AN$ 684
      IF(ABS(FLOAT(INAST)).GT.3.5)GO TO 1500                            $AN$ 685
      NT=NT+5                                                           $AN$ 686
      THCK=(THARR(J,I)+THARR(J,I+1)+THARR(J+1,I+1))/3.                  $AN$ 687
      PRES=-XSIGN*(BLAFOR(I,J)+BLAFOR(I+1,J)+BLAFOR(I+1,J+1))/3.        $AN$ 688
      WRITE (LOG3,1540) NT,THCK                                         $AN$ 689
 1500 WRITE (LOG3,1530) NELEM,NT,IGRD1,IGRD2,IGRD3                      $AN$ 690
      IF(INAST.GT.0)WRITE(LOG3,1550)PRES,NELEM                          $AN$ 691
 1510 CONTINUE                                                          $AN$ 692
 1520 JLOOP=JLOOP+NSTAD                                                 $AN$ 693
 1530 FORMAT (6HCTRIA2,7X,I3,4X,I4,3(5X,I3))                            $AN$ 694
 1540 FORMAT (6HPTRIA2,6X,I4,7X,1H1,F8.4,6X,2H0.)                       $AN$ 695
 1550 FORMAT (6HPLOAD2,6X,2H60,F8.4,5X,I3)                              $AN$ 696
 1560 FORMAT (4HGRID,9X,I3,8X,3F8.4)                                    $AN$ 697
      JD=0                                                              $AN$ 698
      DO 1570 J=1,NLINES                                                $AN$ 699
      DO 1570 I=IRLE,IRTE                                               $AN$ 700
      JD=JD+1                                                           $AN$ 701
```

```
 1570   WRITE (LOG3,1560) JJ,XCAMB(J,I),YCAMB(J,I),ZCAMB(J,I)                    $ANS 702
 1580   CONTINUE                                                                 $ANS 703
        IF (NAERO.EQ.1.OR.IPUNCH.EQ.1) CALL UDU319 (LOG1,LOG2,LOG3,LOG5,NL$ANS 704
       1INES,NSPEC,KSTS,RSTA,XSTA,R,ZR,B1,B2,TC,PI,C1,NBLADE,CCORD,BLOCK,A$ANS 705
       2LPB,EPSLON,IFANGS,IPUNCH,NAERO)                                          $ANS 706
        IF (IFPLOT.NE.0) CALL PLOT (0.0,0.0,-3)                                  $ANS 707
        END                                                                      $ANS 706
```

```
      SUBROUTINE UDU313 (IBL,YS,YP,XS,XP,YSEMI,XSEMI,LOG1,LOG2,N,IPRINT,$13$    2
     1BETA1,BETA2,P,Q,YZERO,T,YONE,XDEL,YDEL,Z,AXIALC,LNCT,IFCORD,SQ,SB,$13$    3
     2ISECN,XSEMJ,YSEMJ,ISTAK,XHERE,X,SS,NSTNS,R,DX,Y,DY,SS1,BX,SIGMA,CC$13$    4
     3ORD,ISPLIT,YZEROS,TS,YONES,ZSPMXT,PFRSPJ,INAST,IRLE,IRTE,THARR)      $13$    5
      DIMENSION CCORD(1)                                                   $13$    6
      REAL IX,IY,IXY,IPX,IPY,IXU,IYU,IXN,IYN,IXYN                          $13$    7
      DIMENSION XXM(81), SNADUM(10), THARR(21,10)                          $13$    8
      DIMENSION YS(21,80), YP(21,80), XS(21,80), XP(21,80), YSEMI(21,31)   $13$    9
     1, XSEMI(21,31), S(80), PHI(11), THICK2(80), XM(81), YM(80), AM(80)   $13$   10
     2, XSEMJ(21,31), YSEMJ(21,31), XHERE(100), X(100), SS(100), R(10,21   $13$   11
     3), DX(100), DY(100), SS1(80,4), Y(100), SIGMA(100)                   $13$   12
      DIMENSION XSPLTM(45), YSPLTM(45), SSPLTM(45), XSPLTS(45), YSPLTS(45$13$   13
     1), XSPLTP(45), YSPLTP(45), THICK(45)                                 $13$   14
      F1(A)=A*EXP(1.0-A*SQ)*SQ                                             $13$   15
      F2(A)=(SQ-1.0)*A*EXP(1.0+A*(1.0-SQ))                                 $13$   16
      F3(A,B,C,D)=3/A**3*EXP(A*XD)*(A*XD-2.0)+C*(XD+SQ)+D                  $13$   17
      F4(A,B)=ABS(A-B)/(A-B)                                               $13$   18
      F5(A,B,C)=3/A**2*EXP(A*XD)*(A*XD-1.0)+C                              $13$   19
      F6(XAB)=SQRT(RDIUS**2-(XAB-X1)**2)+Y1                                $13$   20
      F7(XAB)=-SQRT(RDIUS**2-(XAB-X1)**2)+Y1                               $13$   21
      F8(XAB)=-1./SQRT(RDIUS**2-(XAB-X1)**2)*(XAB-X1)                      $13$   22
   10 FORMAT (1H1)                                                         $13$   23
      BTA1=BETA1                                                           $13$   24
      BTA2=BETA2                                                           $13$   25
      PI=3.14159265359                                                     $13$   26
      C1=180.0/PI                                                          $13$   27
      IF (IPRINT.GE.2) GO TO 40                                            $13$   28
      WRITE (LOG2,20) IBL,P,Q,BETA1,BETA2,YZERO,T,YONE,Z,AXIALC            $13$   29
   20 FORMAT (1H1,40X,43HSTREAMSURFACE GEOMETRY ON STREAMLINE NUMBER,I3,$13$   30
     1/45X,46H**********************************************//,20X,1HP,1$13$   31
     23X,1H=,F7.4,6X,72H(D2YDX2 OF MEANLINE AT LEADING EDGE AS A FRACTIO$13$   32
     3N OF ITS MAXIMUM VALUE.),/,20X,1HQ,15X,1H=,F7.4,6X,73H(D2YDX2 OF M$13$   33
     4EANLINE AT TRAILING EDGE AS A FRACTION OF ITS MAXIMUM VALUE.),/,20$13$   34
     5X,5HBETA1,11X,1H=,F7.3,6X,20H(BLADE INLET ANGLE.),/,20X,5HBETA2,11$13$   35
     6X,1H=,F7.3,6X,21H(BLADE OUTLET ANGLE.),/,20X,5HYZERO,11X,1H=,F8.5,$13$   36
     73X,51H(BLADE LEADING EDGE RADIUS AS A FRACTION OF CHORD.),/,20X,1H$13$   37
     8T,15X,1H=,F8.5,3X,49H(BLADE MAXIMUM THICKNESS AS A FRACTION OF CHO$13$   38
     9RD.),/,20X,4HYONE,12X,1H=,F8.5,5X,60H(BLADE TRAILING EDGE HALF-THI$13$   39
     &CKNESS AS A FRACTION OF CHORD.),/,20X,1HZ,15X,1H=,F7.4,6X,59H(LOCA$13$   40
     $TION OF MAXIMUM THICKNESS AS A FRACTION OF MEAN LINE.),/,20X,4HCOR$13$   41
     %D,12X,1H=,F7.4,6X,39H(CHORD OR MERIDIONAL CHORD OF SECTION.))       $13$   42
      IF (ISECN.EQ.1.OR.ISECN.EQ.3) WRITE (LOG2,30) SQ,SB                  $13$   43
   30 FORMAT (20X,1HS,15X,1H=,F7.4,6X,53H(INFLECTION POINT AS A FRACTION$13$   44
     1 OF MERIDIONAL CHORD.),/,20X,5HBETA3,11X,1H=,F7.3,6X,36H(CHANGE IN$13$   45
     2 ANGLE FROM LEADING EDGE.))                                         $13$   46
   40 IF(IPRINT.NE.3)GO TO 55                                              $13$   47
      LNCT=LNCT+2                                                          $13$   48
      IF(LNCT.LE.60)GO TO 45                                               $13$   49
      LNCT=3                                                               $13$   50
      WRITE(LOG2,10)                                                       $13$   51
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45      WRITE(LOG2,50)IBL,P,Q,BETA1,BETA2,YZERO,T,YONE,Z,AXIALC
50      FORMAT (2X,/,5X,4HLINE,I3,4H   P=,F7.4,4H   Q=,F7.4,8H   BETA1=,F7.3,
     1 8H   BETA2=,F7.3,8H   YZERO=,F7.5,6H   T/C=,F7.5,7H   YONE=,F7.5,4H   Z
     2=,F7.4,6H   AXC=,F7.3)
55      IF(ISECN.EQ.1)GO TO 60
        IF (ISECN.EQ.3) GO TO 130
        IF (ISECN.EQ.2) GO TO 150
        H=1.0/(1.0+SQRT((1.0-Q)/(1.0-P)))
        DA=4.0*(TAN(BETA1/C1)-TAN(BETA2/C1))/(P/(1.0-P)*H*H+H-1.0/3.0)
        DA48=DA/48.0
        XK2=-H*H/(3.0*(1.0-P))*DA
        R=H*H*H/12.0*DA+TAN(BETA1/C1)
        C=-H*H*H*H*DA48
        XMLC=SQRT(1.)+(DA48*(1.0-H)**4+XK2+R+C)**2)
        GO TO 160
60      NQ=1
        SQ=BETA1+SB
        G1=1.0/SQ
        R1=F1(G1)
        G2=G1+5.0
        R2=F1(G2)
        S2=F4(R2,P)
70      G3=G2+(P-R2)*(G2-G1)/(R2-R1)
        R3=F1(G3)
        S3=F4(R3,P)
        IF (ABS(R3-P).LE.0.0001) GO TO 90
        IF (NQ.GT.50) GO TO 1290
        NQ=NQ+1
        IF (ABS(S2-S3).LE.0.0001) GO TO 80
        G1=G3
        R1=R3
        GO TO 70
80      G2=G3
        R2=R3
        S2=S3
        GO TO 70
90      A1=G3
        NQ=1
        G1=1.0/(SQ-1.0)
        R1=F2(G1)
        G2=G1-5.0
        R2=F2(G2)
        S2=F4(R2,Q)
100     G3=G2+(Q-R2)*(G2-G1)/(R2-R1)
        R3=F2(G3)
        S3=F4(R3,Q)
        IF (ABS(R3-Q).LE.0.0001) GO TO 120
        IF (NQ.GT.50) GO TO 1290
        NQ=NQ+1
        IF (ABS(S2-S3).LE.0.0001) GO TO 110
```

```
      G1=G3
      R1=R3
      GO TO 100
110   G2=G3
      R2=R3
      S2=S3
      GO TO 100
120   A2=G3
      B1=A1**2*(TAN(BETA1/C1)-TAN(SB/C1))/(1.0-(A1*SQ+1.0)*EXP(-A1*SQ))
      CC1=TAN(SB/C1)+B1/A1**2
      E1=(A1*SQ+2.0)*B1/A1**3*EXP(-A1*SQ)
      B2=A2**2*(TAN(BETA2/C1)-TAN(SB/C1))/(1.0+(A2*(1.0-SQ)-1.0)*EXP(A2*
     1(1.0-SQ)))
      CC2=TAN(SB/C1)+B2/A2**2
      D2=2.*(B2/A2**3-B1/A1**3)+SQ*(CC1-CC2)+E1
      XD=1.0-SQ
      R2=F3(A2,B2,CC2,D2)
      XMLC=SQRT(1.0+R2**2)
      GO TO 160
130   I1=1
      BETA3=BETA1+SB
      S0=0.
      X0=0.
      Y0=0.
      Y21=0.0
      I2=FLOAT(N)*SQ
      IF (I2.LE.1) SQ=0.0
      IF (I2.LE.1) BETA3=BETA1
      IF (I2.LE.1) GO TO 140
      XRNGE=SQ
      FACT=SQ
      CALL UD0318 (BETA1,BETA3,I1,I2,FACT,X0,Y0,S0,XRNGE,Y11,X11,Y21,RDI
     1US1,S,C1)
      I1=I2
      X0=SQ
      Y0=Y21
      S0=S(I1)
140   I2=N
      FACT=1.-SQ
      XRNGE=FACT
      CALL UD0318 (BETA3,BETA2,I1,I2,FACT,X0,Y0,S0,XRNGE,Y12,X12,Y22,RDI
     1US2,S,C1)
      XMLC=SQRT(1.0+Y22**2)
      GO TO 160
150   CALL UD0318 (BETA1,BETA2,1,N,1.0,0.0,0.0,0.0,1.0,Y1,X1,Y2,RDIUS,S,
     1C1)
      XMLC=SQRT(1.+Y2**2)
      CHORD=XMLC/(1.-2.*YZERO*(1.-XMLC))
      FCSLMN=1.0-CHORD*2.*YZERO
      GO TO 170
```

```
      CHORD=XMLC/(1.0-YZERO+XMLC*(YZERO+ABS(YONE*SIN(BETA2/C1))))
      FCSLMN=1.0-CHORD*(YZERO+ABS(YONE*SIN(BETA2/C1)))
      IF (IFCORD.EQ.1) AXIALC=AXIALC/CHORD
      YZERO=YZERO*CHORD/FCSLMN
      YONE=YONE*CHORD/FCSLMN
      T=T*CHORD/FCSLMN
      S(1)=0.0
      XX=0.0
      XN=N
      IF (ISECN.EQ.2) GO TO 240
      AT=(YZERO-T/2.0)/(2.0*Z**3)
      CT=(T/2.0-YZERO)*3.0/(2.0*Z)
      DT=YZERO
      ET=(YONE-T/2.0)/(1.0-Z)**3-1.5*(YZERO-T/2.0)/(Z**2*(1.0-Z))
      FT=1.5*(YZERO-T/2.0)/Z**2
      HT=T/2.0
      IF (ISECN.EQ.3) GO TO 240
      DELX=1.0/(10.0*(XN-1.0))
      ASSIGN 190 TO ISEC1
      ASSIGN 290 TO ISEC2
      IF (ISECN.EQ.0) GO TO 180
      ASSIGN 200 TO ISEC1
      ASSIGN 300 TO ISEC2
180   DO 230 J=2,N
      DO 220 JJ=1,11
      GO TO ISEC1, (190,200)
190   PHI(JJ)=SQRT(1.0+(DA/12.0*(XX-H)**3+XK2*2.0*XX+B)**2)
      GO TO 220
200   XD=XX-SQ
      IF (XD.GT.0.0) GO TO 210
      PHI(JJ)=SQRT(1.0+(F5(A1,B1,CC1))**2)
      GO TO 220
210   PHI(JJ)=SQRT(1.+(F5(A2,B2,CC2))**2)
220   XX=XX+DELX
      XX=XX-DELX
230   S(J)=S(J-1)+(PHI(1)+PHI(11)+4.0*(PHI(2)+PHI(4)+PHI(6)+PHI(8)+PHI(1
     10))+2.0*(PHI(3)+PHI(5)+PHI(7)+PHI(9)))/(30.0*(XN-1.0))
240   DELX=1.0/(XN-1.0)
      IF (ISECN.NE.2) GO TO 250
      T2=T/2.
      TPRIM2=T2-YZERO
      C2=2.*C1
      AFORM=(TPRIM2+RDIUS*(1.-COS((BETA1-BETA2)/C2)))/XMLC*2.
      PHIS=ACOS((1.-AFORM**2)/(1.+AFORM**2))
      RS=YZERO+XMLC/2./SIN(PHIS)
      YSS=RDIUS-RS+T2
      BFORM=(RDIUS*(1.-COS((BETA1-BETA2)/C2))-TPRIM2)/XMLC*2.
      PHIP=ACOS((1.-BFORM**2)/(1.+BFORM**2))
      PHI2=ABS((BETA1-BETA2)/C1)
250   XM(1)=0.0
```

```
      IF (ISECN.NE.3) GO TO 260
      YMM=0.0
      XMM=0.0
      I2=SQ*FLOAT(N)
      I3=I2
      IF (I2.LE.1) I2=N+1
      DELX=SQ/FLOAT(I2-1)
      IF (I3.NE.I2) I3=1
      DELXX=(1.-SQ)/FLOAT(N-I3)
      IF (I2.EQ.(N+1)) DELX=DELXX
260   DO 350 J=1,N
      SN=S(J)/S(N)
      IF (ISECN.EQ.2) GO TO 340
      IF (SN.GT.Z) GO TO 270
      THICK2(J)=(AT*SN**2+CT)*SN+DT
      GO TO 280
270   SN=SN-Z
      THICK2(J)=(ET*SN+FT)*SN**2+HT
280   IF (ISECN.EQ.3) GO TO 320
      GO TO ISEC2, (290,300)
290   YM(J)=DA+B*(XM(J)-H)**4+XK2*XM(J)**2+B*XM(J)+C
      YPRIME=DA/12.0*(XM(J)-H)**3+XK2*2.0*XM(J)+B
      GO TO 370
300   XD=XM(J)-SQ
      IF (XD.GT.0.0) GO TO 310
      YM(J)=F3(A1,B1,CC1,E1)
      YPRIME=F5(A1,B1,CC1)
      GO TO 370
310   YM(J)=F3(A2,B2,CC2,D2)
      YPRIME=F5(A2,B2,CC2)
      GO TO 370
320   IF ((XM(J)-SQ).GT.0.0.OR.XM(J).EQ.0.0.AND.SQ.EQ.0.0) GO TO 330
      IF (BETA1.EQ.BETA3) GO TO 360
      BTA1=BETA1
      BTA2=BETA3
      RDIUS=RDIUS1
      Y1=Y11
      X1=X11
      GO TO 350
330   IF (BETA2.EQ.BETA3) GO TO 360
      RDIUS=RDIUS2
      X1=X12
      Y1=Y12
      BTA1=BETA3
      BTA2=BETA2
      GO TO 350
340   PHIX=(SN-0.5)*PHI2
      THICK2(J)=YSS*COS(PHIX)+SQRT(RS**2-YSS**2*SIN(PHIX)**2)-RDIUS
350   YM(J)=F6(XM(J))
      YPRIME=F8(XM(J))
```

```
      IF ((BTA1-BTA2).LT.0.0) YPRIME=-YPRIME                                    $13$  252
      IF ((BTA1-BTA2).LT.0.0) YM(J)=F7(XM(J))                                   $13$  253
      IF (ISECN.EQ.2) GO TO 370                                                 $13$  254
      IF (J.EQ.I3) DELX=DELXX                                                   $13$  255
      GO TO 370                                                                 $13$  256
  360 YPRIME=TAN(BETA3/C1)                                                      $13$  257
      IF (J.NE.1) XMM=XM(J-1)/FCSLMN-YZERO                                      $13$  258
      IF (J.NE.1) YMM=YM(J-1)/FCSLMN                                            $13$  259
      YM(J)=YPRIME*(XM(J)-XMM)+YMM                                              $13$  260
      IF (J.EQ.I3) DELX=DELXX                                                   $13$  261
  370 XM(J+1)=XM(J)+DELX                                                        $13$  262
      FYPR=1.0/SQRT(1.0+YPRIME**2)                                              $13$  263
      XS(IBL,J)=(XM(J)-THICK2(J)*YPRIME*FYPR+YZERO)*FCSLMN                      $13$  264
      YS(IBL,J)=(YM(J)+THICK2(J)*FYPR)*FCSLMN                                   $13$  265
      XP(IBL,J)=(XM(J)+THICK2(J)*YPRIME*FYPR+YZERO)*FCSLMN                      $13$  266
      YP(IBL,J)=(YM(J)-THICK2(J)*FYPR)*FCSLMN                                   $13$  267
      AM(J)=ATAN(YPRIME)*C1                                                     $13$  268
      XXM(J)=XM(J)                                                              $13$  269
      IF(J.EQ.N)STAGER=ATAN(YM(N)/XM(N))*C1                                     $13$  270
      XM(J)=(XM(J)+YZERO)*FCSLMN                                                $13$  271
      YM(J)=YM(J)*FCSLMN                                                        $13$  272
      THICK2(J)=THICK2(J)*FCSLMN                                                $13$  273
  380 S(J)=S(J)*FCSLMN                                                          $13$  274
      IF (ISPLIT.EQ.0) GO TO 530                                                $13$  275
      XSPLTM(1)=1.-PERSPJ                                                       $13$  276
      K1=25                                                                     $13$  277
      XSPLTM(K1)=1.                                                             $13$  278
      K11=K1-1                                                                  $13$  279
      DELXX=PERSPJ/FLOAT(K11)                                                   $13$  280
      DO 390 J=2,K11                                                            $13$  281
  390 XSPLTM(J)=XSPLTM(J-1)+DELXX                                               $13$  282
      CALL UD0315 (XM,YM,N,XSPLTM,YSPLTM,K1,1)                                  $13$  283
      YLE=YSPLTM(1)                                                             $13$  284
      CALL UD0315 (XM,S,N,XSPLTM,SSPLTM,K1,1)                                   $13$  285
      CALL UD0315 (XM,AM,N,XSPLTM,SS1(1,3),K1,1)                                $13$  286
      SSPLS=SSPLTM(1)                                                           $13$  287
      DO 400 J=1,K1                                                             $13$  288
  400 SSPLTM(J)=SSPLTM(J)-SSPLS                                                 $13$  289
      GO TO (410,420), ISPLIT                                                   $13$  290
  410 XNORMS=SQRT((XSPLTM(K1)-XSPLTM(1))**2+(YSPLTM(K1)-YSPLTM(1))**2)          $13$  291
      CHORDS=XNORMS/(1.-YZEROS+XNORMS*(YZEROS+ABS(YONES*SIN(BETA2/C1))))        $13$  292
      FCSLMS=(PERSPJ-CHORDS*(YZEROS+ABS(YONES*SIN(BETA2/C1))))/PERSPJ           $13$  293
      YZEROS=YZEROS*CHORDS/FCSLMS                                               $13$  294
      YONES=YONES*CHORDS/FCSLMS                                                 $13$  295
      TS=TS*CHORDS/FCSLMS                                                       $13$  296
      AT=(YZEROS-TS/2.)/(2.*ZSPMXT**3)                                          $13$  297
      CT=(TS/2.-YZEROS)*3./(2.*ZSPMXT)                                          $13$  298
      DT=YZEROS                                                                 $13$  299
      ET=(YONES-TS/2.)/(1.-ZSPMXT)**3-1.5*(YZEROS-TS/2.)/(ZSPMXT**2*(1.-        $13$  300
     1ZSPMXT))                                                                  $13$  301
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      FT=1.5*(YZEROS-TS/2.)/ZSPMXT**2                                   $13$  302
      HT=TS/2.                                                          $13$  303
      GO TO 450                                                         $13$  304
420   YZS=YZEROS                                                        $13$  305
      TS1=TS                                                            $13$  306
      BETA1=SS1(1,3)                                                    $13$  307
      Y1=-COS(BETA1/C1)/(SIN(BETA1/C1)-SIN(BETA2/C1))                   $13$  308
      X1=SIN(BETA1/C1)/(SIN(BETA1/C1)-SIN(BETA2/C1))                    $13$  309
      RDIUS=ABS(1./(SIN(BETA1/C1)-SIN(BETA2/C1)))                       $13$  310
      Y2=TAN((BETA1+BETA2)/(2.*C1))                                     $13$  311
      XMLCS=SQRT(1.+Y2**2)                                              $13$  312
      CHORDS=XMLCS/(1.0+2.*YZEROS*(1.0-XMLCS))                          $13$  313
      FCSLMS=1.0-CHORDS*2.*YZEROS                                       $13$  314
      YZEROS=YZEROS*CHORDS/FCSLMS                                       $13$  315
      TS=TS*CHORDS/FCSLMS                                               $13$  316
      SS1(1,1)=0.                                                       $13$  317
      DELX=1./(XN-1.)                                                   $13$  318
      T2=TS/2.                                                          $13$  319
      TPRIM2=T2-YZEROS                                                  $13$  320
      C2=2.*C1                                                          $13$  321
      AFORM=(TPRIM2+RDIUS*(1.-COS((BETA1-BETA2)/C2)))/XMLCS*2.          $13$  322
      PHIS=ACOS((1.-AFORM**2)/(1.+AFORM**2))                            $13$  323
      RS=YZEROS+XMLCS/2./SIN(PHIS)                                      $13$  324
      YSS=RDIUS-RS+T2                                                   $13$  325
      BFORM=(RDIUS*(1.-COS((BETA1-BETA2)/C2))-TPRIM2)/XMLCS*2.          $13$  326
      PHIP=ACOS((1.-BFORM**2)/(1.+BFORM**2))                            $13$  327
      RP=XMLCS/2./SIN(PHIP)-YZEROS                                      $13$  328
      YPP=RDIUS-RP-T2                                                   $13$  329
      XX=0.                                                             $13$  330
      DO 430 J=2,N                                                      $13$  331
      XX=XX+DELX                                                        $13$  332
      PHI1=ATAN(-1./SQRT(RDIUS**2-(XX-X1)**2)*(XX-X1))                  $13$  333
      IF (BETA1.LT.0.) PHI1=-PHI1                                       $13$  334
      PHI2=ABS(BETA1/C1-PHI1)                                           $13$  335
430   SS1(J,1)=RDIUS*PHI2                                               $13$  336
      DO 440 J=1,N                                                      $13$  337
      SS1(J,1)=SS1(J,1)/SS1(N,1)                                        $13$  338
      PHIX=(SS1(J,1)-.5)*PHI2                                           $13$  339
440   SS1(J,2)=(YSS*COS(PHIX)+SQRT(RS**2-YSS**2*SIN(PHIX)**2)-RDIUS)/T2 $13$  340
      CALL U00314 (XSPLTM,YSPLTM,K1,XSPLTM,XDUM,SS1(1,3),K1,1)          $13$  341
      XNORMS=SQRT(PERSPJ**2+(YSPLTM(K1)-YSPLTM(1))**2)                  $13$  342
      CHORDS=XNORMS/(1.-2.*YZS*(1.-XNORMS))                             $13$  343
      FCSLMS=(PERSPJ-CHORDS*2.*YZS)/PERSPJ                              $13$  344
      TS=TS1*CHORDS/FCSLMS                                              $13$  345
      YZEROS=YZS*CHORDS/FCSLMS                                          $13$  346
450   DO 500 J=1,K1                                                     $13$  347
      SN=SSPLTM(J)/SSPLTM(K1)                                           $13$  348
      IF (ISPLIT.GT.1) GO TO 480                                        $13$  349
      IF (SN.GT.ZSPMXT) GO TO 460                                       $13$  350
      THICK(J)=(AT*SN**2+CT)*SN+DT                                      $13$  351
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```
      GO TO 470
460   SN=SN-ZSPMXT
      THICK(J)=(ET*SN+FT)*SN**2+HT
470   FYPR=1./SQRT(1.+TAN(SS1(J,3)/C1)**2)
      YPRIME=TAN(SS1(J,3)/C1)
      GO TO 490
480   CALL UD0315 (SS1,SS1(1,2),N,SN,THICK(J),1,1)
      THICK(J)=THICK(J)*TS/2.
      FYPR=1.0/SQRT(1.0+SS1(J,3)**2)
      YPRIME=SS1(J,3)
490   XSPLTP(J)=(XSPLTM(J)-(1.-PERSPJ)+THICK(J)*YPRIME*FYPR+YZEROS)*FCSL
     1MS+(1.-PERSPJ)
      XSPLTS(J)=(XSPLTM(J)-(1.-PERSPJ)-THICK(J)*YPRIME*FYPR+YZEROS)*FCSL
     1MS+(1.-PERSPJ)
      YSPLTP(J)=(YSPLTM(J)-YLE-THICK(J)*FYPR)*FCSLMS+YLE
      YSPLTS(J)=(YSPLTM(J)-YLE+THICK(J)*FYPR)*FCSLMS+YLE
      XSPLTM(J)=(XSPLTM(J)-(1.-PERSPJ)+YZEROS)*FCSLMS+(1.-PERSPJ)
      YSPLTM(J)=(YSPLTM(J)-YLE)*FCSLMS+YLE
      THICK(J)=THICK(J)*FCSLMS
500   SSPLTM(J)=SSPLTM(J)*FCSLMS
      IF (ISPLIT.GT.1) SS1(1,3)=ATAN(SS1(1,3))*C1
      YZEROS=YZEROS*FCSLMS
      AREAS=PI/2.*YZEROS**2
      AREA2=AREAS
      YINT=-4./(3.*PI)*YZEROS*AREAS*SIN(SS1(1,3)/C1)
      XINT=YZEROS*(1.-COS(SS1(1,3)/C1)*4./(3.*PI))*AREAS
      DO 510 J=2,K1
      DELA=(THICK(J)+THICK(J-1))*(SSPLTM(J)-SSPLTM(J-1))
      AREAS=AREAS+DELA
      XINT=XINT+DELA*(XSPLTM(J)+XSPLTM(J-1))/2.
510   YINT=YINT+DELA*(YSPLTM(J)+YSPLTM(J-1))/2.
      IF (ISPLIT.LT.2) GO TO 520
      XINT=XINT+AREA2*(XSPLTM(K1)+4.*YZEROS/(3.*PI)*COS(BETA2/C1))
      YINT=YINT+AREA2*(YSPLTM(K1)+4.*YZEROS/(3.*PI)*SIN(BETA2/C1))
      AREAS=AREAS+AREA2
520   XBARS=XINT/AREAS
      YBARS=YINT/AREAS
530   CONTINUE
      YZERO=YZERO*FCSLMN
      IF (INAST.EQ.0) GO TO 550
      NASNUM=IRTE-IRLE+1
      CALL UD0315 (X,SS,100,XHERE(IRLE),SNADUM(IRLE),NASNUM,1)
      SNDUM1=SNADUM(IRLE)
      SNDUM2=SNADUM(IRTE)
      DO 540 J=IRLE,IRTE
      SNADUM(J)=(SNADUM(J)-SNDUM1)/(SNDUM2-SNDUM1)
      CALL UD0315 (XXM,THICK2,N,SNADUM(J),THARR(IBL,J),1,1)
540   THARR(IBL,J)=THARR(IBL,J)*2.*AXIALC
550   CONTINUE
      AREA=PI/2.0*YZERO**2
```

```
      XINT=YZERO*(1.0-COS(BETA1/C1)*4.0/(3.0*PI))*AREA                          402
      YINT=-4.0/(3.0*PI)*YZERO*AREA*SIN(BETA1/C1)                               403
      DO 560 J=2,N                                                              404
      DELA=(THICK2(J)+THICK2(J-1))*(S(J)-S(J-1))                                405
      AREA=AREA+DELA                                                            406
      XINT=XINT+DELA*(XM(J)+XM(J-1))/2.0                                        407
  560 YINT=YINT+DELA*(YM(J)+YM(J-1))/2.0                                        408
      IF (ISECN.NE.2) GO TO 570                                                 409
      AREA2=PI/2.*YZERO**2                                                      410
      XINT=XINT+AREA2*(XM(N)+4.*YZERO/(3.*PI)*COS(BETA2/C1))                    411
      YINT=YINT+AREA2*(YM(N)+4.*YZERO/(3.*PI)*SIN(BETA2/C1))                    412
      AREA=AREA+AREA2                                                           413
  570 XBAR=XINT/AREA                                                            414
      YBAR=YINT/AREA                                                            415
      XBARB=XBAR                                                                416
      YBARB=YBAR                                                                417
      YBAR=YBAR+YDEL/AXIALC                                                     418
      XBAR=XBAR+XDEL/AXIALC                                                     419
      AX=1./99.                                                                 420
      DX(1)=0.                                                                  421
      DO 580 IK=2,100                                                           422
  580 DX(IK)=DX(IK-1)+AX                                                        423
      YMM=0.0                                                                   424
      XMM=0.0                                                                   425
      DO 660 IK=1,100                                                           426
      XAB=DX(IK)                                                                427
      IF (ISECN.EQ.0) GO TO 590                                                 428
      IF (ISECN.EQ.1) GO TO 600                                                 429
      IF (ISECN.EQ.2) GO TO 640                                                 430
      IF (ISECN.EQ.3) GO TO 620                                                 431
  590 Y(IK)=(QA*3*(XAB-H)**4+XAB**2*XK2+B*XAB+C)*FCSLMN                         432
      SS1(IK,1)=QA/12.*(XAB-H)**3+XK2*2.*XAB+B                                  433
      GO TO 660                                                                 434
  600 XO=XAB-SQ                                                                 435
      IF (XO.GT.0.) GO TO 610                                                   436
      Y(IK)=F3(A1,B1,CC1,E1)*FCSLMN                                             437
      SS1(IK,1)=F5(A1,B1,CC1)                                                   438
      GO TO 660                                                                 439
  610 Y(IK)=F3(A2,B2,CC2,D2)*FCSLMN                                             440
      SS1(IK,1)=F5(A2,B2,CC2)                                                   441
      GO TO 660                                                                 442
  620 IF ((XAB-SQ).GT.0.0.OR.XAB.EQ.0.0.AND.SQ.EQ.0.0) GO TO 630                443
      IF (BETA1.EQ.BETA3) GO TO 650                                             444
      RDIUS=RDIUS1                                                              445
      X1=X11                                                                    446
      Y1=Y11                                                                    447
      BTA1=BETA1                                                                448
      BTA2=BETA3                                                                449
      GO TO 640                                                                 450
  630 IF (BETA2.EQ.BETA3) GO TO 650                                             451
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```
      RDIUS=RDIUS2
      X1=X12
      Y1=Y12
      BTA1=BETA3
      BTA2=BETA2
640   Y(IK)=F6(XAB)*FCSLMN
      SS1(IK,1)=F8(XAB)
      IF ((BTA1-BTA2).LT.0.0) SS1(IK,1)=-SS1(IK,1)
      IF ((BTA1-BTA2).LT.0.0) Y(IK)=F7(XAB)*FCSLMN
      GO TO 660
650   SS1(IK,1)=TAN(BETA3/C1)
      IF (IK.NE.1) YMM=Y(IK-1)/FCSLMN
      IF (IK.NE.1) XMM=DX(IK-1)
      Y(IK)=(SS1(IK,1)*(XAB-XMM)+YMM)*FCSLMN
660   SIGMA(IK)=DX(IK)*FCSLMN+YZERO
      CALL UD0315 (SIGMA,Y,100,DX,DY,100,1)
      CALL UD0315 (SIGMA,SS1(1,1),100,DX,Y,100,1)
      CALL UD0315 (DX,DY,100,XBAR,XAB,1,1)
      CALL UD0315 (DX,Y,100,XBAR,XBC,1,1)
      XBAR=XBARD
      YBAR=YBARD
      IX=0.0
      IY=0.0
      IXY=0.0
      DO 670 J=2,N
      DELA=(THICK2(J)+THICK2(J-1))*(S(J)-S(J-1))
      IXD=(THICK2(J)+THICK2(J-1))**3*(S(J)-S(J-1))/12.0
      IYD=(THICK2(J)+THICK2(J-1))*(S(J)-S(J-1))**3/12.0
      COSANG=COS((AM(J)+AM(J-1))/C1)
      IXN=(IXD+IYD+(IXD-IYD)*COSANG)/2.0
      IYN=(IXD+IYD-(IXD-IYD)*COSANG)/2.0
      IXYN=0.0
      IF ((AM(J)+AM(J-1)).NE.0.0) IXYN=((IXN-IYN)*COSANG-IXD+IYD)/(2.0*S
     1IN((AM(J)+AM(J-1))/C1))
      IX=IX+IXN+DELA*((YM(J)+YM(J-1))/2.0-YBAR)**2
      IY=IY+IYN+DELA*((XM(J)+XM(J-1))/2.0-XBAR)**2
670   IXY=IXY+IXYN+DELA*(YBAR-(YM(J)+YM(J-1))/2.0)*(XBAR-(XM(J)+XM(J-1))
     1/2.0)
      ANG=ATAN(2.0*IXY/(IY-IX))
      IPX=(IX+IY)/2.0+(IX-IY)/2.0*COS(ANG)-IXY*SIN(ANG)
      IPY=(IX+IY)/2.0-(IX-IY)/2.0*COS(ANG)+IXY*SIN(ANG)
      ANG=ANG/2.0*C1
      XML=XM(N)
      YML=YM(N)
      CAMBER=BETA1-BETA2
      IF (IPRINT.GE.2) GO TO 790
      LNCT=47
      IF (ISECN.EQ.1.OR.ISECN.EQ.3) LNCT=49
      WRITE (LOG2,380) CHORD,STAGER,CAMBER,AREA,XBAR,YBAR,IX,IY,IXY,ANG,
     1IPX,ANG,IPY,ANG
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680   FORMAT (/,16X,100HNORMALISED RESULTS - ALL THE FOLLOWING REFER TO $1335 502
     1ABLADE HAVING A MERIDIONAL CHORD PROJECTION OF UNITY,/,16X,100(1H*$1335 503
     2),//20X,11HBLADE CHORD,4X,1H=,F7.4,//,20X,16HSTAGGER ANGLE   =,F7.3$1335 504
     3,//,20X,16HCAMBER ANGLE    =,F7.3,//,20X,16HSECTION AREA    =,F7.5,/$1335 505
     4/,20X,45HLOCATION OF CENTROID RELATIVE TO LEADING EDGE,//,30X,6HXBAR$1335 506
     5 =,F8.5,/,30X,6HYBAR =,F8.5,//,20X,37HSECOND MOMENTS OF AREA ABOUT $1335 507
     6UT CENTROID,//,30X,6HIX    =,F8.5,/,30X,6HIY    =,F8.5,/,30X,6HIXY   $1335 508
     7=,F8.5,//,20X,58HANGLE OF INCLINATION OF (ONE) PRINCIPAL AXIS TO (X$1335 509
     8X( AXIS =,F7.3,//,20X,47HPRINCIPAL SECOND MOMENTS OF AREA ABOUT CE$1335 510
     9NTROID,//,30X,6HIPX   =,F7.5,6X,3H(AT,F7.3,15H WITH (XX( AXIS),/,30X$1335 511
     8,6HIPY   =,F7.5,6X,3H(AT,F7.3,15H WITH (YY( AXIS),//)            $1335 512
690   FORMAT (27X,5HPOINT,8X,24HM E A N L I N E   D A T A,13X,23HSURFACE $1335 513
     1COORDINATE DATA,/,27X,6HNUMBER,5X,1HX,7X,1HY,5X,15HANGLE THICKNESS$1335 514
     2,9X,2HX1,6X,2HY1,6X,2HX2,6X,2HY2,//)                             $1335 515
      WRITE (LOG2,690)                                                 $1335 516
      DO 710 J=1,N                                                     $1335 517
      IF (LNCT.NE.50) GO TO 700                                        $1335 518
      WRITE (LOG2,10)                                                  $1335 519
      WRITE (LOG2,690)                                                 $1335 520
      LNCT=4                                                           $1335 521
700   LNCT=LNCT+1                                                      $1335 522
      TM=THICK2(J)*2.0                                                 $1335 523
710   WRITE (LOG2,720) J,XM(J),YM(J),AM(J),TM,XS(IBL,J),YS(IBL,J),XP(IBL$1335 524
     1,J),YP(IBL,J)                                                    $1335 525
720   FORMAT (27X,I3,F13.5,F8.5,F7.3,F8.5,F16.5,3F8.5)                 $1335 526
      IF (ISPLIT.EQ.0) GO TO 760                                       $1335 527
      IF (LNCT.LE.40) GO TO 730                                        $1335 528
      WRITE (LOG2,10)                                                  $1335 529
      LNCT=1                                                           $1335 530
730   WRITE (LOG2,740)                                                 $1335 531
740   FORMAT (//,10X,20HSPLITTER COORDINATES,/,10X,21(1H*),//,2X)      $1335 532
      WRITE (LOG2,690)                                                 $1335 533
      LNCT=LNCT+11                                                     $1335 534
      N=K1                                                             $1335 535
      DO 750 J=1,N                                                     $1335 536
      TM=THICK(J)*2.                                                   $1335 537
      XS(IBL,J)=XSPLTS(J)                                              $1335 538
      XP(IBL,J)=XSPLTP(J)                                              $1335 539
      YP(IBL,J)=YSPLTP(J)                                              $1335 540
      YS(IBL,J)=YSPLTS(J)                                              $1335 541
      WRITE (LOG2,720) J,XSPLTM(J),YSPLTM(J),SS1(J,3),TM,XS(IBL,J),YS(IB$1335 542
     1L,J),XP(IBL,J),YP(IBL,J)                                         $1335 543
      LNCT=LNCT+1                                                      $1335 544
      IF (LNCT.LE.50) GO TO 750                                        $1335 545
      WRITE (LOG2,10)                                                  $1335 546
      WRITE (LOG2,690)                                                 $1335 547
      LNCT=4                                                           $1335 548
750   CONTINUE                                                         $1335 549
760   CONTINUE                                                         $1335 550
      DO 770 J=1,N                                                     $1335 551
```

```
      XM(J)=XS(IBL,J)                                                   $13$
      YM(J)=YS(IBL,J)                                                   $13$
      AM(J)=XP(IBL,J)                                                   $13$
770   THICK2(J)=YP(IBL,J)                                               $13$
      WRITE (LOG2,780) IBL                                              $13$
780   FORMAT (1H1,45X,33HNORMALISED PLOT OF SECTION NUMBER,I3,/,2X)     $13$
      CALL UD0316 (N,LOG2,XM,YM,AM,THICK2)                              $13$
790   A2=AXIALC**2                                                      $13$
      A4=A2**2                                                          $13$
      IX=IX*A4                                                          $13$
      IY=IY*A4                                                          $13$
      IXY=IXY*A4                                                        $13$
      IPX=IPX*A4                                                        $13$
      IPY=IPY*A4                                                        $13$
      IF (ISTAK.GT.1) GO TO 800                                         $13$
      XBAR=ISTAK                                                        $13$
      IF (ISTAK.EQ.0) YBAR=0.                                           $13$
      IF (ISTAK.EQ.1) YBAR=YML                                          $13$
800   RLE=YZERO*AXIALC                                                  $13$
      IF (ISPLIT.NE.0) GO TO 810                                        $13$
      CHORD=CHORD*AXIALC                                                $13$
      CCORD(IBL)=CHORD                                                  $13$
      AREA=AREA*A2                                                      $13$
      XC=RLE-XBAR*AXIALC-XDEL                                           $13$
      YC=-YBAR*AXIALC-YDEL                                              $13$
      XTC=(XML-XBAR)*AXIALC-XDEL                                        $13$
      YTC=(YML-YBAR)*AXIALC-YDEL                                        $13$
      GO TO 860                                                         $13$
810   RLE=YZEROS*AXIALC                                                 $13$
      CHORD=CHORDS*AXIALC                                               $13$
      AREAS=AREAS*AXIALC**2                                             $13$
      XC=(XSPLTM(1)-XBAR)*AXIALC-XDEL                                   $13$
      YC=(YSPLTM(1)-YBAR)*AXIALC-YDEL                                   $13$
      XTC=(XSPLTM(K1)-XBAR)*AXIALC-XDEL                                 $13$
      YTC=(YSPLTM(K1)-YBAR)*AXIALC-YDEL                                 $13$
      XBARS=(XBARS-XBAR)*AXIALC-XDEL                                    $13$
      YBARS=(YBARS-YBAR)*AXIALC-YDEL                                    $13$
      IF (IPRINT.GE.2) GO TO 940                                        $13$
      GO TO (820,840), ISPLIT                                           $13$
820   WRITE (LOG2,830) CHORD,RLE,XC,YC,XBARS,YBARS,AREAS                $13$
830   FORMAT (1H1,31X,69HDIMENSIONAL RESULTS - ALL RESULTS REFER TO A BL$13$
     1ADE OF SPECIFIED CHORD,/,32X,69(1H*),//,20X,11HBLADE CHORD,4X,1H=,$13$
     21PE12.5,//20X,10HEND RADIUS,5X,1H=,1PE12.5,8X,14HCENTERED AT X=,1P$13$
     3E12.5,3H Y=,1PE13.5,//,20X,26HLOCATION OF CENTROID AT X=,1PE12.5,7$13$
     4H AND Y=,1PE12.5,//,20X,16HSECTION AREA    =,1PE12.5,//,2X)       $13$
      GO TO 900                                                         $13$
840   WRITE (LOG2,850) CHORD,RLE,XC,YC,XTC,YTC,XBARS,YBARS,AREAS        $13$
850   FORMAT (1H1,31X,69HDIMENSIONAL RESULTS - ALL RESULTS REFER TO A BL$13$
     1ADE OF SPECIFIED CHORD,/,32X,69(1H*),//,20X,11HBLADE CHORD,4X,1H=,$13$
     21PE12.5,//20X,10HEND RADIUS,5X,1H=,1PE12.5,8X,14HCENTERED AT X=,1P$13$
```

```
     3E12.5,3H Y=,1PE13.5,/,64X,6HAND X=,1PE12.5,3H Y=,1PE13.5,/,20X,26H$13$  602
     4LOCATION OF CENTROID AT X=,1PE12.5,7H AND Y=,1PE12.5,//,20X,26HSEC$13$  603
     5TION AREA    =,1PE12.5,//,2X)                                      $13$  604
      GO TO 900                                                          $13$  605
860   CONTINUE                                                           $13$  606
      IF (IPRINT.GE.2) GO TO 940                                         $13$  607
      IF (ISECN.EQ.2) GO TO 880                                          $13$  608
      WRITE (LOG2,870) CHORD,RLE,XC,YC,AREA,IX,IY,IXY,IPX,ANG,IPY,ANG    $13$  609
870   FORMAT (1H1,31X,69HDIMENSIONAL RESULTS - ALL RESULTS REFER TO A BL $13$  610
     1ADE OF SPECIFIED CHORD,/,32X,69H**************************************$13$  611
     2**************************,//,20X,11HBLADE CHORD,4X,1H=,1PE12.5,/,20X$13$  612
     3,10HLE RADIUS,5X,1H=,1PE12.5,8X,14HCENTERED AT X=,1PE13.5,3H Y=,1PE$13$  613
     413.5,//,20X,16HSECTION AREA    =,1PE12.5,//,20X,37HSECOND MOMENTS OF AR$13$  614
     5EA ABOUT CENTROID,//,30X,6HIX    =,1PE12.5,/,30X,6HIY    =,1PE12.5,/,30X$13$  615
     6,6HIXY   =,1PE12.5,//,20X,47HPRINCIPAL SECOND MOMENTS OF AREA ABOUT $13$  616
     7CENTROID,//,30X,5HIPX   =,1PE12.5,5H  (AT,0PF7.3,15H WITH (XC AXIS),$13$  617
     8/,30X,6HIPY   =,1PE12.5,5H  (AT,0PF7.3,15H WITH (YC AXIS),//)     $13$  618
      GO TO 910                                                          $13$  619
880   CONTINUE                                                           $13$  620
      WRITE (LOG2,890) CHORD,RLE,XC,YC,XTC,YTC,AREA,IX,IY,IXY,IPX,ANG,IP $13$  621
     1Y,ANG                                                              $13$  622
890   FORMAT (1H1,31X,69HDIMENSIONAL RESULTS - ALL RESULTS REFER TO A BL $13$  623
     1ADE OF SPECIFIED CHORD,/,32X,69H**************************************$13$  624
     2**************************,//,20X,11HBLADE CHORD,4X,1H=,1PE12.5,/,20X$13$  625
     3,9HEND RADII,6X,1H=,1PE12.5,8X,14HCENTERED AT X=,1PE13.5,3H Y=,1PE1$13$  626
     43.5,/,64X,6HAND X=,1PE13.5,3H Y=,1PE13.5,//,20X,16HSECTION AREA    $13$  627
     5=,1PE12.5,//,20X,37HSECOND MOMENTS OF AREA ABOUT CENTROID,//,30X,6H$13$  628
     6IX    =,1PE12.5,/,30X,6HIY    =,1PE12.5,/,30X,6HIXY   =,1PE12.5,//,20$13$  629
     7X,47HPRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID,//,30X,6HIPX  $13$  630
     8 =,1PE12.5,5H  (AT,0PF7.3,15H WITH (XC AXIS),/,30X,6HIPY   =,1PE12.$13$  631
     95,5H  (AT,0PF7.3,15H WITH (YC AXIS),//)                           $13$  632
900   CONTINUE                                                           $13$  633
910   WRITE (LOG2,920)                                                   $13$  634
      WRITE (LOG2,930)                                                   $13$  635
920   FORMAT(4X,2HPT,5X,7HSURFACE,10(1H-),3HONE,8X,7HSURFACE,10(1H-),3HTWO$13$  636
     1,10X,2HPT,5X,7HSURFACE,10(1H-),3HONE,8X,7HSURFACE,10(1H-),3HTWO)  $13$  637
930   FORMAT (4X,2HNO,8X,1HX,13X,1HY,13X,1HX,13X,1HY,12X,2HNO,8X,1HX,13X$13$  638
     1,1HY,13X,1HX,13X,1HY,//)                                          $13$  639
      LNCT=24                                                            $13$  640
940   DO 970 J=1,N                                                       $13$  641
      XS(IBL,J)=(XS(IBL,J)-XBAR)*AXIALC-XDEL                             $13$  642
      YS(IBL,J)=(YS(IBL,J)-YBAR)*AXIALC-YDEL                             $13$  643
      XP(IBL,J)=(XP(IBL,J)-XBAR)*AXIALC-XDEL                             $13$  644
      YP(IBL,J)=(YP(IBL,J)-YBAR)*AXIALC-YDEL                             $13$  645
      IF (IPRINT.GE.2) GO TO 970                                         $13$  646
      IF ((J/2)*2.NE.J) GO TO 970                                        $13$  647
      IF (LNCT.NE.60) GO TO 950                                          $13$  648
      LNCT=4                                                             $13$  649
      WRITE (LOG2,10)                                                    $13$  650
                                                                         $13$  651
```

```
      WRITE (LOG2,920)                                                          $13$  652
      WRITE (LOG2,930)                                                          $13$  653
  950 LNCT=LNCT+1                                                               $13$  654
      JM1=J-1                                                                   $13$  655
      WRITE (LOG2,960) JM1,XS(IBL,JM1),YS(IBL,JM1),XP(IBL,JM1),YP(IBL,JM      $13$  656
     11),J,XS(IBL,J),YS(IBL,J),XP(IBL,J),YP(IBL,J)                             $13$  657
  960 FORMAT (3X,I3,4(2X,1PE12.5),6X,I3,4(2X,1PE12.5))                          $13$  658
  970 CONTINUE                                                                  $13$  659
      IF (ISPLIT.GT.1) ISECN=ISPLIT                                             $13$  660
      IF (IPPINT.GE.2) GO TO 1000                                               $13$  661
      IF (LNCT.GT.24) WRITE (LOG2,930)                                          $13$  662
  980 FORMAT (1H1)                                                              $13$  663
      IF (LNCT.GT.24) LNCT=2                                                    $13$  664
      LNCT=LNCT+5                                                               $13$  665
      IF (ISECN.EQ.2) GO TO 1030                                                $13$  666
      WRITE (LOG2,990)                                                          $13$  667
  990 FORMAT (2X,/,48X,37HPOINTS DESCRIBING LEADING EDGE RADIUS,//,48X,9        $13$  668
     1HPOINT NO.,6X,1HX,13X,1HY,/,2X)                                           $13$  669
 1000 EPS=BETA1+180.0                                                           $13$  670
      IF (ISECN.EQ.2) GO TO 1030                                                $13$  671
      DO 1020 J=1,31                                                            $13$  672
      XSEMI(IBL,J)=XC-RLE*SIN(EPS/C1)                                           $13$  673
      YSEMI(IBL,J)=YC+RLE*COS(EPS/C1)                                           $13$  674
      EPS=EPS-5.0                                                               $13$  675
      IF (IPRINT.GE.2) GO TO 1020                                               $13$  676
      WRITE (LOG2,1010) J,XSEMI(IBL,J),YSEMI(IBL,J)                             $13$  677
      LNCT=LNCT+1                                                               $13$  678
 1010 FORMAT (48X,I2,1PE17.5,1PE14.5)                                           $13$  679
 1020 CONTINUE                                                                  $13$  680
      GO TO 1090                                                                $13$  681
 1030 PHISS=PHIS-ABS((BETA1-BETA2)/C2)                                          $13$  682
      PHIPP=ABS((BETA1-BETA2))/C2-PHIP                                          $13$  683
      EPS=BETA1+180.0                                                           $13$  684
      EPS2=BETA2+90.                                                            $13$  685
      DELEP=(180.-(PHISS+PHIPP)*C1)/28.                                         $13$  686
      DO 1050 J=1,31                                                            $13$  687
      IF (J.NE.1) GO TO 1040                                                    $13$  688
      XSEMI(IBL,J)=XP(IBL,1)                                                    $13$  689
      YSEMI(IBL,J)=YP(IBL,1)                                                    $13$  690
      XSEMJ(IBL,J)=XS(IBL,N)                                                    $13$  691
      YSEMJ(IBL,J)=YS(IBL,N)                                                    $13$  692
      EPS=EPS-PHIPP*C1                                                          $13$  693
      EPS2=EPS2-PHISS*C1                                                        $13$  694
      GO TO 1060                                                                $13$  695
 1040 IF (J.NE.31) GO TO 1050                                                   $13$  696
      XSEMI(IBL,J)=XS(IBL,1)                                                    $13$  697
      YSEMI(IBL,J)=YS(IBL,1)                                                    $13$  698
      YSEMJ(IBL,J)=YP(IBL,N)                                                    $13$  699
      XSEMJ(IBL,J)=XP(IBL,N)                                                    $13$  700
      GO TO 1060                                                                $13$  701
```

```
1050  XSEMI(IBL,J)=XC-RLE*SIN(EPS/C1)
      YSEMI(IBL,J)=YC+RLE*COS(EPS/C1)
      XSEMJ(IBL,J)=XTC+RLE*COS(EPS2/C1)
      YSEMJ(IBL,J)=YTC+RLE*SIN(EPS2/C1)
      EPS=EPS-DELEP
      EPS2=EPS2-DELEP
1060  CONTINUE
      IF (IPRINT.GE.2) GO TO 1090
      WRITE (LOG2,1070)
1070  FORMAT (2X,/,39X,44HPOINTS DESCRIBING LEADING AND TRAILING EDGES,/
     1,25X,12HLEADING EDGE,22X,13HTRAILING EDGE,/,2X,9HPOINT NO.,4X,8X,1
     2HX,14X,1HY,12X,8X,1HX,14X,1HY,/,2X)
      WRITE (LOG2,1080) (J,XSEMI(IBL,J),YSEMI(IBL,J),XSEMJ(IBL,J),YSEMJ(
     1IBL,J),J=1,31)
      LNCT=LNCT+31
1080  FORMAT (6X,I2,7X,1PE17.5,1PE14.5,2X,1PE17.5,1PE14.5)
1090  SSURF=AXIALC
      SS2=BX-AXIALC*XBAR-XDEL
      SBAR=SS2+AXIALC*XBARB+XDEL
      DO 1100 IK=1,100
1100  SS(IK)=SS(IK)-SBAR
      CALL UD0315 (SS,X,100,0.0,SBAR,1,1)
      CALL UD0315 (XHERE,R(1,IBL),NSTNS,SBAR,RXBAR,1,0)
      XBARC=XBAR
      YBARC=YBAR
      XBAR=XBARB+XDEL/AXIALC
      YBAR=YBARB+YDEL/AXIALC
      SS1(1,1)=SS(1)
      S23=AXIALC/99.
      SS(1)=SS(1)+SS2
      DO 1110 IK=2,100
      SS1(IK,1)=SS(IK)
1110  SS(IK)=SS(IK-1)+S23
      SIGMAO=(XAB-YBAR)/RXBAR*AXIALC
      DO 1120 IK=2,100
      IF (XBAR.EQ.DX(IK)) GO TO 1140
      IF (XBAR.GT.DX(IK-1).AND.XBAR.LT.DX(IK)) GO TO 1150
1120  CONTINUE
      WRITE (LOG2,1130)
1130  FORMAT (1H1,23H XBAR CANNOT BE LOCATED)
1140  SIGMA(IK)=SIGMAO
      KL=IK+1
      GO TO 1160
1150  KL=IK
      SIGMA(IK-1)=SIGMAO
1160  SSDUM=SS(KL-1)
      SS(KL-1)=0.
      YP1=XBC
      RX1=RXBAR
      DO 1170 IK=KL,100
```

```
      XSURF=SS2+DX(IK)*SSURF+SS1(1,1)                                   $13$
      CALL UD0315 (SS1(1,1),X,100,XSURF,XDUM,1,1)                       $13$
      CALL UD0315 (XHERE,R(1,IBL),NSTNS,XDUM,RX2,1,0)                   $13$
      SIGMA(IK)=SIGMA(IK-1)+(Y(IK)/RX2+YP1/RX1)/2.*(SS(IK)-SS(IK-1))    $13$
      YP1=Y(IK)                                                         $13$
 1170 RX1=RX2                                                           $13$
      SS(KL-1)=SSDUM                                                    $13$
      SSDUM=SS(KL)                                                      $13$
      SIGDUM=SIGMA(KL)                                                  $13$
      SIGMA(KL)=SIGMAO                                                  $13$
      SS(KL)=0.                                                         $13$
      RX1=RXBAR                                                         $13$
      YP1=XBC                                                           $13$
      KM=KL-1                                                           $13$
      DO 1180 IK=1,KM                                                   $13$
      KJ=KL-IK                                                          $13$
      XSURF=SS2+DX(KJ)*SSURF+SS1(1,1)                                   $13$
      CALL UD0315 (SS1(1,1),X,100,XSURF,XDUM,1,1)                       $13$
      CALL UD0315 (XHERE,R(1,IBL),NSTNS,XDUM,RX2,1,0)                   $13$
      SIGMA(KJ)=SIGMA(KJ+1)-(Y(KJ)/RX2+YP1/RX1)/2.*(SS(KJ+1)-SS(KJ))    $13$
      YP1=Y(KJ)                                                         $13$
 1180 RX1=RX2                                                           $13$
      SIGMA(KL)=SIGDUM                                                  $13$
      SS(KL)=SSDUM                                                      $13$
      DO 1190 IK=1,100                                                  $13$
 1190 SS(IK)=SS1(IK,1)                                                  $13$
      XBAR=XBARC                                                        $13$
      YBAR=YBARC                                                        $13$
      DO 1200 IK=1,N                                                    $13$
      SS1(IK,1)=SS2+((XS(IBL,IK)+XDEL)/AXIALC+XBAR)*SSURF+SS(1)         $13$
 1200 SS1(IK,2)=SS2+((XP(IBL,IK)+XDEL)/AXIALC+XBAR)*SSURF+SS(1)         $13$
      DO 1210 IK=1,31                                                   $13$
 1210 SS1(IK,3)=SS2+((XSEMI(IBL,IK)+XDEL)/AXIALC+XBAR)*SSURF+SS(1)      $13$
      IF (ISECN.NE.2) GO TO 1230                                        $13$
      DO 1220 IK=1,31                                                   $13$
 1220 SS1(IK,4)=SS2+((XSEMJ(IBL,IK)+XDEL)/AXIALC+XBAR)*SSURF+SS(1)      $13$
      CALL UD0315 (SS,X,100,SS1(1,4),SS1(1,4),31,1)                     $13$
 1230 CALL UD0315 (SS,X,100,SS1(1,1),SS1(1,1),N,1)                      $13$
      CALL UD0315 (SS,X,100,SS1(1,2),SS1(1,2),N,1)                      $13$
      CALL UD0315 (SS,X,100,SS1(1,3),SS1(1,3),31,1)                     $13$
      IF (ISTAK.GT.1) GO TO 1250                                        $13$
      IF (ISTAK.EQ.1) SIGMAO=SIGMA(100)                                 $13$
      IF (ISTAK.EQ.0) SIGMAO=SIGMA(1)                                   $13$
      DO 1240 IK=1,100                                                  $13$
 1240 SIGMA(IK)=SIGMA(IK)-SIGMAO                                        $13$
 1250 DO 1260 IK=1,100                                                  $13$
      DX(IK)=(DX(IK)-XBAR)*AXIALC-XDEL                                  $13$
 1260 DY(IK)=(DY(IK)-YBAR)*AXIALC-YDEL                                  $13$
      DO 1280 MK=1,4                                                    3$
      IF (ISECN.NE.2.AND.MK.EQ.4) GO TO 1280                            3$
```

```
      IF (MK.EQ.4.OR.MK.EQ.3) NNN=31                                          $13$  802
      IF (MK.EQ.1.OR.MK.EQ.2) NNN=N                                           $13$  803
      DO 1270 IK=1,NNN                                                        $13$  804
      IF (MK.EQ.1) YP1=YS(IBL,IK)                                             $13$  805
      IF (MK.EQ.2) YP1=YP(IBL,IK)                                             $13$  806
      IF (MK.EQ.3) YP1=YSEMI(IBL,IK)                                          $13$  807
      IF (MK.EQ.4) YP1=YSEMJ(IBL,IK)                                          $13$  808
      IF (MK.EQ.1) RX1=XS(IBL,IK)                                             $13$  809
      IF (MK.EQ.2) RX1=XP(IBL,IK)                                             $13$  810
      IF (MK.EQ.3) RX1=XSEMI(IBL,IK)                                          $13$  811
      IF (MK.EQ.4) RX1=XSEMJ(IBL,IK)                                          $13$  812
      CALL UD0315 (DX,DY,100,RX1,RXBAR,1,1)                                   $13$  813
      DELLY=YP1-RXBAR                                                         $13$  814
      CALL UD0315 (XHERE,R(1,IBL),NSTNS,SS1(IK,MK),RAB,1,0)                   $13$  815
      DELSIG=DELLY/RAB                                                        $13$  816
      CALL UD0315 (DX,SIGMA,100,RX1,XAB,1,1)                                  $13$  817
1270  SS1(IK,MK)=XAB+DELSIG                                                   $13$  818
1280  CONTINUE                                                                $13$  819
      RETURN                                                                  $13$  820
1290  WRITE (LOG2,1300)                                                       $13$  821
1300  FORMAT (1H1,10X,54HITERATIVE SOLUTION FOR CONSTANT FAILS - CASE AB      $13$  822
     1ANDONED)                                                                $13$  823
      STOP                                                                    $13$  824
      END                                                                     $13$  825
```

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      SUBROUTINE UDU314 (XDATA,YDATA,NDATA,XIN,YOUT,YPRIME,NXY,NWOT)     $14      2
C     THIS SPLINE ROUTINE DETERMINES Y AND/OR YPRIME  LINEAR EXTRAPOLATI$14      3
C     XDATA AND XIN MUST BE IN ASCENDING ORDER  E1 AND E2 ARE D2YDX2 LAS$14      4
C     D2YDX2 LAST-BUT-ONE AT ENDS OF SPECIFIED REGION OF BEAM           $14      5
      REAL M                                                            $14      6
      DIMENSION A(65), B(65), D(65), M(65), XDATA(1), YDATA(1), XIN(1),  $14      7
     1YOUT(1), YPRIME(1)                                                $14      8
      IF (NDATA-2) 240,10,70                                            $14      9
10    IF (NWOT-1) 20,40,20                                              $14     10
20    DO 30 I=1,NXY                                                     $14     11
30    YOUT(I)=((YDATA(2)-YDATA(1))/(XDATA(2)-XDATA(1)))*(XIN(I)-XDATA(1)$14     12
     1)+YDATA(1)                                                        $14     13
40    IF (NWOT) 240,240,50                                              $14     14
50    DO 60 I=1,NXY                                                     $14     15
60    YPRIME(I)=(YDATA(2)-YDATA(1))/(XDATA(2)-XDATA(1))                 $14     16
      GO TO 240                                                         $14     17
70    CONTINUE                                                          $14     18
      E1=1.0                                                            $14     19
      E2=1.0                                                            $14     20
      A(1)=1.0                                                          $14     21
      B(1)=-E1                                                          $14     22
      D(1)=0.0                                                          $14     23
      N=NDATA-1                                                         $14     24
      DO 80 I=2,N                                                       $14     25
      A(I)=(XDATA(I+1)-XDATA(I-1))/3.0-(XDATA(I)-XDATA(I-1))*B(I-1)/(6.0$14     26
     1*A(I-1))                                                          $14     27
      B(I)=(XDATA(I+1)-XDATA(I))/6.0                                    $14     28
80    D(I)=(YDATA(I+1)-YDATA(I))/(XDATA(I+1)-XDATA(I))-(YDATA(I)-YDATA(I$14     29
     1-1))/(XDATA(I)-XDATA(I-1))-(XDATA(I)-XDATA(I-1))*D(I-1)/6.0/A(I-1)$14     30
      A(NDATA)=-E2                                                      $14     31
      B(NDATA)=1.0                                                      $14     32
      D(NDATA)=0.0                                                      $14     33
      M(NDATA)=A(NDATA)*D(N)/(A(NDATA)*B(N)-A(N)*B(NDATA))              $14     34
      DO 90 II=2,NDATA                                                  $14     35
      I=NDATA+1-II                                                      $14     36
90    M(I)=(D(I)-B(I)*M(I+1))/A(I)                                      $14     37
      J=1                                                               $14     38
      I=1                                                               $14     39
100   IF (XIN(I)-XDATA(1)) 190,190,110                                  $14     40
110   IF (XIN(I)-XDATA(J+1)) 140,140,120                                $14     41
120   IF (J+1-NDATA) 130,140,140                                        $14     42
130   J=J+1                                                             $14     43
      GO TO 110                                                         $14     44
140   IF (XIN(I)-XDATA(NDATA)) 150,220,220                              $14     45
150   DX=XDATA(J+1)-XDATA(J)                                            $14     46
      IF (NWOT-1) 180,170,160                                           $14     47
160   YOUT(I)=M(J)/(6.0*DX)*(XDATA(J+1)-XIN(I))**3+M(J+1)/(6.0*DX)*(XIN($14     48
     1I)-XDATA(J))**3+(XDATA(J+1)-XIN(I))*(YDATA(J)/DX-M(J)/6.0*DX)+(XIN$14     49
     2(I)-XDATA(J))*(YDATA(J+1)/DX-M(J+1)/6.0*DX)                       $14     50
      IF (NWOT) 170,180,170                                             $14     51
```

```
170   YPPIME(I)=(-M(J)*(XDATA(J+1)-XIN(I))**2/2.0+M(J+1)*(XIN(I)-XDATA(J$14$   52
     1))**2/2.0+YDATA(J+1)-YDATA(J))/DX-(M(J+1)-M(J))/6.0*DX          $14$   53
180   I=I+1                                                           $14$   54
      IF (I-NXY) 190,190,240                                          $14$   55
190   YDASH=(YDATA(2)-YDATA(1))/(XDATA(2)-XDATA(1))-(M(1)/3.0+M(2)/6.0)*$14$   56
     1(XDATA(2)-XDATA(1))                                             $14$   57
      IF (NWOT-1) 200,210,200                                         $14$   58
200   YOUT(I)=YDATA(1)-YDASH*(XDATA(1)-XIN(I))                        $14$   59
      IF (NWOT) 210,180,210                                           $14$   60
210   YPRIME(I)=YDASH                                                 $14$   61
      GO TO 180                                                       $14$   62
220   YDASH=(YDATA(NDATA)-YDATA(N))/(XDATA(NDATA)-XDATA(N))+(M(NDATA)/3.$14$   63
     10+M(N)/6.0)*(XDATA(NDATA)-XDATA(N))                             $14$   64
      IF (NWOT-1) 230,210,230                                         $14$   65
230   YOUT(I)=YDATA(NDATA)+YDASH*(XIN(I)-XDATA(NDATA))                $14$   66
      IF (NWOT) 210,180,210                                           $14$   67
240   RETURN                                                          $14$   68
      END                                                             $14$   69
```

```
      SUBROUTINE UU0315 (XDATA,YDATA,NDATA,XIN,YOUT,NXY,NTYPE)                  $15$    2
      REAL M                                                                    $15$    3
      DIMENSION M(21), A(21), B(21), D(21), XDATA(1), YDATA(1), XIN(1),         $15$    4
     1YOUT(1)                                                                   $15$    5
      IF (NDATA-1) 10,10,30                                                     $15$    6
10    DO 20 I=1,NXY                                                             $15$    7
20    YOUT(I)=YDATA(1)                                                          $15$    8
      RETURN                                                                    $15$    9
30    IF (NDATA-2) 50,50,40                                                     $15$   10
40    IF (NTYPE) 180,180,50                                                     $15$   11
50    J=1                                                                       $15$   12
      I=1                                                                       $15$   13
60    IF (XIN(I)-XDATA(2)) 130,130,70                                           $15$   14
70    IF (XIN(I)-XDATA(NDATA-1)) 80,140,140                                     $15$   15
80    IF (XIN(I)-XDATA(J)) 100,120,90                                           $15$   16
90    IF (XIN(I)-XDATA(J+1)) 120,120,100                                        $15$   17
100   J=J+1                                                                     $15$   18
      IF (J-NDATA) 80,110,110                                                   $15$   19
110   J=1                                                                       $15$   20
      GO TO 80                                                                  $15$   21
120   YOUT(I)=YDATA(J)+(YDATA(J+1)-YDATA(J))/(XDATA(J+1)-XDATA(J))*(XIN(        $15$   22
     1I)-XDATA(J))                                                              $15$   23
      GO TO 150                                                                 $15$   24
130   YOUT(I)=YDATA(1)+(YDATA(2)-YDATA(1))/(XDATA(2)-XDATA(1))*(XIN(I)-X        $15$   25
     1DATA(1))                                                                  $15$   26
      GO TO 150                                                                 $15$   27
140   YOUT(I)=YDATA(NDATA-1)+(YDATA(NDATA)-YDATA(NDATA-1))/(XDATA(NDATA)        $15$   28
     1-XDATA(NDATA-1))*(XIN(I)-XDATA(NDATA-1))                                  $15$   29
150   IF (I-NXY) 160,170,170                                                    $15$   30
160   I=I+1                                                                     $15$   31
      GO TO 60                                                                  $15$   32
170   RETURN                                                                    $15$   33
180   A(1)=1.0                                                                  $15$   34
      B(1)=0.0                                                                  $15$   35
      D(1)=0.0                                                                  $15$   36
      N=NDATA-1                                                                 $15$   37
      DO 190 I=2,N                                                              $15$   38
      A(I)=(XDATA(I+1)-XDATA(I-1))/3.0-(XDATA(I)-XDATA(I-1))*B(I-1)/(6.0        $15$   39
     1*A(I-1))                                                                  $15$   40
      B(I)=(XDATA(I+1)-XDATA(I))/6.0                                            $15$   41
190   D(I)=(YDATA(I+1)-YDATA(I))/(XDATA(I+1)-XDATA(I))-(YDATA(I)-YDATA(I        $15$   42
     1-1))/(XDATA(I)-XDATA(I-1))-(XDATA(I)-XDATA(I-1))*D(I-1)/6.0/A(I-1)        $15$   43
      M(NDATA)=0.0                                                              $15$   44
      DO 200 II=2,N                                                             $15$   45
      I=NDATA+1-II                                                              $15$   46
200   M(I)=(D(I)-B(I)*M(I+1))/A(I)                                              $15$   47
      M(1)=0.0                                                                  $15$   48
      J=1                                                                       $15$   49
      I=1                                                                       $15$   50
210   IF (XIN(I)-XDATA(1)) 230,260,220                                          $15$   51
```

```
220     IF (XIN(I)-XDATA(NDATA)) 280,270,240                                    $15$   52
230     JP=1                                                                    $15$   53
        KP=2                                                                    $15$   54
        GO TO 250                                                               $15$   55
240     JP=NDATA                                                                $15$   56
        KP=NDATA-1                                                              $15$   57
250     YPRIME=(YDATA(KP)-YDATA(JP))/(XDATA(KP)-XDATA(JP))-M(KP)/6.0*(XDAT      $15$   58
       1A(KP)-XDATA(JP))                                                        $15$   59
        YOUT(I)=YDATA(JP)+(XIN(I)-XDATA(JP))*YPRIME                             $15$   60
        GO TO 350                                                               $15$   61
260     YOUT(I)=YDATA(1)                                                        $15$   62
        GO TO 350                                                               $15$   63
270     YOUT(I)=YDATA(NDATA)                                                    $15$   64
        GO TO 350                                                               $15$   65
280     IF (XIN(I)-XDATA(J)) 300,320,290                                        $15$   66
290     IF (XIN(I)-XDATA(J+1)) 340,330,300                                      $15$   67
300     J=J+1                                                                   $15$   68
        IF (J-NDATA) 260,310,310                                                $15$   69
310     J=1                                                                     $15$   70
        GO TO 280                                                               $15$   71
320     YOUT(I)=YDATA(J)                                                        $15$   72
        GO TO 350                                                               $15$   73
330     YOUT(I)=YDATA(J+1)                                                      $15$   74
        GO TO 350                                                               $15$   75
340     DX=XDATA(J+1)-XDATA(J)                                                  $15$   76
        YOUT(I)=M(J)/(6.0*DX)*(XDATA(J+1)-XIN(I))**3+M(J+1)/(6.0*DX)*(XIN($15$   77
       1I)-XDATA(J))**3+(XDATA(J+1)-XIN(I))*(YDATA(J)/DX-M(J)/6.0*DX)+(XIN$15$   78
       2(I)-XDATA(J))*(YDATA(J+1)/DX-M(J+1)/6.0*DX)                             $15$   79
350     IF (I-NXY) 360,370,370                                                  $15$   80
360     I=I+1                                                                   $15$   81
        GO TO 210                                                               $15$   82
370     RETURN                                                                  $15$   83
        END                                                                     $15$   84
```

```
      SUBROUTINE U00316 (IX,LOG1,X1,Y1,X2,Y2)
      REAL LINE
      DIMENSION X1(1), Y1(1), X2(1), Y2(1), LINE(121), XNUM(13)
      DATA SYMBOL/1H*/,DASH/1H-/,CROSS/1H+/,BLANK/1H /,XI/1HI/
      YMIN=Y1(1)
      XMIN=X1(1)
      YMAX=YMIN
      XMAX=XMIN
      DO 10 I=1,IX
      IF (Y2(I).LT.YMIN) YMIN=Y2(I)
      IF (Y2(I).GT.YMAX) YMAX=Y2(I)
      IF (X2(I).LT.XMIN) XMIN=X2(I)
      IF (X2(I).GT.XMAX) XMAX=X2(I)
      IF (Y1(I).GT.YMAX) YMAX=Y1(I)
      IF (X1(I).GT.XMAX) XMAX=X1(I)
10    CONTINUE
      IF (XMAX.EQ.XMIN.OR.YMIN.EQ.YMAX) GO TO 170
      YH=YMAX+(YMAX-YMIN)/25.0
      YL=YMIN-(YMAX-YMIN)/25.0
      XH=XMAX+(XMAX-XMIN)/38.3333
      XL=XMIN-(XMAX-XMIN)/38.3333
      IF ((YH-YL)/(XH-XL).GT.0.75) XH=1.3333*(YH-YL)+XL
      IF ((YH-YL)/(XH-XL).LT.0.75) YH=0.75*(XH-XL)+YL
      XMAX=(XMIN+XMAX-XH+XL)/2.0
      XH=XH-XL+XMAX
      XL=XMAX
      XMAX=(YMIN+YMAX-YH+YL)/2.0
      YH=YH-YL+XMAX
      YL=XMAX
      XMAX=ABS(XH)
      XMIN=ABS(XL)
      YMIN=ABS(YL)
      YMAX=ABS(YH)
      IF (XMIN.GT.XMAX) XMAX=XMIN
      IF (YMIN.GT.YMAX) YMAX=YMIN
      XMAX=ALOG10(XMAX)
      YMAX=ALOG10(YMAX)
      IF (XMAX.LT.0.0) XMAX=XMAX-1.0
      IF (YMAX.LT.0.0) YMAX=YMAX-1.0
      MX=-XMAX
      MY=-YMAX
      WRITE (LOG1,20) MX,MY
20    FORMAT (20X,46HSCALES - (X( IS SHOWN TIMES 10 TO THE POWER OF,I3,4
     10H   (Y( IS SHOWN TIMES 10 TO THE POWER OF,I3,/)
      YINC=(YH-YL)/54.0
      YINC2=YINC/2.0
      XRANGE=XH-XL
      DO 140 KLINE=1,55
      IF (KLINE.EQ.1.OR.KLINE.EQ.55) GO TO 50
      DO 30 L=2,120
```

```
30    LINE(L)=BLANK
      IF (KLINE.EQ.7.OR.KLINE.EQ.13.OR.KLINE.EQ.19.OR.KLINE.EQ.25.OR.KLI
     1NE.EQ.31.OR.KLINE.EQ.37.OR.KLINE.EQ.43.OR.KLINE.EQ.49) GO TO 40
      LINE(1)=XI
      LINE(121)=XI
      GO TO 80
40    LINE(1)=DASH
      LINE(121)=DASH
      GO TO 80
50    DO 60 L=2,120
60    LINE(L)=DASH
      LINE(1)=CROSS
      LINE(121)=CROSS
      DO 70 L=11,111,10
70    LINE(L)=XI
      GO TO 120
80    DO 100 I=1,IX
      IF (Y2(I).GT.YH+YINC2.OR.Y2(I).LE.YH-YINC2) GO TO 90
      L=(X2(I)-XL)/XRANGE*120.0+1.5
      LINE(L)=SYMBOL
90    IF (Y1(I).GT.YH+YINC2.OR.Y1(I).LE.YH-YINC2) GO TO 100
      L=(X1(I)-XL)/XRANGE*120.0+1.5
      LINE(L)=SYMBOL
100   CONTINUE
      IF (KLINE.EQ.1.OR.KLINE.EQ.7.OR.KLINE.EQ.13.OR.KLINE.EQ.19.OR.KLIN
     1E.EQ.25.OR.KLINE.EQ.31.OR.KLINE.EQ.37.OR.KLINE.EQ.43.OR.KLINE.EQ.4
     29.OR.KLINE.EQ.55) GO TO 120
      WRITE (LOG1,110) LINE
110   FORMAT (8X,121A1)
      GO TO 140
120   YNUM=YH*10.0**MY
      WRITE (LOG1,130) YNUM,LINE
130   FORMAT (1X,F6.3,1X,121A1)
140   YH=YH-YINC
      XNUM(1)=XL*10.0**MX
      XINC=((XH-XL)/12.0)*10.0**MX
      DO 150 I=2,13
150   XNUM(I)=XNUM(I-1)+XINC
      WRITE (LOG1,160) XNUM
160   FORMAT (6X,12(F6.3,4X),F6.3)
      RETURN
170   WRITE (LOG1,180)
180   FORMAT (//,35X,54H NO PLOT HAS BEEN MADE BECAUSE (X( OR (Y( RANGE I
     1S ZERO)
      RETURN
      END
```

```
      SUBROUTINE UD0317 (ISTAK,PLTSZE,ITRIG,TITLE,IKDUM,IFPLOT)                 117    2
      DIMENSION TITLE(8)                                                        117    3
      IF (ITRIG.EQ.2.AND.IFPLOT.NE.2) CALL PLOT (PLTSZE,0.,-3)                  117    4
      PLTTIT=PLTSZE*.1                                                          117    5
      IF (ISTAK.LT.2) GO TO 10                                                  117    6
      BAL=.35*PLTSZE                                                            117    7
      XLEN1=.3*PLTSZE                                                           117    8
      XLEN2=XLEN1                                                               117    9
      YLEN1=.25*PLTSZE                                                          117   10
      YLEN2=-1.*YLEN1                                                           117   11
      XBACK1=-1.9                                                               117   12
      XBACK2=-6.2                                                               117   13
      GO TO 50                                                                  117   14
   10 IF (ISTAK.EQ.0) GO TO 20                                                  117   15
      XLEN1=.70*PLTSZE                                                          117   16
      XLEN2=.15*PLTSZE                                                          117   17
      XBACK1=-1.9-.20*PLTSZE                                                    117   18
      XBACK2=-6.2-.20*PLTSZE                                                    117   19
      IF (IKDUM.EQ.1) GO TO 30                                                  117   20
      GO TO 40                                                                  117   21
   20 CONTINUE                                                                  117   22
      XLEN1=.15*PLTSZE                                                          117   23
      XLEN2=.70*PLTSZE                                                          117   24
      XBACK1=-1.9+.20*PLTSZE                                                    117   25
      XBACK2=-6.2+.20*PLTSZE                                                    117   26
      IF (IKDUM.EQ.1) GO TO 40                                                  117   27
   30 BAL=.25*PLTSZE                                                            117   28
      YLEN1=.50*PLTSZE                                                          117   29
      YLEN2=-.15*PLTSZE                                                         117   30
      GO TO 50                                                                  117   31
   40 BAL=.50*PLTSZE                                                            117   32
      YLEN1=.15*PLTSZE                                                          117   33
      YLEN2=-.50*PLTSZE                                                         117   34
   50 CONTINUE                                                                  117   35
      YBACK1=-(.35+BAL)                                                         117   36
      YBACK2=YBACK1-.01*PLTSZE-.175                                             117   37
      CALL PLOT (0.0,-PLTSZE,-3)                                                117   38
      CALL PLOT (7.0,PLTTIT,-3)                                                 117   39
      CALL PLOT (0.0,BAL,3)                                                     117   40
      CALL PLOT (XLEN1,BAL,-2)                                                  117   41
      CALL PLOT (XLEN2,0.0,2)                                                   117   42
      CALL PLOT (0.0,YLEN1,3)                                                   117   43
      CALL PLOT (0.0,YLEN2,2)                                                   117   44
      GO TO (60,70), ITRIG                                                      117   45
   60 CALL SYMBOL (XBACK1,YBACK1,.175,22HSTREAMSURFACE SECTIONS,0.0,22)         117   46
      GO TO 80                                                                  117   47
   70 XBACK1=XBACK1+0.35                                                        117   48
      CALL SYMBOL (XBACK1,YBACK1,.175,18HCARTESIAN SECTIONS,0.0,18)             117   49
   80 CALL SYMBOL (XBACK2,YBACK2,.175,TITLE,0.0,72)                             117   50
      RETURN                                                                    117   51
```

```
$175  52

END
```

```
      SUBROUTINE UJJ313 (BETA1,BETA2,I1,I2,FACT,X0,Y0,SJ,XR,Y1,X1,Y2,RDI
     1US,S,C1)
      DIMENSION S(30)
      DELX=XR/FLOAT(I2-I1)
      XX=X0
      I3=I1+1
      IF (BETA1.EQ.BETA2) GO TO 20
      Y1=-COS(BETA1/C1)/(SIN(BETA1/C1)-SIN(BETA2/C1))
      X1=SIN(BETA1/C1)/(SIN(BETA1/C1)-SIN(BETA2/C1))
      Y2=TAN((BETA1+BETA2)/(2.0*C1))
      RDIUS=ABS(1.0/(SIN(BETA1/C1)-SIN(BETA2/C1)))
      Y2=Y2*FACT+Y0
      Y1=Y1*FACT+Y0
      X1=X1*FACT+X0
      RDIUS=RDIUS*FACT
      DO 10 J=I3,I2
      XX=XX+DELX
      PHI1=ATAN(-1./SQRT(RDIUS**2-(XX-X1)**2)*(XX-X1))
      IF ((BETA1-BETA2).LT.0.0) PHI1=-PHI1
      PHI2=ABS(BETA1/C1-PHI1)
10    S(J)=RDIUS*PHI2+S0
      RETURN
20    AM=TAN(BETA1/C1)
      DO 30 J=I3,I2
      XX=XX+DELX
30    S(J)=(XX-X0)*SQRT(AM*AM+1.0)+S0
      Y2=AM*(XX-X0)+Y0
      RETURN
      END
```

```
      SUBROUTINE UDU319 (LOG1,LOG2,LOG3,LOG5,NLINES,NSPEC,KPTS,RSTA,XSTA$119$    2
     1,R,ZR,B1,B2,TC,PI,C1,NBLADE,CCORD,BLOCK,ALPB,EPSLON,IFANGS,IPUNCH,$119$    3
     2NAERO)                                                           $119$    4
      DIMENSION KPTS(1), RSTA(21,10), XSTA(21,10), R(10,21), ZR(1), B1(1$119$    5
     1), B2(1), TC(1), CCORD(1), BLOCK(10,21), ALPB(10,21), EPSLON(10,21$119$    6
     2), NR(10), NTERP(10), NMACH(10), NLOSS(10), NL1(10), NL2(10), NEVA$119$    7
     3L(10), NCURVE(10), NLITER(10), NDEL(10), RR(21,10), XLOSS(21,10), $119$    8
     4RTF(5), DV(11,5), DVBAC(11,5), ROTF(21), DELTAD(21), AC(21), F137$119$    9
     5S(4), F137S(5), F142TC(7), F161D(8,5), F195M(4,2), F164X3(8), F172$119$   10
     6K(7), NOUT1(10), NOUT2(10), SOL(21), DEV(10,21), DEVV(10,5), DX(10$119$   11
     7),X(10),JOU(5),IFANGS(1),NOUT3(10),NBLAD(10)                     $119$   12
      DATA F137B/0.0,10.0,20.0,30.0,40.0,50.0,60.0,70.0/               $119$   13
      DATA F137S/0.4,0.8,1.2,1.6,2.0/                                  $119$   14
      DATA F142TC/0.0,0.02,0.04,0.06,0.08,0.10,0.12/                   $119$   15
      DATA F161D/0.0,0.009,0.17,0.29,0.42,0.59,0.79,1.05,0.0,0.12,0.30,0$119$   16
     1.51,0.75,1.05,1.47,2.07,0.0,0.16,0.33,0.61,0.95,1.42,2.12,3.07,0.0$119$   17
     2,0.17,0.40,0.72,1.11,1.71,2.62,3.95,0.0,0.2,0.44,0.78,1.21,1.90,3.$119$   18
     301,4.75/                                                         $119$   19
      DATA F195M/0.17,0.173,0.179,0.189,0.206,0.232,0.269,0.310,0.25,0.2$119$   20
     155,0.261,0.268,0.278,0.292,0.312,0.342/                          $119$   21
      DATA F164X3/0.965,0.945,0.921,0.890,0.850,0.782,0.679,0.550/     $119$   22
      DATA F172K/0.0,0.160,0.331,0.521,0.74,1.0,1.300/                 $119$   23
      LMAX=60                                                          $119$   24
      READ(LOG1,10)NRAD,NOPTS,NDATR,NSWITC,NLE,NTE,XKSHPE,SPEED,NOUT1(NL$119$   25
     1E),NOUT2(NLE),NOUT3(NLE)                                         $119$   26
   10 FORMAT(6I3,/,2F12.0,/3I3)                                        $119$   27
      WRITE(LOG2,20)NRAD,NOPTS,NDATR,NSWITC,NLE,NTE,XKSHPE,SPEED,NLE,NOUT$119$   28
     1T1(NLE),NOUT2(NLE),NOUT3(NLE)                                    $119$   29
   20 FORMAT (1H1,3X,54HDATA INTERFACING ROUTINE - DEVIATION CALCULATION$119$   30
     1S AND DATA FORMATTING,//,10X,69(1H*),//,10X,6HINPUT,//,10X,5(1H*),//,$119$   31
     210X,6HNRAD =,I3,9H  NOPTS =,I3,9H  NDATR =,I3,11H  NSWITCH =,I2,7H$119$   32
     3  NLE =,I2,7H  NTE =,I3,//,10X,8HXKSHPE =,F7.4,9H  SPEED =,F9.1,//$119$   33
     4,10X,24HAT LEADING EDGE (STATION,I3,9H) NOUT1 =,I2,9H  NOUT2 =,I2$119$   34
     5,9H  NOUT3 =,I2)                                                 $119$   35
      LNCT=10                                                          $119$   36
      K=NLE+1                                                          $119$   37
      DO 60 I=K,NTE                                                    $119$   38
      READ (LOG1,30) NR(I),NTERP(I),NMACH(I),NLOSS(I),NL1(I),NL2(I),NEVA$119$   39
     1L(I),NCURVE(I),NLITER(I),NDEL(I),NOUT1(I),NOUT2(I),NOUT3(I),NBLAD($119$   40
     2I)                                                               $119$   41
   30 FORMAT(14I3)                                                     $119$   42
      IF (LNCT+6+NR(I).LE.LMAX) GO TO 50                               $119$   43
      WRITE (LOG2,40)                                                  $119$   44
   40 FORMAT (1H1)                                                     $119$   45
      LNCT=1                                                           $119$   46
   50 LNCT=LNCT+6+NR(I)                                                $119$   47
      WRITE (LOG2,60) I,NR(I),NTERP(I),NMACH(I),NLOSS(I),NL1(I),NL2(I),N$119$   48
     1EVAL(I),NCURVE(I),NLITER(I),NDEL(I),NOUT1(I),NOUT2(I),NOUT3(I),NBL$119$   49
     2AD(I)                                                            $119$   50
   60 FORMAT (2X,/,10X,7HSTATION,I3,7H  NR =,I3,9H  NTERP =,I2,9H  NMAC$119$   51
```

```
     1H =,I2,9H  NLOSS =,I2,7H  NL1 =,I3,7H  NL2 =,I3,9H  NEVAL =,I2,10H$198   52
     2  NCURVE =,I2,10H  NLITER =,I3,8H  NOFL =,I2,/,22X,7HNOUT1 =,I2,9H$198   53
     3  NOUT2 =,I2,9H  NOUT3 =,I2,9H  NBLAD =,I3)                       198   54
      L1=NP(I)                                                          198   55
      READ (LOG1,70) (RK(J,I),XLOSS(J,I),J=1,L1)                        198   56
70    FORMAT (2F12.0)                                                   198   57
80    WRITE (LOG2,90) (RK(J,I),XLOSS(J,I),J=1,L1)                       198   58
90    FORMAT (2X,/,14X,6HRADIUS,6X,15HLOSS DESCRIPTOR,//,(F20.4,F17.6)) 198   59
      IF (LNCT+7+NOPTS.LE.LMAX) GO TO 100                               198   60
      WRITE (LOG2,40)                                                   198   61
      LNCT=1                                                            198   62
100   LNCT=LNCT+2                                                       198   63
      WRITE (LOG2,110) NRAD                                             198   64
110   FORMAT (2X,/,10X,24HDEVIATION FRACTION CURVES AT,I2,6H RADII)     198   65
      DO 140 K=1,NRAD                                                   198   66
      IF (LNCT+5+NOPTS.LE.LMAX) GO TO 120                               198   67
      WRITE (LOG2,40)                                                   198   68
      LNCT=1                                                            198   69
120   LNCT=LNCT+5+NOPTS                                                 198   70
      READ (LOG1,130) RTC(K),(DM(J,K),DVFRAC(J,K),J=1,NOPTS)            198   71
130   FORMAT (F12.0,/,(2F12.0))                                         198   72
140   WRITE (LOG2,150) RTC(K),(DM(J,K),DVFRAC(J,K),J=1,NOPTS)           198   73
150   FORMAT (2X,/,10X,5HRTC =,F9.4,//,15X,2HDM,10X,9HDVFRAC,//,(F20.3,F198   74
     113.5))                                                            198   75
      READ (LOG1,160) (ROTR(J),DELTAD(J),AC(J),J=1,NOATR)               198   76
160   FORMAT (3F12.3)                                                   198   77
      IF (LNCT+3+NOATR.LE.LMAX) GO TO 170                               198   78
      WRITE (LOG2,40)                                                   198   79
      LNCT=1                                                            198   80
170   LNCT=LNCT+3+NOATR                                                 198   81
      WRITE (LOG2,180) (ROTR(J),DELTAD(J),AC(J),J=1,NOATR)              198   82
180   FORMAT (2X,/,15X,4HROTR,6X,6HDELTAD,9X,2HAC,//,(F20.4,F11.3,F13.4)198   83
     1)                                                                 198   84
      IF (LNCT+6+NLINES.LE.LMAX) GO TO 190                              198   85
      WRITE (LOG2,40)                                                   198   86
      LNCT=1                                                            198   87
190   LNCT=LNCT+5+NLINES                                                198   88
      WRITE (LOG2,200)                                                  198   89
200   FORMAT (2X,/,10X,7HRESULTS,/,10X,7(1H*))                          198   90
      WRITE (LOG2,210)                                                  198   91
210   FORMAT (2X,/,5X,10HSTREAMLINE,5X,5HBETA1,6X,5HBETA2,5X,6HCAMBER,7X198   92
     1,3HT/C,8X,3HA/C,5X,8HSOLIDITY,4X,11HADJST. DEVN,4X,15HTOTAL DEVIAT198   93
     2ION,/,2X)                                                         198   94
      DO 290 J=1,NLINES                                                 198   95
      XJ=J                                                              198   96
      CALL UDO315 (ZR,B1,NSPEC,XJ,BETA1,1,0)                            198   97
      CALL UDO315 (ZR,B2,NSPEC,XJ,BETA2,1,0)                            198   98
      CALL UDO315 (ZR,TC,NSPEC,XJ,THICK,1,0)                            198   99
      S=1.0                                                             198  100
      IF (SOLD.GT.0.0) S=-1.0                                           198  101
```

```
      CAMBER=(BETA1-BETA2)*Q
      SOLID=CCORD(J)*FLOAT(NBLADE)/(PI*(R(NLE,J)+R(NTE,J)))
      BETA1=BETA1*Q
      CALL UD0315 (F137B,F195M(1,NSWITC),8,BETA1,XMS,1,0)
      CALL UD0315 (F137B,F164XB,8,BETA1,XB,1,0)
      CALL UD0315 (F142TC,F172K,7,THICK,XKDT,1,0)
      DO 220 K=1,5
220   CALL UD0315 (F137B,F161D(1,K),8,BETA1,DOD(K),1,0)
      CALL UD0315 (F137S,DOD,5,SOLID,DD,1,1)
      CALL UD0315 (RDTE,DELTAD,NDATR,R(NTE,J),DADD,1,0)
      CALL UD0315 (RDTE,AC,NDATR,R(NTE,J),AONC,1,0)
      SOL(J)=SOLID
      DEV(NTE,J)=(DADD+DD*XKSHPE*XKDT+CAMBER*SOLID**(-XB)*(XMS+0.5*(AONC
     1-0.5)))*Q
      BETA2=BETA2*Q
      DO 230 I=NLE,NTE
230   CALL UD0315 (RSTA(1,I),XSTA(1,I),KPTS(I),R(I,J),X(I),1,0)
      DX(NLE)=0.0
      K=NLE+1
      DO 240 I=K,NTE
240   DX(I)=DX(I-1)+SQRT((X(I)-X(I-1))**2+(R(I,J)-R(I-1,J))**2)
      X1=DX(NTE)
      DO 250 I=K,NTE
250   DX(I)=DX(I)/X1
      L2=NTE-NLE-1
      K=NLE+1
      DO 260 L1=1,NRAD
260   CALL UD0315 (DM(1,L1),DVFRAC(1,L1),NDPTS,DX(K),DEVV(K,L1),L2,0)
      KK=NTE-1
      DO 280 I=K,KK
      DO 270 L1=1,NRAD
270   DOD(L1)=DEVV(I,L1)
      CALL UD0315 (RTE,DOD,NRAD,R(NTE,J),DEVFR,1,0)
280   DEV(I,J)=DEV(NTE,J)*DEVFR
290   WRITE (LOG2,300) J,BETA1,BETA2,CAMBER,THICK,AONC,SOLID,DADD,DEV(NT
     1E,J)
300   FORMAT (I11,F14.3,2F11.3,2F11.4,F12.5,F14.4,F17.4)
      IF (IFANGS(NLE).EQ.0) GO TO 340
      IF (NAERO.EQ.0) GO TO 330
      WRITE(LOG5,310)NLINES,NOUT1(NLE),NOUT2(NLE),NOUT3(NLE)
310   FORMAT(I3,11(2X,1H0),3I3,3H  0,/,4H 0.0)
      WRITE (LOG5,320) (R(NLE,J),ALPB(NLE,J),EPSLON(NLE,J),J=1,NLINES)
320   FORMAT (2F12.7,12X,F12.7,24X,/,4H 0.0,44X)
      IF (IPUNCH.EQ.0) GO TO 340
330   WRITE(LOG3,310)NLINES,NOUT1(NLE),NOUT2(NLE),NOUT3(NLE)
      WRITE (LOG3,320) (R(NLE,J),ALPB(NLE,J),EPSLON(NLE,J),J=1,NLINES)
340   DO 370 I=K,NTE
      DO 350 J=1,NLINES
350   RDTE(J)=R(I,J)
      CALL UD0315 (RR(1,I),XLOSS(1,I),NR(I),RDTE,DELTAD,NLINES,0)
```

```
      NX=LOG2                                                                    $19$  152
      IF(NAERO.EQ.0)NX=LOG3                                                      $19$  153
360   WRITE(NX,380)NLINES,NTEMP(I),NMACH(I),NLOSS(I),NL1(I),NL2(I),NEVAL$19$  154
     1(I),NCURVE(I),NLITER(I),NDEL(I),NOUT1(I),NOUT2(I),NOUT3(I),NBLAD(I$19$  155
     2),SPEED,(P(I,J),ALSB(I,J),DELTAD(J),EPSLON(I,J),BLOCK(I,J),SOL(J),$19$  156
     3DEV(I,J),J=1,NLINES)                                                      $19$  157
      IF(NX.EQ.LOG3)GO TO 370                                                    $19$  158
      NX=LOG3                                                                    $19$  159
      IF(NAERO.NE.0.AND.IPUNCH.NE.0)GO TO 360                                    $19$  160
370   CONTINUE                                                                   $19$  161
380   FORMAT(2I3,34  0,I3,3H  6,11I3,/,F12.3,/,(6F12.7,/,F12.7,36X))             $19$  162
      RETURN                                                                     $19$  163
      END                                                                        $19$  164
```

```
      OVERLAY(UD300,3,0)                                                $AB$
      PROGRAM UD03AB                                                    $AB$
      DIMENSION BLAFOR(10,21), XCAMB(21,10), THARR(21,10)               $AB$
      COMMON /CONTRL/ NANAL,NAERO,NARBIT,LOG1,LOG2,LOG3,LOG4,LOG5,LOG6  $AB$
      DIMENSION AIRANG(10,21), YPPME(81), SU(82), YU(81), BETMET(10), SM$AB$
     1(10,5), DEVCRV(10,5), RADEV(5), RINC(21), XINC(21), EXB(21), S1(10$AB$
     2), DEVRAD(10), LL(10), DELDEV(21), F137B(8), F137S(5), F161D(8,5),$AB$
     3 F195M(8,2), F164XB(8), F172K(7), F142TC(7), NPTS(21), YMPRME(81),$AB$
     4 YA(21), YB(21), YC(21), YE(21), NOINF(51), SORARR(51), RDMIN(51) $AB$
      DIMENSION RLES(21), TCS(21), TES(21), ZZS(21), PERSPT(21)         $AB$
      COMMON EPZ(100,3),R(10,21),ZOUT(21),SS(100),X(100),YPRIME(100),YS($AB$
     121,81),YP(21,81),XP(21,81),XS(21,81),YSEMI(21,31),XSEMI(21,31),ZS($AB$
     221,81),ZP(21,81),ZSEMI(21,31),TITLE(8),XHERE(10),XTEMP(100),RAD(10$AB$
     30),TEMP1(21),TEMP2(21),TEMP3(21),TEMP4(21),ZR(21),ZZ(21),FLE(21),T$AB$
     4C(21),TE(21),SDIVR(21),DELX(21),DELY(21),XSTA(21,10),RSTA(21,10),K$AB$
     5PTS(21),SIGMA(100),TANPHI(10,21),ZCAMB(21,10),YCAMB(21,10),IFANGS($AB$
     610),THETA(21,10),ALPHA(21,10)                                     $AB$
      DIMENSION TITLE4(8)                                               $AB$
      EQUIVALENCE (TITLE(1),TITLE4(1))                                  $AB$
      REAL IX,IY,IXY,IPX,IPY,IXN,IYN,IXYN,IXD,IYD                       $AB$
      DATA F137B/0.0,10.0,20.0,30.0,40.0,50.0,60.0,70.0/                $AB$
      DATA F137S/0.4,0.8,1.2,1.6,2.0/                                   $AB$
      DATA F142TC/0.0,0.02,0.04,0.06,0.08,0.10,0.12/                    $AB$
      DATA F161D/0.0,0.009,0.17,0.29,0.42,0.59,0.79,1.05,0.0,0.12,0.30,0$AB$
     1.51,0.75,1.05,1.47,2.07,0.0,0.16,0.33,0.61,0.95,1.42,2.12,3.07,0.0$AB$
     2,0.17,0.40,0.72,1.11,1.71,2.62,3.95,0.0,0.2,0.44,0.78,1.21,1.90,3.$AB$
     301,4.75/                                                          $AB$
      DATA F195M/0.17,0.173,0.179,0.189,0.206,0.232,0.269,0.310,0.25,0.2$AB$
     155,0.261,0.266,0.278,0.292,0.312,0.342/                           $AB$
      DATA F164XB/0.965,0.945,0.921,0.890,0.850,0.782,0.679,0.550/      $AB$
      DATA F172K/0.0,0.160,0.331,0.521,0.74,1.0,1.300/                  $AB$
      PI=4.0*ATAN(1.0)                                                  $AB$
      C1=180.0/PI                                                       $AB$
      READ (LOG1,110) TITLE4                                            $AB$
  110 FORMAT (7A10,A2)                                                  $AB$
      WRITE (LOG2,120) TITLE4                                           $AB$
  120 FORMAT (1H1,30X,69HPROGRAM UD0300 - COMPRESSOR DESIGN - ARBITRARY $AB$
     1MEANLINE BLADE SECTION,/,31X,69(1H*),//,10X,5HTITLE,25X,1H=,7A10,A$AB$
     22)                                                                $AB$
      READ (LOG1,130) NLINES,NSTNS,NZ,NSPEC,ISEGPT,NBLADE,ISTAK,IPUNCH,I$AB$
     1FPLOT,IPRINT,ISPLIT,INAST                                         $AB$
  130 FORMAT (12I3)                                                     $AB$
      WRITE (LOG2,140) NLINES,NSTNS,NZ,NSPEC,ISEGPT,NBLADE,ISTAK,IPUNCH,$AB$
     1IFPLOT,IPRINT,ISPLIT,INAST                                        $AB$
  140 FORMAT (10X,24HNUMBER OF STREAMSURFACES,6X,1H=,I3,/,10X,18HNUMBER $AB$
     1OF STATIONS,12X,1H=,I3,/,10X,27HNUMBER OF CONSTANT-Z PLANES,3X,1H=$AB$
     2,I3,/,10X,27HNUMBER OF BLADE DATA POINTS,3X,1H=,I3,/,10X,31HNUMBER$AB$
     3 OF POINTS PER SEGMENT  =,I3,/,10X,29HNUMBER OF BLADES IN BLADE RO$AB$
     4W,1X,1H=,I3,/,10X,5HISTAK,25X,1H=,I3,/,10X,6HIPUNCH,24X,1H=,I3,/,1$AB$
     50X,6HIFPLOT,24X,1H=,I3,/,10X,6HIPRINT,24X,1H=,I3,/,10X,6HISPLIT,24$AB$
```

```
     6X,1H=,I3,/,10X,5HINAST,25X,1H=,I3)                                $AB$
      READ (LOG1,150) ZINNER,ZOUTER,SCALE,STACKX,PLTSZE                 $AB$
      WRITE (LOG2,160) ZINNER,ZOUTER,SCALE,STACKX,PLTSZE                $AB$
150   FORMAT (5F12.0)                                                   $AB$
160   FORMAT (/,10X,6HZINNER,24X,1H=,F8.4,/,10X,6HZOUTER,24X,1H=,F8.4,/,$AB$
     110X,5HSCALE,25X,1H=,F8.4,/,10X,6HSTACKX,24X,1H=,F8.4,/,10X,6HPLTSZ$AB$
     2E,24X,1H=,F8.4,//,20X)                                            $AB$
      READ(LOG1,130) IRLE,IRTE,NRADEV,NINC,NSIGN,IFCA                   $AB$
      WRITE(LOG2,170)IRLE,IRTE,NRADEV,NINC,NSIGN,IFCA                   $AB$
170   FORMAT (10X,27HLEADING EDGE STATION NUMBER,3X,1H=,I3,/,10X,28HTRAI$AB$
     1LING EDGE STATION NUMBER,2X,1H=,I3,/,10X,26HRADII SPECIFYING DEVIA$AB$
     2TION,4X,1H=,I3,/,10X,26HRADII SPECIFYING INCIDENCE,4X,1H=,I3/10X,2$AB$
     37HSENSE OF ROTATION INDICATOR,3X,1H=,I3,/,10X,27HDEVIATION CALCULA$AB$
     4TION INDEX,3X,1H=,I3,/,2X)                                        $AB$
      READ (LOG1,150) XKSHPE,SOLTOL                                     $AB$
      WRITE (LOG2,180) XKSHPE,SOLTOL                                    $AB$
180   FORMAT (10X,12HSHAPE FACTOR,13X,1H=,F8.4,/,10X,18HSOLIDITY TOLERAN$AB$
     1CE,12X,1H=,F8.4,//,2X)                                            $AB$
      DO 210 K=1,NRADEV                                                 $AB$
      READ (LOG1,130) NPTS(K)                                           $AB$
      READ (LOG1,150) RADEV(K)                                          $AB$
      WRITE (LOG2,190) K,NPTS(K),RADEV(K)                               $AB$
190   FORMAT (5X,15HDEVIATION CURVE ,I2,5X,18HNUMBER OF POINTS =,I2,5X,8$AB$
     1HRADIUS =,F8.4,/,2X)                                              $AB$
      NPT=NPTS(K)                                                       $AB$
      READ (LOG1,200) (SM(J,K),DEVCRV(J,K),J=1,NPT)                     $AB$
200   FORMAT (2F12.0)                                                   $AB$
210   WRITE (LOG2,220) (J,SM(J,K),DEVCRV(J,K),J=1,NPT)                  $AB$
220   FORMAT (10X,5HPOINT,5X,22HNORMALIZED MERIODIONAL,5X,20HNORMALIZED $AB$
     1DEVIATION,/,23X,5HCHORD,16X,12HDISTRIBUTION,//(11X,I2,14X,F6.4,20X$AB$
     2,F6.4))                                                           $AB$
      READ (LOG1,230) (RINC(J),XINC(J),DELDEV(J),J=1,NINC)              $AB$
230   FORMAT (3F12.0)                                                   $AB$
      WRITE (LOG2,240) (RINC(J),XINC(J),DELDEV(J),J=1,NINC)             $AB$
240   FORMAT (2X,//,5X,42HINCIDENCE AND EXTRA DEVIATION DISTRIBUTION,//,$AB$
     110X,12HINLET RADIUS,4X,9HINCIDENCE,4X,15HEXTRA DEVIATION,//(F19.4,$AB$
     2F14.3,F15.3))                                                     $AB$
      LNCT=3                                                            $AB$
      WRITE (LOG2,250)                                                  $AB$
250   FORMAT (1H1,//,20X,36HSTREAMSURFACE GEOMETRY SPECIFICATION)       $AB$
      LOGN=LOG1                                                         $AB$
      IF (NAERO.EQ.1) LOGN=LOG6                                         $AB$
      DO 380 I=1,NSTNS                                                  $AB$
      READ (LOG1,130) IFANGS(I)                                         $AB$
      READ (LOGN,130) KPTS(I)                                           $AB$
      KPT=KPTS(I)                                                       $AB$
      READ (LOGN,200) (XSTA(K,I),RSTA(K,I),K=1,KPT)                     $AB$
      IF (KPTS(I).GE.2) GO TO 260                                       $AB$
      KPTS(I)=2                                                         $AB$
      XSTA(2,I)=XSTA(1,I)                                               $AB$
```

```
      RSTA(2,I)=RSTA(1,I)+1.0                                                    $ABS  102
260   IF (INAST.EQ.0) READ (LOGN,200) (R(I,J),AIRANG(I,J),J=1,NLINES)           $ABS  103
      IF (INAST.NE.0) READ (LOGN,270) (R(I,J),AIRANG(I,J),BLAFOR(I,J),J=       $ABS  104
     11,NLINES)                                                                 $ABS  105
270   FORMAT (3F12.0)                                                           $ABS  106
      IDUM=KPTS(I)                                                              $ABS  107
      IF (NLINES.GT.IDUM) IDUM=NLINES                                           $ABS  108
      IF (LNCT.LE.54-NLINES) GO TO 290                                          $ABS  109
      WRITE (LOG2,280)                                                          $ABS  110
280   FORMAT (1H1)                                                              $ABS  111
      LNCT=1                                                                    $ABS  112
290   LNCT=LNCT+IDUM+5                                                          $ABS  113
      IF (INAST.NE.0) GO TO 360                                                 $ABS  114
      WRITE (LOG2,300) I,KPTS(I),I,IFANGS(I)                                    $ABS  115
300   FORMAT (2X,/,10X,17HCOMPUTING STATION,I3,5X,28HNUMBER OF DESCRIBIN$ABS  116
     1G POINTS=,I3,5X,7HIFANGS(,I2,2H)=,I3,//6X,11HDESCRIPTION,9X,10HSTR$ABS  117
     2EAMLINE,5X,5HRADII,11X,9HAIR ANGLE,/,6X,1HX,9X,1HR,11X,6HNUMBER,//$ABS  118
     3,2X)                                                                      $ABS  119
      DO 310 K=1,IDUM                                                           $ABS  120
      IF (K.LE.KPTS(I).AND.K.LE.NLINES) WRITE (LOG2,320) XSTA(K,I),RSTA($ABS  121
     1K,I),K,R(I,K),AIRANG(I,K)                                                 $ABS  122
      IF (K.LE.KPTS(I).AND.K.GT.NLINES) WRITE (LOG2,330) XSTA(K,I),RSTA($ABS  123
     1K,I)                                                                      $ABS  124
      IF (K.GT.KPTS(I).AND.K.LE.NLINES) WRITE (LOG2,340) K,R(I,K),AIRANG$ABS  125
     1(I,K)                                                                     $ABS  126
310   CONTINUE                                                                  $ABS  127
320   FORMAT (3X,F8.4,2X,F8.4,8X,I2,9X,F8.4,9X,F8.4,9X,F8.4)                    $ABS  128
330   FORMAT (3X,F8.4,2X,F8.4)                                                  $ABS  129
340   FORMAT (29X,I2,9X,F8.4,9X,F8.4,9X,F8.4)                                   $ABS  130
      GO TO 380                                                                 $ABS  131
350   WRITE (LOG2,300) I,KPTS(I),I,IFANGS(I)                                    $ABS  132
360   FORMAT (2X,/,10X,17HCOMPUTING STATION,I3,5X,28HNUMBER OF DESCRIBIN$ABS  133
     1G POINTS=,I3,5X,7HIFANGS(,I2,2H)=,I3,//6X,11HDESCRIPTION,9X,10HSTR$ABS  134
     2EAMLINE,5X,5HRADII,11X,9HAIR ANGLE,5X,14HDELTA PRESSURE,/,6X,1HX,9$ABS  135
     3X,1HR,11X,6HNUMBER,//,2X)                                                 $ABS  136
      DO 370 K=1,IDUM                                                           $ABS  137
      IF (K.LE.KPTS(I).AND.K.LE.NLINES) WRITE (LOG2,320) XSTA(K,I),RSTA($ABS  138
     1K,I),K,R(I,K),AIRANG(I,K),BLAFOR(I,K)                                     $ABS  139
      IF (K.LE.KPTS(I).AND.K.GT.NLINES) WRITE (LOG2,330) XSTA(K,I),RSTA($ABS  140
     1K,I)                                                                      $ABS  141
      IF (K.GT.KPTS(I).AND.K.LE.NLINES) WRITE (LOG2,340) K,R(I,K),AIRANG$ABS  142
     1(I,K),BLAFOR(I,K)                                                         $ABS  143
370   CONTINUE                                                                  $ABS  144
380   CONTINUE                                                                  $ABS  145
      IF (LNCT.LE.54-NSPEC) GO TO 390                                           $ABS  146
      WRITE (LOG2,280)                                                          $ABS  147
      LNCT=1                                                                    $ABS  148
390   LNCT=LNCT+NSPEC+5                                                         $ABS  149
      READ (LOG1,400) (ZR(J),YA(J),RLE(J),TC(J),TE(J),ZZ(J),DELX(J),DELY$ABS  150
     1(J),J=1,NSPEC)                                                            $ABS  151
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```
400   FORMAT (6F12.0,/,2F12.0)                                          $AB$
      WRITE (LOG2,410) (ZR(J),YA(J),RLE(J),TC(J),TE(J),ZZ(J),DELX(J),DEL$AB$
     1Y(J),J=1,NSPEC)                                                   $AB$
410   FORMAT (2X,/,36X,31HSECTION GEOMETRY SPECIFICATIONS,//,9X,95HSTREA$AB$
     1MLINE        SOLIDITY    LE RADIUS    MAX THICK    TE THICK     POINT OF$AB$
     2      X STACK       Y STACK,/,11X,6HNUMBER,8X,8HMODIFIER,4X,6H/CHORD,$AB$
     36X,6H/CHORD,3X,20H/2*CHORD    MAX THICK,5X,6HOFFSET,6X,6HOFFSET,//($AB$
     4F16.2,F16.4,F11.5,3F12.5,F13.6,F12.6))                            $AB$
      IF (ISPLIT.EQ.0) GO TO 450                                        $AB$
      READ (LOG1,420) (RLES(J),TCS(J),TES(J),ZZS(J),PERSPT(J),J=1,NSPEC)$AB$
      WRITE (LOG2,430)                                                  $AB$
420   FORMAT (5F12.4)                                                   $AB$
430   FORMAT (2X,/,20X,13HSPLITTER DATA,//,10X,10HSTREAMLINE,2X,47HLE RA$AB$
     1DIUS MAX THICK TE THICK  POINT OF PER CENT,/,11X,6HNUMBER,7X,6H/CH$AB$
     2ORD,4X,6H/CHORD,3X,8H/2*CHORD,2X,9HMAX THICK,2X,8HSPLITTER,/,2X)  $AB$
      WRITE (LOG2,440) (ZR(J),RLES(J),TCS(J),TES(J),ZZS(J),PERSPT(J),J=1$AB$
     1,NSPEC)                                                           $AB$
440   FORMAT (10X,F7.2,3X,F8.3,F10.3,3F10.4)                            $AB$
450   CONTINUE                                                          $AB$
      IF (IFPLOT.EQ.4) CALL PLOT (0.0,-PLTSZE,-3)                       $AB$
      IF (IFPLOT.EQ.0.OR.IFPLOT.EQ.4) GO TO 460                         $AB$
      IKDUM=0                                                           $AB$
      IF ((AIRANG(IRLE,1)-AIRANG(IRTE,1)).LT.0.) IKDUM=1                $AB$
      IF (IFPLOT.EQ.1.OR.IFPLOT.EQ.3) CALL UD0324 (ISTAK,PLTSZE,1,TITLE,$AB$
     1IKDUM,IFPLOT)                                                     $AB$
460   DO 970 J=1,NLINES                                                 $AB$
      DO 470 I=IRLE,IRTE                                                $AB$
      KPT=KPTS(I)                                                       $AB$
470   CALL UD0322 (PSTA(1,I),XSTA(1,I),KPT,R(I,J),XHERE(I),1,0)         $AB$
      X(1)=XHERE(IRLE)                                                  $AB$
      X(100)=XHERE(IRTE)                                                $AB$
      AX=(X(100)-X(1))/99.0                                             $AB$
      DO 480 I=2,99                                                     $AB$
480   X(I)=X(I-1)+AX                                                    $AB$
      ICORIT=IRTE-IRLE+1                                                $AB$
      CALL UD0321 (XHERE(IRLE),R(IRLE,J),ICORIT,X,XDUM,YPRIME,100,1)    $AB$
      SS(1)=0.0                                                         $AB$
      DO 490 I=2,100                                                    $AB$
490   SS(I)=SS(I-1)+AX*SQRT(1.0+((YPRIME(I)+YPRIME(I-1))/2.0)**2)       $AB$
      XJ=J                                                              $AB$
      CALL UD0322 (ZR,RLE,NSPEC,XJ,YZERO,1,0)                           $AB$
      CALL UD0322 (ZR,TC,NSPEC,XJ,T,1,0)                                $AB$
      CALL UD0322 (ZR,TE,NSPEC,XJ,YONE,1,0)                             $AB$
      CALL UD0322 (ZR,DELX,NSPEC,XJ,XDEL,1,0)                           $AB$
      CALL UD0322 (ZR,DELY,NSPEC,XJ,YDEL,1,0)                           $AB$
      CALL UD0322 (ZR,ZZ,NSPEC,XJ,Z,1,0)                                $AB$
      CALL UD0322 (ZR,YA,NSPEC,XJ,SSOLID,1,0)                           $AB$
      CALL UD0322 (ZR,SDIVR,NSPEC,XJ,SDR,1,0)                           $AB$
      CALL UD0322 (ZR,YB,NSPEC,XJ,DELSDR,1,0)                           $AB$
      CALL UD0322 (ZR,YC,NSPEC,XJ,ROLEMN,1,0)                           $AB$
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```
      IF (ISPLIT.EQ.0) GO TO 500                                        $AB$ 202
      CALL UD0322 (ZR,RLES,NSPEC,XJ,YZEROS,1,1)                         $AB$ 203
      CALL UD0322 (ZR,TCS,NSPEC,XJ,TS,1,1)                              $AB$ 204
      CALL UD0322 (ZR,TES,NSPEC,XJ,YONES,1,1)                           $AB$ 205
      CALL UD0322 (ZR,ZZS,NSPEC,XJ,ZSPMXT,1,1)                          $AB$ 206
      CALL UD0322 (ZR,PERSPT,NSPEC,XJ,PERSPJ,1,1)                       $AB$ 207
500   CONTINUE                                                          $AB$ 208
      CALL UD0322 (ZR,YE,NSPEC,XJ,ACCIFP,1,0)                           $AB$ 209
      LMN=0                                                             $AB$ 210
      PRNT=0.                                                           $AB$ 211
      XSIGN=NSIGN                                                       $AB$ 212
      STAGER=(AIRANG(IRLE,J)+AIRANG(IRTE,J))/2.                         $AB$ 213
      RINSOL=(R(IRLE,J)+R(IRTE,J))/2.                                   $AB$ 214
      SDR1=SDR                                                          $AB$ 215
      CHORD=SS(100)/COS(STAGER/C1)                                      $AB$ 216
      SOLID=CHORD*FLOAT(NBLADE)*(1.0-SSOLID)/(2.0*PI*RINSOL)            $AB$ 217
      CALL UD0322 (RINC,XINC,NINC,R(IRLE,J),TEMP2,1,0)                  $AB$ 218
      CALL UD0322 (RINC,DELDEV,NINC,R(IRLE,J),TEMP3,1,0)                $AB$ 219
      BETMET(1)=AIRANG(IRLE,J)-XSIGN*TEMP2(1)                           $AB$ 220
      BETS=AIRANG(IRLE,J)*XSIGN                                         $AB$ 221
      DO 520 K=1,5                                                      $AB$ 222
520   CALL UD0322 (F137B,F161D(1,K),8,BETS,EXB(K),1,0)                  $AB$ 223
      CALL UD0322 (F137B,F195M(1,IFCA),8,BETS,XMS,1,0)                  $AB$ 224
      CALL UD0322 (F137B,F164XB,8,BETS,XTEMP,1,0)                       $AB$ 225
      CALL UD0322 (ZR,TC,NSPEC,XJ,X1,1,0)                               $AB$ 226
      CALL UD0322 (F142TC,F172K,7,X1,XKDT,1,0)                          $AB$ 227
      BETS=BETMET(1)*XSIGN                                              $AB$ 228
      NN=0                                                              $AB$ 229
530   NN=NN+1                                                           $AB$ 230
      IF (NN.GT.20) GO TO 1430                                          $AB$ 231
      CALL UD0322 (F137S,EX3,5,SOLID,DO,1,1)                            $AB$ 232
      XMM=XMS/SOLID**XTEMP(1)                                           $AB$ 233
      DEV=(DO*XKDT*XKSHPE+XMM*(BETS-XSIGN*AIRANG(IRTE,J))+TEMP3(1))*1.0/$AB$ 234
     1(1.-XMM)                                                          $AB$ 235
      IF(IPRINT.NE.2.AND.NN.EQ.1)WRITE(LOG2,535)J,NN,DEV,SOLID          $AB$ 236
535   FORMAT(2X,/,10X,13HSTREAMSURFACE,I3,7X,10HITERATION ,I2,3X,11HDEVI$AB$ 237
     1ATION =,F7.3,3X,10HSOLIDITY =,F7.4)                               $AB$ 238
      IF(IPRINT.NE.2.AND.NN.GT.1)WRITE(LOG2,540)NN,DEV,SOLID            $AB$ 239
540   FORMAT (33X,10HITERATION ,I2,3X,11HDEVIATION =,F7.3,3X,10HSOLIDITY$AB$ 240
     1 =,F7.4)                                                          $AB$ 241
      MN=IRTE-IRLE+1                                                    $AB$ 242
      BETMET(MN)=AIRANG(IRTE,J)-DEV*XSIGN                               $AB$ 243
      S1(1)=0.                                                          $AB$ 244
      DO 580 I=1,NSTNS                                                  $AB$ 245
      IF (I-IRLE) 580,580,550                                           $AB$ 246
550   IF (IRTE-I) 580,580,560                                           $AB$ 247
560   L=I-IRLE+1                                                        $AB$ 248
      CALL UD0322 (X,SS,100,XHERE(I),S1(L),1,1)                         $AB$ 249
      S1(L)=S1(L)/SS(100)                                               $AB$ 250
      DO 570 K=1,NRADEV                                                 $AB$ 251
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570     CALL UD0322 (SM(1,K),DEVCRV(1,K),NPTS(K),S1(L),DEVRAD(K),1,0)      $ABS$ 252
        CALL UD0322 (RADEV,DEVRAD,NRADEV,P(IRTE,J),DEVPCT,1,0)             $ABS$ 253
        BETMET(L)=AIRANG(I,J)-DEV*DEVPCT*XSIGN                             $ABS$ 254
580     CONTINUE                                                           $ABS$ 255
        S1(MN)=1.                                                          $ABS$ 256
        IPOINT=(ISEGPT-1)*(MN-1)+1                                         $ABS$ 257
        IF (IPOINT.GT.80) IPOINT=80                                        $ABS$ 258
        X1=1.0/FLOAT(IPOINT-1)                                             $ABS$ 259
        DO 590 K=1,IPOINT                                                  $ABS$ 260
590     SU(K)=FLOAT(K-1)*X1                                                $ABS$ 261
        DO 600 K=1,MN                                                      $ABS$ 262
600     YPRIME(K)=TAN(BETMET(K)/C1)                                        $ABS$ 263
        CALL UD0327 (S1,YPRIME,MN,SU,YMPRME,X1,X1,IPOINT,0,0)              $ABS$ 264
        CALL UD0327 (S1,YPRIME,MN,SU,X1,X1,YU,IPOINT,0,2)                  $ABS$ 265
        CHORD1=SQRT(YU(IPOINT)**2+1.)*SS(100)                              $ABS$ 266
        CALL UD0322 (SU,YU,IPOINT,SSOLID,YSOLID,1,1)                       $ABS$ 267
        CHORD=SQRT((SU(IPOINT)-SSOLID)**2+(YU(IPOINT)-YSOLID)**2)*SS(100)  $ABS$ 268
        SOLID1=CHORD/RINSOL/2./PI*FLOAT(NBLADE)                            $ABS$ 269
        DIFF=SOLID-SOLID1                                                  $ABS$ 270
        IF (ABS(DIFF).LT.SOLTOL*SOLID) GO TO 610                           $ABS$ 271
        SOLID=SOLID1                                                       $ABS$ 272
        GO TO 530                                                          $ABS$ 273
610     IF (IPRINT.NE.2) WRITE (LOG2,640) NN,DEV,SOLID                     $ABS$ 274
        IF (IPRINT.EQ.2) GO TO 680                                         $ABS$ 275
        CALL UD0327 (S1,YPRIME,MN,SU,X1,YPRIME,X1,IPOINT,0,1)              $ABS$ 276
        WRITE (LOG2,620)                                                   $ABS$ 277
620     FORMAT( 2X,//,5X,21HPOINT NO.  FRACTION M,9X,1HY,11X,10HY-D  (DEG)$ABS$ 278
     1,10X,4HY-DU,3X,11HRAD OF CURV,/,2X)                                  $ABS$ 279
        DO 630 K=1,IPOINT                                                  $ABS$ 280
        X1=ATAN(YMPRME(K))*C1                                              $ABS$ 281
        X2=0.0                                                             $ABS$ 282
        IF (YPRIME(K).NE.0.0) X2=(1.0+YMPRME(K)**2)**1.5/YPRIME(K)         $ABS$ 283
630     WRITE (LOG2,640) K,SU(K),YU(K),X1,YPRIME(K),X2                     $ABS$ 284
640     FORMAT (I10,,F16.6,2X,F14.4)                                       $ABS$ 285
        WRITE (LOG2,650)                                                   $ABS$ 286
650     FORMAT (2X,/,15X,11HDATA POINTS,/,2X)                              $ABS$ 287
        DO 660 K=1,MN                                                      $ABS$ 288
        X1=ATAN(YPRIME(K))*C1                                              $ABS$ 289
660     WRITE (LOG2,670) K,S1(K),X1                                        $ABS$ 290
670     FORMAT (I10,F16.6,F32.6)                                           $ABS$ 291
680     CONTINUE                                                           $ABS$ 292
        NPOINT=IPOINT                                                      $ABS$ 293
        XNORMC=CHORD1/SS(100)                                              $ABS$ 294
        AXIALC=SS(100)                                                     $ABS$ 295
        DO 690 I=1,NSTNS                                                   $ABS$ 296
        KPT=KPTS(I)                                                        $ABS$ 297
690     CALL UD0322 (RSTA(1,I),XSTA(1,I),KPT,R(I,J),XHERE(I),1,0)          $ABS$ 298
        X(1)=XHERE(1)                                                      $ABS$ 299
        X(100)=XHERE(NSTNS)                                                $ABS$ 300
        AX=(X(100)-X(1))/99.0                                              $ABS$ 301
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      DO 700 I=2,99                                                          $ABS  302
700   X(I)=X(I-1)+AX                                                         $ABS  303
      CALL UDD321 (XHERE,R(1,J),NSTNS,X,XDUM,YPRIME,100,1)                   $ABS  304
      CALL UDD321 (XHERE,R(1,J),NSTNS,XHERE,XDUM,TANPHI(1,J),NSTNS,1)        $ABS  305
      SS(1)=0.0                                                              $ABS  306
      DO 710 I=2,100                                                         $ABS  307
710   SS(I)=SS(I-1)+AX*SQRT(1.0+((YPPIME(I)+YPRIME(I-1))/2.0)**2)            $ABS  308
      CALL UDD322 (X,SS,100,STACKX,BX,1,1)                                   $ABS  309
      CALL UDD320 (J,YS,YP,XS,XP,YSEMI,XSEMI,LOG2,IPOINT,IPRINT,BETMET(1     $ABS  310
     1),BETMET(MN),YZERO,T,YONE,XDEL,YDEL,Z,XNORMC,LNCT,XTEMP,YPRIME,RAD     $ABS  311
     2,SIGMA,LPZ,XHERE,X,SS,NSTNS,R,BX,SU,YU,YMPRME,AXIALC,ISTAK,ISPLIT,     $ABS  312
     3YZEROS,TS,YONES,ZSPMXT,PERSPJ,INAST,THARR,S1,IRLE,IRTE)                $ABS  313
      NPOINT=IPOINT                                                          $ABS  314
      CALL UDD322 (X,SS,100,STACKX,BX,1,1)                                   $ABS  315
      DO 720 I=1,100                                                         $ABS  316
      X(I)=X(I)-STACKX                                                       $ABS  317
720   SS(I)=SS(I)-BX                                                         $ABS  318
      DO 730 I=1,NSTNS                                                       $ABS  319
730   XHERE(I)=XHERE(I)-STACKX                                               $ABS  320
      IF (IFPLOT.EQ.0.OR.IFPLOT.EQ.2.OR.IFPLOT.EQ.4) GO TO 770               $ABS  321
      XPLOT=XS(J,1)*SCALE                                                    $ABS  322
      YPLOT=YS(J,1)*SCALE                                                    $ABS  323
      CALL PLOT (XPLOT,YPLOT,3)                                              $ABS  324
      DO 740 I=2,NPOINT                                                      $ABS  325
      XPLOT=XS(J,I)*SCALE                                                    $ABS  326
      YPLOT=YS(J,I)*SCALE                                                    $ABS  327
740   CALL PLOT (XPLOT,YPLOT,2)                                              $ABS  328
      DO 750 II=1,NPOINT                                                     $ABS  329
      I=NPOINT-II+1                                                          $ABS  330
      XPLOT=XP(J,I)*SCALE                                                    $ABS  331
      YPLOT=YP(J,I)*SCALE                                                    $ABS  332
750   CALL PLOT (XPLOT,YPLOT,2)                                              $ABS  333
      DO 760 I=2,30                                                          $ABS  334
      XPLOT=XSEMI(J,I)*SCALE                                                 $ABS  335
      YPLOT=YSEMI(J,I)*SCALE                                                 $ABS  336
760   CALL PLOT (XPLOT,YPLOT,2)                                              $ABS  337
      XPLOT=XS(J,1)*SCALE                                                    $ABS  338
      YPLOT=YS(J,1)*SCALE                                                    $ABS  339
      CALL PLOT (XPLOT,YPLOT,2)                                              $ABS  340
770   IJDUM=0                                                                $ABS  341
      DO 780 I=1,NSTNS                                                       $ABS  342
      IF (IFANGS(I).GE.1) IJDUM=1                                            $ABS  343
780   CONTINUE                                                               $ABS  344
      CALL UDD322 (SS,X,100,XTEMP,XTEMP,100,1)                               $ABS  345
      DO 790 I=1,NSTNS                                                       $ABS  346
      CALL UDD322 (XTEMP,SIGMA,100,XHERE(I),THETA(J,I),1,1)                  $ABS  347
      CALL UDD322 (XTEMP,YPRIME,100,XHERE(I),ALPHA(J,I),1,1)                 $ABS  348
      ZCAMB(J,I)=R(I,J)*COS(THETA(J,I))                                      $ABS  349
      XCAMB(J,I)=XHERE(I)                                                    $ABS  350
790   YCAMB(J,I)=R(I,J)*SIN(THETA(J,I))                                      $ABS  351
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```
800   DO 810 I=1,NPOINT
810   XTEMP(I)=XS(J,I)
      CALL UD0322 (SS,X,100,XTEMP,XTEMP,NPOINT,1)
      CALL UD0322 (XHERE,R(1,J),NSTNS,XTEMP,RAD,NPOINT,0)
      K=1
      DO 820 I=1,NPOINT
      EPS=EPZ(I,K)
      ZS(J,I)=RAD(I)*COS(EPS)
      YS(J,I)=RAD(I)*SIN(EPS)
820   XS(J,I)=XTEMP(I)
      DO 830 I=1,NPOINT
830   XTEMP(I)=XP(J,I)
      CALL UD0322 (SS,X,100,XTEMP,XTEMP,NPOINT,1)
      CALL UD0322 (XHERE,R(1,J),NSTNS,XTEMP,RAD,NPOINT,0)
      K=2
      DO 840 I=1,NPOINT
      EPS=EPZ(I,K)
      ZP(J,I)=RAD(I)*COS(EPS)
      YP(J,I)=RAD(I)*SIN(EPS)
840   XP(J,I)=XTEMP(I)
      DO 850 I=1,31
850   XTEMP(I)=XSEMI(J,I)
      CALL UD0322 (SS,X,100,XTEMP,XTEMP,31,1)
      CALL UD0322 (XHERE,R(1,J),NSTNS,XTEMP,RAD,31,0)
      K=3
      DO 860 I=1,31
      EPS=EPZ(I,K)
      ZSEMI(J,I)=RAD(I)*COS(EPS)
      YSEMI(J,I)=RAD(I)*SIN(EPS)
860   XSEMI(J,I)=XTEMP(I)
      IF (IPRINT.GE.2) GO TO 970
      IF (LNCT.LE.50) GO TO 870
      WRITE (LOG2,280)
      LNCT=1
870   LNCT=LNCT+5
      WRITE (LOG2,880) J
880   FORMAT (2X,/,10X,38HCARTESIAN COORDINATES ON STREAMSURFACE,I3,//,1
     10X,8HPOINT NO,5X,2HZ1,12X,2HX1,12X,2HY1,16X,2HZ2,12X,2HX2,12X,2HY2
     2,/,2X)
      I=1
890   WRITE (LOG2,900) I,ZS(J,I),XS(J,I),YS(J,I),ZP(J,I),XP(J,I),YP(J,I)
900   FORMAT (10X,I5,3X,1P3E14.5,4X,1P3E14.5)
      I=I+1
      LNCT=LNCT+1
      IF (I.GT.NPOINT) GO TO 920
      IF (LNCT.LE.59) GO TO 890
      WRITE (LOG2,910)
910   FORMAT(1H1,9X,8HPOINT NO,5X,2HZ1,12X,2HX1,12X,2HY1,16X,2HZ2,12X,2H
     1X2,12X,2HY2,/,2X)
      LNCT=2
```

```
      GO TO 890                                                                 $ABB$  402
  920 IF (LNCT.LE.50) GO TO 930                                                 $ABB$  403
      WRITE (LOG2,240)                                                          $ABB$  404
      LNCT=1                                                                    $ABB$  405
  930 LNCT=LNCT+3                                                               $ABB$  406
      WRITE (LOG2,940)                                                          $ABB$  407
  940 FORMAT (2X,/,10X,6HPOINT NO,4X,5HZSEMI,9X,5HXSEMI,9X,5HYSEMI,/,2X)        $ABB$  408
      I=1                                                                       $ABB$  409
  950 WRITE (LOG2,960) I,ZSEMI(J,I),XSEMI(J,I),YSEMI(J,I)                       $ABB$  410
  960 FORMAT (10X,I3,3X,1P3E14.5)                                               $ABB$  411
      I=I+1                                                                     $ABB$  412
      LNCT=LNCT+1                                                               $ABB$  413
      IF (I.GT.31) GO TO 970                                                    $ABB$  414
      IF (LNCT.LE.59) GO TO 950                                                 $ABB$  415
      WRITE (LOG2,240)                                                          $ABB$  416
      WRITE (LOG2,940)                                                          $ABB$  417
      LNCT=4                                                                    $ABB$  418
      GO TO 950                                                                 $ABB$  419
  970 CONTINUE                                                                  $ABB$  420
      IF (IPRINT.EQ.1) GO TO 1100                                               $ABB$  421
      VOL=0.0                                                                   $ABB$  422
      DO 980 J=2,NLINES                                                         $ABB$  423
      VOL=VOL+(((XS(J,1)-XP(J,1))**2+(YS(J,1)-YP(J,1))**2)+((XS(J-1,1)-X        $ABB$  424
     1P(J-1,1))**2+(YS(J-1,1)-YP(J-1,1))**2))*(ZS(J,1)+ZP(J,1)-ZS(J-1,1)        $ABB$  425
     2-ZP(J-1,1))*PI/32.0                                                       $ABB$  426
      DO 980 I=2,NPOINT                                                         $ABB$  427
  980 VOL=VOL+((SQRT((XS(J,I)-XP(J,I))**2+(YS(J,I)-YP(J,I))**2)+SQRT((XS        $ABB$  428
     1(J,I-1)-XP(J,I-1))**2+(YS(J,I-1)-YP(J,I-1))**2))*(SQRT((XS(J,I-1)-        $ABB$  429
     2XS(J,I))**2+(YS(J,I-1)-YS(J,I))**2)+SQRT((XP(J,I-1)-XP(J,I))**2+(Y        $ABB$  430
     3P(J,I-1)-YP(J,I))**2))+(SQRT((XS(J-1,I)-XP(J-1,I))**2+(YS(J-1,I)-Y        $ABB$  431
     4P(J-1,I))**2)+SQRT((XS(J-1,I-1)-XP(J-1,I-1))**2+(YS(J-1,I-1)-YP(J-        $ABB$  432
     51,I-1))**2))*(SQRT((XS(J-1,I-1)-XS(J-1,I))**2+(YS(J-1,I-1)-YS(J-1,        $ABB$  433
     6I))**2)+SQRT((XP(J-1,I-1)-XP(J-1,I))**2+(YP(J-1,I-1)-YP(J-1,I))**2        $ABB$  434
     7))*(ZS(J,I)+ZS(J,I-1)+ZP(J,I)+ZP(J,I-1)-ZS(J-1,I)-ZS(J-1,I-1)-ZP(        $ABB$  435
     8J-1,I)-ZP(J-1,I-1))/32.0                                                  $ABB$  436
      IF (LNCT.LE.59) GO TO 990                                                 $ABB$  437
      LNCT=1                                                                    $ABB$  438
      WRITE (LOG2,240)                                                          $ABB$  439
  990 LNCT=LNCT+4                                                               $ABB$  440
      WRITE (LOG2,1000) VOL                                                     $ABB$  441
 1000 FORMAT (2X,/,2X,/,40X,25HVOLUME OF BLADE SECTION =,1PE11.4,/,40X,3        $ABB$  442
     16(1H*))                                                                   $ABB$  443
      IF (IJOUM.EQ.0) GO TO 1100                                                $ABB$  444
      WRITE (LOG2,240)                                                          $ABB$  445
      WRITE (LOG2,1010)                                                         $ABB$  446
 1010 FORMAT (43X,43HBLADE CALCULATIONS FOR AERODYNAMIC ANALYSIS,/,43X,4        $ABB$  447
     13(1H*))                                                                   $ABB$  448
      IOUM=7                                                                    $ABB$  449
      LNCT=3                                                                    $ABB$  450
      DO 1090 I=1,NSTNS                                                         $ABB$  451
```

```
      IF (IFANGS(I).EQ.0.OR.(ISPLIT.GE.1.AND.IFANGS(I).EQ.1)) GO TO 1090$ABS$  452
      DO 1030 J=1,NLINES                                                $ABS$  453
      CALL UU0322 (RSTA(1,I),XSTA(1,I),KPTS(I),R(I,J),XOUM,1,0)         $ABS$  454
      CALL UU0321 (RSTA(1,I),XSTA(1,I),KPTS(I),R(I,J),XOUM,ZR(J),1,1)   $ABS$  455
      DO 1020 K=1,NPOINT                                                $ABS$  456
      SS(K)=XS(J,K)                                                     $ABS$  457
      RAD(K)=YS(J,K)                                                    $ABS$  458
      XTEMP(K)=XP(J,K)                                                  $ABS$  459
 1020 X(K)=YP(J,K)                                                      $ABS$  460
      XOUM=XOUM-STACKK                                                  $ABS$  461
      CALL UU0322 (SS,RAD,NPOINT,XOUM,YY1,1,1)                          $ABS$  462
      CALL UU0322 (XTEMP,X,NPOINT,XOUM,YY2,1,1)                         $ABS$  463
      W1=YY1/R(I,J)                                                     $ABS$  464
      W2=YY2/R(I,J)                                                     $ABS$  465
      TC(J)=ABS(ATAN(W1/SQRT(1.-W1**2))-ATAN(W2/SQRT(1.-W2**2)))/(2.*PI)$ABS$  466
     1*FLOAT(NBLADE)                                                    $ABS$  467
 1030 CONTINUE                                                          $ABS$  468
      CALL UU0321 (ZCAMB(1,I),YCAMB(1,I),NLINES,ZCAMB(1,I),XOUM,RLE,NLIN$ABS$  469
     1ES,1)                                                             $ABS$  470
      IF (LNCT+IDUM+NLINES.LE.59) GO TO 1040                            $ABS$  471
      WRITE (LOG2,240)                                                  $ABS$  472
      LNCT=2                                                            $ABS$  473
 1040 LNCT=LNCT+IDUM+NLINES                                             $ABS$  474
      WRITE (LOG2,1050) I,NLINES                                        $ABS$  475
 1050 FORMAT (///,3X,8HSTATION ,I2,5X,17HNUMBER OF RADII= ,I2,//,36X,6H$ABS$  476
     1RADIUS,9X,7HSECTION,9X,4HCAMB,9X,5HBLADE,7X,5HTHETA,/,48X,5HANGLE,$ABS$  477
     2 6X,5HANGLE,7X,9HBLOCKAGE,/,2X)                                   $ABS$  478
      DO 1060 J=1,NLINES                                                $ABS$  479
      EPS=(THETA(J,I)-ATAN(RLE(J)))*C1                                  $ABS$  480
      ALPHP=ALPHA(J,I)                                                  $ABS$  481
      ALP=(ATAN((TANPHI(I,J)*TAN(EPS/C1)+ALPHB*SQRT(1.+TANPHI(I,J)**2))/$ABS$  482
     1(1.-TANPHI(I,J)*ZR(J))))*C1                                       $ABS$  483
      WRITE (LOG2,1070) R(I,J),ALP,EPS,TC(J),THETA(J,I)                 $ABS$  484
      IF (IPUNCH.EQ.0) GO TO 1060                                       $ABS$  485
      IF(ISPLIT.LT.1)GO TO 1058                                         $ABS$  486
      READ(LOG1,1054)XB                                                 $ABS$  487
 1054 FORMAT(35X,F12.0)                                                 $ABS$  488
      WRITE(LOG2,1056)XB,I,J                                            $ABS$  489
 1056 FORMAT(90X,14HADDIT. BLOCK =,F7.5,3H I=,I2,3H J=,I2)              $ABS$  490
      TC(J)=TC(J)+XB                                                    $ABS$  491
 1058 WRITE(LOG2,1080)R(I,J),ALP,EPS,TC(J),THETA(J,I),I,J               $ABS$  492
 1060 CONTINUE                                                          $ABS$  493
 1070 FORMAT (30X,5F12.4)                                               $ABS$  494
 1080 FORMAT (5F12.7,2I3)                                               $ABS$  495
 1090 CONTINUE                                                          $ABS$  496
 1100 IF (IFPLOT.LT.2.OR.IFPLOT.EQ.4) GO TO 1110                        $ABS$  497
      CALL UU0324 (ISTAK,PLTSZE,2,TITLE,IKOUM,IFPLOT)                   $ABS$  498
 1110 IF (IPRINT.EQ.1.OR.IPRINT.EQ.3) GO TO 1130                        $ABS$  499
      LNCT=2                                                            $ABS$  500
      WRITE (LOG2,1120)                                                 $ABS$  501
```

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1120  FORMAT (1H1,27X,74HBLADE SURFACE GEOMETRY IN CARTESIAN COORDINATES$ABS  502
     1 AT SPECIFIED VALUES OF (Z(,/,28X,74H**************************$ABS  503
     2**************************************)                          $ABS  504
1130  IF (IPRINT.EQ.1.AND.IPLOT.LE.1) GO TO 1450                       $ABS  505
      XZ=NZ-1                                                          $ABS  506
      DZ=(ZOUTER-ZINNER)/XZ                                            $ABS  507
      ZOUT(1)=ZINNER                                                   $ABS  508
      DO 1140 J=3,NZ                                                   $ABS  509
1140  ZOUT(J-1)=ZOUT(J-2)+DZ                                           $ABS  510
      ZOUT(NZ)=ZOUTER                                                  $ABS  511
      DO 1150 I=1,NPOINT                                               $ABS  512
      CALL UD0322 (ZS(1,I),XS(1,I),NLINES,ZOUT,TEMP1,NZ,0)             $ABS  513
      CALL UD0322 (ZS(1,I),YS(1,I),NLINES,ZOUT,TEMP2,NZ,0)             $ABS  514
      CALL UD0322 (ZP(1,I),XP(1,I),NLINES,ZOUT,TEMP3,NZ,0)             $ABS  515
      CALL UD0322 (ZP(1,I),YP(1,I),NLINES,ZOUT,TEMP4,NZ,0)             $ABS  516
      DO 1150 J=1,NZ                                                   $ABS  517
      XS(J,I)=TEMP1(J)                                                 $ABS  518
      YS(J,I)=TEMP2(J)                                                 $ABS  519
      XP(J,I)=TEMP3(J)                                                 $ABS  520
1150  YP(J,I)=TEMP4(J)                                                 $ABS  521
      DO 1160 I=1,31                                                   $ABS  522
      CALL UD0322 (ZSEMI(1,I),XSEMI(1,I),NLINES,ZOUT,TEMP1,NZ,0)       $ABS  523
      CALL UD0322 (ZSEMI(1,I),YSEMI(1,I),NLINES,ZOUT,TEMP2,NZ,0)       $ABS  524
      DO 1160 J=1,NZ                                                   $ABS  525
      XSEMI(J,I)=TEMP1(J)                                              $ABS  526
1160  YSEMI(J,I)=TEMP2(J)                                              $ABS  527
      DO 1420 J=1,NZ                                                   $ABS  528
      RD=SQRT((XS(J,1)-XP(J,1))**2+(YS(J,1)-YP(J,1))**2)/2.0           $ABS  529
      AREA=PI*RD**2/2.0                                                $ABS  530
      BETA1=ATAN((YS(J,2)+YP(J,2)-YS(J,1)-YP(J,1))/(XS(J,2)+XP(J,2)-XS(J$ABS  531
     1,1)-XP(J,1)))                                                    $ABS  532
      XINT=AREA*((XP(J,1)+XS(J,1))/2.0-COS(BETA1)*4.0/(3.0*PI)*RD)     $ABS  533
      YINT=AREA*((YP(J,1)+YS(J,1))/2.0-SIN(BETA1)*4.0/(3.0*PI)*RD)     $ABS  534
      DO 1170 I=2,NPOINT                                               $ABS  535
      DELA=(SQRT((XS(J,I)-XP(J,I))**2+(YS(J,I)-YP(J,I))**2)+SQRT((XS(J,I$ABS  536
     1-1)-XP(J,I-1))**2+(YS(J,I-1)-YP(J,I-1))**2))*(SQRT((XS(J,I-1)-XS(J$ABS  537
     2,I))**2+(YS(J,I-1)-YS(J,I))**2)+SQRT((XP(J,I-1)-XP(J,I))**2+(YP(J,$ABS  538
     3I-1)-YP(J,I))**2))/4.0                                           $ABS  539
      AREA=AREA+DELA                                                   $ABS  540
      XINT=XINT+DELA*(XS(J,I)+XS(J,I-1)+XP(J,I)+XP(J,I-1))/4.0         $ABS  541
1170  YINT=YINT+DELA*(YS(J,I)+YS(J,I-1)+YP(J,I)+YP(J,I-1))/4.0         $ABS  542
      YINT=YINT/AREA                                                   $ABS  543
      XINT=XINT/AREA                                                   $ABS  544
      X1=(XS(J,1)+XP(J,1))/2.                                          $ABS  545
      Y1=(YS(J,1)+YP(J,1))/2.                                          $ABS  546
      T1=SQRT((XS(J,1)-XP(J,1))**2+(YS(J,1)-YP(J,1))**2)               $ABS  547
      F=0.                                                             $ABS  548
      U=0.                                                             $ABS  549
      DO 1180 I=2,NPOINT                                               $ABS  550
      T2=SQRT((XS(J,I)-XP(J,I))**2+(YS(J,I)-YP(J,I))**2)               $ABS  551
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      X2=(XS(J,I)+XP(J,I))/2.                                                    $ABS$  552
      Y2=(YS(J,I)+YP(J,I))/2.                                                    $ABS$  553
      DELU=SQRT((X2-X1)**2+(Y2-Y1)**2)                                           $ABS$  554
      U=U+DELU                                                                   $ABS$  555
      TAV3=(T1**3+T2**3)/2.                                                      $ABS$  556
      F=F+TAV3*DELU                                                              $ABS$  557
      X1=X2                                                                      $ABS$  558
      Y1=Y2                                                                      $ABS$  559
 1180 T1=T2                                                                      $ABS$  560
      TOPCON=((1./3.)*F)/(1.+(4./3.)*F/AREA/U**2)                                $ABS$  561
      IX=0.0                                                                     $ABS$  562
      IY=0.0                                                                     $ABS$  563
      IXY=0.0                                                                    $ABS$  564
      DO 1190 I=2,NPOINT                                                         $ABS$  565
      XD=(SQRT((XS(J,I-1)-XP(J,I-1))**2+(YS(J,I-1)-YP(J,I-1))**2)+SQRT((         $ABS$  566
     1XS(J,I)-XP(J,I))**2+(YS(J,I)-YP(J,I))**2))/2.0                             $ABS$  567
      YD=(SQRT((XS(J,I)-XS(J,I-1))**2+(YS(J,I)-YS(J,I-1))**2)+SQRT((XP(J         $ABS$  568
     1,I)-XP(J,I-1))**2+(YP(J,I)-YP(J,I-1))**2))/2.0                             $ABS$  569
      IXD=YD*YD*XD/12.0                                                          $ABS$  570
      IYD=XD*XD*XD*YD/12.0                                                       $ABS$  571
      ANG=ATAN((YS(J,I)+YP(J,I)-YS(J,I-1)-YP(J,I-1))/(XP(J,I)+XS(J,I)-XP         $ABS$  572
     1(J,I-1)-XS(J,I-1)))                                                        $ABS$  573
      COSANG=COS(2.0*ANG)                                                        $ABS$  574
      IXN=(IXD+IYD+(IXD-IYD)*COSANG)/2.0                                         $ABS$  575
      IYN=(IXD+IYD-(IXD-IYD)*COSANG)/2.0                                         $ABS$  576
      IXYN=0.0                                                                   $ABS$  577
      IF (ANG.NE.0.0) IXYN=((IXN-IYN)*COSANG-IXD+IYD)/(2.0*SIN(2.0*ANG))         $ABS$  578
      DELA=XD*YD                                                                 $ABS$  579
      YMN=(YS(J,I)+YS(J,I-1)+YP(J,I)+YP(J,I-1))/4.0-YINT                         $ABS$  580
      XMN=(XS(J,I)+XS(J,I-1)+XP(J,I)+XP(J,I-1))/4.0-XINT                         $ABS$  581
      IX=IX+IXN+DELA*YMN*YMN                                                     $ABS$  582
      IY=IY+IYN+DELA*XMN*XMN                                                     $ABS$  583
 1190 IXY=IXY+IXYN+DELA*YMN*XMN                                                  $ABS$  584
      ANG=ATAN(2.0*IXY/(IY-IX))                                                  $ABS$  585
      IPX=(IX+IY)/2.0+(IX-IY)/2.0*COS(ANG)-IXY*SIN(ANG)                          $ABS$  586
      IPY=(IX+IY)/2.0-(IX-IY)/2.0*COS(ANG)+IXY*SIN(ANG)                          $ABS$  587
      ANG=ANG/2.0*57.1                                                           $ABS$  588
      IF (IPRINT.EQ.1.OR.IPRINT.EQ.3) GO TO 1320                                 $ABS$  589
      IF (LNCT.LE.48) GO TO 1200                                                 $ABS$  590
      WRITE (LDG2,2&0)                                                           $ABS$  591
      LNCT=1                                                                     $ABS$  592
 1200 LNCT=LNCT+16                                                               $ABS$  593
      WRITE (LDG2,1210) J,ZOUT(J),AREA,XINT,YINT,IX,IY,IXY,IPX,ANG,IPY,A         $ABS$  594
     1NG                                                                         $ABS$  595
 1210 FORMAT (2X,/,30X,14HSECTION NUMBER,I3,3X,5HZ( =,F9.4,/,50X,34H***         $ABS$  596
     1**********,///,20X,16HSECTION PROPERTIES,7X,1                              $ABS$  597
     22HSECTION AREA,26X,1H=,1PE12.4,//,45X,20HLOCATION OF CENTROID,11X,         $ABS$  598
     34HXBAR,3X,1H=,E12.4,/,45X,22HRELATIVE TO STACK AXIS,9X,4HYBAR,3X,1         $ABS$  599
     4H=,E12.4,//,42X,22HSECOND MOMENTS OF AREA,9X,2HIX,5X,1H=,E12.4,/,4         $ABS$  600
     55X,14HABOUT CENTROID,17X,2HIY,5X,1H=,E12.4,/,75X,3HIXY,4X,1H=,E12.         $ABS$  601
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     64,//,45X,24HPRINCIPAL SECOND MOMENTS,7X,3HIPX,4X,1H=,E12.4,4H (AT,$ABS$  602
     7UPF7.2,21H DEGREES TO (X( AXIS),/,45X,22HOF AREA ABOUT CENTROID,9X$ABS$  603
     8,3HIPY,4X,1H=,1PE12.4,4H (AT,UPF7.2,21H DEGREES TO (Y( AXIS))      $ABS$  604
      WRITE (LOG2,1220) TORCON                                           $ABS$  605
1220  FORMAT (/,45X,14HTORSIONAL CONSTANT,20X,1H=,1PE12.4,/,2X)          $ABS$  606
      LNCT=LNCT+3                                                        $ABS$  607
      IF (LNCT.LE.50) GO TO 1230                                         $ABS$  608
      WRITE (LOG2,230)                                                   $ABS$  609
      LNCT=1                                                             $ABS$  610
1230  LNCT=LNCT+3                                                        $ABS$  611
      WRITE (LOG2,1240)                                                  $ABS$  612
1240  FORMAT (2X,/,20X,19HSECTION COORDINATES,/,2X)                      $ABS$  613
      WRITE (LOG2,1250)                                                  $ABS$  614
1250  FORMAT(31X,8HPOINT NO,5X,2HX1,12X,2HY1,16X,2HX2,12X,2HY2,/,2X)     $ABS$  615
      DO 1260 I=1,NPOINT                                                 $ABS$  616
      LNCT=LNCT+1                                                        $ABS$  617
      IF (LNCT.LE.50) GO TO 1260                                         $ABS$  618
      LNCT=4                                                             $ABS$  619
      WRITE (LOG2,230)                                                   $ABS$  620
      WRITE (LOG2,1250)                                                  $ABS$  621
1260  WRITE (LOG2,1270) I,XS(J,I),YS(J,I),XP(J,I),YP(J,I)                $ABS$  622
1270  FORMAT (31X,I5,3X,1P2E14.5,4X,2E14.5)                              $ABS$  623
      IF (LNCT.LE.55) GO TO 1280                                         $ABS$  624
      LNCT=1                                                             $ABS$  625
      WRITE (LOG2,230)                                                   $ABS$  626
1280  LNCT=LNCT+3                                                        $ABS$  627
      WRITE (LOG2,1290)                                                  $ABS$  628
1290  FORMAT (2X,/,31X,8HPOINT NO,5X,5HXSEMI,9X,5HYSEMI,/,2X)            $ABS$  629
      DO 1300 I=1,31                                                     $ABS$  630
      LNCT=LNCT+1                                                        $ABS$  631
      IF (LNCT.LE.50) GO TO 1300                                         $ABS$  632
      WRITE (LOG2,230)                                                   $ABS$  633
      WRITE (LOG2,1290)                                                  $ABS$  634
      LNCT=4                                                             $ABS$  635
1300  WRITE (LOG2,1310) I,XSEMI(J,I),YSEMI(J,I)                          $ABS$  636
1310  FORMAT (31X,I5,3X,1P2E14.5)                                        $ABS$  637
1320  IF (IFPLOT.LT.2) GO TO 1420                                        $ABS$  638
      IF (IFPLOT.EQ.4) GO TO 1360                                        $ABS$  639
      XPLOT=XS(J,1)*SCALE                                                $ABS$  640
      YPLOT=YS(J,1)*SCALE                                                $ABS$  641
      CALL PLOT (XPLOT,YPLOT,3)                                          $ABS$  642
      DO 1330 I=2,NPOINT                                                 $ABS$  643
      XPLOT=XS(J,I)*SCALE                                                $ABS$  644
      YPLOT=YS(J,I)*SCALE                                                $ABS$  645
1330  CALL PLOT (XPLOT,YPLOT,2)                                          $ABS$  646
      DO 1340 II=1,NPOINT                                                $ABS$  647
      I=NPOINT+1-II                                                      $ABS$  648
      XPLOT=XP(J,I)*SCALE                                                $ABS$  649
      YPLOT=YP(J,I)*SCALE                                                $ABS$  650
1340  CALL PLOT (XPLOT,YPLOT,2)                                          $ABS$  651
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```
      DO 1350 I=2,11                                                    $ABS  652
      XPLOT=XSEMI(J,I)*SCALE                                            $ABS  653
      YPLOT=YSEMI(J,I)*SCALE                                            $ABS  654
1350  CALL PLOT (XPLOT,YPLOT,2)                                         $ABS  655
      XPLOT=XS(J,1)*SCALE                                               $ABS  656
      YPLOT=YS(J,1)*SCALE                                               $ABS  657
      CALL PLOT (XPLOT,YPLOT,2)                                         $ABS  658
      GO TO 1420                                                        $ABS  659
1360  CALL SYMBOL (19.9,2.0,.175,22HCARTESIAN SECTION NO. ,J.0,22)      $ABS  660
      XJ=J                                                              $ABS  661
      CALL NUMBER (23.7?,2.,.175,XJ,0.0,-1)                             $ABS  662
      CALL SYMBOL (20.6,1.0,.175,16HSTAGGER = ,0.0,10)                  $ABS  663
      STAGER=ATAN((YS(J,NPOINT)+YP(J,NPOINT)-YS(J,1)-YP(J,1))/(XS(J,NPOI$ABS  664
     1NT)+XP(J,NPOINT)-XS(J,1)-XP(J,1)))*C1                             $ABS  665
      CALL NUMBER (22.3?,1.,.175,STAGER,0.0,3)                          $ABS  666
      CALL PLOT (22.0,3.25,-3)                                          $ABS  667
      SINSTG=SIN(STAGER/C1)                                             $ABS  668
      COSSTG=COS(STAGER/C1)                                             $ABS  669
      YPLOT=4.75                                                        $ABS  670
      XPLOT=4.75*SINSTG/COSSTG                                          $ABS  671
      IF (ABS(XPLOT).LE.22.0) GO TO 1370                                $ABS  672
      XPLOT=22.0                                                        $ABS  673
      YPLOT=-22.0/SINSTG*COSSTG                                         $ABS  674
1370  CALL PLOT (XPLOT,YPLOT,3)                                         $ABS  675
      XPLOT=-XPLOT                                                      $ABS  676
      YPLOT=-YPLOT                                                      $ABS  677
      CALL PLOT (XPLOT,YPLOT,2)                                         $ABS  678
      XPLOT=22.0                                                        $ABS  679
      YPLOT=-22.0*SINSTG/COSSTG                                         $ABS  680
      IF (ABS(YPLOT).LE.4.75) GO TO 1380                                $ABS  681
      YPLOT=-4.75                                                       $ABS  682
      XPLOT=4.75/SINSTG*COSSTG                                          $ABS  683
1380  CALL PLOT (XPLOT,YPLOT,3)                                         $ABS  684
      XPLOT=-XPLOT                                                      $ABS  685
      YPLOT=-YPLOT                                                      $ABS  686
      CALL PLOT (XPLOT,YPLOT,2)                                         $ABS  687
      XPLOT=SCALE*(XS(J,1)*COSSTG+YS(J,1)*SINSTG)                       $ABS  688
      YPLOT=SCALE*(YS(J,1)*COSSTG-XS(J,1)*SINSTG)                       $ABS  689
      CALL PLOT (XPLOT,YPLOT,3)                                         $ABS  690
      DO 1390 I=2,NPOINT                                                $ABS  691
      XPLOT=SCALE*(XS(J,I)*COSSTG+YS(J,I)*SINSTG)                       $ABS  692
      YPLOT=SCALE*(YS(J,I)*COSSTG-XS(J,I)*SINSTG)                       $ABS  693
1390  CALL PLOT (XPLOT,YPLOT,2)                                         $ABS  694
      DO 1400 II=1,NPOINT                                               $ABS  695
      I=NPOINT+1-II                                                     $ABS  696
      XPLOT=SCALE*(XP(J,I)*COSSTG+YP(J,I)*SINSTG)                       $ABS  697
      YPLOT=SCALE*(YP(J,I)*COSSTG-XP(J,I)*SINSTG)                       $ABS  698
1400  CALL PLOT (XPLOT,YPLOT,2)                                         $ABS  699
      DO 1410 I=2,11                                                    $ABS  700
      XPLOT=SCALE*(XSEMI(J,I)*COSSTG+YSEMI(J,I)*SINSTG)                 $ABS  701
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      YPLOT=SCALE*(YSEMI(J,I)*COSSTG-XSEMI(J,I)*SINSTG)                 $ABB  702
1410  CALL PLOT (XPLOT,YPLOT,2)                                        $ABB  703
      XPLOT=SCALE*(XS(J,1)*COSSTG+YS(J,1)*SINSTG)                      $ABB  704
      YPLOT=SCALE*(YS(J,1)*COSSTG-XS(J,1)*SINSTG)                      $ABB  705
      CALL PLOT (XPLOT,YPLOT,2)                                        $ABB  706
      CALL PLOT (23.0,-5.25,-3)                                        $ABB  707
1420  CONTINUE                                                         $ABB  708
      GO TO 1450                                                       $ABB  709
1430  WRITE (LOG2,1440) J                                              $ABB  710
1440  FORMAT (10X,6HFAILED  ,I2)                                       $ABB  711
1450  CONTINUE                                                         $ABB  712
      IF (INAST.EQ.J) GO TO 1560                                       $ABB  713
      NSTAD=IRTE-IRLE+1                                                $ABB  714
      JLOOP=0                                                          $ABB  715
      NELEM=0                                                          $ABB  716
      NSTRD=NLINES-1                                                   $ABB  717
      IRT=IRTE-1                                                       $ABB  718
      NT=1995                                                          $ABB  719
      DO 1500 J=1,NSTRD                                                $ABB  720
      DO 1490 I=IPLE,IRT                                               $ABB  721
      NELEM=NELEM+1                                                    $ABB  722
      IGRD1=I-1+JLOOP                                                  $ABB  723
      IGRD3=IGRD1+NSTAD                                                $ABB  724
      IGRD2=IGRD1+NSTAD+1                                              $ABB  725
      NT=NT+5                                                          $ABB  726
      WRITE (LOG3,1510) NELEM,NT,IGRD1,IGRD2,IGRD3                     $ABB  727
      IF(ABS(FLOAT(INAST)).GT.3.5)GO TO 1460                           $ABB  728
      THCK=(THARR(J,I)+THARR(J+1,I)+THARR(J+1,I+1))/3.                 $ABB  729
      PRES=-XSIGN*(BLAFOR(I,J)+BLAFOR(I,J+1)+BLAFOR(I+1,J+1))/3.       $ABB  730
      GO TO 1470                                                       $ABB  731
1460  THCK=(THARR(J,I)+THARR(J+1,I)+THARR(J+1,I+1)+THARR(J,I+1))/4.    $ABB  732
      PRES=-XSIGN*(BLAFOR(I,J)+BLAFOR(I,J+1)+BLAFOR(I+1,J+1)+BLAFOR(I+1,$ABB  733
     1J))/4.                                                           $ABB  734
1470  WRITE (LOG3,1520) NT,THCK                                        $ABB  735
      IF(INAST.GT.3)WRITE(LOG3,1530)PRES,NELEM                         $ABB  736
      NELEM=NELEM+1                                                    $ABB  737
      IGRD3=IGRD2                                                      $ABB  738
      IGRD2=IGRD1+1                                                    $ABB  739
      IF(ABS(FLOAT(INAST)).GT.3.5)GO TO 1480                           $ABB  740
      NT=NT+5                                                          $ABB  741
      THCK=(THARR(J,I)+THARR(J,I+1)+THARR(J+1,I+1))/3.                 $ABB  742
      PRES=-XSIGN*(BLAFOR(I,J)+BLAFOR(I+1,J)+BLAFOR(I+1,J+1))/3.       $ABB  743
      WRITE (LOG3,1520) NT,THCK                                        $ABB  744
1480  WRITE (LOG3,1510) NELEM,NT,IGRD1,IGRD2,IGRD3                     $ABB  745
      IF(INAST.GT.3)WRITE(LOG3,1530)PRES,NELEM                         $ABB  746
1490  CONTINUE                                                         $ABB  747
1500  JLOOP=JLOOP+NSTAD                                                $ABB  748
1510  FORMAT (6HCTRIA2,7X,I3,4X,I4,3(5X,I3))                           $ABB  749
1520  FORMAT (6HPTRIA2,6X,I4,7X,1H1,F8.4,6X,2H0.)                      $ABB  750
1530  FORMAT (6HPLOAD2,4X,2H60,F8.4,5X,I3)                             $ABB  751
```

```
1540  FORMAT (4HGPI),9X,I3,9X,3F8.4)                                    $ABS  752
      JD=0                                                              $ABS  753
      DO 1550 J=1,NLINES                                                $ABS  754
      DO 1550 I=IRL(J),IRT(J)                                           $ABS  755
      JD=JD+1                                                           $ABS  756
1550  WRITE (LOG3,1540) JD,XCAMB(J,I),YCAMB(J,I),ZCAMB(J,I)             $ABS  757
1560  CONTINUE                                                          $ABS  758
      IF (IFPLOT.NE.0) CALL PLOT (0.0,0.0,-3)                           $ABS  759
      END                                                               $ABS  760
```

```
      SUBROUTINE UD0320 (IBL,YS,YP,XS,XP,YSEMI,XSEMI,LOG2,N,IPRINT,BETA1$20$
     1,BETA2,YZERO,T,YONE,XDEL,YDEL,Z,XNORMC,LNCT,DX,Y,DY,SIGMA,SS1,XHER$20$
     2E,X,SS,NSTNS,R,BX,XM,YM,AM,AXIALC,ISTAK,ISPLIT,YZEROS,TS,YONES,ZSP$20$
     3MXT,PERSPU,INAST,THARR,BETMET,IRLE,IRTE)                          $20$
      DIMENSION XSPLTM(45), YSPLTM(45), SSPLTM(45), XSPLTS(45), YSPLTS(4$20$
     15), XSPLTP(45), YSPLTP(45), THICK(45)                             $20$
      REAL IX,IY,IXY,IPX,IPY,IXD,IYD,IXN,IYN,IXYN                       $20$
      DIMENSION BETMET(10), THARR(21,10)                                $20$
      DIMENSION YS(21,81), YP(21,81), XS(21,81), XP(21,81), YSEMI(21,31)$20$
     1, XSEMI(21,31), S(81), Y(100), THICK2(81), X4(82), YM(81), AM(81),$20$
     2 XHERE(100), X(100), SS(100), R(10,21), DX(100), DY(100), SS1(100,$20$
     33), SIGMA(100)                                                    $20$
10    FORMAT (1H1)                                                      $20$
      PI=3.1415926535                                                   $20$
      C1=180.0/PI                                                       $20$
      IF (IPRINT.GE.2) GO TO 30                                         $20$
      WRITE (LOG2,20) IBL,BETA1,BETA2,YZERO,T,YONE,Z,AXIALC             $20$
20    FORMAT (1H1,44X,43HSTREAMSURFACE GEOMETRY ON STREAMLINE NUMBER,I3,$20$
     1/45X,46(1H*),//,20X,5HBETA1,11X,1H=,F7.3,6X,20H(BLADE INLET ANGLE.$20$
     2),/,20X,5HBETA2,11X,1H=,F7.3,6X,21H(BLADE OUTLET ANGLE.),/,20X,5HY$20$
     3ZERO,11X,1H=,F8.5,5X,51H(BLADE LEADING EDGE RADIUS AS A FRACTION O$20$
     4F CHORD.),/,20X,1HT,15X,1H=,F8.5,5X,49H(BLADE MAXIMUM THICKNESS AS$20$
     5 A FRACTION OF CHORD.),/,20X,4HYONE,12X,1H=,F8.5,5X,63H(BLADE TRAI$20$
     6LING EDGE HALF-THICKNESS AS A FRACTION OF CHORD.),/,20X,1HZ,15X,1H$20$
     7=,F7.4,6X,59H(LOCATION OF MAXIMUM THICKNESS AS A FRACTION OF MEAN $20$
     8LINE.),/,20X,4HCORD,12X,1H=,F7.4,6X,30H(MERIDIONAL CHORD OF SECTIO$20$
     9N.))                                                              $20$
30    IF (IPRINT.NE.3) GO TO 50                                         $20$
      WRITE (LOG2,40) IBL,BETA1,BETA2,YZERO,T,YONE,Z,AXIALC             $20$
40    FORMAT (2X,/,5X,13HSTREAMSURFACE,I3,10H   BETA1 =,F7.3,9H  BETA2 =$20$
     1,F7.3,9H  YZERO =,F8.5,5H  T =,F8.5,8H  YONE =,F8.5,5H  Z =,F6.3,1$20$
     20H  AXIALC =,F8.5)                                                $20$
50    CHORD=XNORMC/(1.0-YZERO+XNORMC*(YZERO+ABS(YONE*SIN(BETA2/C1))))   $20$
      FCSLMN=1.0-CHORD*(YZERO+ABS(YONE*SIN(BETA2/C1)))                  $20$
      AX=1./99.                                                         $20$
      DX(1)=0.                                                          $20$
      DO 60 IK=2,100                                                    $20$
60    DX(IK)=DX(IK-1)+AX                                                $20$
      CALL UD0322 (XM,YM,N,DX,DY,100,1)                                 $20$
      SIGMA(1)=0.                                                       $20$
      DO 70 K=2,100                                                     $20$
70    SIGMA(K)=SIGMA(K-1)+SQRT((DX(K)-DX(K-1))**2+(DY(K)-DY(K-1))**2)   $20$
      CALL UD0322 (DX,SIGMA,100,XM,S,N,1)                               $20$
      YZERO=YZERO*CHORD/FCSLMN                                          $20$
      YONE=YONE*CHORD/FCSLMN                                            $20$
      T=T*CHORD/FCSLMN                                                  $20$
      S(1)=0.0                                                          $20$
      AT=(YZERO-T/2.0)/(2.0*Z**3)                                       $20$
      CT=(T/2.0-YZERO)*3.0/(2.0*Z)                                      $20$
      DT=YZERO                                                          $20$
```

```
      ET=(YONE-T/2.0)/(1.0-Z)**3-1.5*(YZERO-T/2.0)/(Z**2*(1.0-Z))                $20$   52
      FT=1.5*(YZERO-T/2.0)/Z**2                                                  $20$   53
      HT=T/2.0                                                                   $20$   54
      STAGER=ATAN(YM(N)/XM(N))*C1                                                $20$   55
      DO 100 J=1,N                                                               $20$   56
      SN=S(J)/S(N)                                                               $20$   57
      IF (SN.GT.Z) GO TO 80                                                      $20$   58
      THICK2(J)=(AT*SN**2+CT)*SN+DT                                              $20$   59
      GO TO 90                                                                   $20$   60
   80 SN=SN-Z                                                                    $20$   61
      THICK2(J)=(ET*SN+FT)*SN**2+HT                                              $20$   62
   90 FYPR=1./SQRT(1.+AM(J)**2)                                                  $20$   63
      YPRIME=AM(J)                                                               $20$   64
      XS(IBL,J)=(XM(J)-THICK2(J)*YPRIME*FYPR+YZERO)*FCSLMN                       $20$   65
      YS(IBL,J)=(YM(J)+THICK2(J)*FYPR)*FCSLMN                                    $20$   66
      XP(IBL,J)=(XM(J)+THICK2(J)*YPRIME*FYPR+YZERO)*FCSLMN                       $20$   67
      YP(IBL,J)=(YM(J)-THICK2(J)*FYPR)*FCSLMN                                    $20$   68
      AM(J)=ATAN(AM(J))*C1                                                       $20$   69
      XM(J)=(XM(J)+YZERO)*FCSLMN                                                 $20$   70
      YM(J)=YM(J)*FCSLMN                                                         $20$   71
      THICK2(J)=THICK2(J)*FCSLMN                                                 $20$   72
  100 S(J)=S(J)*FCSLMN                                                           $20$   73
      IF (INAST.EQ.0) GO TO 120                                                  $20$   74
      DO 110 J=IRLE,IRTE                                                         $20$   75
      J1=J-IRLE+1                                                                $20$   76
      CALL UD0322 (XM,THICK2,N,BETMET(J1),THARR(IBL,J),1,1)                      $20$   77
  110 THARR(IBL,J)=THARR(IBL,J)*2.*AXIALC                                        $20$   78
  120 CONTINUE                                                                   $20$   79
      IF (ISPLIT.EQ.0) GO TO 190                                                 $20$   80
      XSPLTM(1)=1.-PERSPJ                                                        $20$   81
      K1=25                                                                      $20$   82
      XSPLTM(K1)=1.                                                              $20$   83
      K11=K1-1                                                                   $20$   84
      DELXX=PERSPJ/FLOAT(K11)                                                    $20$   85
      DO 130 J=2,K11                                                             $20$   86
  130 XSPLTM(J)=XSPLTM(J-1)+DELXX                                                $20$   87
      CALL UD0322 (XM,YM,N,XSPLTM,YSPLTM,K1,1)                                   $20$   88
      YLE=YSPLTM(1)                                                              $20$   89
      CALL UD0322 (XM,S,N,XSPLTM,SSPLTM,K1,1)                                    $20$   90
      CALL UD0322 (XM,AM,N,XSPLTM,SS1(1,3),K1,1)                                 $20$   91
      SSPLS=SSPLTM(1)                                                            $20$   92
      DO 140 J=1,K1                                                              $20$   93
  140 SSPLTM(J)=SSPLTM(J)-SSPLS                                                  $20$   94
      XNORMS=SQRT((XSPLTM(K1)-XSPLTM(1))**2+(YSPLTM(K1)-YSPLTM(1))**2)           $20$   95
      CHORDS=XNORMS/(1.-YZEROS+XNORMS*(YZEROS+ABS(YONES*SIN(BETA2/C1))))         $20$   96
      FCSLMS=(PERSPJ-CHORDS*(YZEROS+ABS(YONES*SIN(BETA2/C1))))/PERSPJ            $20$   97
      YZEROS=YZEROS*CHORDS/FCSLMS                                                $20$   98
      YONES=YONES*CHORDS/FCSLMS                                                  $20$   99
      TS=TS*CHORDS/FCSLMS                                                        $20$  100
      AT=(YZEROS-TS/2.)/(2.*ZSPMXT**3)                                             $$  101
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```
      CT=(TS/2.-YZEROS)*3./(2.*ZSPMXT)                                  $20$  102
      DT=YZEROS                                                         $20$  103
      ET=(YONES-TS/2.)/(1.-ZSPMXT)**3-1.5*(YZEROS-TS/2.)/(ZSPMXT**2*(1.-$20$  104
     1ZSPMXT))                                                          $20$  105
      FT=1.5*(YZEROS-TS/2.)/ZSPMXT**2                                   $20$  106
      HT=TS/2.                                                          $20$  107
      DO 170 J=1,K1                                                     $20$  108
      SN=SSPLTM(J)/SSPLTM(K1)                                           $20$  109
      IF (SN.GT.ZSPMXT) GO TO 150                                       $20$  110
      THICK(J)=(AT*SN**2+CT)*SN+DT                                      $20$  111
      GO TO 160                                                         $20$  112
  150 SN=SN-ZSPMXT                                                      $20$  113
      THICK(J)=(ET*SN+FT)*SN**2+HT                                      $20$  114
  160 FYPR=1./SQRT(1.+TAN(SS1(J,3)/C1)**2)                              $20$  115
      YPRIME=TAN(SS1(J,3)/C1)                                           $20$  116
      XSPLTP(J)=(XSPLTM(J)-(1.-PERSPJ)+THICK(J)*YPRIME*FYPR+YZEROS)*FCSL$20$  117
     1MS+(1.-PERSPJ)                                                    $20$  118
      XSPLTS(J)=(XSPLTM(J)-(1.-PERSPJ)-THICK(J)*YPRIME*FYPR+YZEROS)*FCSL$20$  119
     1MS+(1.-PERSPJ)                                                    $20$  120
      YSPLTP(J)=(YSPLTM(J)-YLE-THICK(J)*FYPR)*FCSLMS+YLE                $20$  121
      YSPLTS(J)=(YSPLTM(J)-YLE+THICK(J)*FYPR)*FCSLMS+YLE                $20$  122
      XSPLTM(J)=(XSPLTM(J)-(1.-PERSPJ)+YZEROS)*FCSLMS+(1.-PERSPJ)       $20$  123
      YSPLTM(J)=(YSPLTM(J)-YLE)*FCSLMS+YLE                              $20$  124
      THICK(J)=THICK(J)*FCSLMS                                          $20$  125
  170 SSPLTM(J)=SSPLTM(J)*FCSLMS                                        $20$  126
      YZEROS=YZEROS*FCSLMS                                              $20$  127
      AREAS=PI/2.*YZEROS**2                                             $20$  128
      YINT=-4./(3.*PI)*YZEROS*AREAS*SIN(SS1(1,3)/C1)                    $20$  129
      XINT=YZEROS*(1.-COS(SS1(1,3)/C1)*4./(3.*PI))*AREAS                $20$  130
      DO 180 J=2,K1                                                     $20$  131
      DELA=(THICK(J)+THICK(J-1))*(SSPLTM(J)-SSPLTM(J-1))                $20$  132
      AREAS=AREAS+DELA                                                  $20$  133
      XINT=XINT+DELA*(XSPLTM(J)+XSPLTM(J-1))/2.                         $20$  134
  180 YINT=YINT+DELA*(YSPLTM(J)+YSPLTM(J-1))/2.                         $20$  135
      XBARS=XINT/AREAS                                                  $20$  136
      YBARS=YINT/AREAS                                                  $20$  137
  190 CONTINUE                                                          $20$  138
      YZERO=YZERO*FCSLMN                                                $20$  139
      AREA=PI/2.0*YZERO**2                                              $20$  140
      XINT=YZERO*(1.0-COS(BETA1/C1)*4.0/(3.0*PI))*AREA                  $20$  141
      YINT=-4.0/(3.0*PI)*YZERO*AREA*SIN(BETA1/C1)                       $20$  142
      DO 200 J=2,N                                                      $20$  143
      DELA=(THICK2(J)+THICK2(J-1))*(S(J)-S(J-1))                        $20$  144
      AREA=AREA+DELA                                                    $20$  145
      XINT=XINT+DELA*(XM(J)+XM(J-1))/2.0                                $20$  146
  200 YINT=YINT+DELA*(YM(J)+YM(J-1))/2.0                                $20$  147
      XBAR=XINT/AREA                                                    $20$  148
      YBAR=YINT/AREA                                                    $20$  149
      XBARB=XBAR                                                        $20$  150
      YBARB=YBAR                                                        $20$  151
```

```
      YBAR=YBAR+YDEL/AXIALC
      XBAR=XBAR+XDEL/AXIALC
      CALL UD0322 (XM,AM,N,DX,SS1,100,1)
      DO 210 IK=1,100
      SS1(IK,1)=TAN(SS1(IK,1)/C1)
      Y(IK)=DY(IK)*FCSLMN
210   SIGMA(IK)=DX(IK)*FCSLMN+YZERO
      CALL UD0322 (SIGMA,Y,100,DX,DY,100,1)
      CALL UD0322 (SIGMA,SS1,100,DX,Y,100,1)
      CALL UD0322 (DX,DY,100,XBAR,XAB,1,1)
      CALL UD0322 (DX,Y,100,XBAR,XBC,1,1)
      XBAR=XBARB
      YBAR=YBARB
      IX=0.0
      IY=0.0
      IXY=0.0
      DO 220 J=2,N
      DELA=(THICK2(J)+THICK2(J-1))*(S(J)-S(J-1))
      IXD=(THICK2(J)+THICK2(J-1))**3*(S(J)-S(J-1))/12.0
      IYD=(THICK2(J)+THICK2(J-1))*(S(J)-S(J-1))**3/12.0
      COSANG=COS((AM(J)+AM(J-1))/C1)
      IXN=(IXD+IYD+(IXD-IYD)*COSANG)/2.0
      IYN=(IXD+IYD-(IXD-IYD)*COSANG)/2.0
      IXYN=0.0
      IF ((AM(J)+AM(J-1)).NE.0.0) IXYN=((IXN-IYN)*COSANG-IXD+IYD)/(2.0*S
     1IN((AM(J)+AM(J-1))/C1))
      IX=IX+IXN+DELA*((YM(J)+YM(J-1))/2.0-YBAR)**2
      IY=IY+IYN+DELA*((XM(J)+XM(J-1))/2.0-XBAR)**2
220   IXY=IXY+IXYN+DELA*(YBAR-(YM(J)+YM(J-1))/2.0)*(XBAR-(XM(J)+XM(J-1))
     1/2.0)
      ANG=ATAN(2.0*IXY/(IY-IX))
      IPX=(IX+IY)/2.0+(IX-IY)/2.0*COS(ANG)-IXY*SIN(ANG)
      IPY=(IX+IY)/2.0-(IX-IY)/2.0*COS(ANG)+IXY*SIN(ANG)
      ANG=ANG/2.0*C1
      XML=XM(N)
      YML=YM(N)
      CAMBER=BETA1-BETA2
      IF (IPRINT.GE.2) GO TO 340
      LNCT=47
      WRITE (LOG2,230) CHORD,STAGER,CAMBER,AREA,XBAR,YBAR,IX,IY,IXY,ANG,
     1IPX,ANG,IPY,ANG
230   FORMAT (/,15X,100HNORMALISED RESULTS - ALL THE FOLLOWING REFER TO
     1ABLADE HAVING A MERIDIONAL CHORD PROJECTION OF UNITY,/,16X,100(1H*
     2),//20X,11HBLADE CHORD,4X,1H=,F7.4,//,20X,16HSTAGGER ANGLE  =,F7.3
     3,//,20X,16HCAMBER ANGLE   =,F7.3,//,20X,16HSECTION AREA   =,F7.5,/
     4/,20X,45HLOCATION OF CENTROID RELATIVE TO LEADING EDGE,//,30X,6HXB
     5AR =,F8.5,/,30X,6HYBAR =,F8.5,//,20X,37HSECOND MOMENTS OF AREA ABO
     6UT CENTROID,//,30X,6HIX   =,F8.5,/,30X,6HIY   =,F8.5,/,30X,6HI
     7=,F8.5,//,20X,58HANGLE OF INCLINATION OF (ONE) PRINCIPAL AXIS
     8X( AXIS =,F7.3,//,20X,47HPRINCIPAL SECOND MOMENTS OF AREA ABO
```

```
     $NTROID,//,30X,6HIPX   =,F7.5,6X,3H(AT,F7.3,15H WITH (X( AXIS),/,30X$220 202
     *,6HIPY   =,F7.5,5X,3H(AT,F7.3,15H WITH (Y( AXIS),//)                $220 203
240   FORMAT (27X,5HPOINT,8X,24HM E A N L I N E   D A T A,13X,23HSURFACE   $220 204
     1COORDINATE DATA,/,27X,6HNUMBER,5X,1HX,7X,1HY,5X,15HANGLE THICKNESS$220 205
     2,9X,2HX1,6X,2HY1,6X,2HX2,6X,2HY2,//)                               $220 206
      WRITE (LOG2,240)                                                   $220 207
      DO 260 J=1,N                                                       $220 208
      IF (LNCT.NE.50) GO TO 250                                          $220 209
      WRITE (LOG2,10)                                                    $220 210
      WRITE (LOG2,240)                                                   $220 211
      LNCT=4                                                             $220 212
250   LNCT=LNCT+1                                                        $220 213
      TM=THICK2(J)*2.0                                                   $220 214
260   WRITE (LOG2,270) J,XM(J),YM(J),AM(J),TM,XS(IBL,J),YS(IBL,J),XP(IBL$220 215
     1,J),YP(IBL,J)                                                      $220 216
270   FORMAT (27X,I3,F13.5,F8.5,F7.3,F8.5,F16.5,3F8.5)                   $220 217
      IF (ISPLIT.EQ.0) GO TO 310                                         $220 218
      IF (LNCT.LE.40) GO TO 280                                          $220 219
      WRITE (LOG2,10)                                                    $220 220
      LNCT=1                                                             $220 221
280   WRITE (LOG2,290)                                                   $220 222
290   FORMAT (//,10X,20HSPLITTER COORDINATES,/,10X,21(1H*),//,2X)        $220 223
      WRITE (LOG2,240)                                                   $220 224
      LNCT=LNCT+11                                                       $220 225
      N=K1                                                               $220 226
      DO 300 J=1,N                                                       $220 227
      TM=THICK(J)*2.                                                     $220 228
      XS(IBL,J)=XSPLTS(J)                                                $220 229
      XP(IBL,J)=XSPLTP(J)                                                $220 230
      YP(IBL,J)=YSPLTP(J)                                                $220 231
      YS(IBL,J)=YSPLTS(J)                                                $220 232
      WRITE (LOG2,270) J,XSPLTM(J),YSPLTM(J),SS1(J,3),TM,XS(IBL,J),YS(IB$220 233
     1L,J),XP(IBL,J),YP(IBL,J)                                           $220 234
      LNCT=LNCT+1                                                        $220 235
      IF (LNCT.LE.50) GO TO 300                                          $220 236
      WRITE (LOG2,10)                                                    $220 237
      WRITE (LOG2,240)                                                   $220 238
      LNCT=4                                                             $220 239
300   CONTINUE                                                           $220 240
310   CONTINUE                                                           $220 241
      DO 320 J=1,N                                                       $220 242
      XM(J)=XS(IBL,J)                                                    $220 243
      YM(J)=YS(IBL,J)                                                    $220 244
      AM(J)=XP(IBL,J)                                                    $220 245
320   THICK2(J)=YP(IBL,J)                                                $220 246
      WRITE (LOG2,330) IBL                                               $220 247
330   FORMAT (1H1,35X,33HNORMALISED PLOT OF SECTION NUMBER,I3,/,2X)      $220 248
      CALL UDJ323 (N,LOG2,XM,YM,AM,THICK2)                               $220 249
340   A2=AXIALC**2                                                       $220 250
      A4=A2**2                                                           $220 251
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```
      IX=IX*A4                                                                  $200 252
      IY=IY*A4                                                                  $200 253
      IXY=IXY*A4                                                                $200 254
      IPX=IPX*A4                                                                $200 255
      IPY=IPY*A4                                                                $200 256
      IF (ISTAK.GT.1) GO TO 350                                                 $200 257
      XBAR=ISTAK                                                                $200 258
      IF (ISTAK.EQ.0) YBAR=0.                                                   $200 259
      IF (ISTAK.EQ.1) YBAR=YML                                                  $200 260
  350 RLE=YZERO*AXIALC                                                          $200 261
      IF (ISPLIT.NE.0) GO TO 360                                                $200 262
      CHORD=CHORD*AXIALC                                                        $200 263
      AREA=AREA*A2                                                              $200 264
      XC=RLE-XBAR*AXIALC-XDEL                                                   $200 265
      YC=-YBAR*AXIALC-YDEL                                                      $200 266
      GO TO 360                                                                 $200 267
  360 RLE=YZEROS*AXIALC                                                         $200 268
      CHORD=CHORDC*AXIALC                                                       $200 269
      AREAS=AREAS*AXIALC**2                                                     $200 270
      XC=(XSPLTM(1)-XBAR)*AXIALC-XDEL                                           $200 271
      YC=(YSPLTM(1)-YBAR)*AXIALC-YDEL                                           $200 272
      XBARS=(XBARS-XBAR)*AXIALC-XDEL                                            $200 273
      YBARS=(YBARS-YBAR)*AXIALC-YDEL                                            $200 274
      IF (IPRINT.GE.2) GO TO 430                                                $200 275
      WRITE (LOG2,370) CHORD,RLE,XC,YC,XBARS,YBARS,AREAS                        $200 276
  370 FORMAT (1H1,31X,59HDIMENSIONAL RESULTS - ALL RESULTS REFER TO A BL        $200 277
     1ADE OF SPECIFIED CHORD,/,32X,59(1H*),//,20X,11HBLADE CHORD,4X,1H=,        $200 278
     2 1PE12.5,//20X,10HBLEND RADIUS,5X,1H=,1PE12.5,8X,14HCENTERED AT X=,1P     $200 279
     3E12.5,3H Y=,1PE13.5,//,20X,26HLOCATION OF CENTROID AT X=,1PE12.5,7        $200 280
     4H AND Y=,1PE12.5,//,20X,16HSECTION AREA   =,1PE12.5,//,2X)                $200 281
      GO TO 400                                                                 $200 282
  380 CONTINUE                                                                  $200 283
      IF (IPRINT.GE.2) GO TO 430                                                $200 284
      WRITE (LOG2,390) CHORD,RLE,XC,YC,AREA,IX,IY,IXY,IPX,ANG,IPY,ANG           $200 285
  390 FORMAT (1H1,31X,59HDIMENSIONAL RESULTS - ALL RESULTS REFER TO A BL        $200 286
     1ADE OF SPECIFIED CHORD,/,32X,59H************************************    $200 287
     2************************,//,20X,11HBLADE CHORD,4X,1H=,1PE12.5,//,20X,1    $200 288
     30HBLEND RADIUS,5X,1H=,1PE12.5,8X,14HCENTERED AT X=,1PE12.5,3H Y=,1PE1    $200 289
     43.5,3H Y=,1PE13.5,//,20X,16HSECTION AREA   =,1PE12.5,//,20X,37HSECOND    $200 290
     5 MOMENTS OF AREA ABOUT CENTROID,//,30X,6HIX   =,1PE12.5,/,30X,6HIY       $200 291
     6  =,1PE12.5,/,30X,6HIXY  =,1PE12.5,//,20X,47HPRINCIPAL SECOND MOMENTS    $200 292
     7 OF AREA ABOUT CENTROID,//,30X,6HIPX  =,1PE12.5,5H  (AT,0PF7.3,15H DEG    $200 293
     8REES WITH (X( AXIS),/,30X,6HIPY  =,1PE12.5,5H  (AT,0PF7.3,15H DEGREES    $200 294
     9 WITH (Y( AXIS),//)                                                       $200 295
  400 CONTINUE                                                                  $200 296
      WRITE (LOG2,410)                                                          $200 297
      WRITE (LOG2,420)                                                          $200 298
  410 FORMAT(4X,2HPT,5X,7HSURFACE,10(1H-),3HONE,8X,7HSURFACE,10(1H-),3HT        $200 299
     1WO,10X,2HPT,5X,7HSURFACE,10(1H-),3HONE,8X,7HSURFACE,10(1H-),3HTWO)        $200 300
  420 FORMAT (4X,2HNO,8X,1HX,13X,1HY,13X,1HX,13X,1HY,12X,2HNO,8X,1HX,13X        $200 301
```

```
     1,1HY,13X,1HX,13X,1HY,//)                                                
```

```
      S23=AXIALC/99.                                                    $20$ 352
      SS(1)=SS(1)+S32                                                   $20$ 353
      DO 530 IK=2,100                                                   $20$ 354
      SS1(IK,1)=SS(IK)                                                  $20$ 355
530   SS(IK)=SS(IK-1)+S23                                               $20$ 356
      SIGMAO=(XAB-YBAR)/RXBAR*AXIALC                                    $20$ 357
      DO 540 IK=2,100                                                   $20$ 358
      IF (XBAR.EQ.DX(IK)) GO TO 560                                     $20$ 359
      IF (XBAR.GT.DX(IK-1).AND.XBAR.LT.DX(IK)) GO TO 570                $20$ 360
540   CONTINUE                                                          $20$ 361
      WRITE (LOG2,550)                                                  $20$ 362
550   FORMAT (1H1,25H XBAR CANNOT BE LOCATED)                           $20$ 363
560   SIGMA(IK)=SIGMAO                                                  $20$ 364
      KL=IK+1                                                           $20$ 365
      GO TO 580                                                         $20$ 366
570   KL=IK                                                             $20$ 367
      SIGMA(IK-1)=SIGMAO                                                $20$ 368
580   SSDUM=SS(KL-1)                                                    $20$ 369
      SS(KL-1)=0.                                                       $20$ 370
      YP1=XBC                                                           $20$ 371
      RX1=RXBAR                                                         $20$ 372
      DO 590 IK=KL,100                                                  $20$ 373
      XSURF=SS2+DX(IK)*SSURF+SS1(1,1)                                   $20$ 374
      CALL UD0322 (SS1(1,1),X,100,XSURF,XDUM,1,1)                       $20$ 375
      CALL UD0322 (SS1(1,1),X,100,XSURF,XDUM,1,1)                       $20$ 376
      CALL UD0322 (SS1(1,1),X,100,XSURF,XDUM,1,1)                       $20$ 377
      CALL UD0322 (XHERE,R(1,IBL),NSTNS,XDUM,RX2,1,0)                   $20$ 378
      SIGMA(IK)=SIGMA(IK-1)+(Y(IK)/RX2+YP1/RX1)/2.*(SS(IK)-SS(IK-1))    $20$ 379
      YP1=Y(IK)                                                         $20$ 380
590   RX1=RX2                                                           $20$ 381
      SS(KL-1)=SSDUM                                                    $20$ 382
      SSDUM=SS(KL)                                                      $20$ 383
      SIGDUM=SIGMA(KL)                                                  $20$ 384
      SIGMA(KL)=SIGMAO                                                  $20$ 385
      SS(KL)=0.                                                         $20$ 386
      RX1=RXBAR                                                         $20$ 387
      YP1=XBC                                                           $20$ 388
      KM=KL-1                                                           $20$ 389
      DO 600 IK=1,KM                                                    $20$ 390
      KJ=KL-IK                                                          $20$ 391
      XSURF=SS2+DX(KJ)*SSURF+SS1(1,1)                                   $20$ 392
      CALL UD0322 (SS1(1,1),X,100,XSURF,XDUM,1,1)                       $20$ 393
      CALL UD0322 (XHERE,R(1,IBL),NSTNS,XDUM,RX2,1,0)                   $20$ 394
      SIGMA(KJ)=SIGMA(KJ+1)-(Y(KJ)/RX2+YP1/RX1)/2.*(SS(KJ+1)-SS(KJ))    $20$ 395
      YP1=Y(KJ)                                                         $20$ 396
600   RX1=RX2                                                           $20$ 397
      SIGMA(KL)=SIGDUM                                                  $20$ 398
      SS(KL)=SSDUM                                                      $20$ 399
      DO 610 IK=1,100                                                   $20$ 400
610   SS(IK)=SS1(IK,1)                                                  $20$ 401
```

```
0123456789012345678901234567890123456789012345678
0000000000000000000000000000000000000000000000000
4444444444444444444444444444444444444444444444444

5555555555555555555555555555555555555555555555555
0000000000000000000000000000000000000000000000000
2222222222222222222222222222222222222222222222222
4444444444444444444444444444444444444444444444444
6666666666666666666666666666666666666666666666666
8888888888888888888888888888888888888888888888888
```

```
      SUBROUTINE UDU322 (XDATA,YDATA,NDATA,XIN,YOUT,NXY,NTYPE)
      DIMENSION XDATA(1), YDATA(1), XIN(1), YOUT(1)
      CALL UDU327 (XDATA,YDATA,NDATA,XIN,YOUT,X1,X1,NXY,NTYPE,0)
      RETURN
      END
```

```
      SUBROUTINE UD0323 (IX,LOG1,X1,Y1,X2,Y2)
      REAL LINE
      DIMENSION X1(1), Y1(1), X2(1), Y2(1), LINE(121), XNUM(13)
      DATA SYMBOL/1H*/,DASH/1H-/,CROSS/1H+/,BLANK/1H /,XI/1HI/
      YMIN=Y1(1)
      XMIN=X1(1)
      YMAX=YMIN
      XMAX=XMIN
      DO 10 I=1,IX
      IF (Y2(I).LT.YMIN) YMIN=Y2(I)
      IF (Y2(I).GT.YMAX) YMAX=Y2(I)
      IF (X2(I).LT.XMIN) XMIN=X2(I)
      IF (X2(I).GT.XMAX) XMAX=X2(I)
      IF (Y1(I).GT.YMAX) YMAX=Y1(I)
      IF (X1(I).GT.XMAX) XMAX=X1(I)
10    CONTINUE
      IF (XMAX.EQ.XMIN.OR.YMIN.EQ.YMAX) GO TO 170
      YH=YMAX+(YMAX-YMIN)/25.0
      YL=YMIN-(YMAX-YMIN)/25.0
      XH=XMAX+(XMAX-XMIN)/38.3333
      XL=XMIN-(XMAX-XMIN)/38.3333
      IF ((YH-YL)/(XH-XL).GT.0.75) XH=1.3333*(YH-YL)+XL
      IF ((YH-YL)/(XH-XL).LT.0.75) YH=0.75*(XH-XL)+YL
      XMAX=(XMIN+XMAX-XH+XL)/2.0
      XH=XH-XL+XMAX
      XL=XMAX
      XMAX=(YMIN+YMAX-YH+YL)/2.0
      YH=YH-YL+XMAX
      YL=XMAX
      XMAX=ABS(XH)
      XMIN=ABS(XL)
      YMIN=ABS(YL)
      YMAX=ABS(YH)
      IF (XMIN.GT.XMAX) XMAX=XMIN
      IF (YMIN.GT.YMAX) YMAX=YMIN
      XMAX=ALOG10(XMAX)
      YMAX=ALOG10(YMAX)
      IF (XMAX.LT.0.0) XMAX=XMAX-1.0
      IF (YMAX.LT.0.0) YMAX=YMAX-1.0
      MX=-XMAX
      MY=-YMAX
      WRITE (LOG1,20) MX,MY
20    FORMAT (20X,46HSCALES - {X{ IS SHOWN TIMES 10 TO THE POWER OF,I3,4
     10H   {Y{ IS SHOWN TIMES 10 TO THE POWER OF,I3,/)
      YINC=(YH-YL)/54.0
      YINC2=YINC/2.0
      XRANGE=XH-XL
      DO 140 KLINE=1,55
      IF (KLINE.EQ.1.OR.KLINE.EQ.55) GO TO 50
      DO 30 L=2,120
```

```
30    LINE(L)=BLANK
      IF (KLINE.EQ.7.OR.KLINE.EQ.13.OR.KLINE.EQ.19.OR.KLINE.EQ.25.OR.KLI
     1NE.EQ.31.OR.KLINE.EQ.37.OR.KLINE.EQ.43.OR.KLINE.EQ.49) GO TO 40
      LINE(1)=XI
      LINE(121)=XI
      GO TO 80
40    LINE(1)=DASH
      LINE(121)=DASH
      GO TO 80
50    DO 60 L=2,120
60    LINE(L)=DASH
      LINE(1)=CROSS
      LINE(121)=CROSS
      DO 70 L=11,111,10
70    LINE(L)=XI
      GO TO 120
80    DO 100 I=1,IX
      IF (Y2(I).GT.YH+YINC2.OR.Y2(I).LE.YH-YINC2) GO TO 90
      L=(X2(I)-XL)/XRANGE*120.0+1.5
      LINE(L)=SYMBOL
90    IF (Y1(I).GT.YH+YINC2.OR.Y1(I).LE.YH-YINC2) GO TO 100
      L=(X1(I)-XL)/XRANGE*120.0+1.5
      LINE(L)=SYMBOL
100   CONTINUE
      IF (KLINE.EQ.1.OR.KLINE.EQ.7.OR.KLINE.EQ.13.OR.KLINE.EQ.19.OR.KLIN
     1E.EQ.25.OR.KLINE.EQ.31.OR.KLINE.EQ.37.OR.KLINE.EQ.43.OR.KLINE.EQ.4
     29.OR.KLINE.EQ.55) GO TO 120
      WRITE (LOG1,110) LINE
110   FORMAT (8X,121A1)
      GO TO 140
120   YNUM=YH*10.0**MY
      WRITE (LOG1,130) YNUM,LINE
130   FORMAT (1X,F6.3,1X,121A1)
140   YH=YH-YINC
      XNUM(1)=XL*10.0**MX
      XINC=((XH-XL)/12.0)*10.0**MX
      DO 150 I=2,13
150   XNUM(I)=XNUM(I-1)+XINC
      WRITE (LOG1,160) XNUM
160   FORMAT (6X,12(F6.3,4X),F6.3)
      RETURN
170   WRITE (LOG1,180)
180   FORMAT (//,35X,54HNO PLOT HAS BEEN MADE BECAUSE (X( OR (Y( RANGE I
     1S ZERO)
      RETURN
      END
```

```
      SUBROUTINE UD0324 (ISTAK,PLTSZE,ITRIG,TITLE,IKOUM,IFPLOT)
      DIMENSION TITLE(6)
      IF (ITRIG.EQ.2.AND.IFPLOT.NE.2) CALL PLOT (PLTSZE,0.,-3)
      PLTTIT=PLTSZE*.1
      IF (ISTAK.LT.2) GO TO 10
      BAL=.35*PLTSZE
      XLEN1=.3*PLTSZE
      XLEN2=XLEN1
      YLEN1=.25*PLTSZE
      YLEN2=-1.*YLEN1
      XBACK1=-1.9
      XBACK2=-5.2
      GO TO 50
10    IF (ISTAK.EQ.0) GO TO 20
      XLEN1=.70*PLTSZE
      XLEN2=.15*PLTSZE
      XBACK1=-1.4-.20*PLTSZE
      XBACK2=-5.2-.20*PLTSZE
      IF (IKOUM.EQ.1) GO TO 30
      GO TO 40
20    CONTINUE
      XLEN1=.15*PLTSZE
      XLEN2=.70*PLTSZE
      XBACK1=-1.9+.20*PLTSZE
      XBACK2=-5.2+.20*PLTSZE
      IF (IKOUM.EQ.1) GO TO 40
30    BAL=.25*PLTSZE
      YLEN1=.20*PLTSZE
      YLEN2=-.15*PLTSZE
      GO TO 50
40    BAL=.20*PLTSZE
      YLEN1=.15*PLTSZE
      YLEN2=-.50*PLTSZE
50    CONTINUE
      YBACK1=-(.35+BAL)
      YBACK2=YBACK1-.01*PLTSZE-.175
      CALL PLOT (0.0,-PLTSZE,-3)
      CALL PLOT (7.0,PLTTIT,-3)
      CALL PLOT (0.0,BAL,3)
      CALL PLOT (XLEN1,BAL,-2)
      CALL PLOT (XLEN2,0.0,2)
      CALL PLOT (0.0,YLEN1,3)
      CALL PLOT (0.0,YLEN2,2)
      GO TO (60,70), ITRIG
60    CALL SYMBOL (XBACK1,YBACK1,.175,22HSTREAMSURFACE SECTIONS,0.0,22)
      GO TO 80
70    XBACK1=XBACK1+0.35
      CALL SYMBOL (XBACK1,YBACK1,.175,18HCARTESIAN SECTIONS,0.0,18)
80    CALL SYMBOL (XBACK2,YBACK2,.175,TITLE,0.0,72)
      RETURN
```

```
$245  52

END
```

```
      SUBROUTINE UU0327 (XDATA,YDATA,NDATA,XIN,YOUT,SLOPE,YINT,NXY,NTYPE,NWOT)
      REAL M,INT
      DIMENSION XDATA(1), YDATA(1), XIN(1), YOUT(1), YINT(1), SLOPE(1)
      DIMENSION M(100), A(100), B(100), INT(100), D(100)
      N=NDATA-1
      IF (NTYPE.EQ.0.AND.NDATA.GE.3) GO TO 140
      IF (NDATA.GT.1) GO TO 40
      IF (NWOT.GT.0) GO TO 20
      DO 10 I=1,NXY
10    YOUT(I)=YDATA(1)
20    IF (NWOT*NWOT.NE.1) RETURN
      DO 30 I=1,NXY
30    SLOPE(I)=0.0
      RETURN
40    IF (NDATA.GT.2) GO TO 80
      YPRIME=(YDATA(2)-YDATA(1))/(XDATA(2)-XDATA(1))
      IF (NWOT.GT.0) GO TO 60
      DO 50 I=1,NXY
50    YOUT(I)=YDATA(1)+YPRIME*(XIN(I)-XDATA(1))
60    IF (NWOT*NWOT.NE.1) RETURN
      DO 70 I=1,NXY
70    SLOPE(I)=YPRIME
      RETURN
80    J=2
      DO 130 I=1,NXY
      IF (XIN(I).LE.XDATA(2)) GO TO 110
      IF (XIN(I).GE.XDATA(N)) GO TO 120
90    IF (XIN(I).GE.XDATA(J).AND.XIN(I).LE.XDATA(J+1)) GO TO 100
      J=J+1
      IF (J.LE.N-1) GO TO 90
      J=2
      GO TO 90
100   YOUT(I)=YDATA(J)+(YDATA(J+1)-YDATA(J))/(XDATA(J+1)-XDATA(J))*(XIN(I)-XDATA(J))
      GO TO 130
110   YOUT(I)=YDATA(1)+(YDATA(2)-YDATA(1))/(XDATA(2)-XDATA(1))*(XIN(I)-XDATA(1))
      GO TO 130
120   YOUT(I)=YDATA(N)+(YDATA(NDATA)-YDATA(N))/(XDATA(NDATA)-XDATA(N))*(XIN(I)-XDATA(N))
130   CONTINUE
      RETURN
140   A(1)=1.0
      D(1)=0.0
      B(1)=0.0
      DO 150 I=2,N
      A(I)=(XDATA(I+1)-XDATA(I-1))/3.0-(XDATA(I)-XDATA(I-1))*B(I-1)/(6.0*A(I-1))
      B(I)=(XDATA(I+1)-XDATA(I))/6.0
```

```
      B(I)=(YDATA(I+1)-YDATA(I))/(XDATA(I+1)-XDATA(I))-(YDATA(I)-YDATA(I$27$   52
     1-1))/(XDATA(I)-XDATA(I-1))-(XDATA(I)-XDATA(I-1))*D(I-1)/6.0/A(I-1)$27$   53
      M(NDATA)=0.0                                                      $27$   54
      DO 160 II=1,N                                                     $27$   55
      I=NDATA-II                                                        $27$   56
160   M(I)=(D(I)-B(I)*M(I+1))/A(I)                                      $27$   57
      ASSIGN 240 TO L1                                                  $27$   58
      ASSIGN 270 TO L2                                                  $27$   59
      ASSIGN 290 TO L3                                                  $27$   60
      IF (NWOT.EQ.0) GO TO 190                                          $27$   61
      IF (NWOT*NWOT.NE.1) GO TO 170                                     $27$   62
      ASSIGN 260 TO L2                                                  $27$   63
      IF (NWOT.EQ.-1) GO TO 190                                         $27$   64
      ASSIGN 250 TO L1                                                  $27$   65
      GO TO 190                                                         $27$   66
170   ASSIGN 250 TO L1                                                  $27$   67
      ASSIGN 280 TO L3                                                  $27$   68
      INT(1)=0.0                                                        $27$   69
      DO 180 J=2,N                                                      $27$   70
      DX=XDATA(J)-XDATA(J-1)                                            $27$   71
180   INT(J)=INT(J-1)+(M(J)+M(J-1))/24.0*DX**3+DX/2.0*(YDATA(J)+YDATA(J-$27$   72
     11)-DX**2*(M(J)+M(J-1))/6.0                                        $27$   73
190   J=1                                                               $27$   74
      DO 290 I=1,NXY                                                    $27$   75
      IF (XIN(I).LT.XDATA(1)) GO TO 210                                 $27$   76
      IF (XIN(I).GT.XDATA(NDATA)) GO TO 220                             $27$   77
200   IF (XIN(I).GE.XDATA(J).AND.XIN(I).LE.XDATA(J+1)) GO TO 230        $27$   78
      J=J+1                                                             $27$   79
      IF (J.LE.N) GO TO 200                                             $27$   80
      J=1                                                               $27$   81
      GO TO 200                                                         $27$   82
210   YPRIME=(M(2)/2.0+M(1)/3.0)*(XDATA(1)-XDATA(2))+(YDATA(2)-YDATA(1))$27$   83
     1/(XDATA(2)-XDATA(1))                                              $27$   84
      IF (NWOT.LE.0) YOUT(I)=YDATA(1)+YPRIME*(XIN(I)-XDATA(1))          $27$   85
      IF (NWOT*NWOT.EQ.1) SLOPE(I)=YPRIME                               $27$   86
      GO TO 290                                                         $27$   87
220   YPRIME=(M(NDATA)/3.0+M(N)/6.0)*(XDATA(NDATA)-XDATA(N))+(YDATA(NDAT$27$   88
     1A)-YDATA(N))/(XDATA(NDATA)-XDATA(N))                              $27$   89
      IF (NWOT.LE.0) YOUT(I)=YDATA(NDATA)+YPRIME*(XIN(I)-XDATA(NDATA))  $27$   90
      IF (NWOT*NWOT.EQ.1) SLOPE(I)=YPRIME                               $27$   91
      GO TO 290                                                         $27$   92
230   DX=XDATA(J+1)-XDATA(J)                                            $27$   93
      GO TO L1, (240,250)                                               $27$   94
240   YOUT(I)=M(J)/(6.0*DX)*(XDATA(J+1)-XIN(I))**3+M(J+1)/(6.0*DX)*(XIN($27$   95
     1I)-XDATA(J))**3+(XDATA(J+1)-XIN(I))*(YDATA(J)/DX-M(J)/6.0*DX)+(XIN$27$   96
     2(I)-XDATA(J))*(YDATA(J+1)/DX-M(J+1)/6.0*DX)                       $27$   97
      GO TO L2, (270,290)                                               $27$   98
260   SLOPE(I)=(-M(J)*(XDATA(J+1)-XIN(I))**2/2.0+M(J+1)*(XIN(I)-XDATA(J)$27$   99
     1)**2/2.0+YDATA(J+1)-YDATA(J))/DX-(M(J+1)-M(J))/6.0*DX             $27$  100
      GO TO 290                                                         $27$  101
```

```
270   GO TO L3, (280,290)                                                  $27$ 102
280   YINT(I)=INT(J)-M(J)/(24.0*DX)*(XDATA(J+1)-XIN(I))**4+M(J+1)/(24.0*$27$ 103
     1DX)*(XIN(I)-XDATA(J))**4-(YDATA(J)/DX-M(J)/6.0*DX)*(XDATA(J+1)-XIN$27$ 104
     2(I))**2/2.0+(YDATA(J+1)/DX-M(J+1)/6.0*DX)*(XIN(I)-XDATA(J))**2/2.0$27$ 105
     3+M(J)/24.0*DX**3+(YDATA(J)-M(J)/6.0*DX**2)*DX/2.0                   $27$ 106
290   CONTINUE                                                             $27$ 107
      RETURN                                                               $27$ 108
      END                                                                  $27$ 109
```

SECTION II

EXAMPLES OF USE OF PROGRAM

1. DISCUSSION OF EXAMPLE A

The example shown is the design of a single-stage compressor and is based upon a design described in Reference 1. The input data cards are shown in the next subsection, and selected output data are shown in the following subsection. An analytic meanline rotor blade and an arbitrary meanline stator are used, so that with the aerodynamic calculations all three program sections are used.

The original design was made using 15 streamsurfaces to describe the flow, but in the interests of economy, only 8 have been used here. The same computing station geometry is used here as was used in the original design, and alternate streamsurfaces, as derived previously, are input to the analytic meanline section for the rotor geometry determination. Streamsurfaces are specified from one station upstream of the leading edge to one station downstream of the trailing edge. Blade section specifications were also reproduced directly, and these specify a polynominal camberline blade with an uncambered leading edge. Output of NASTRAN data cards is specified by setting INAST = 4. Thus four-point averaging will be used, and no pressure load cards will be punched. Input to the interface routine includes a shape correction factor of 0.7, and a single deviation fraction curve, as was used originally. One degree of additional deviation at the trailing edge (over that determined by the basic deviation rule) is specified, and the point of maximum camber is given as 0.75 of the blade chord. The loss form indicator NLOSS is set to 4 for each station within the rotor blade, so that (in the aerodynamic analysis) loss coefficients will be determined as a function of the trailing edge values. Accordingly, NLOSS is set to 1 for the trailing edge, and a loss coefficient distribution is given. The results show the blade inlet, outlet, and camber angles as positive; they are set positive in this routine so that they may be used in conjunction with the deviation rule data. The additional deviation remains positive, but the total deviation is shown negative, as it is used in the aerodynamic section in conjunction with (generally) negative rotor blade angles.

The input printout from the aerodynamic section follows, and it is seen that blade geometry for stations 4 through 9 are to come internally from the analytic meanline section. These data are listed with the rest, and show, for stations 5 through 9, the deviation "rising" from about -1.5 degrees to the trailing edge values of about -13.5 degrees. No loss

coefficients are shown for stations 5 through 8; these will be generated internally from values at station 9, and the loss fraction curve shown as the final input data. A simple linear increase from leading edge to trailing edge is indicated. For the stator, whirl velocity is specified and NOUT2 is set to 1 from one station upstream of the bladerow to one station downstream. Thus data will be output for the arbitrary meanline blade section. For each of the stations within the stator, an isentropic efficiency variation is given, relative to conditions at the rotor inlet. At the trailing edge, a relative total pressure loss coefficient is given, because for both rotor and stator a loss re-estimation is specified. As NEVAL is negative for stations 9 and 15, the new losses will not be incorporated into the iteration, but will be computed after the solution is converged. One family of loss parameter/diffusion factor curves is given in the data, and is called out for both blades. For the rotor, NDEL is set to 2, and the specified Prandtl-Meyer expansion angle varies from zero at the hub to -5 degrees (that is, 5 degrees of compression) at the tip. As leading edge geometry is given, the incidence angles will be added to these values. NDEL is set to zero for the stator, so that no shock loss will be computed. Pressure load cards for the NASTRAN program are specified for both rotor and stator. Four-point averages are specified for the rotor, three-point for the stator.

The output from aerodynamic analysis shows details of the flow through the machine, and is very similar to that shown in Reference 1. The loss coefficient re-estimation shows a relatively high rotor loss coefficient, due principally to a less optimistic assumption regarding precompression of the inlet flow.

The stator blade design follows, producing a blade that corresponds to the air angle distribution determined through it in the aerodynamic section. A uniform 3 degrees of incidence and 1 degree of extra deviation are specified. INAST is set to -3, specifying the output of NASTRAN data cards for the stator, without pressure load cards (which are specified for the aerodynamic section). Three-point averages are to be used. Details of the resulting blade section for the innermost streamsurface are shown.

2. INPUT DATA CARD LISTING FOR EXAMPLE A

The input data cards are shown on the following pages, 50 cards per page. No completely blank cards have been used.

```
EXAMPLE SINGLE-STAGE DESIGN                                                    DATA1   2
  1   1   1                                                                    DATA1   3
ROTOR BLADE DESIGN                                                             DATA1   4
  8   8   6   8 50 30   2   0   0   0   0   3   0 -4   2   7   1                DATA1   5
6.5            9.0            2.0            .979            11.0              DATA1   6
  2   0                                                                        DATA1   7
-.4            6.601                                                           DATA1   8
-.4            9.0500                                                          DATA1   9
6.6015                                                                         DATA1  10
6.9415                                                                         DATA1  11
7.2818                                                                         DATA1  12
7.6242                                                                         DATA1  13
7.9593                                                                         DATA1  14
8.3136                                                                         DATA1  15
8.6777                                                                         DATA1  16
9.05                                                                           DATA1  17
  2   1                                                                        DATA1  18
0.0            6.7586                                                          DATA1  19
0.0            8.9900                                                          DATA1  20
6.7586                                                                         DATA1  21
7.0673                                                                         DATA1  22
7.3793                                                                         DATA1  23
7.6938                                                                         DATA1  24
8.0102                                                                         DATA1  25
8.3303                                                                         DATA1  26
8.6555                                                                         DATA1  27
8.9900                                                                         DATA1  28
  2   1                                                                        DATA1  29
.4             6.9066                                                          DATA1  30
.4             8.9231                                                          DATA1  31
6.9066                                                                         DATA1  32
7.1951                                                                         DATA1  33
7.4826                                                                         DATA1  34
7.7681                                                                         DATA1  35
8.0537                                                                         DATA1  36
8.3407                                                                         DATA1  37
8.6295                                                                         DATA1  38
8.9231                                                                         DATA1  39
  2   1                                                                        DATA1  40
.8             7.0871                                                          DATA1  41
.8             8.8562                                                          DATA1  42
7.0871                                                                         DATA1  43
7.3529                                                                         DATA1  44
7.6094                                                                         DATA1  45
7.8586                                                                         DATA1  46
8.1056                                                                         DATA1  47
8.3543                                                                         DATA1  48
8.6030                                                                         DATA1  49
8.8562                                                                         DATA1  50
  2   1                                                                        DATA1  51
```

```
.03962          .00660          .7              2.0253          -.0017                  DATA1102
5.0             -53.179         -21.975         0.0             .5          .00155      DATA1103
.03722          .00620          .7              2.0074          -.0043                  DATA1104
6.0             -53.701         -23.143         0.0             .5          .00152      DATA1105
.03511          .00585          .7              2.0025          -.0062                  DATA1106
7.0             -54.180         -24.053         0.0             .5          .00150      DATA1107
.03317          .00553          .7              2.0096          -.0049                  DATA1108
8.0             -54.705         -24.317         0.0             .5          .00146      DATA1109
.03129          .00521          .7              2.0278          .0012                   DATA1110
  1   0   1   1   2   7                                                                 DATA1111
0.7             20371.4                                                                 DATA1112
                1                                                                       DATA1113
  1   0   1   4  -1  -1   0   1   0   0   0   0  0-30                                   DATA1114
0.0             0.0                                                                     DATA1115
  1   0   0   4  -2  -2   0   1                      -30                                 DATA1116
0.0             0.0                                                                     DATA1117
  1   0   0   4  -3  -3   0   1                      -30                                 DATA1118
0.0             0.0                                                                     DATA1119
  1   0   0   4  -4  -4   0   1                      -30                                 DATA1120
0.0             0.0                                                                     DATA1121
  3   0   0   1  -5  -5  -1   0   0   2              2-30                                DATA1122
7.5[illegible]  .0800                                                                   DATA1123
7.5[illegible]  .0950                                                                   DATA1124
7.[illegible]   .1117                                                                   DATA1125
7.[illegible]   .1300                                                                   DATA1126
8.1267          .1503                                                                   DATA1127
8.2917          .1748                                                                   DATA1128
8.[illegible]   .2060                                                                   DATA1129
8.6556          .2405                                                                   DATA1130
0.0                                                                                     DATA1131
0.0             .1                                                                      DATA1132
0.25            .12                                                                     DATA1133
0.5             .17                                                                     DATA1134
.75             .32                                                                     DATA1135
1.0             1.0                                                                     DATA1136
0.0             1.0             0.75                                                    DATA1137
STAGE AERODYNAMIC DESIGN                                                                DATA1138
0.0                                                                                     DATA1139
 17   8   0   0   0   0   0   1   1   0   0   0   0   0   0   0   0                     DATA1140
  4   5   6   7   8   9                                                                 DATA1141
0.0                                                                                     DATA1142
1.0             4.0             3.0             10.0                                    DATA1143
0.0                                                                                     DATA1144
29.0            1.0                                                                     DATA1145
  2                                                                                     DATA1146
-1.0            0.0836                                                                  DATA1147
-1.0            9.09                                                                    DATA1148
  2                                                                                     DATA1149
-1.0            0.3746                                                                  DATA1150
-1.0            9.09                                                                    DATA1151
```

```
3.8256          8.0686
3.8370          8.1835
3.8123          8.3126
3.7453          8.4397
3.6202          8.5632
  8
4.1720          7.7677
4.2137          7.8195
4.2534          7.9392
4.2753          8.0633
4.2810          8.1900
4.2687          8.3137
4.2351          8.4435
4.1720          8.5797
  2
4.725           7.6819
4.725           8.5891
  2
5.4             7.6819
5.4             8.5891
  2
7.0             7.6819
7.0             8.5891
  1
0.0             14.696          514.7           0.0
  0
  0
6.75            0.0
9.0             -5.0
  0                                                     1
  0                                                     1   1  49
   6   0   0   0   4   2 -8   0   0   0   0   0   0    1      49
0.0
7.7326          554.0           .93             0.0             .08
0.0
7.8858          546.0           .916            0.0             .08
0.0
8.0541          535.0           .897            0.0             .08
0.0
8.2354          541.0           .872            0.0             .08
0.0
8.4278          573.0           .835            0.0             .08
0.0
8.5638          623.0           .775            0.0             .08
0.0
   6   0   0   0   4   2 -9   0   0   0   0   0   0    1      49
0.0
7.7467          281.0           .9              0.0             .08
0.0
7.9             265.0           .89             0.0             .08
```

```
DATA1202
DATA1203
DATA1204
DATA1205
DATA1206
DATA1207
DATA1208
DATA1209
DATA1210
DATA1211
DATA1212
DATA1213
DATA1214
DATA1215
DATA1216
DATA1217
DATA1218
DATA1219
DATA1220
DATA1221
DATA1222
DATA1223
DATA1224
DATA1225
DATA1226
DATA1227
DATA1228
DATA1229
DATA1230
DATA1231
DATA1232
DATA1233
DATA1234
DATA1235
DATA1236
DATA1237
DATA1238
DATA1239
DATA1240
DATA1241
DATA1242
DATA1243
DATA1244
DATA1245
DATA1246
DATA1247
DATA1248
DATA1249
DATA1250
DATA1251
```

```
0.0
0.0695        260.0          .875          0.0           .08
0.0
0.2598        268.0          .854          0.0           .08
0.0
0.4345        292.0          .820          0.0           .08
0.0
0.5632        327.0          .761          0.0           .08
0.0
  3   3   0   0   4   2-10   3   0   0   0   0   0   1      49
0.0
7.7977        77.0           .868          0.0           .05
0.0
7.8902        74.0           .853          0.0           .05
0.0
8.0651        74.0           .552          0.0           .05
0.0
8.2551        73.0           .435          0.0           .05
0.0
8.4435        69.0           .805          0.0           .05
0.0
8.5796        102.0          .749          0.0           .05
0.0
  3   0   3   0   4   1  -4  -4  -1   1   0   3   0   1   2  49
0.0
7.6819        0.0            .0800         0.0           .01          2.369
0.0
7.8647        0.0            .1032         0.0           .01          1.9
0.0
8.0637        0.0            .1300         0.0           .01          1.8
0.0
8.2613        0.0            .1623         0.0           .01          1.8
0.0
8.4593        0.0            .2090         0.0           .01          1.9
0.0
8.5491        0.0            .2496         0.0           .01          2.155
0.0
                                                   1
0.0
0.0
0.0
```

```
0.0                                                                    DATA1302
0.0                                                                    DATA1303
0.0                                                                    DATA1304
0.0                                                                    DATA1305
0.0                                                                    DATA1306
0.0                                                                    DATA1307
  5                                                                    DATA1308
0.0          .006          .006          .006                           DATA1309
0.2          .007          .007          .007                           DATA1310
0.4          .014          .014          .014                           DATA1311
0.6          .03           .03           .03                            DATA1312
0.8          .05           .05           .05                            DATA1313
1.0          .125          .125          .125                           DATA1314
  2   1                                                                DATA1315
0.0                                                                    DATA1316
0.0          0.0                                                       DATA1317
1.0          1.0                                                       DATA1318
STATOR BLADE DESIGN                                                    DATA1319
  8   7 10   1 15 49   1   0   0        -3                              DATA1320
7.5          8.625         3.0           0.0           11.0            DATA1321
  2   6   1   1   1   1                                                DATA1322
0.7          0.01                                                      DATA1323
  5                                                                    DATA1324
0.0                                                                    DATA1325
0.0          0.1                                                       DATA1326
0.25         0.11                                                      DATA1327
0.5          0.17                                                      DATA1328
0.75         0.32                                                      DATA1329
1.0          1.0                                                       DATA1330
0.0          3.0           1.0                                         DATA1331
  0                                                                    DATA1332
  0                                                                    DATA1333
  0                                                                    DATA1334
  0                                                                    DATA1335
  0                                                                    DATA1336
  0                                                                    DATA1337
  0                                                                    DATA1338
1.0          0.0           0.005         0.05          0.005       0.7 DATA1339
0.0                                                                    DATA1340
```

3. SELECTIONS FROM OUTPUT DATA FOR EXAMPLE A

PROGRAM UD 7[illegible] - COMPR[illegible] - ANALYTIC [illegible] BLADE SECTION

```
TITLE                                  =ROTOR BLADE DESIGN
NUMBER OF STREAMSURFACES               =  8
NUMBER OF STATIONS                     =  8
NUMBER OF CONSTANT-Z PLANES            =  6
NUMBER OF BLADE DATA POINTS            =  8
NUMBER OF POINTS ON SURFACES           = 20
NUMBER OF BLADES IN BLADE ROW          = 20
TSTAK                                  =  2
IPUNCH                                 =  0
IC ON                                  =  0
IFCORD                                 =  0
IFPLOT                                 =  0
IPRINT                                 =  3
ISPLIT                                 =  0
INAST                                  = -4
IPLE                                   =  2
IPTE                                   =  7
NSIGN                                  =  1

ZINNER                                 =  6.5000
ZOUTER                                 =  9.0000
SCALE                                  =  2.0000
STACKX                                 =   .9790
PLTSZE                                 = 11.0000
```

STREAMSURFACE GEOMETRY SPECIFICATION

COMPUTING STATION 1 NUMBER OF DESCRIBING POINTS= 2 IFANGS(1)= 0

DESCRIPTION X	R	STREAMLINE NUMBER	RADII	DELTA PRESSURE
-.4000	6.6010	1	6.6016	-0.0000
-.4000	9.0510	2	6.9415	-0.0000
		3	7.2818	-0.0000
		4	7.6242	-0.0000
		5	7.9693	-0.0000
		6	8.3196	-0.0000
		7	8.6777	-0.0000
		8	9.0500	-0.0000

COMPUTING STATION 2 NUMBER OF DESCRIBING POINTS= 2 IFANGS(2)= 1

DESCRIPTION X	R	STREAMLINE NUMBER	RADII	DELTA PRESSURE
0.0000	6.7586	1	6.7586	-0.0000
0.0000	8.9900	2	7.0673	-0.0000
		3	7.3793	-0.0000
		4	7.6938	-0.0000
		5	8.0122	-0.0000
		6	8.3303	-0.0000
		7	8.6555	-0.0000
		8	8.9900	-0.0000

COMPUTING STATION 3 NUMBER OF DESCRIBING POINTS= 2 IFANGS(3)= 1

DESCRIPTION X	DESCRIPTION R	STREAMLINE NUMBER	RADII	DELTA PRESSURE
.4000	6.9966	1	6.9966	-0.0000
.4000	8.3231	2	7.1961	-0.0000
		3	7.4834	-0.0000
		4	7.7581	-0.0000
		5	8.0527	-0.0000
		6	8.3627	-0.0000
		7	8.6996	-0.0000
		8	8.3231	-0.0000

COMPUTING STATION 4 NUMBER OF DESCRIBING POINTS= 2 IFANGS(4)= 1

DESCRIPTION X	DESCRIPTION R	STREAMLINE NUMBER	RADII	DELTA PRESSURE
.8000	7.8471	1	7.8471	-0.0000
.8000	8.8562	2	7.3529	-0.0000
		3	7.6294	-0.0000
		4	7.9549	-0.0000
		5	8.1066	-0.0000
		6	8.3543	-0.0000
		7	8.6030	-0.0000
		8	8.8562	-0.0000

COMPUTING STATION 5 NUMBER OF DESCRIBING POINTS= 2 IFANGS(5)= 1

DESCRIPTION X	DESCRIPTION R	STREAMLINE NUMBER	RADII	DELTA PRESSURE
1.2000	7.3207	1	7.3207	-0.0000
1.2000	8.7894	2	7.5241	-0.0000
		3	7.7262	-0.0000
		4	7.9332	-0.0000
		5	8.1374	-0.0000
		6	8.3444	-0.0000
		7	8.5549	-0.0000
		8	8.7894	-0.0000

COMPUTING STATION 6 NUMBER OF DESCRIBING POINTS= 2 IFANGS(6)= 1

DESCRIPTION X	DESCRIPTION R	STREAMLINE NUMBER	RADII	DELTA PRESSURE
1.6000	7.4479	1	7.4479	-0.0000
1.6000	8.7225	2	7.6335	-0.0000
		3	7.7947	-0.0000
		4	7.9642	-0.0000
		5	8.1417	-0.0000
		6	8.3251	-0.0000
		7	8.5166	-0.0000
		8	8.7225	-0.0000

COMPUTING STATION 7 NUMBER OF DESCRIBING POINTS= 2 IFANGS(7)= 1

DESCRIPTION X	DESCRIPTION R	STREAMLINE NUMBER	RADII	DELTA PRESSURE
2.0000	7.5545	1	7.5545	-0.0000
2.0000	8.6556	2	7.6964	-0.0000
		3	7.8447	-0.0000
		4	7.9970	-0.0000
		5	8.1545	-0.0000
		6	8.3074	-0.0000
		7	8.4597	-0.0000
		8	8.6556	-0.0000

COMPUTING STATION 8 NUMBER OF DESCRIBING POINTS= 2 IFANGS(8)= 0

DESCRIPTION X	DESCRIPTION R	STREAMLINE NUMBER	RADII	DELTA PRESSURE
2.3000	7.5946	1	7.5946	-0.0000
2.3000	8.6279	2	7.7078	-0.0000
		3	7.8399	-0.0000
		4	7.9737	-0.0000
		5	8.1271	-0.0000
		6	8.2924	-0.0000
		7	8.4469	-0.0000
		8	8.6279	-0.0000

DEVIATION FRACTION CURVES AT 1 RADII

RTE = 3.0000

DM	DVFRAC
0.00000	.10000
.25000	.12000
.50000	.17000
.75000	.32000
1.00000	1.00000

MDTF	DELTAD	AC
3.0000	1.000	.7500

RESULTS
****

STREAMLINE	BETA1	BETA2	CAMBER	T/C	A/C	SOLIDITY	ADDIT. DEVN	TOTAL DEVIATION
1	61.543	17.455	43.094	.0446	.7500	2.17139	1.0000	-13.7617
2	61.436	16.446	44.990	.0444	.7500	2.07929	1.0000	-13.3976
3	62.142	18.239	43.924	.0424	.7500	2.00988	1.0000	-13.044.
4	62.428	20.162	42.266	.0396	.7500	1.95734	1.0000	-12.8490
5	63.179	21.875	41.304	.0372	.7500	1.91930	1.0000	-12.8050
6	63.701	23.143	40.559	.0351	.7500	1.89204	1.0000	-12.7750
7	64.180	24.053	40.127	.0332	.7500	1.87245	1.0000	-12.7943
8	64.705	24.317	40.388	.0313	.7500	1.85988	1.0000	-12.9930

STATION 3 NUMBER OF RADII= 9

RADIUS	SECTION ANGLE	LEAN ANGLE	BLADE BLOCKAGE	THETA
6.9966	-60.4939	10.9552	.1218	.1180
7.1961	-61.8813	7.2954	.1130	.1114
7.4826	-61.1324	4.6181	.1002	.1074
7.7631	-61.3769	3.0369	.0923	.1049
8.0537	-61.7356	1.8043	.0863	.1034
8.3407	-62.17[illegible]	1.2255	.0814	.1025
8.6296	-62.7404	1.2589	.0773	.1018
8.9231	-63.5906	1.3787	.0741	.1010

STATION 4 NUMBER OF RADII= 8

RADIUS	SECTION ANGLE	LEAN ANGLE	BLADE BLOCKAGE	THETA
7.0871	-56.8192	4.6739	.1628	.0199
7.3579	-56.6219	1.3539	.1468	.0179
7.6034	-56.5238	-.5460	.1342	.0177
7.8588	-56.5737	-.8427	.1241	.0182
8.1066	-56.9127	-.8722	.1164	.0186
8.3543	-57.4499	-.4471	.1102	.0190
8.6030	-58.1591	1.0131	.1049	.0189
8.8562	-59.0898	2.9254	.1003	.0179

STATION 5 NUMBER OF RADII= 9

RADIUS	SECTION ANGLE	LEAN ANGLE	BLADE BLOCKAGE	THETA
7.3207	-48.0635	-6.4953	.1401	-.0547
7.5241	-47.0562	-5.9579	.1295	-.0517
7.7262	-46.8503	-4.8016	.1194	-.0491
7.9302	-47.1644	-2.8474	.1116	-.0474
8.1374	-47.9135	-1.3974	.1054	-.0465
8.3489	-48.8535	-.3097	.1003	-.0461
8.5649	-49.9306	1.4679	.0957	-.0463
8.7894	-50.7642	3.6429	.0910	-.0474

STATION 6 NUMBER OF RADII= 8

RADIUS	SECTION ANGLE	LEAN ANGLE	BLADE BLOCKAGE	THETA
7.4879	-29.7799	-9.7012	.0944	-.0962
7.6395	-3[illegible].6116	-6.4795	.0889	-.0934
7.7987	-32.0247	-3.6699	.0828	-.0916
7.9662	-33.4949	-1.3[illegible]77	.0790	-.0[illegible]6
8.1417	-34.8798	.3[illegible]	.0739	-.0915
8.3251	-36.2126	1.2402	.0703	-.0908
8.5166	-37.3[illegible]9	2.2396	.0668	-.0915
8.7225	-38.2060	3.3324	.0631	-.0927

STATION 7 NUMBER OF RADII= 8

RADIUS	SECTION ANGLE	LEAN ANGLE	BLADE BLOCKAGE	THETA
7.6595	-12.7[illegible]27	-3.3125	.0332	-.1151
7.6864	-15.2954	.1571	.0304	-.1146
7.8243	-17.9744	2.0667	.0281	-.1150
7.9720	-20.1385	2.5414	.0262	-.1158
8.1285	-21.7467	3.2072	.0246	-.1169
8.2934	-23.1637	3.4949	.0233	-.1183
8.4667	-24.2135	3.2060	.0221	-.1192
8.6556	-24.6006	2.6098	.0210	-.1203

```
DATA INTERFACING ROUTINE - DEVIATION CALCULATIONS AND DATA FORMATTING
*********************************************************************
INPUT
*****

NRAD =  1  NORIG    5  NDATR =  1  NSWITCH = 1  NLF = 2  NTE =  7

XKSHPE =  .7000  SPEED =  20371.4

AT LEADING EDGE (STATION  2) NOUT1 =-0  NOUT2 =-0  NOUT3 = 1

STATION  3   NR =  1  NTERP = 0  NMACH = 1  NLOSS = 4  NL1 = -1  NL2 = -1  NEVAL = 0  NCURVE = 1  NLITER =  0  NDEL = 0
            NOUT1 = 0  NOUT2 = 0  NOUT3 = 0  NBLAD =-30

    RADIUS      LOSS DESCRIPTOR

    0.0000         0.000000

STATION  4   NR =  1  NTERP = 0  NMACH = 0  NLOSS = 4  NL1 = -2  NL2 = -2  NEVAL = 0  NCURVE = 1  NLITER = -0  NDEL =-0
            NOUT1 =-0  NOUT2 =-0  NOUT3 =-0  NBLAD =-30

    RADIUS      LOSS DESCRIPTOR

    0.0000         0.000000

STATION  5   NR =  1  NTERP = 0  NMACH = 0  NLOSS = 4  NL1 = -3  NL2 = -3  NEVAL = 0  NCURVE = 1  NLITER = -0  NDEL =-0
            NOUT1 =-0  NOUT2 =-0  NOUT3 =-0  NBLAD =-30

    RADIUS      LOSS DESCRIPTOR

    0.0000         0.000000

STATION  6   NR =  1  NTERP = 0  NMACH = 0  NLOSS = 4  NL1 = -4  NL2 = -4  NEVAL = 0  NCURVE = 1  NLITER = -0  NDEL =-0
            NOUT1 =-0  NOUT2 =-0  NOUT3 =-0  NBLAD =-30

    RADIUS      LOSS DESCRIPTOR

    0.0000         0.000000

STATION  7   NR =  8  NTERP = 0  NMACH = 0  NLOSS = 1  NL1 = -5  NL2 = -5  NEVAL =-1  NCURVE = 0  NLITER =  0  NDEL = 2
            NOUT1 =-0  NOUT2 =-0  NOUT3 = 2  NBLAD =-30

    RADIUS      LOSS DESCRIPTOR

    7.5585          .080000
    7.6836          .095000
    7.8229          .111700
    7.9703          .130000
    8.1267          .150900
    8.2917          .174800
    8.4654          .209300
    8.6556          .283600
```

DEVIATION FRACTION CURVES AT 1 RADII

RTE = 3.0000

DM	DVFRAC
0.00000	.10000
.25000	.12500
.50000	.17000
.75000	.32000
1.00000	1.00000

ROTF	DELTAD	AC
3.0000	1.000	.7500

RESULTS
****

STREAMLINE	BETA1	BETA2	CAMBER	T/C	A/C	SOLIDITY	ADDIT. DEVN	TOTAL DEVIATION
1	61.549	17.455	44.094	.0446	.7500	2.17139	1.0000	-13.7617
2	61.836	15.446	46.390	.0454	.7500	2.07929	1.0000	-13.3976
3	62.162	18.238	43.924	.0424	.7500	2.00988	1.0000	-13.044.
4	62.628	20.262	42.366	.0396	.7500	1.95734	1.0000	-12.8490
5	63.179	21.875	41.304	.0372	.7500	1.91935	1.0000	-12.9050
6	63.791	23.143	40.648	.0351	.7500	1.89204	1.0000	-12.7750
7	64.180	24.053	40.127	.0332	.7500	1.87245	1.0000	-12.7943
8	64.705	24.317	40.388	.0313	.7500	1.85988	1.0000	-12.9930

```
                                    PROGRAM UD0330 - COMPR SCOR DESIGN - AERODYNAMIC SECTION
                                    ********************************************************
INPUT DATA
**********

TITLE                                          = STAGE AERODYNAMIC DESIGN

SPECIFIC HEAT AT CONSTANT PRESSURE             =  .24000
GAS CONSTANT                                   = 53.3200
GRAVITATIONAL CONSTANT                         = 32.1740
JOULES EQUIVALENT                              = 778.160

NUMBER OF STATIONS                             = 17
NUMBER OF STREAMLINES                          =  8
MAX NUMBER OF PASSES                           = 40
MAX NUMBER OF ARBITRARY PASSES                 = 10
BOUNDARY LAYER CALC INDICATOR                  =  0
NUMBER OF RUNNING POINTS                       =  1
STREAMLINE DISTRIBUTION INDICATOR              =  0
NUMBER OF LOSS/P-FACTOR CURVE SETS             =  1
NUMBER OF LOSS/T.E.LOSS CURVE SETS             =  1
STREAMLINE INPUT INDICATOR                     =  0
STREAMLINE OUTPUT INDICATOR                    =  0
PRECISION PLOT INDICATOR                       =  0
MAX NUMBER OF LINES/PAGE                       = 80
WAKE TRANSPORT CALC INDICATOR                  =  0
MAINSTREAM MIXING CALC INDICATOR               =
NO OF STATIONS FROM ANALYTIC SECN              =  6
LINE-PRINTER PLOT INDICATOR                    = -0
MOMENTUM EQUATION FORM INDICATOR               = -0

GEOMETRY COMES FROM ANALYTIC SECTION FOR STATIONS    4  5  6  7  8  9

GRAVITATIONAL CONSTANT                         = 32.1740
JOULES EQUIVALENT                              = 778.160
LINEAR DIMENSION SCALE FACTOR                  = 12.[illegible]
BASIC TOLERANCE                                =  .00100
KINEMATIC VISCOSITY                            =  .00018
B.L. SHAPE FACTOR                              =  .70000

PLOTTING SCALE FOR DIMENSIONS                  =  1.000
PLOTTING SCALE FOR PRESSURES                   =  4.000
MINIMUM RADIUS ON PLOT                         =  3.000
MINIMUM PRESSURE ON PLOT                       = 10.000
MAXIMUM M-SQUARED IN RELAXATION FACTOR         =  .6000
CONSTANT IN RELAXATION FACTOR                  =  6.0000

WAKE TRANSFER CONSTANT                         = 0.00000
TURBULENT MIXING CONSTANT                      =-0.00000

POINTS TO BE COMPUTED

NO      FLOWRATE    SPEED FACTOR

 1       29.100        1.000

ANNULUS / COMPUTING STATION GEOMETRY

STATION  1  SPECIFIED BY  2 POINTS

       XSTN          RSTN

     -1.8000       6.0586
     -1.8000       9.0900

STATION  2  SPECIFIED BY  2 POINTS

       XSTN          RSTN

     -1.0000       6.3746
     -1.0000       9.0900

STATION  3  SPECIFIED BY  2 POINTS

       XSTN          RSTN

     -.4000       6.6016
     -.4000       9.0500
```

STATION 4 SPECIFIED BY 2 POINTS

XSTN	RSTN
0.0000	6.7586
0.0000	8.9900

STATION 5 SPECIFIED BY 2 POINTS

XSTN	RSTN
.4000	6.9566
.4000	8.9731

STATION 6 SPECIFIED BY 2 POINTS

XSTN	RSTN
.8000	7.0871
.8000	8.9562

STATION 7 SPECIFIED BY 2 POINTS

XSTN	RSTN
1.2000	7.3217
1.2000	8.7834

STATION 8 SPECIFIED BY 2 POINTS

XSTN	RSTN
1.6000	7.4879
1.6000	8.7225

STATION 9 SPECIFIED BY 2 POINTS

XSTN	RSTN
2.0000	7.5545
2.0000	8.6556

STATION 10 SPECIFIED BY 6 POINTS

XSTN	RSTN
2.2250	7.0840
2.3350	7.8033
2.3950	8.0000
2.4080	8.2000
2.3500	8.4000
2.2250	8.6279

STATION 11 SPECIFIED BY 8 POINTS

XSTN	RSTN
2.5123	7.6272
2.5998	7.7472
2.8402	7.8735
2.9262	8.0049
2.9401	8.1427
2.8936	8.2873
2.7656	8.4401
2.5153	8.6114

STATION 12 SPECIFIED BY 9 POINTS

XSTN	RSTN
3.0650	7.7726
3.2061	7.8336
3.3114	7.9410
3.3759	8.0550
3.3931	8.1746
3.3560	8.2994
3.2554	8.4287
3.0679	8.5638

STATION 13 SPECIFIED BY 8 POINTS

XSTN	RSTN
3.5183	7.2467
3.7124	7.8456
3.7826	7.9538
3.8256	8.0586
3.8373	8.1885
3.8123	8.3126
3.7453	8.4307
3.5212	8.5692

STATION 14 SPECIFIED BY 8 POINTS

XSTN	RSTN
4.1723	7.7277
4.2187	7.8135
4.2578	7.9332
4.2753	8.0633
4.2813	8.1[illegible]
4.2687	8.3187
4.2351	8.4485
4.1725	8.5797

STATION 15 SPECIFIED BY 2 POINTS

XSTN	RSTN
4.7250	7.6819
4.7251	8.5891

STATION 16 SPECIFIED BY 2 POINTS

XSTN	RSTN
5.4000	7.6819
5.4000	8.5891

STATION 17 SPECIFIED BY 2 POINTS

XSTN	RSTN
7.0000	7.6819
7.0000	8.5891

STATION CALCULATION DATA

STATION 1 NDATA= 1 NTERR=-0 NDIMEN=-0 NMACH=-0

DATAC	TOTAL PRESSURE	TOTAL TEMPERATURE	WHIRL ANGLE
0.0000	14.6960	518.700	0.000

STATION 2 NDATA= 0 NTERR=-0 NDIMEN=-0 NMACH=-0 NWORK=-0 NLOSS=-0 NL1= -0 NL2= -0 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2=-0 NOUT3=-0 NBLADE= -0

STATION 3 NDATA= 0 NTERR=-0 NDIMEN=-0 NMACH=-0 NWORK=-0 NLOSS=-0 NL1= -0 NL2= -0 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2=-0 NOUT3=-0 NBLADE= -0

STATION 4 NDATA= 8 NTERR= 0 NDIMEN= 0 NMACH= 0 NWORK= 0 NLOSS= 0 NL1= 0 NL2= 0 NEVAL= 0 NCURVE= 0 NLITER= 0 NDEL= 0
NOUT1=-0 NOUT2=-0 NOUT3= 1 NBLADE= 0

SPEED = 0.00

DATAC	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8	DATA9
6.7596	-61.729	-0.000000	16.6402	-0.00000	-0.00000	0.0000	-0.0000	-0.0000	-0.0000
7.0673	-63.026	-0.000000	12.7965	-0.00000	-0.00000	0.0000	-0.0000	-0.0000	-0.0000
7.3733	-63.747	-0.000000	9.5272	-0.00000	-0.00000	0.0000	-0.0000	-0.0000	-0.0000
7.6934	-63.727	-0.000000	6.8059	-0.00000	-0.00000	0.0000	-0.0000	-0.0000	-0.0000
8.0032	-63.[illegible]	-0.000000	4.6942	-0.00000	-0.00000	0.0000	-0.0000	-0.0000	-0.0000
8.3303	-63.692	-0.000000	3.5041	-0.00000	-0.00000	0.0000	-0.0000	-0.0000	-0.0000
8.6555	-64.250	-0.000000	2.1898	-0.00000	-0.00000	0.0000	-0.0000	-0.0000	-0.0000
8.9900	-64.997	-0.000000	.3229	-0.00000	-0.00000	0.0000	-0.0000	-0.0000	-0.0000

STATION 5 NDATA= 9 NTEPP= 0 NDTMEN= 0 NMACH= 1 NWORK= 6 NLOSS= 4 NL1= -1 NL2= -1 NEVAL= 0 NCURVE= 1 NLITER= 0 NDEL= 0
NOUT1= 7 NOUT2= 7 NOUT3= 0 NBLADE=-10

SPEED = 20371.40

DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8	DATA9
6.9056	-61.604	0.000000	10.3553	.117145	2.17133	-1.5555	-0.0000	-0.0000	-0.0000
7.1051	-62.881	0.000000	7.2036	.111755	2.07923	-1.0137	-0.0000	-0.0000	-0.0000
7.0832	-62.133	0.000000	4.5141	.111791	2.00984	-1.4756	-0.0000	-0.0000	-0.0000
7.7044	-63.777	0.000000	3.3329	.108226	1.95734	-1.4535	-0.0000	-0.0000	-0.0000
8.1339	-63.736	0.000000	1.8101	.104836	1.91937	-1.4479	-0.0000	-0.0000	-0.0000
8.3427	-63.173	0.000000	1.2365	.101178	1.89226	-1.4435	-0.0000	-0.0000	-0.0000
8.5335	-63.760	0.000000	1.3588	.097732	1.87245	-1.4452	-0.0000	-0.0000	-0.0000
8.9231	-63.581	0.000000	1.1747	.093408	1.85988	-1.4484	-0.0000	-0.0000	-0.0000

STATION 6 NDATA= 9 NTEPP= 0 NDTMEN= 0 NMACH= 0 NWORK= 6 NLOSS= 4 NL1= -2 NL2= -2 NEVAL= 0 NCURVE= 1 NLITER= -0 NDEL= -0
NOUT1=-1 NOUT2=-0 NOUT3=-0 NBLADE=-10

SPEED = 20371.40

DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8	DATA9
7.0831	-66.813	0.000000	4.5339	.116285	2.17133	-2.0734	-0.0000	-0.0000	-0.0000
7.1123	-65.229	0.000000	1.3738	.111642	2.07923	-1.5735	-0.0000	-0.0000	-0.0000
7.5146	-65.774	0.000000	-.2450	.113410	2.00988	-1.9819	-0.0000	-0.0000	-0.0000
7.8588	-66.574	0.000000	-1.4627	.112410	1.95734	-1.9687	-0.0000	-0.0000	-0.0000
8.1256	-66.814	0.000000	-1.8702	.110644	1.91937	-1.9765	-0.0000	-0.0000	-0.0000
8.3614	-67.056	0.000000	-1.6436	.108236	1.89226	-1.9771	-0.0000	-0.0000	-0.0000
8.6111	-66.153	0.000000	-1.1111	.104835	1.87245	-1.9679	-0.0000	-0.0000	-0.0000
8.8763	-66.100	0.000000	-0.9334	.100877	1.85988	-1.9859	-0.0000	-0.0000	-0.0000

STATION 7 NDATA= 9 NTEPP= 0 NDTMEN= 0 NMACH= 0 NWORK= 6 NLOSS= 4 NL1= -3 NL2= -3 NEVAL= 0 NCURVE= 1 NLITER= -0 NDEL= -0
NOUT1=-1 NOUT2=-0 NOUT3=-0 NBLADE=-10

SPEED = 20371.40

DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8	DATA9
7.3217	-68.163	0.000000	-5.6983	.114126	2.17139	-2.6614	-0.0000	-0.0000	-0.0000
7.5241	-67.556	0.000000	-5.0579	.113845	2.07923	-2.5818	-0.0000	-0.0000	-0.0000
7.7765	-67.881	0.000000	-4.8115	.111936	2.00984	-2.6073	-0.0000	-0.0000	-0.0000
8.0403	-67.164	0.000000	-3.8674	.111351	1.95734	-2.6446	-0.0000	-0.0000	-0.0000
8.1374	-67.041	0.000000	-3.3374	.108644	1.91937	-2.6245	-0.0000	-0.0000	-0.0000
8.3633	-67.353	0.000000	-3.3137	.106734	1.89226	-2.6412	-0.0000	-0.0000	-0.0000
8.5869	-67.871	0.000000	-3.2874	.103556	1.87245	-2.6425	-0.0000	-0.0000	-0.0000
8.7934	-68.766	0.000000	-3.4429	.099195	1.85988	-2.6545	-0.0000	-0.0000	-0.0000

STATION 8 NDATA= 9 NTEPP= 0 NDTMEN= 0 NMACH= 0 NWORK= 6 NLOSS= 4 NL1= -4 NL2= -4 NEVAL= 0 NCURVE= 1 NLITER= -0 NDEL= -0
NOUT1=-1 NOUT2=-0 NOUT3=-0 NBLADE=-10

SPEED = 20371.40

DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8	DATA9
7.4873	-70.781	0.000000	-9.7212	.093440	2.17139	-5.1375	-0.0000	-0.0000	-0.0000
7.5335	-71.612	0.000000	-6.6788	.094799	2.07939	-5.1477	-0.0000	-0.0000	-0.0000
7.7317	-71.036	0.000000	-3.6693	.094279	2.00984	-5.5793	-0.0000	-0.0000	-0.0000
7.9045	-73.405	0.000000	-1.3171	.097813	1.95734	-5.4285	-0.0000	-0.0000	-0.0000
8.1417	-74.879	0.000000	.3325	.097197	1.91937	-5.3574	-0.0000	-0.0000	-0.0000
8.3251	-76.211	0.000000	1.2402	.097096	1.89226	-5.3163	-0.0000	-0.0000	-0.0000
8.5166	-77.771	0.000000	2.2146	.096679	1.87245	-5.3186	-0.0000	-0.0000	-0.0000
8.7225	-79.206	0.000000	3.3324	.096310	1.85988	-5.4182	-0.0000	-0.0000	-0.0000

```
STATION  9   NDATA=  9 NTEPP= 0 NOTMEN= 0 NMACH= 0 NWORK= 6 NLOSS= 1 NL1= -5 NL2= -5 NEVAL=-1 NCURVE= 0 NLITER=  0 NDEL=  2
            NOUT1=-1 NOUT2=-0 NOUT3= 2 NALADE=-10

   SPEED = 20371.41

      DATA0       DATA1       DATA2       DATA3       DATA4       DATA5       DATA6       DATA7       DATA8       DATA9
   7.5586     -13.737      .0[illegible]   -3.3126     .03322      2.17139     -13.7617    -0.0001     -0.0000     -0.0000
   7.6856     -13.205      .0[illegible]    .1071      .03034      2.17929     -13.3076    -0.0000     -0.0000     -0.0000
   7.8243     -17.974      .1114[illegible] 2.0667     .03018      2.[illegible]  -13.[illegible]  -0.0000     -0.0000     -0.0000
   7.9722     -21.133      .1[illegible]    2.6414     .03016      1.9[illegible]  -12.8[illegible]  -0.0000     -0.0000     -0.0000
   8.1236     -21.767      .1511[illegible] 3.2[illegible]  .03[illegible]  1.31930     -13.[illegible]  -0.0000     -0.0000     -0.0000
   8.2834     -23.144      .1[illegible]    3.6[illegible]  .03[illegible]  1.[illegible]  -13.[illegible]  -0.0000     -0.0000     -0.0000
   8.4667     -24.216      .2[illegible]    3.[illegible]   .03[illegible]  1.87[illegible]  -13.[illegible]  -0.0000     -0.0000     -0.0000
   8.6526     -24.631      .2[illegible]    2.6[illegible]  .03[illegible]  1.85988     -13.[illegible]  -0.0000     -0.0000     -0.0000

      DELC        DELTA
   6.7510      -0.0000
   9.0000      -6.0000

STATION 10  NDATA=  0 NTEPP=-0 NOTMEN=-0 NMACH=-0 NWORK=-0 NLOSS=-0 NL1= -0 NL2= -0 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
            NOUT1=-0 NOUT2= 1 NOUT3=-0 NALADE= -0

STATION 11  NDATA=  0 NTEPP=-0 NOTMEN=-0 NMACH=-0 NWORK=-0 NLOSS=-0 NL1= -0 NL2= -0 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
            NOUT1=-0 NOUT2= 1 NOUT3= 1 NALADE= 49

STATION 12  NDATA=  6 NTEPP= 0 NOTMEN= 0 NMACH= 0 NWORK= 4 NLOSS= 2 NL1= -9 NL2=  0 NEVAL= 0 NCURVE= 0 NLITER=  0 NDEL=  0
            NOUT1= 0 NOUT2= 1 NOUT3=-0 NALADE= 49

   SPEED =      0.00

      DATA0       DATA1       DATA2       DATA3       DATA4       DATA5       DATA6       DATA7       DATA8       DATA9
   7.7336     [illegible]  .[illegible]  0.0010      .[illegible]  -0.00000    0.0000      -0.0000     -0.0000     -0.00[illegible]
   7.[illegible]  [illegible]  .[illegible]  0.[illegible]  .[illegible]  -0.[illegible]  0.[illegible]  -0.[illegible]  -0.[illegible]  -0.[illegible]
   8.[illegible]  [illegible]  .[illegible]  0.[illegible]  .[illegible]  -0.[illegible]  0.[illegible]  -0.[illegible]  -0.[illegible]  -0.[illegible]
   8.[illegible]  [illegible]  .[illegible]  0.[illegible]  .[illegible]  -0.[illegible]  0.[illegible]  -0.[illegible]  -0.[illegible]  -0.[illegible]
   8.[illegible]  [illegible]  .[illegible]  0.[illegible]  .[illegible]  -0.[illegible]  0.[illegible]  -0.[illegible]  -0.[illegible]  -0.[illegible]
   8.[illegible]  [illegible]  .[illegible]  0.[illegible]  .[illegible]  -0.[illegible]  0.[illegible]  -0.[illegible]  -0.[illegible]  -0.[illegible]

STATION 13  NDATA=  6 NTEPP= 0 NOTMEN= 0 NMACH= 0 NWORK= 4 NLOSS= 2 NL1= -9 NL2=  0 NEVAL= 0 NCURVE= 0 NLITER=  0 NDEL=  0
            NOUT1= 0 NOUT2= 1 NOUT3=-0 NALADE= 49

   SPEED =      0.00

      DATA0       DATA1       DATA2       DATA3       DATA4       DATA5       DATA6       DATA7       DATA8       DATA9
   7.7467     [illegible]  .[illegible]  0.0000      .[illegible]  -0.000000   0.0000      -0.0000     -0.0000     -0.[illegible]
   7.[illegible]  [illegible]  .[illegible]  0.[illegible]  .[illegible]  -0.[illegible]  0.[illegible]  -0.[illegible]  -0.[illegible]  -0.[illegible]
   8.[illegible]  [illegible]  .[illegible]  0.[illegible]  .[illegible]  -0.[illegible]  0.[illegible]  -0.[illegible]  -0.[illegible]  -0.[illegible]
   8.[illegible]  [illegible]  .[illegible]  0.[illegible]  .[illegible]  -0.[illegible]  0.[illegible]  -0.[illegible]  -0.[illegible]  -0.[illegible]
   8.[illegible]  [illegible]  .[illegible]  0.[illegible]  .[illegible]  -0.[illegible]  0.[illegible]  -0.[illegible]  -0.[illegible]  -0.[illegible]
   8.[illegible]  [illegible]  .[illegible]  0.[illegible]  .[illegible]  -0.[illegible]  0.[illegible]  -0.[illegible]  -0.[illegible]  -0.[illegible]

STATION 14  NDATA=  6 NTEPP= 0 NOTMEN= 0 NMACH= 0 NWORK= 4 NLOSS= 2 NL1=-13 NL2=  0 NEVAL= 0 NCURVE= 0 NLITER=  0 NDEL=  0
            NOUT1= 0 NOUT2= 1 NOUT3=-0 NALADE= 49

   SPEED =      0.00

      DATA0       DATA1       DATA2       DATA3       DATA4       DATA5       DATA6       DATA7       DATA8       DATA9
   7.7477     [illegible]  .[illegible]  0.0000      .[illegible]  -0.000000   0.0000      -0.0000     -0.[illegible]  -0.[illegible]
   7.[illegible]  [illegible]  .[illegible]  0.[illegible]  .[illegible]  -0.[illegible]  0.[illegible]  -0.[illegible]  -0.[illegible]  -0.[illegible]
   8.[illegible]  [illegible]  .[illegible]  0.[illegible]  .[illegible]  -0.[illegible]  0.[illegible]  -0.[illegible]  -0.[illegible]  -0.[illegible]
   8.[illegible]  [illegible]  .[illegible]  0.[illegible]  .[illegible]  -0.[illegible]  0.[illegible]  -0.[illegible]  -0.[illegible]  -0.[illegible]
   8.[illegible]  [illegible]  .[illegible]  0.[illegible]  .[illegible]  -0.[illegible]  0.[illegible]  -0.[illegible]  -0.[illegible]  -0.[illegible]
   8.[illegible]  [illegible]  .[illegible]  0.[illegible]  .[illegible]  -0.[illegible]  0.[illegible]  -0.[illegible]  -0.[illegible]  -0.[illegible]
```

STATION 15 NDATA= 6 NTERP= 0 NDIMEN= 0 NMACH= 0 NWORK= 4 NLOSS= 1 NL1= -4 NL2= -4 NEVAL=-1 NCURVE= 1 NLITER= 0 NDEL= 0
NOUT1= 0 NOUT2= 1 NOUT3= 2 NBLADE= 49

SPEED = 0.00

DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8	DATA9
[illegible]									

STATION 16 NDATA= 0 NTERP=-0 NDIMEN=-0 NMACH=-0 NWORK=-0 NLOSS=-0 NL1= -0 NL2= -0 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2= 1 NOUT3=-1 NBLADE= -2

STATION 17 NDATA= 0 NTERP=-0 NDIMEN=-0 NMACH=-0 NWORK=-0 NLOSS=-0 NL1= -0 NL2= -0 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2=-0 NOUT3=-0 NBLADE= -0

BLOCKAGE FACTOR SPECIFICATIONS

STATION	WALL BLOCKAGE	WAKE BLOCKAGE	WAKE DISTRIBUTION FACTOR
[illegible]			

LOSS PARAMETER / DIFFUSION FACTOR CURVES FOR BLADE TYPE 1 5 D-FACTORS GIVEN

DIFFUSION FACTORS	L O S S P A R A M E T E R, HUB	MID	TIP
[illegible]			

FRACTIONAL LOSS DISTRIBUTION CURVES FOR BLADE CLASS 1 2 POINTS GIVEN AT 1 RADIAL LOCATIONS

FRACTION OF COMPUTING STATION LENGTH AT BLADE EXIT = 0.0000

FRACTION OF MERIDIONAL CHORD	LOSS/LOSS AT TRAILING EDGE
0.0000	0.0000
1.0000	1.0000

OUTPUT FOR POINT NO. 1

STATION 1 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	6.0586	-1.8000	[illegible]	396.01	0.00	369.88	141.48	396.01	0.00	20.932	0.000
2	6.5176	-1.8000	.4471	[illegible]	0.00	385.15	119.77	403.05	0.00	17.138	0.000
3	6.9512	-1.8000	.8836	408.94	0.00	397.51	96.00	408.94	0.00	13.577	0.000
4	7.3831	-1.8000	1.3145	413.69	0.00	407.15	73.11	413.69	0.00	10.179	0.000
5	7.8113	-1.8000	1.7427	417.13	0.00	414.02	50.81	417.13	0.00	6.996	0.000
6	8.2376	-1.8000	2.1688	419.28	0.00	418.25	30.10	419.28	0.00	4.116	0.000
7	8.6645	-1.8000	2.5959	420.27	0.00	420.03	10.41	420.27	0.00	1.692	0.000
8	9.0930	-1.8000	3.0214	420.48	0.00	420.48	0.00	420.48	0.00	0.000	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	STATIC	TEMPERATURES TOTAL	STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.3594	14.6960	13.4413	518.700	505.693	.071790	124.488	121.356	.975629	0.000	20.932
2	.3660	14.6960	13.3977	518.700	505.183	.071624	124.488	121.244	.975629	0.000	17.138
3	.3715	14.6960	13.3618	518.700	504.785	.071482	124.488	121.148	.975629	0.000	13.577
4	.3759	14.6960	13.3318	518.700	504.460	.071367	124.488	121.070	.975629	0.000	10.179
5	.3791	14.6960	13.3087	518.700	504.221	.071283	124.488	121.013	.975629	0.000	6.996
6	.3811	14.6960	13.2949	518.700	504.072	.071230	124.488	120.977	.975629	0.000	4.116
7	.3825	14.6960	13.2885	518.700	504.013	.071206	124.488	120.961	.975629	0.000	1.692
8	.3822	14.6960	13.2871	518.700	503.999	.071200	124.488	120.957	.975629	0.000	0.000

STATION 2 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	6.3746	-1.0000	[illegible]	444.63	0.00	413.57	138.09	444.63	-205.78	20.828	0.000
2	6.7623	-1.0000	.3877	452.72	0.00	432.96	133.27	452.72	-1193.73	17.121	0.000
3	7.1444	-1.0000	.7698	459.79	0.00	447.03	137.54	459.79	-411.79	13.527	0.000
4	7.5208	-1.0000	1.1522	464.79	0.00	457.71	90.83	464.79	-123.84	10.015	0.000
5	7.9394	-1.0000	1.5349	466.69	0.00	463.59	53.75	466.69	-52.30	6.614	0.000
6	8.2950	-1.0000	1.9204	464.29	0.00	463.48	22.41	464.29	-27.44	3.384	0.000
7	8.6881	-1.0000	2.3175	456.28	0.00	455.27	3.52	456.28	-16.04	.442	0.000
8	9.0930	-1.0000	2.7154	441.80	0.00	441.55	-14.70	441.80	-10.53	-1.907	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	STATIC	TEMPERATURES TOTAL	STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.4149	14.6960	13.1273	518.700	502.249	.070387	124.488	120.540	.975629	0.000	20.828
2	.4195	14.6960	13.0721	518.700	501.645	.070375	124.488	120.395	.975629	0.000	17.121
3	.4192	14.6960	13.0272	518.700	501.109	.070187	124.488	120.266	.975629	0.000	13.527
4	.4239	14.6960	12.9881	518.700	500.724	.070052	124.488	120.174	.975629	0.000	10.015
5	.4257	14.6960	12.9767	518.700	500.576	.070000	124.488	120.138	.975629	0.000	6.614
6	.4274	14.6960	12.9916	518.700	500.762	.070065	124.488	120.183	.975629	0.000	3.384
7	.4179	14.6960	13.0475	518.700	501.376	.070281	124.488	120.331	.975629	0.000	.442
8	.4122	14.6960	13.1404	518.700	502.458	.070661	124.488	120.590	.975629	0.000	-1.907

STATION 3 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	6.6316	-.4000	0.0000	491.28	0.00	450.41	176.67	491.28	43.42	21.077	0.000
2	6.9469	-.4000	.3453	505.33	0.00	483.79	149.26	505.33	195.36	17.180	0.000
3	7.2482	-.4000	.6866	515.31	0.00	501.06	120.34	515.31	518.40	13.505	0.000
4	7.6310	-.4000	1.0294	522.87	0.00	515.24	88.96	522.87	-266.95	9.796	0.000
5	7.9749	-.4000	1.3733	525.70	0.00	523.83	54.94	525.70	-59.05	5.985	0.000
6	8.3228	-.4000	1.7212	524.45	0.00	524.11	18.79	524.45	-23.96	2.054	0.000
7	8.6797	-.4000	2.0781	512.71	0.00	512.39	-18.09	512.71	-11.82	-2.022	0.000
8	9.0500	-.4000	2.4484	486.20	0.00	483.38	-32.28	486.20	-6.11	-6.172	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.4490	14.6965	13.7976	518.700	498.616	.069316	124.488	119.668	.975629	0.000	21.077
2	.4526	14.6965	13.7809	518.700	497.461	.069812	124.488	119.388	.975629	0.000	17.196
3	.4710	14.6965	13.6176	518.700	496.547	.069614	124.488	119.185	.975629	0.000	13.505
4	.4832	14.6965	13.5006	518.700	495.951	.069333	124.488	119.029	.975629	0.000	9.796
5	.4838	14.6965	13.5009	518.700	495.916	.069277	124.488	118.948	.975629	0.000	5.988
6	.4837	14.6965	13.5476	518.700	495.913	.069345	124.488	118.995	.975629	0.000	2.054
7	.4814	14.6965	13.5375	518.700	496.028	.069695	124.488	119.239	.975629	0.000	-2.022
8	.4642	14.6965	13.8149	518.700	499.030	.069460	124.488	119.767	.975629	0.000	-6.172

STATION 4 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	6.7385	0.0000	0.0000	550.89	0.00	514.75	136.23	550.89	-21.79	20.867	0.000
2	7.0712	0.0000	.3126	565.90	0.00	529.65	154.37	565.84	31.94	17.634	0.000
3	7.3944	0.0000	.6519	567.69	0.00	561.36	131.49	567.65	52.52	14.124	0.000
4	7.6026	0.0000	.9419	579.85	0.00	574.54	113.25	579.85	22.37	11.257	0.000
5	8.1152	0.0000	1.2966	599.29	0.00	595.96	97.51	599.29	33.34	8.289	0.000
6	8.3329	0.0000	1.6743	601.38	0.00	599.15	76.41	601.38	88.56	6.585	0.000
7	8.6771	0.0000	1.9985	589.45	0.00	588.42	-34.94	589.45	-7.36	-3.399	0.000
8	8.9303	0.0000	2.2914	574.74	0.00	567.64	-91.04	574.74	-24.07	-9.013	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.5061	14.6965	13.3390	518.700	493.447	.067532	124.488	118.427	.975629	0.000	21.867
2	.5139	14.6965	13.2934	518.700	492.005	.067377	124.488	118.319	.975629	0.000	17.634
3	.5322	14.6965	13.2[illegible]	518.700	491.[illegible]	.067203	124.488	118.[illegible]76	.975629	0.000	14.124
4	.5374	14.6965	13.1619	518.700	490.795	.067063	124.488	117.773	.975629	0.000	11.257
5	.5474	14.6965	13.1358	518.700	490.[illegible]6	.066991	124.488	117.[illegible]3	.975629	0.000	8.289
6	.5476	14.6965	13.1382	518.700	490.842	.066995	124.488	117.656	.975629	0.000	6.585
7	.5436	14.6965	13.1814	518.700	491.747	.067236	124.488	117.543	.975629	0.000	-3.399
8	.5212	14.6965	13.2444	518.700	493.213	.067770	124.488	117.891	.975629	0.000	-9.013

STATION 4 IS AT THE LEADING EDGE OF A BLADE ROTATING AT 20371.4 RPM NUMBER OF BLADES IN ROW = 32

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	INCIDENCE ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE
1	1341.50	1331.77	[illegible].2143	-65.763	3.859	-61.511	15.640	1.7484
2	1357.07	1374.44	[illegible].2[illegible]	-66.149	4.371	-61.777	12.759	2.4522
3	1372.76	1423.[illegible]	1.[illegible]	-66.591	4.443	-62.138	9.479	2.9225
4	1384.79	1466.[illegible]	1.[illegible]	-67.141	4.426	-62.615	6.760	3.2467
5	1394.89	1501.04	1.[illegible]	-67.632	4.357	-63.178	4.660	3.4673
6	1401.38	1523.81	1.[illegible]	-68.171	4.455	-63.757	3.495	3.6209
7	1399.20	1548.02	1.[illegible]	-69.[illegible]	4.856	-64.184	2.182	3.7036
8	1398.19	1608.39	1.[illegible]	-73.[illegible]	5.506	-64.714	.323	3.6269

STATION 5 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	6.9366	.4000	0.[illegible]	636.64	69.41	588.05	241.54	640.42	6.22	22.236	0.000
2	7.2312	.4000	.2946	646.50	91.99	596.74	223.23	652.88	5.59	20.199	0.000
3	7.4835	.4000	.5929	657.45	101.53	629.49	199.71	665.25	5.43	16.771	0.000
4	7.7757	.4000	.9601	666.76	106.35	651.97	144.25	675.19	6.42	12.495	0.000
5	8.0613	.4000	1.[illegible]	673.92	108.45	667.90	89.89	682.53	9.40	7.665	0.000
6	8.3449	.4000	1.[illegible]	681.42	110.14	681.83	29.38	690.26	17.04	2.387	0.000
7	8.6322	.4000	1.[illegible]	689.55	112.22	688.36	-40.45	698.62	57.66	-3.363	0.000
8	8.9231	.4000	2.0165	695.54	115.74	684.62	-114.74	705.12	**********	-9.495	0.000

STREAM-LINE	MACH NUMBER	PRESSURE TOTAL	PRESSURE STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.5352	16.[illegible]	12.6335	532.442	494.754	.[illegible]8733	[illegible].892	119.7.1	.97[illegible]255	6.222	22.296
2	.[illegible]343	16.[illegible]03	13.[illegible]37	534.[illegible]46	502.[illegible]19	.[illegible]99936	123.141	12[illegible].[illegible]28	.976[illegible]21	[illegible].911	20.199
3	.5745	16.[illegible]99	13.1331	541.197	504.371	.[illegible]70322	129.997	12[illegible].[illegible]49	.976[illegible]31	8.779	16.771
4	.[illegible]5139	15.3724	13.[illegible]78	547.166	515.271	.[illegible]74414	132.360	12[illegible].[illegible]56	.975973	9.[illegible]52	12.495
5	.[illegible]5034	17.[illegible]644	13.[illegible]647	546.[illegible]63	5[illegible].791	.[illegible]73346	132.[illegible]03	12[illegible].[illegible]38	.977[illegible]69	3.[illegible]42	7.665
6	.[illegible]5364	17.[illegible]749	13.[illegible]6.9	548.[illegible]01	5[illegible].244	.[illegible]72[illegible]10	131.[illegible]14	12[illegible].[illegible]499	.977[illegible]57	9.[illegible]41	2.387
7	.[illegible]5334	17.[illegible]087	13.[illegible]294	547.[illegible]59	5[illegible].745	.[illegible]60347	131.[illegible]366	12[illegible].[illegible]614	.977762	9.243	-1.363
8	.[illegible]5395	17.[illegible]645	13.[illegible]663	549.[illegible]56	5[illegible].[illegible]96	.[illegible]59377	131.[illegible]821	12[illegible].[illegible]892	.9[illegible]4727	9.449	-9.495

STATION 6 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE ROTATING AT 2037.4 RPM. NUMBER OF BLADES IN ROW = 30

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	1227.91	1321.83	1.2379	-61.207	1.530	-59.657	19.955	9.2272	.01574	.[illegible]175	.[illegible]195
2	1[illegible].10	1[illegible].[illegible]8	1.[illegible]322	-61.[illegible]7	1.[illegible]3	-59.957	7.[illegible]37	10.[illegible]2[illegible]2	.[illegible]3[illegible]1	.[illegible]3271	.[illegible]353
3	1[illegible].44	1[illegible].[illegible]9	1.[illegible]273	-61.[illegible]73	1.[illegible]75	-60.[illegible]98	4.[illegible]69	11.[illegible]039	.[illegible]2246	.[illegible]3194	.[illegible]416
4	1[illegible].32	1[illegible].[illegible]8	1.[illegible]3[illegible]2	-62.[illegible]41	1.[illegible]67	-60.[illegible]07	3.[illegible]3	11.[illegible]8218	.[illegible]2511	.[illegible]3475	.[illegible]431
5	1[illegible].[illegible]1	1[illegible].[illegible]5	1.[illegible]34[illegible]	-62.[illegible]73	1.[illegible]69	-61.[illegible]84	1.747	12.[illegible]7[illegible]6	.[illegible]3[illegible]19	.[illegible]4533	.[illegible]4[illegible]0
5	1[illegible].[illegible]0	1[illegible].[illegible]3	1.[illegible]30[illegible]	-63.[illegible]11	1.[illegible]63	-62.[illegible]68	1.223	13.5127	.[illegible]3[illegible]31	.[illegible]5572	.[illegible]357
7	1[illegible].[illegible]7	1[illegible].[illegible]0	1.[illegible]337[illegible]	-64.[illegible]30	1.[illegible]46[illegible]	-62.[illegible]91	1.[illegible]61	14.[illegible]2[illegible]74	.[illegible]4[illegible]45	.[illegible]5595	.[illegible]332
8	1[illegible].[illegible]	1[illegible].[illegible]	1.[illegible]4771	-64.[illegible]47	1.[illegible]69	-63.[illegible]18	1.379	14.7225	.[illegible]5792	.[illegible]624	.[illegible]245

STREAM-LINE	INLET THROUGH STATION 5 PRESSURE RATIO	INLET THROUGH STATION 5 ISENTROPIC EFFICIENCY	INLET THROUGH STATION 5 DELTA H ON H1	STATION 4 THROUGH STATION 5 PRESSURE RATIO	STATION 4 THROUGH STATION 5 ISENTROPIC EFFICIENCY	STATION 4 THROUGH STATION 5 DELTA H ON H1
1	1.[illegible]891	.[illegible]921	.[illegible]273	1.[illegible]891	.9[illegible]21	.[illegible]273
2	1.[illegible]341	.[illegible]8[illegible]5	.[illegible]374	1.[illegible]341	.[illegible]8[illegible]5	.[illegible]374
3	1.[illegible]8[illegible]	.[illegible]9[illegible]9	.[illegible]436	1.[illegible]8[illegible]	.[illegible]9[illegible]9	.[illegible]436
4	1.[illegible]740	.[illegible]8[illegible]0	.[illegible]472	1.[illegible]740	.[illegible]8[illegible]0	.[illegible]472
5	1.[illegible]3[illegible]	.[illegible]8741	.[illegible]5[illegible]1	1.[illegible]3[illegible]	.[illegible]8741	.[illegible]5[illegible]9
6	1.[illegible]3[illegible]	.[illegible]8[illegible]3	.[illegible]5[illegible]3	1.[illegible]3[illegible]	.[illegible]8[illegible]3	.[illegible]524
7	1.[illegible]2[illegible]	.[illegible]8[illegible]2	.[illegible]5[illegible]3	1.[illegible]2[illegible]	.[illegible]8[illegible]2	.[illegible]553
8	1.[illegible]2[illegible]	.[illegible]7[illegible]4	.[illegible]5[illegible]9	1.[illegible]2[illegible]	.[illegible]7[illegible]4	.[illegible]599

MEAN VALUES — INLET TO STA. 5 / STA. 4 TO STA. 5

	INLET TO STA. 5	STA. 4 TO STA. 5
PRESSURE RATIO	1.1524	1.1524
ISEN EFFY	.8621	.8621
DELTA H ON H1	.0479	.0479

STATION 6 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	MESH-POINT COORDS X-COORD	MESH-POINT COORDS L-COORD	VELOCITIES MERIDIONAL TA[illegible]	VELOCITIES [illegible]OTAL	VELOCITIES AXIAL	VELOCITIES RADIAL	VELOCITIES TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.[illegible]71	.[illegible]	.[illegible]	446.73	5[illegible].[illegible]	397.[illegible]	234.[illegible]2	736.74	4.31	27.246	[illegible].[illegible]
2	7.[illegible]43	.[illegible]	.5[illegible]9[illegible]	474.[illegible]	5[illegible].[illegible]	439.16	19[illegible].[illegible]	754.4[illegible]	-340.[illegible]	22.[illegible]	[illegible].[illegible]
3	7.[illegible]9[illegible]	.[illegible]	.[illegible]1[illegible]8	491.[illegible]	5[illegible].46	47[illegible].[illegible]	143.7	76[illegible].[illegible]	-[illegible].12	16.931	[illegible].[illegible]
4	7.[illegible]771	.[illegible]	.79[illegible]	[illegible].[illegible]	[illegible].61	4[illegible].[illegible]	34.78	74[illegible].[illegible]	-4.13	11.[illegible]	[illegible].[illegible]
5	8.[illegible]229	.[illegible]	.[illegible]358	[illegible].[illegible]	6[illegible].[illegible]	[illegible].[illegible]	51.[illegible]	79[illegible].[illegible]	-3.[illegible]	[illegible].[illegible]	[illegible].[illegible]
6	8.[illegible]453	.[illegible]	1.[illegible]702	[illegible].[illegible]	6[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	-4.[illegible]	.[illegible]541	[illegible].[illegible]
7	8.[illegible]110	.[illegible]	1.[illegible]7[illegible]0	[illegible].[illegible]	6[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	-7.[illegible]	-4.[illegible]	[illegible].[illegible]
8	8.[illegible]3	.[illegible]	1.[illegible]7[illegible]1	[illegible].[illegible]	6[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	1667.[illegible]	-9.[illegible]	[illegible].[illegible]

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.[illegible]157	20.[illegible]467	17.[illegible]3[illegible]4	541.[illegible]29	5[illegible].363	.[illegible]1[illegible]6660	151.967	143.127	.976[illegible]6[illegible]	52.667	27.236
2	.[illegible]933	21.[illegible]815	17.[illegible]3[illegible]3	546.456	5[illegible].[illegible]7	.[illegible]17[illegible]267	153.[illegible]49	143.[illegible]A3	.977[illegible]92	52.[illegible]93	22.352
3	.6[illegible]3[illegible]	22.[illegible]8[illegible]9	18.[illegible]3[illegible]16	552.[illegible]45	5[illegible].[illegible]50	.[illegible]1[illegible]4[illegible]01	155.[illegible]15	146.[illegible]28	.977[illegible]71	50.[illegible]36	16.931
4	.6[illegible]72	23.[illegible]77[illegible]	18.[illegible]3[illegible]3	558.[illegible]72	5[illegible].[illegible]19	.[illegible]1[illegible]99[illegible]7	159.[illegible]61	149.[illegible]74	.97[illegible]1	50.193	11.382
5	.6542	23.[illegible]772	18.[illegible]3[illegible]7	565.[illegible]52	6[illegible].[illegible]17	.[illegible]111549	159.[illegible]81	147.[illegible]96	.97[illegible]507	50.[illegible]28	5.[illegible]96
6	.6612	24.[illegible]096	19.[illegible]523	571.[illegible]33	6[illegible].[illegible]53	.[illegible]113219	161.552	149.573	.979[illegible]1[illegible]	50.[illegible]68	.541
7	.6693	24.[illegible]154	19.[illegible]6[illegible]4	581.[illegible]62	6[illegible].[illegible]05	.[illegible]114545	163.479	150.049	.979[illegible]85	51.054	-4.661
8	.6834	25.[illegible]421	20.[illegible]2[illegible]8	592.[illegible]83	634.045	.115119	164.244	152.171	.982073	52.280	-9.488

STATION 6 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE ROTATING AT 20371.4 RPM. NUMBER OF BLADES IN ROW = 30

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	1288.30	909.72	.4759	-58.464	3.674	-54.791	+.634	11.5662	.03133	.4810	.6169
2	1269.26	883.99	.7444	-56.714	2.131	-54.583	1.217	12.6982	.03856	.4641	.5712
3	1252.44	919.52	.7601	-57.744	1.979	-55.765	-.447	13.9544	.04541	.4614	.5364
4	1410.74	953.42	.7810	-57.959	1.947	-56.011	-.845	15.1158	.05257	.4633	.5196
5	1444.24	971.79	.8074	-58.711	1.915	-56.797	-.867	16.1252	.05955	.4587	.4955
6	1467.31	1007.24	.8327	-59.406	1.927	-57.477	-1.410	17.1766	.06956	.4739	.4612
7	1570.48	1031.88	.8615	-60.033	1.928	-58.105	-1.644	18.1429	.08249	.4791	.4345
8	1574.43	1045.24	.8672	-60.571	1.941	-58.630	2.925	18.7902	.11584	.4934	.4048

STREAM-LINE	INLET THROUGH STATION 4 PRESSURE RATIO	INLET THROUGH STATION 4 ISENTROPIC EFFICIENCY	INLET THROUGH STATION 4 DELTA H ON H1	STATION 4 THROUGH STATION 6 PRESSURE RATIO	STATION 4 THROUGH STATION 6 ISENTROPIC EFFICIENCY	STATION 4 THROUGH STATION 6 DELTA H ON H1
1	2.1477	.9733	.2369	2.0677	.9733	.2368
2	2.1134	.9472	.2571	2.1134	.9673	.2643
3	2.1474	.9626	.2571	2.1474	.9604	.2673
4	2.2313	.9517	.2533	2.2303	.9537	.2699
5	2.2344	.9424	.2516	2.2344	.9467	.2630
6	2.3593	.9372	.2577	2.3582	.9372	.2577
7	2.4771	.9244	.3137	2.4771	.9244	.3112
8	2.5149	.8945	.3354	2.5149	.8945	.3354

MEAN VALUES	INLET TO STA. 6	STA. 4 TO STA. 6
PRESSURE RATIO	2.2836	2.2886
ISEN EFFY	.9432	.9435
DELTA H ON H1	.2827	.2827

STATION 7 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	MESH-POINT COORDS X-COORD	MESH-POINT COORDS L-COORD	VELOCITIES MERIDIONAL	VELOCITIES TANGENTIAL	VELOCITIES AXIAL	VELOCITIES RADIAL	VELOCITIES TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.3227	1.2100	.0000	545.11	735.85	447.40	263.09	915.75	-3.38	25.495	0.000
2	7.3542	1.2535	.0435	654.61	746.79	526.24	328.21	926.21	-3.38	18.731	0.000
3	7.7133	1.5100	.4126	667.48	757.07	621.67	415.72	934.73	-3.47	12.008	0.000
4	7.9772	1.7700	.6765	668.94	760.47	656.73	511.11	963.97	-4.86	6.174	0.000
5	8.1411	1.9300	.8404	669.07	773.25	804.94	611.14	954.19	-6.35	1.146	0.000
6	8.3528	2.1500	1.0519	669.27	759.35	864.41	711.14	966.42	-8.51	-3.196	0.000
7	8.5650	2.3631	1.2643	667.74	819.34	954.74	811.58	983.24	-16.53	-6.456	0.000
8	8.7814	2.5797	1.4807	839.01	859.91	53 .65	-99.68	1013.74	-1667.50	-9.488	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.7577	36.5841	25.0119	574.476	518.295	.111033	162.738	145.991	.977440	53.473	25.485
2	.7537	37.0443	25.4471	493.963	512.577	.111216	164.164	147.019	.977917	53.216	18.731
3	.7674	36.9721	25.3770	496.334	517.744	.111346	163.673	146.224	.978487	53.360	12.008
4	.7717	39.1469	26.9455	497.197	523.179	.111540	167.358	149.553	.979155	51.603	6.174
5	.7753	40.4134	27.9196	704.393	529.212	.111679	169.199	151.115	.979562	54.133	1.146
6	.7832	41.6453	28.7185	713.644	538.547	.111834	171.231	152.579	.980936	54.041	-3.196
7	.7910	42.8734	29.5171	723.218	643.401	.111983	174.434	154.433	.982148	53.442	-6.456
8	.8174	44.4847	29.9744	749.131	654.514	.111973	179.111	157.547	.985699	57.947	-9.488

STATION 7 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE ROTATING AT 20371.4 RPM. NUMBER OF BLADES IN ROW = 32

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	1301.43	795.50	.4530	-46.057	2.661	-43.395	-4.496	7.3029	.04912	.5165	.6983
2	1338.47	814.78	.4719	-47.112	2.578	-44.534	-5.935	7.9458	.05810	.5328	.6535
3	1376.78	937.88	.6497	-48.439	2.496	-45.944	-6.742	8.0920	.06730	.5342	.6161
4	1411.39	867.84	.7211	-49.121	2.444	-46.678	-2.788	8.1811	.07451	.5467	.5826
5	1449.44	875.98	.7437	-50.161	2.424	-47.737	-1.347	8.1927	.09556	.5687	.5510
6	1484.45	893.67	.7711	-51.244	2.413	-48.831	-.284	8.3211	.14447	.5701	.5212
7	1523.37	905.60	.7841	-51.975	2.413	-49.562	1.487	8.2668	.13450	.5844	.4931
8	1543.53	885.50	.7752	-52.584	2.454	-50.131	3.643	8.2475	.17376	.6233	.4575

STREAM-LINE	INLET THROUGH STATION 7 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1	STATION 4 THROUGH STATION 7 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1
1	2.6894	.9641	.3377	2.6894	.9641	.3377
2	2.6441	.9557	.3186	2.6441	.9637	.3186
3	2.6110	.9496	.3038	2.6110	.9624	.3038
4	2.6779	.9631	.3444	2.6779	.9631	.3444
5	2.7502	.9773	.3882	2.7502	.9822	.3532
6	2.8998	.9198	.3765	2.8998	.9198	.3765
7	2.9144	.9226	.3857	2.9144	.9226	.3957
8	3.0273	.8436	.4307	3.0273	.8436	.4307

MEAN VALUES	INLET TO STA. 7	STA. 4 TO STA. 7
PRESSURE RATIO	2.7460	2.7460
ISEN EFFY	.9276	.9276
DELTA H ON H1	.3604	.3604

STATION 4 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIUS OF CURVATURE	TOTAL	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.6479	1.6100	0.0000	688.13	888.87	661.31	137.68	1123.87	16.347	0.000
2	7.5384	1.6000	.1515	691.74	893.16	649.73	135.78	1111.43	14.957	0.000
3	7.7365	1.6000	.3035	694.34	897.01	637.45	7.00	1116.33	6.355	0.000
4	7.8678	1.6000	.4550	699.16	911.07	624.65	25.14	1135.73	2.299	0.000
5	8.1339	1.6000	.6060	705.83	925.53	610.70	-14.27	1152.26	-1.325	0.000
6	8.3247	1.6000	.7559	717.87	944.87	595.65	-49.85	1173.12	-4.593	0.000
7	8.5518	1.6000	.9058	733.13	976.63	580.14	-77.17	1204.36	-7.475	0.000
8	8.7225	1.6000	1.0346	737.41	1001.31	563.65	-98.55	1180.70	-9.495	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.8783	47.8762	27.1296	716.354	610.447	.111175	171.732	146.507	.977958	52.245	16.347
2	.8130	46.8471	25.3579	720.476	617.754	.111454	173.953	148.261	.978912	53.477	14.957
3	.8135	45.9443	25.6808	724.347	624.682	.111347	174.323	149.924	.979186	54.530	6.355
4	.8341	46.1768	26.3423	728.247	631.529	.111692?	175.264	151.387	.980324	55.446	2.299
5	.8312	47.1087	27.3676	731.224	638.69?	.111825?	177.975	153.269	.981465	56.317	-1.325
6	.8015	48.6731	28.8706	731.228	646.225	.111930?	181.312	155.111	.982455	57.249	-4.593
7	.8202	49.8074	29.2118	734.199	655.476	.111?294	183.418	157.410	.984471	58.574	-7.475
8	.7941	50.7790	29.9753	730.001	673.908	.110108	183.860	161.760	.983645	62.924	-9.495

STATION 4 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE ROTATING AT 20171.4 RPM. NUMBER OF BLADES IN ROW = 33

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	MEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	1331.15	818.17	.8758	-32.744	6.178	-26.610	-9.761	8.2421	.06771	.5132	.7049
2	1267.39	804.09	.8678	-35.107	5.855	-29.252	-6.501	7.4189	.07643	.5555	.5734
3	1206.01	796.61	.8671	-37.141	6.503	-31.348	-3.765	6.6602	.04999	.5819	.6477
4	1415.78	855.38	.8579	-34.846	5.470	-33.416	-1.337	5.3968	.11422	.6367	.6147
5	1446.93	837.67	.8523	-41.204	6.358	-34.845	.314	5.3918	.12059	.6288	.5811
6	1479.39	809.45	.8498	-41.364	5.517	-36.238	1.225	4.7698	.13337	.6495	.5477
7	1511.74	831.43	.8396	-42.285	5.318	-36.437	2.224	4.3571	.16624	.6757	.5149
8	1545.43	791.60	.8767	-42.496	5.418	-37.479	3.332	2.8870	.23158	.7428	.4847

STREAM-LINE	INLET THROUGH STATION 8 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1	STATION 4 THROUGH STATION 8 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1
1	2.9929	.9649	.3795	2.9929	.9649	.3795
2	3.0292	.9561	.3693	3.0292	.9561	.3693
3	3.0747	.9467	.4003	3.0747	.9467	.4003
4	3.1394	.9338	.4137	3.1394	.9338	.4137
5	3.2117	.9201	.4297	3.2117	.9201	.4297
6	3.3036	.9042	.4483	3.3036	.9042	.4483
7	3.3353	.8824	.4733	3.3353	.8824	.4733
8	3.5674	.8348	.5230	3.5674	.8348	.5236

MEAN VALUES	INLET TO STA. 8	STA. 4 TO STA. 8
PRESSURE RATIO	3.2225	3.2225
ISEN EFFY	.9137	.9137
DELTA H ON H1	.4341	.4341

STATION 9 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	MESH-POINT COORDS X-COORD	MESH-POINT COORDS L-COORD	VELOCITIES MERIDIONAL	VELOCITIES TANGENTIAL	VELOCITIES AXIAL	VELOCITIES RADIAL	VELOCITIES TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.5585	2.4681	0.0000	743.65	984.76	772.41	126.11	1234.83	-5.11	4.238	0.000
2	7.4409	2.4443	.1376	737.15	972.12	719.96	94.64	1211.41	-15.97	3.135	0.000
3	7.3224	2.4204	.2751	731.53	959.64	684.64	64.02	1195.13	54.69	2.033	0.000
4	7.2033	2.3966	.4127	725.89	949.63	649.63	33.17	1180.06	12.94	1.676	0.000
5	7.1744	2.3727	.5502	682.03	978.21	643.49	-5.32	1140.55	7.46	-.590	0.000
6	7.2042	2.3488	.6878	626.31	987.14	575.38	-35.36	1196.61	6.27	-2.997	0.000
7	7.2419	2.3250	.8253	662.17	1011.48	624.24	-32.19	1229.28	5.32	-5.389	0.000
8	7.2586	2.3300	1.0371	646.97	1005.32	608.88	-44.29	1242.86	7.31	-8.257	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	1.0157	48.5777	26.2489	719.928	612.667	.111317	177.319	147.315	.974464	53.045	9.238
2	.9972	48.1468	25.8199	740.444	638.631	.110688	177.717	148.444	.979289	53.672	6.136
3	.9746	48.3736	26.2347	742.885	653.903	.110513	174.285	149.758	.980361	54.132	3.932
4	.9472	48.3054	26.2571	747.071	659.431	.110941	170.297	151.061	.981523	54.545	1.676
5	.0441	48.2768	26.2711	748.115	635.170	.110741	181.748	152.441	.983122	54.997	-.588
6	.0641	48.1214	27.2690	760.745	641.614	.111858	183.584	153.989	.984464	55.585	-2.997
7	.0577	48.3939	27.4716	770.319	650.339	.111246	185.285	156.141	.987548	56.799	-5.389
8	.9736	51.1709	27.4697	790.944	670.717	.111407	191.819	163.970	.993959	61.818	-8.257

STATION 9 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE ROTATING AT 20371.4 RPM. NUMBER OF BLADES IN ROW = 30

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	1767.70	823.13	.4797	-25.884	13.762	-12.122	-1.313	0.0000	.08030	.5240	.7115
2	1726.14	814.82	.6773	-28.414	13.309	-14.217	.147	0.0000	.09514	.5572	.6712
3	1390.45	817.87	.5640	-31.091	13.349	-18.133	2.155	0.0000	.11146	.5831	.6273
4	1614.76	822.64	.4601	-33.313	12.851	-20.154	2.534	0.0000	.12988	.6044	.5830
5	1644.35	858.57	.4710	-34.487	12.914	-21.242	3.192	0.0000	.15061	.6241	.5395
6	1673.17	872.07	.5711	-35.716	12.776	-22.940	3.486	0.0000	.17429	.6428	.4974
7	1704.31	825.22	.5616	-36.539	12.709	-23.847	3.210	0.0000	.2.746	.6686	.4568
8	1518.74	778.51	.5798	-37.756	12.993	-24.763	2.610	0.0000	.28950	.7498	.4226

STREAM-LINE	INLET THROUGH STATION 9 PRESSURE RATIO	INLET THROUGH STATION 9 ISENTROPIC EFFICIENCY	INLET THROUGH STATION 9 DELTA H ON H1	STATION 4 THROUGH STATION 9 PRESSURE RATIO	STATION 4 THROUGH STATION 9 ISENTROPIC EFFICIENCY	STATION 4 THROUGH STATION 9 DELTA H ON H1
1	3.3167	.8816	.4244	1.3123	.9406	.4244
2	3.2978	.8908	.4375	1.2978	.9496	.4375
3	3.2856	.8741	.4321	1.2856	.9361	.4321
4	3.2737	.8716	.4463	1.2737	.9334	.4463
5	3.3162	.8725	.4513	1.3162	.9025	.4513
6	3.3435	.8814	.4667	1.3428	.8814	.4667
7	3.3937	.8697	.4844	1.3937	.8624	.4844
8	3.4792	.7935	.5409	3.4792	.7935	.5409

MEAN VALUES	INLET TO STA. 9	STA. 4 TO STA. 9
PRESSURE RATIO	3.3357	3.3357
ISEN EFFY	.8939	.8939
DELTA H ON H1	.4592	.4592

STATION 10 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	MESH-POINT COORDS X-COORD	MESH-POINT COORDS L-COORD	VELOCITIES MERIDIONAL	VELOCITIES TANGENTIAL	VELOCITIES AXIAL	VELOCITIES RADIAL	VELOCITIES TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.5946	2.2250	0.0000	728.15	981.65	721.92	95.44	1221.75	7.17	7.503	27.599
2	7.7160	2.2012	.1459	736.66	971.41	731.76	54.79	1219.31	9.61	6.613	25.746
3	7.8378	2.1773	.2923	745.53	965.41	743.43	87.58	1219.76	11.55	5.721	23.843
4	7.9598	2.1535	.4374	750.68	964.47	748.23	46.19	1223.74	13.69	5.528	21.344
5	8.1319	2.1296	.5823	746.95	974.47	745.57	24.10	1227.82	16.33	1.849	19.793
6	8.2811	2.1058	.7350	734.11	984.13	736.11	-.13	1230.98	10.67	-.002	17.371
7	8.4435	2.1264	.9085	705.58	1014.16	705.58	-26.87	1235.75	9.18	-2.181	15.158
8	8.6279	2.2240	1.1108	629.74	1099.04	627.21	-56.37	1266.67	3.94	-5.136	13.451

STREAM-LINE	MACH NUMBER	PRESSURE TOTAL	PRESSURE STATIC	TEMPERATURE TOTAL	TEMPERATURE STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	1.0967	44.0727	25.1871	738.828	616.639	.112255	177.319	147.519	.978464	53.417	35.093
2	1.0939	44.0464	25.1871	741.444	616.734	.111871	177.7 7	148. .15	.979188	52.833	32.355
3	1.0911	44.0206	25.1871	744.062	616.829	.111504	178.245	148.677	.979911	52.248	29.644
4	1.0883	43.9952	25.1871	746.681	616.923	.111153	178.297	149.199	.980634	51.664	26.944
5	1.0855	43.9702	25.1871	749.302	617.018	.110817	179.349	149.721	.981357	51.079	24.256
6	.9493	40.1216	24.1871	760.765	644.673	.110749	182.546	154.321	.984365	53.394	-13.369
7	.9033	40.7937	25.1871	771.113	644.947	.110912	185.285	154.787	.987643	55.453	-27.339
8	1.0910	51.1703	26.3559	799.944	665.778	.109351	191.819	159.776	.993959	60.184	-35.587

STATION 11 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	MESH-POINT COORDS X-COORD	MESH-POINT COORDS L-COORD	VELOCITIES MERIDIONAL	VELOCITIES TANGENTIAL	VELOCITIES AXIAL	VELOCITIES RADIAL	VELOCITIES TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	2.6223	2.5133	.0000	628.61	925.58	648.63	117.22	1100.71	10.44	9.162	57.747
2	2.7222	2.7239	.1949	871.79	864.10	A23.07	111.04	1073. .9	-143.77	7.633	51.711
3	2.8221	2.9345	.3894	918.14	853.04	978.53	110.86	1139. .44	-27.445	5.767	37.372
4	2.9219	3.1452	.5839	949.44	841.35	965.83	60.78	1161.17	-48.32	4.215	15.576
5	3.0218	3.3561	.7783	952.71	971.30	951.51	47.83	1354. .54	22. .96	2.879	-6.843
6	2.9379	3.8004	.9616	933.41	986.84	943.45	35.73	1344.68	62.95	1.426	-33.773
7	2.8773	3.7703	1.0574	891.93	1116.17	820.96	-3.28	1355.46	39.70	.6449	-49.717
8	2.8114	3.8163	1.1762	693.17	1131.14	601.57	-49.13	1255.49	-14.49	-4.199	-57.616

STREAM-LINE	MACH NUMBER	PRESSURE TOTAL	PRESSURE STATIC	TEMPERATURE TOTAL	TEMPERATURE STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	1.0967	44.0727	25.1868	738.828	616.636	.112255	177.319	147.519	.978464	54.399	67.443
2	1.0939	44.0464	25.1868	741.444	616.730	.111871	177.7 7	148. .15	.979188	49.232	53.333
3	1.0911	44.0206	25.1868	744.062	616.825	.111504	178.245	148.677	.979911	44.067	43.338
4	1.0883	43.9952	25.1868	746.681	616.919	.111153	178.297	149.199	.980634	45.357	22.891
5	1.0855	43.9702	25.1868	749.302	617.014	.110817	179.349	149.721	.981357	45.553	-33.966
6	.9493	40.1216	24.1868	760.765	644.669	.110749	182.546	154.321	.984365	47.213	-29.346
7	.9033	40.7937	25.1868	771.113	644.943	.110912	185.285	154.787	.987643	51.288	-52.363
8	1.0910	51.1703	26.3556	799.944	665.773	.109351	191.819	159.776	.993959	61.290	-61.704

STATION 11 IS AT THE LEADING EDGE OF A BLADE ROTATING AT .... RPM. NUMBER OF BLADES IN ROW = 49

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	INCIDENCE ANGLE	BLADE ANGLE	CAMBER ANGLE	PRESS DIFF ACROSS BLADE
1	1130.73	[illegible]	.3841	54.290	8.006	6.000	3.000	-11.6352
2	1130.73	[illegible]	.3854	49.232	0.000	0.000	3.000	-15.6059
3	1130.73	[illegible]	.3868	44.067	0.000	0.000	3.000	-17.7196
4	1130.73	[illegible]	.3881	39.357	0.000	0.000	3.000	-18.1805
5	1130.73	[illegible]	.3894	34.553	0.000	0.000	3.000	-19.4 13
6	1130.73	[illegible]	.4147	47.213	0.000	0.000	3.000	-19.6429
7	1130.73	[illegible]	.4313	51.138	0.000	0.000	3.000	-17.8 15
8	1130.73	[illegible]	.5613	61.290	0.000	0.000	3.000	-13.2946

STATION 12 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	MESH-POINT COORDS X-COORD	MESH-POINT COORDS L-COORD	VELOCITIES MERIDIONAL	VELOCITIES TANGENTIAL	VELOCITIES AXIAL	VELOCITIES RADIAL	VELOCITIES TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	2.7326	3.0603	.0000	928.47	559.01	997.17	116.59	1144.65	-3.43	6.126	55.619
2	2.7826	3.2492	.1777	921.79	551.04	913.39	66.10	1073.69	-6.14	5.135	50.291
3	2.8326	3.4381	.3547	882.21	541.03	881.58	44.65	1034.9	-5.01	3.901	36.795
4	2.8826	3.6269	.5321	844.44	534.87	863.45	35.24	1016.72	-4.03	2.329	18.934
5	2.9326	3.8158	.7091	803.19	537.19	854.65	29.42	1004.13	-11.44	1.561	-5.563
6	2.9043	3.9050	.7113	856.86	548.09	866.58	31.96	1035.59	-67.30	1.452	-27.732
7	2.8726	3.9050	.8956	869.59	574.15	876.66	7.73	1042.23	16.92	.509	-48.351
8	2.8618	3.9679	1.1012	883.43	623.00	842.79	-33.64	1081.01	5.78	-2.182	-56.672

STREAM-LINE	MACH NUMBER	PRESSURE TOTAL	PRESSURE STATIC	TEMPERATURE TOTAL	TEMPERATURE STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.9114	47.1228	26.3378	738.424	620.861	.115513	177.319	161.152	.994588	29.233	61.745
2	.8599	46.9044	28.3115	740.444	646.654	.113139	177.717	165.693	.994399	31.831	55.416
3	.8302	46.8461	29.1053	740.956	657.738	.112104	177.845	166.996	.994222	31.515	37.637
4	.8179	47.1137	29.4358	742.071	661.873	.112021	178.207	167.653	.994366	31.748	21.263
5	.8110	47.4750	29.6025	743.115	663.837	.112019	178.369	167.949	.994503	31.986	-3.0033
6	.8169	48.2722	31.1338	744.748	673.210	.112582	180.696	169.577	.994343	32.103	-26.280
7	.8167	48.6706	31.4216	745.519	675.671	.112446	180.245	169.941	.994119	33.441	-47.842
8	.8126	50.0959	32.7949	748.744	683.0 5	.112323	181.819	169.681	.995374	35.192	-54.854

STATION 12 IS WITHIN .02 AT THE TRAILING EDGE OF A BLADE ROTATING AT ...,.. RPM. NUMBER OF BLADES IN ROW = 49

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	1.20	1166.65	.9318	29.233	0.030	0.000	0.000	-14.3779	1.53173	0.6666	6.4338
2	1.000	1071.49	.8629	31.831	0.000	0.000	0.000	-16.1459	1.72268	0.6053	6.9316
3	1.000	1054.95	.8540	31.515	0.000	0.000	0.000	-17.2783	1.91110	0.6511	7.1433
4	1.000	1054.73	.8570	31.748	0.000	0.000	0.000	-18.0548	2.17142	0.6966	7.1575
5	1.000	1055.19	.8611	31.986	0.000	0.000	0.000	-18.5377	2.54327	0.7035	7.1375
6	1.000	1065.88	.8667	32.103	0.000	0.000	0.000	-18.8216	3.00482	0.7210	7.1534
7	1.000	1043.27	.8467	33.441	0.000	0.000	0.000	-18.1691	3.95352	0.7611	7.3534
8	1.000	1041.91	.8324	35.192	0.000	0.000	0.000	-17.4555	6.55554	0.8060	7.7518

STREAM-LINE	INLET THROUGH STATION 12 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1	STATION 4 THROUGH STATION 12 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1
1	3.2565	.9310	.4244	3.2565	.9303	.4244
2	3.1579	.9359	.4278	3.1579	.9307	.4275
3	3.1945	.9308	.4321	3.1945	.9258	.4321
4	3.2770	.8962	.4603	3.2770	.8962	.4603
5	3.3731	.8794	.4519	3.3731	.8798	.4519
6	3.5711	.8628	.4567	3.5711	.8628	.4567
7	3.9191	.8336	.4484	3.9191	.8336	.4484
8	4.6281	.7750	.5439	4.6281	.7750	.5439

MEAN VALUES	INLET TO STA.12	STA. 4 TO STA.12
PRESSURE RATIO	3.2512	3.2512
ISEN EFFY	.8715	.8715
DELTA H ON H1	.4592	.4592

STATION 12 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	MESH-POINT COORDS X-COORD	MESH-POINT COORDS L-COORD	VELOCITIES MERIDIONAL	VELOCITIES TANGENTIAL	VELOCITIES AXIAL	VELOCITIES RADIAL	VELOCITIES TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.7447	3.6189	0.000	791.36	281.00	791.15	-17.77	839.76	-5.78	-1.286	43.137
2	7.9431	3.7102	.1174	769.61	272.87	769.37	-15.77	815.55	-7.63	-1.174	39.578
3	7.9813	3.7282	.1417	766.04	261.08	765.89	-11.39	811.03	-9.57	-.462	27.129
4	8.0006	3.7345	.1548	765.21	259.06	765.21	-4.65	809.72	-11.44	-.353	14.141
5	8.0181	3.7379	.1676	765.72	244. 9	765.72	1.89	809.72	-15.22	.143	-2.811
6	8.0341	3.7415	.1793	782.14	273.26	782.33	4.07	828.93	-21.17	.637	-19.218
7	8.0434	3.7419	.1941	799.94	292.04	799.12	13.36	851.27	-37.69	.955	-37.995
8	8.0532	3.7382	.2084	849.56	327.30	848.47	12.23	910.32	59.45	.825	-46.629

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.6771	48.4333	34.1504	738.424	680.146	.113612	177.319	163.215	.992988	19.569	43.953
2	.6480	48.6078	34.7410	740.444	686.209	.113107	177.717	164.424	.993376	19.339	38.404
3	.6325	48.7401	35.0337	740.956	688.443	.113031	177.845	164.771	.993422	19.090	26.266
4	.6198	48.8748	35.2514	741.071	691.986	.113330	178.207	165.057	.993494	18.996	13.688
5	.6131	48.9806	35.3811	741.115	692.917	.113359	178.369	165.198	.993525	19.093	-.0669
6	.6178	49.1829	35.4317	741.745	693.615	.113761	178.696	165.868	.993622	19.253	-14.581
7	.6512	49.2243	35.4954	742.019	691.724	.113827	178.845	163.814	.993306	20.129	-37.033
8	.6495	49.1556	35.4364	742.244	693.249	.113928	178.819	164.249	.993658	21.052	-45.834

STATION 13 IS WITHIN .03 AT THE TRAILING EDGE OF A BLADE ROTATING AT ... RPM NUMBER OF BLADES IN ROW = 49

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	0.000	873.76	.8671	19.649	0.000	0.000	0.000	-9.3543	2.16376	0.2011	9.2538
2	0.000	865.66	.8590	19.339	0.000	0.000	0.000	-10.1495	2.03236	0.1900	9.3456
3	0.000	856.13	.8496	18.980	0.000	0.000	0.000	-11.0497	2.03141	0.1900	9.2401
4	0.000	844.99	.8386	18.554	0.000	0.000	0.000	-11.9731	2.04541	0.1912	9.1436
5	0.000	832.12	.8259	18.063	0.000	0.000	0.000	-11.8.87	2.04774	0.1914	8.8473
6	0.000	817.43	.8114	17.503	0.000	0.000	0.000	-12.1436	3.33314	0.3116	8.8278
7	0.000	801.23	.7953	16.884	0.000	0.000	0.000	-12.1295	4.28137	0.4004	6.9261
8	0.000	783.92	.7782	16.223	0.000	0.000	0.000	-12.1445	6.91913	0.6468	9.2451

STREAM-LINE	INLET THROUGH STATION 13 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1	STATION 4 THROUGH STATION 13 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1
1	3.1791	.8514	.4344	3.1791	.8514	.4344
2	3.1744	.8479	.4322	3.1744	.8478	.4325
3	3.1692	.8441	.4321	3.1692	.8441	.4321
4	3.1634	.8394	.4303	3.1634	.8394	.4303
5	3.1569	.8343	.4519	3.1569	.8343	.4519
6	3.1494	.8287	.4667	3.1494	.8287	.4667
7	3.1404	.8218	.4884	3.1404	.8218	.4884
8	3.1304	.8141	.5109	3.1304	.8141	.5109

MEAN VALUES	INLET TO STA.13	STA. 4 TO STA.13
PRESSURE RATIO	3.1793	3.1793
ISEN EFFY	.8521	.8521
DELTA H ON H1	.4592	.4592

STATION 14 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE	STREAMLINE ANGLE	STATION LEAN ANGL
1	7.7977	6.1720	0.0000	661.01	77.00	643.99	-14.47	665.55	23.36	-3.752		23.985
2	7.8159	6.3199	.1372	655.87	74.90	654.77	-14.80	660.14	-44.98	-3.391		22.178
3	7.8316	6.3616	.1729	660.05	73.60	659.30	-14.71	664.13	-12.37	-3.352		13.335
4	7.8469	6.4037	.2087	658.67	73.93	657.53	-15.57	662.64	-8.12	-3.453		9.929
5	8.1496	6.4457	.2913	681.41	74.13	680.29	-20.64	685.66	-7.14	-2.478		-7.113
6	8.3145	6.4881	.3334	7[illegible]	74.97	[illegible]	-19.54	709.53	-8.15	-1.588		-8.546
7	8.4690	6.5260	.3734	726.93	76.07	725.84	-18.47	731.50	-12.03	-.642		-21.733
8	8.5737	6.5726	.4174	745.44	102.01	743.51	14.15	748.24	-277.54	1.132		-27.772

STREAM-LINE	MACH NUMBER	PRESSURE TOTAL	PRESSURE STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.6944	46.2818	37.0614	718.429	703.054	.142321	177.319	168.736	.9A5259	6.745	20.533
2	.6917	46.2936	37.1164	740.444	726.182	.142366	177.727	169.054	.9A5517	6.515	16.746
3	.6911	46.3279	37.3697	743.966	729.154	.142473	178.245	169.497	.9A3337	3.363	9.968
4	.6959	46.4011	37.6564	747.771	732.633	.142549	178.897	17[illegible]	.9A6575	5.308	3.476
5	.6997	46.4634	37.5903	751.118	735.937	.142597	181.748	171.559	.9A7771	6.365	-3.349
6	.6911	46.3509	37.3411	74[illegible]	718.[illegible]74	.142534	182.684	172.[illegible]30	.9AA368	6.471	-13.532
7	.6914	46.3551	36.1324	772.210	737.481	.141541	185.245	174.396	.9A1479	6.383	-21.254
8	.6914	46.3611	34.1179	799.244	747.017	.137A14	191.A19	174.[illegible]84	.9A7461	7.399	-26.643

STATION 14 IS WITHIN .00 AT THE TRAILING EDGE OF A BLADE ROTATING AT ... RPM NUMBER OF BLADES IN ROW = 49

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	0.00	665.55	.6946	6.745	0.000	0.000	0.000	-5.1393	2.82133	0.2440	10.4941
2	0.00	660.14	.6889	6.515	0.000	0.000	0.000	-5.4335	2.96634	0.2565	10.3551
3	0.00	664.13	.6931	6.363	0.000	0.000	0.000	-5.7163	2.89797	0.2506	10.2515
4	0.00	662.64	.6915	6.308	0.000	0.000	0.000	-6.0672	3.02747	0.2618	9.7744
5	0.00	685.66	.7152	6.365	0.000	0.000	0.000	-6.3658	3.29576	0.2850	9.6152
6	0.00	709.53	.7400	6.471	0.000	0.000	0.000	-6.6439	3.67215	0.3176	9.5845
7	0.00	731.50	.7633	6.383	0.000	0.000	0.000	-6.8166	4.36887	0.3780	9.7625
8	0.00	748.24	.7808	7.399	0.000	0.000	0.000	-7.0870	7.25521	0.6278	10.1800

STREAM-LINE	INLET THROUGH STATION 14 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON M1	STATION 4 THROUGH STATION 14 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON M1
1	2.9336	.8663	.4244	2.9336	.8663	.4244
2	3.0113	.8652	.4375	3.0113	.8652	.4375
3	3.0971	.8607	.4521	3.0971	.8607	.4521
4	3.1564	.8529	.4623	3.1564	.8529	.4623
5	3.0322	.8415	.4519	3.0322	.8415	.4519
6	3.1482	.8301	.4667	3.1482	.8301	.4667
7	3.1951	.8052	.4884	3.1951	.8052	.4884
8	3.2965	.7483	.5409	3.2965	.7483	.5409

MEAN VALUES	INLET TO STA.14	STA. 4 TO STA.14
PRESSURE RATIO	3.1161	3.1161
ISEN EFFY	.8331	.8323
DELTA H ON M1	.4592	.4592

STATION 15 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS R-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.6819	4.7250	666.57	0.00	666.33	-15.54	666.57	13.18	-1.336	0.000
2	7.7823	4.7250	645.56	0.00	646.39	-13.37	646.64	9.79	-1.043	0.000
3	7.8756	4.7250	628.33	0.00	628.74	-17.64	628.33	8.26	-1.463	0.000
4	8.0175	4.7250	622.31	0.00	621.65	-28.61	622.31	7.38	-2.635	0.000
5	8.1435	4.7250	621.85	0.00	621.29	-36.56	621.85	8.84	-2.448	0.000
6	8.2868	4.7250	628.16	0.00	628.41	-31.39	628.16	12.14	-1.957	0.000
7	8.4346	4.7250	637.76	0.00	637.65	-11.04	637.76	24.62	-.983	0.000
8	8.5931	4.7250	628.68	0.00	628.63	5.34	628.68	-36.07	.487	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	STATIC	TEMPERATURES TOTAL	STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.5145	46.4703	33.1619	731.929	701.455	.130699	177.319	168.445	.981463	3.000	-1.336
2	.4947	46.1909	33.1479	741.444	709.488	.149384	177.717	169.358	.982569	3.000	-1.043
3	.4830	46.3441	33.4640	742.456	709.013	.147854	178.005	170.375	.984363	3.000	-1.463
4	.4756	46.1220	33.6609	747.073	714.464	.146434	173.297	171.563	.986316	3.000	-2.635
5	.4727	46.0731	33.6977	748.115	715.517	.146125	171.748	173.000	.988099	3.000	-2.448
6	.4749	46.2204	33.7164	748.745	715.824	.146160	172.584	174.670	.990281	3.000	-1.957
7	.4794	46.4697	33.6965	748.119	714.174	.145745	173.265	176.262	.992485	3.000	-.983
8	.4872	46.7244	33.6852	748.244	714.422	.134555	191.819	183.941	1.000398	3.000	.487

STATION 15 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE ROTATING AT .0 RPM NUMBER OF BLADES IN ROW = 49

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	0.00	666.57	.5116	0.000	0.000	0.000	0.000	0.0000	.0000	.5161	.5768
2	0.00	646.64	.4967	0.000	0.000	0.000	0.000	0.0000	.0929	.6742	.6151
3	0.00	628.33	.4831	0.000	0.000	0.000	0.000	0.0000	.1054	.7180	.6334
4	0.00	622.31	.4784	0.000	0.000	0.000	0.000	0.0000	.1231	.7369	.6339
5	0.00	621.85	.4777	0.000	0.000	0.000	0.000	0.0000	.1443	.7414	.6195
6	0.00	628.16	.4839	0.000	0.000	0.000	0.000	0.0000	.1652	.7358	.5906
7	0.00	637.76	.4908	0.000	0.000	0.000	0.000	0.0000	.1901	.7184	.5443
8	0.00	628.68	.4838	0.000	0.000	0.000	0.000	0.0000	.2896	.7033	.4570

STREAM-LINE	INLET THROUGH STATION 15 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON M1	STATION 11 THROUGH STATION 15 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON M1
1	3.1639	.9251	.4244	.9531	0.0000	0.0000
2	3.1416	.9148	.4375	.8535	0.0000	0.0000
3	3.1312	.8996	.4521	.9433	0.0000	0.0000
4	3.1758	.8576	.4623	.9335	0.0000	0.0000
5	3.0554	.8707	.4519	.9205	0.0000	0.0000
6	3.1657	.8016	.4667	.9156	0.0000	0.0000
7	3.1410	.7563	.4884	.8987	0.0000	0.0000
8	3.1094	.6934	.5409	.8650	0.0000	0.0000

MEAN VALUES	INLET TO STA.15	STA.11 TO STA.15
PRESSURE RATIO	3.0737	.9211
ISEN EFFY	.8237	0.0000
DELTA H ON M1	.4592	3.0030

STATION 16 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.6919	5.6100	0.0000	686.54	0.00	686.54	0.00	686.54	0.00	0.000	0.000
2	7.7334	5.6100	.0379	661.31	0.00	661.31	-3.48	661.31	267.76	-.324	0.000
3	7.8447	5.6100	.1372	636.71	0.00	636.71	-3.67	636.71	143.23	-.644	0.000
4	8.1013	5.6100	.3294	620.60	0.00	620.59	-3.46	620.60	111.12	-.914	0.000
5	8.1415	5.6100	.4633	610.66	0.00	610.65	-3.48	610.66	106.47	-.326	0.000
6	8.2831	5.6100	.5007	609.83	0.00	609.82	-2.87	609.83	129.61	-.270	0.000
7	8.6334	5.6100	.7409	613.07	0.00	613.07	-1.66	613.07	225.57	-.155	0.000
8	8.9491	5.6100	.9979	601.52	0.00	601.52	0.00	601.52	0.00	0.000	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.6287	46.4795	34.7779	738.824	698.645	.149493	177.319	167.915	.981143	0.000	0.000
2	.6386	46.4795	34.7279	741.444	704.051	.149539	177.707	168.979	.982569	0.000	-.026
3	.6611	46.4795	34.7105	749.956	719.119	.147448	179.285	172.189	.984313	0.000	-.066
4	.6774	46.4795	34.7233	747.071	715.032	.146184	179.297	171.615	.986314	0.000	-.134
5	.6819	46.4795	34.6819	757.115	722.458	.144700	180.744	173.302	.988699	0.000	-.326
6	.6817	46.4795	34.6747	760.746	729.419	.143118	182.596	175.157	.991281	0.000	-.273
7	.6807	46.4795	34.6667	772.010	740.743	.140906	185.295	177.778	.994865	0.000	-.155
8	.6826	46.4795	34.6610	799.244	769.134	.135751	191.819	184.503	1.003998	0.000	0.000

STATION 17 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.6919	7.0000	0.0000	688.25	0.00	688.25	0.00	688.25	0.00	0.000	0.000
2	7.7334	7.0000	.0379	662.96	0.00	662.96	-3.37	662.96	0.00	-.005	0.000
3	7.8447	7.0000	.1372	638.47	0.00	638.47	-3.56	638.47	0.00	-.113	0.000
4	8.1013	7.0000	.3294	621.37	0.00	621.37	-3.20	621.37	0.00	-.218	0.000
5	8.1415	7.0000	.4633	610.69	0.00	610.69	-3.22	610.69	0.00	-.120	0.000
6	8.2831	7.0000	.5007	609.11	0.00	609.11	-2.69	609.11	0.00	-.118	0.000
7	8.6334	7.0000	.7409	611.78	0.00	611.78	-1.61	611.78	0.00	-.011	0.000
8	8.9491	7.0000	.9979	599.93	0.00	599.93	0.00	599.93	0.00	0.000	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.6311	46.4795	34.6993	738.824	698.611	.149389	177.319	167.859	.981143	0.000	0.000
2	.6377	46.4795	34.6493	740.444	701.471	.149463	177.707	168.029	.982569	0.000	-.026
3	.6483	46.4795	34.6493	742.954	710.977	.147373	178.285	170.155	.986103	0.000	-.113
4	.6744	46.4795	34.6233	747.071	714.943	.146144	179.297	171.586	.986314	0.000	-.218
5	.6819	46.4795	34.6819	757.115	722.458	.144699	180.744	173.302	.988699	0.000	-.326
6	.6817	46.4795	34.6747	760.746	729.419	.143151	182.596	175.174	.991281	0.000	-.273
7	.6807	46.4795	34.6667	772.010	740.743	.140939	185.295	177.811	.994865	0.000	-.155
8	.6826	46.4795	34.6610	799.244	769.295	.135821	191.819	184.631	1.003998	0.000	0.000

POINT NO. 1 PASS 15 THE CALCULATION IS CONVERGED

SPEED FACTOR = 1.000 FLOW = 29.000 TOTAL PRESSURE RATIO = 3.373 ISENTROPIC EFFICIENCY = .8227 POWER = .2346E+04

DATA FOR WASTRAN PROGRAM FOR BLADE BETWEEN STATIONS 4 AND 9

NAME	CODE	DELTA θ	ELEMENT	MESHPOINTS - J	I	J	I	J	I
BLOAD2	60	5.86135	1	2	4	2	5	1	4
BLOAD2	60	5.86135	2	2	5	2	6	1	5
BLOAD2	60	10.87799	3	2	5	2	6	1	5
BLOAD2	60	10.87799	4	2	6	2	7	1	6
BLOAD2	60	9.85331	5	2	6	2	7	1	6
BLOAD2	60	9.85331	6	2	7	2	8	1	7
BLOAD2	60	7.66248	7	2	7	2	8	1	7
BLOAD2	60	7.66248	8	2	8	2	9	1	8
BLOAD2	60	3.87550	9	2	8	2	9	1	8
BLOAD2	60	3.87550	10	2	9	2	9	1	8
BLOAD2	60	6.87454	11	3	4	3	5	2	4
BLOAD2	60	6.87454	12	3	5	3	6	2	5
BLOAD2	60	11.88917	13	3	5	3	6	2	5
BLOAD2	60	11.88917	14	3	6	3	6	2	6

LOSS COEFFICIENT DETERMINATION FOR BLADE BETWEEN STATIONS 4 AND 9 -- FOR PURPOSES OF COMPARISON ONLY BLADE TYPE 1

STREAM-LINE	INLET RADIUS	OUTLET RADIUS	CASCADE SOLIDITY	DIFF FACTOR	LOSS PARAMETER	DIFFUSION LOSS	BLADE ANGLE	INCIDENCE ANGLE	EXPANSION ANGLE	INLET M.NO	EXPANDED MACH NO	SHOCK LOSS	TOTAL LOSS
1	7.739	7.663	2.1714	.5241	.02239	.11774	61.5110	3.853	3.844	1.1943	1.1564	.03106	.14154
2	7.766	7.683	2.1796	.5272	.02429	.11884	61.7756	4.174	3.658	1.2633	1.2241	.03155	.14773
3	7.793	7.703	2.1881	.5304	.02647	.12000	62.0466	4.426	3.473	1.3339	1.2924	.03204	.15204
4	7.820	7.723	2.1968	.5341	.02900	.12127	62.3242	4.365	3.288	1.4062	1.3624	.03253	.15380
5	7.847	7.743	2.2058	.5384	.03200	.12270	62.6087	4.466	3.103	1.4804	1.4347	.03303	.15573
6	7.873	7.763	2.2152	.5439	.03562	.12435	62.9004	4.565	2.918	1.5569	1.5096	.03354	.15789
7	7.900	7.783	2.2249	.5509	.04004	.12627	63.1997	4.664	2.733	1.6359	1.5870	.03406	.16033
8	7.927	7.803	2.2350	.5599	.04552	.12854	63.5071	4.763	2.548	1.7178	1.6673	.03459	.16313

LOSS COEFFICIENT DETERMINATION FOR BLADE BETWEEN STATIONS 11 AND 15 -- FOR PURPOSES OF COMPARISON ONLY BLADE TYPE 1

STREAM-LINE	INLET RADIUS	OUTLET RADIUS	CASCADE SOLIDITY	DIFF FACTOR	LOSS PARAMETER	DIFFUSION LOSS	BLADE ANGLE	INCIDENCE ANGLE	EXPANSION ANGLE	INLET M.NO	EXPANDED MACH NO	SHOCK LOSS	TOTAL LOSS
1	7.622	7.642	2.3590	.6162	.03159	.14965	0.000	0.000	0.000	0.000000	0.000000	0.00000	.14965
2	7.722	7.722	2.3824	.6242	.03415	.15471	0.000	0.000	0.000	0.000000	0.000000	0.00000	.15471
3	7.822	7.802	2.4064	.6329	.03717	.16064	0.000	0.000	0.000	0.000000	0.000000	0.00000	.16064
4	7.922	7.882	2.4317	.6429	.04086	.16807	0.000	0.000	0.000	0.000000	0.000000	0.00000	.16807
5	8.022	7.962	2.4589	.6549	.04549	.17746	0.000	0.000	0.000	0.000000	0.000000	0.00000	.17746
6	8.122	8.042	2.4889	.6699	.05147	.18977	0.000	0.000	0.000	0.000000	0.000000	0.00000	.18977
7	8.222	8.122	2.5227	.6894	.05931	.20586	0.000	0.000	0.000	0.000000	0.000000	0.00000	.20586
8	8.322	8.202	2.5599	.7133	.06892	.22566	0.000	0.000	0.000	0.000000	0.000000	0.00000	.22566

PROGRAM U01300 - COMPRESSOR DESIGN - ARBITRARY MEANLINE BLADE SECTION

TITLE	=STATOR BLADE DESIGN
NUMBER OF STREAMSURFACES	= 9
NUMBER OF STATIONS	= 7
NUMBER OF CONSTANT-Z PLANES	= 10
NUMBER OF BLADE DATA POINTS	= 1
NUMBER OF POINTS PER SEGMENT	= 15
NUMBER OF BLADES IN BLADE ROW	= 49
ISTAK	= 1
IRUNCH	= 0
IPLOT	= 0
IPRINT	= -0
ISPLIT	= -0
ILAST	= -3
RINNER	= 7.5000
ROUTER	= 9.6250
SCALE	= 1.0000
STACKX	= 0.0000
PLTSIZ	= 11.0000
LEADING EDGE STATION NUMBER	= 2
TRAILING EDGE STATION NUMBER	= 6
RADII SPECIFYING DEVIATION	= 1
RADII SPECIFYING INCIDENCE	= 1
SENSE OF ROTATION INDICATOR	= 1
DEVIATION CALCULATION INDEX	= 1
SHAPE FACTOR	= .7000
SOLIDITY TOLERANCE	= .0100

DEVIATION CURVE 1 NUMBER OF POINTS = 5 RADIUS = 0.0000

POINT	NORMALIZED MERIDIONAL CHORD	NORMALIZED DEVIATION DISTRIBUTION
1	0.0000	.1000
2	.2500	.1100
3	.5000	.1700
4	.7500	.3200
5	1.0000	1.0000

INCIDENCE AND EXTRA DEVIATION DISTRIBUTION

INLET RADIUS	INCIDENCE	EXTRA DEVIATION
0.0000	7.000	1.000

STREAMSURFACE GEOMETRY SPECIFICATION

COMPUTING STATION 1 NUMBER OF DESCRIBING POINTS= 5 IFANGS(1)= 0

DESCRIPTION X	R	STREAMLINE NUMBER	RADII	AIR ANGLE	DELTA PRESSURE
2.2250	7.5840	1	7.5840	53.4168	-0.0000
2.3350	7.8000	2	7.7140	52.8312	-0.0000
2.3950	8.0000	3	7.8479	52.3[illegible]	-0.0000
2.4080	8.2000	4	7.9868	52.1637	-0.0000
2.3500	8.4000	5	8.1319	52.5287	-0.0000
2.2250	8.6279	6	8.2801	53.3901	-0.0000
		7	8.4426	55.1533	-0.0000
		8	8.6279	60.1878	-0.0000

COMPUTING STATION 2 NUMBER OF DESCRIBING POINTS= 8 IFANGS(2)= 0

DESCRIPTION X	R	STREAMLINE NUMBER	RADII	AIR ANGLE	DELTA PRESSURE
2.5129	7.6272	1	7.6272	54.3994	-0.0000
2.6939	7.7472	2	7.7733	49.2323	-0.0000
2.8402	7.8770	3	7.9040	46.5472	-0.0000
2.9252	8.0049	4	8.0292	45.3565	-0.0000
2.9491	8.1427	5	8.1574	45.5533	-0.0000
2.8996	8.2473	6	8.2909	47.2130	-0.0000
2.7656	8.4401	7	8.4350	51.0375	-0.0000
2.5153	8.6114	8	8.6114	61.2904	-0.0000

COMPUTING STATION 3 NUMBER OF DESCRIBING POINTS= 8 IFANGS(3)= 0

DESCRIPTION X	R	STREAMLINE NUMBER	RADII	AIR ANGLE	DELTA PRESSURE
3.0459	7.7326	1	7.7326	29.2327	-0.0000
3.2061	7.8336	2	7.8368	30.8313	-0.0000
3.3114	7.9410	3	7.9458	31.5193	-0.0000
3.3759	8.0550	4	8.0599	31.7404	-0.0000
3.3931	8.1746	5	8.1804	31.9858	-0.0000
3.3560	8.2994	6	8.3040	32.3032	-0.0000
3.2554	8.4287	7	8.4324	33.4412	-0.0000
3.0679	8.5638	8	8.5638	35.1918	-0.0000

COMPUTING STATION 4 NUMBER OF DESCRIBING POINTS= 8 IFANGS(4)= 0

DESCRIPTION X	R	STREAMLINE NUMBER	RADII	AIR ANGLE	DELTA PRESSURE
3.6189	7.7467	1	7.7467	19.5493	-0.0000
3.7124	7.8456	2	7.8431	19.3390	-0.0000
3.7826	7.9538	3	7.9502	19.0898	-0.0000
3.8256	8.0686	4	8.0655	18.9942	-0.0000
3.8370	8.1885	5	8.1880	19.0934	-0.0000
3.8123	8.3126	6	8.3141	19.2527	-0.0000
3.7453	8.4397	7	8.4438	20.1294	-0.0000
3.6202	8.5692	8	8.5692	21.0521	-0.0000

COMPUTING STATION 5 NUMBER OF DESCRIBING POINTS= 8 IFANGS(5)= 0

DESCRIPTION X	R	STREAMLINE NUMBER	RADII	AIR ANGLE	DELTA PRESSURE
4.1721	7.7077	1	7.7077	6.7455	-0.0000
4.2187	7.8195	2	7.8159	6.5149	-0.0000
4.2534	7.9392	3	7.9315	6.3629	-0.0000
4.2753	8.0633	4	8.0543	6.3077	-0.0000
4.2810	8.1900	5	8.1826	6.3663	-0.0000
4.2687	8.3187	6	8.3142	6.4713	-0.0000
4.2351	8.4485	7	8.4489	6.9[illegible]5	-0.0000
4.1726	8.5797	8	8.5797	[illegible].3982	-0.0000

COMPUTING STATION 6 NUMBER OF DESCRIBING POINTS= 2 IFANGS(6)= 0

DESCRIPTION X	R	STREAMLINE NUMBER	RADII	AIR ANGLE	DELTA PRESSURE
4.7250	7.6819	1	7.6819	0.0000	-0.0000
4.7250	8.5891	2	7.7829	0.0000	-0.0000
		3	7.8946	0.0000	-0.0000
		4	8.0175	0.0000	-0.0000
		5	8.1495	0.0000	-0.0000
		6	8.2888	0.0000	-0.0000
		7	8.4346	0.0000	-0.0000
		8	8.5891	0.0000	-0.0000

COMPUTING STATION 7 NUMBER OF DESCRIBING POINTS= 2 IFANGS(7)= 0

DESCRIPTION X	R	STREAMLINE NUMBER	RADII	AIR ANGLE	DELTA PRESSURE
5.4000	7.6819	1	7.6819	0.0000	-0.0000
5.4000	8.5891	2	7.7800	0.0000	-0.0000
		3	7.8891	0.0000	-0.0000
		4	8.0103	0.0000	-0.0000
		5	8.1421	0.0000	-0.0000
		6	8.2826	0.0000	-0.0000
		7	8.4311	0.0000	-0.0000
		8	8.5891	0.0000	-0.0000

SECTION GEOMETRY SPECIFICATIONS

STREAMLINE NUMBER	SOLIDITY MODIFIER	LE RADIUS /CHORD	MAX THICK /CHORD	TE THICK /2*CHORD	POINT OF MAX THICK	X STACK OFFSET	Y STACK OFFSET
1.00	0.0000	.00500	.06000	.00500	.70000	0.000000	-0.000000

STREAMSURFACE 1 ITERATION 1 DEVIATION = 9.501 SOLIDITY = 2.5482
ITERATION 2 DEVIATION = 9.840 SOLIDITY = 2.4060
ITERATION 2 DEVIATION = 9.840 SOLIDITY = 2.4060

POINT NO.	[illegible]	Y	Y-0 (DEG)	Y-00	RAD OF CURV
1	[illegible]	[illegible]	51.399446	-3.[illegible]14	-1.2163
2	.017867	.021439	50.[illegible]631	-3.277394	-1.1157
3	.[illegible]714	.042582	49.6461[illegible]5	-3.[illegible]751	-1.[illegible]96
4	.053571	.063246	47.[illegible]819	-3.[illegible]173	-.9563
5	.071429	.083894	45.396927[illegible]	-3.254162	-.8876
6	.089286	.104456	43.725705	-3.[illegible]221	-.8332
7	.107143	.124863	42.[illegible]159	-3.[illegible]948	-.7887
8	.125000	.145056	4[illegible].[illegible]752	-2.[illegible]343	-.7536
9	.142857	.164998	39.45[illegible]727	-2.[illegible]7	-.7280
10	.160714	.184668	36.656[illegible]58	-2.[illegible]140	-.7121
11	.178571	.204071	34.[illegible]76832	-2.[illegible]41	-.7063
12	.196429	.223278	32.132979	-2.391[illegible]	-.7101
13	.214286	.242322	31.[illegible]852	-2.[illegible]549	-.7313
14	.232143	.[illegible]4	29.[illegible]2187	-1.[illegible]155	-.7677
15	.25[illegible]	.2[illegible]3	28.[illegible]574	-1.[illegible]332	-.8273
16	.267857	.2[illegible]170	27.[illegible]39	-1.[illegible]470	-.9132
17	.285714	.[illegible]16	25.[illegible]163	-1.[illegible]028	-1.[illegible]84
18	.303571	.[illegible]469	24.[illegible]460	-1.[illegible]36	-1.1448
19	.321429	.2615[illegible]	23.[illegible]643	-.[illegible]4	-1.2935
20	.339286	.2[illegible]4	23.[illegible]310	-.877821	-1.4633
21	.357143	.2[illegible]6	22.371179	-.[illegible]59	-1.[illegible]88
22	.375000	.2733[illegible]	21.[illegible]74	-.[illegible]16	-1.8375
23	.392857	.2[illegible]33	21.166140	-.[illegible]93	-2.[illegible]83
24	.410714	.2[illegible]62	21.[illegible]418	-.571893	-2.1336
25	.428571	.2[illegible]4	20.[illegible]35	-.[illegible]07	-2.1861
26	.446429	.2[illegible]47	19.[illegible]61	-.[illegible]446	-2.1[illegible]9
27	.464286	.[illegible]29	19.[illegible]4	-.[illegible]131	-2.[illegible]31
28	.482143	.[illegible]13	18.[illegible]19	-.[illegible]79	-1.[illegible]53
29	.[illegible]	.[illegible]19	17.946731	-.705174	-1.6470
30	.517857	.[illegible]1	17.[illegible].1	-.[illegible]219	-1.4546
31	.[illegible]14	.[illegible]37	16.[illegible]93	-.[illegible]71	-1.[illegible]41
32	.553571	.[illegible]4	16.[illegible]2[illegible]	-.[illegible]44	-1.[illegible]49
33	.571429	.[illegible]93	14.716629	-.[illegible]35	-1.1198
34	.[illegible]6	.[illegible]13	13.[illegible]15	-1.[illegible]44	-1.[illegible]28
35	.[illegible]43	.[illegible]17	12.[illegible]31	-1.[illegible]7[illegible]	-1.[illegible]2
36	.[illegible]0	.[illegible]59	11.[illegible]18	-1.[illegible]14	-.9896
37	.[illegible]7	.[illegible]73	11.[illegible]67	-1.[illegible]33	-.9296
38	.[illegible]14	.[illegible]14	[illegible].41[illegible]74	-1.[illegible]49	-.9066
39	.[illegible]71	.[illegible]30	8.[illegible]60	-1.[illegible]56	-.8928
40	.[illegible]29	.[illegible]39	7.[illegible]91	-1.[illegible]66	-.8867
41	.714286	.[illegible]78	5.[illegible]42	-1.[illegible]98	-.8883
42	.[illegible]43	.[illegible]13	4.[illegible]17	-1.[illegible]48	-.8979
43	.[illegible]	.[illegible]39	[illegible].[illegible]31	-1.[illegible]15	-.9150
44	.767857	.[illegible]36	2.[illegible]24	-1.[illegible]97	-.9395
45	.[illegible]14	.[illegible]32	1.[illegible]14	-1.[illegible]20	-.9674
46	.[illegible]71	.[illegible]16	.[illegible]09	-1.[illegible]38	-.9875
47	.[illegible]29	.[illegible]88	-.[illegible]72	-.[illegible]41	-1.[illegible]16
48	.[illegible]86	.[illegible]4	-1.[illegible]9	-.[illegible]30	-1.0353
49	.[illegible]43	.[illegible]1	-2.[illegible]43	-.[illegible]55	-1.[illegible]9
50	.[illegible]	.[illegible]7	-3.[illegible]55	-.[illegible]64	-1.[illegible]9
51	.[illegible]7	.[illegible]6	-4.[illegible]4	-.[illegible]39	-1.1522
52	.[illegible]14	.[illegible]2	-5.[illegible]2	-.[illegible]40	-1.1222
53	.[illegible]71	.[illegible]1	-6.[illegible]5	-.[illegible]56	-1.[illegible]7
54	.[illegible]29	.[illegible]6	-7.[illegible]8	-.[illegible]57	-1.1575
55	.964286	.[illegible]7	-8.[illegible]22	-.[illegible]43	-1.1723
56	.982143	.[illegible]8	-8.[illegible]4	-.[illegible]15	-1.1850
57	1.[illegible]	.[illegible]4	-9.[illegible]3	-.[illegible]73	-1.1955

DATA POINTS

1	0.[illegible]	51.399446
2	.253123	29.144977
3	.[illegible]3	17.[illegible]2
4	.751196	[illegible].577409
5	1.[illegible]	-9.843073

STREAMSURFACE GEOMETRY ON STREAMLINE NUMBER 1

BETA1 = 51.399 (BLADE INLET ANGLE.)
BETA2 = -9.840 (BLADE OUTLET ANGLE.)
YZERO = .00500 (BLADE LEADING EDGE RADIUS AS A FRACTION OF CHORD.)
T = .15000 (BLADE MAXIMUM THICKNESS AS A FRACTION OF CHORD.)
YONE = .00500 (BLADE TRAILING EDGE HALF-THICKNESS AS A FRACTION OF CHORD.)
Z = .7000 (LOCATION OF MAXIMUM THICKNESS AS A FRACTION OF MEAN LINE.)
CORD = 2.2252 (MERIDIONAL CHORD OF SECTION.)

NORMALISED RESULTS - ALL THE FOLLOWING REFER TO BLADE HAVING A MERIDIONAL CHORD PROJECTION OF UNITY

BL OF CHORD = 1.0595

STAGGER ANGLE = 19.487

CAMBER ANGLE = 61.240

SECTION AREA = .05002

LOCATION OF CENTROID RELATIVE TO LEADING EDGE

XBAR = .52189
YBAR = .29204

SECOND MOMENTS OF AREA ABOUT CENTROID

IX = .00378
IY = .00315
IXY = .00100

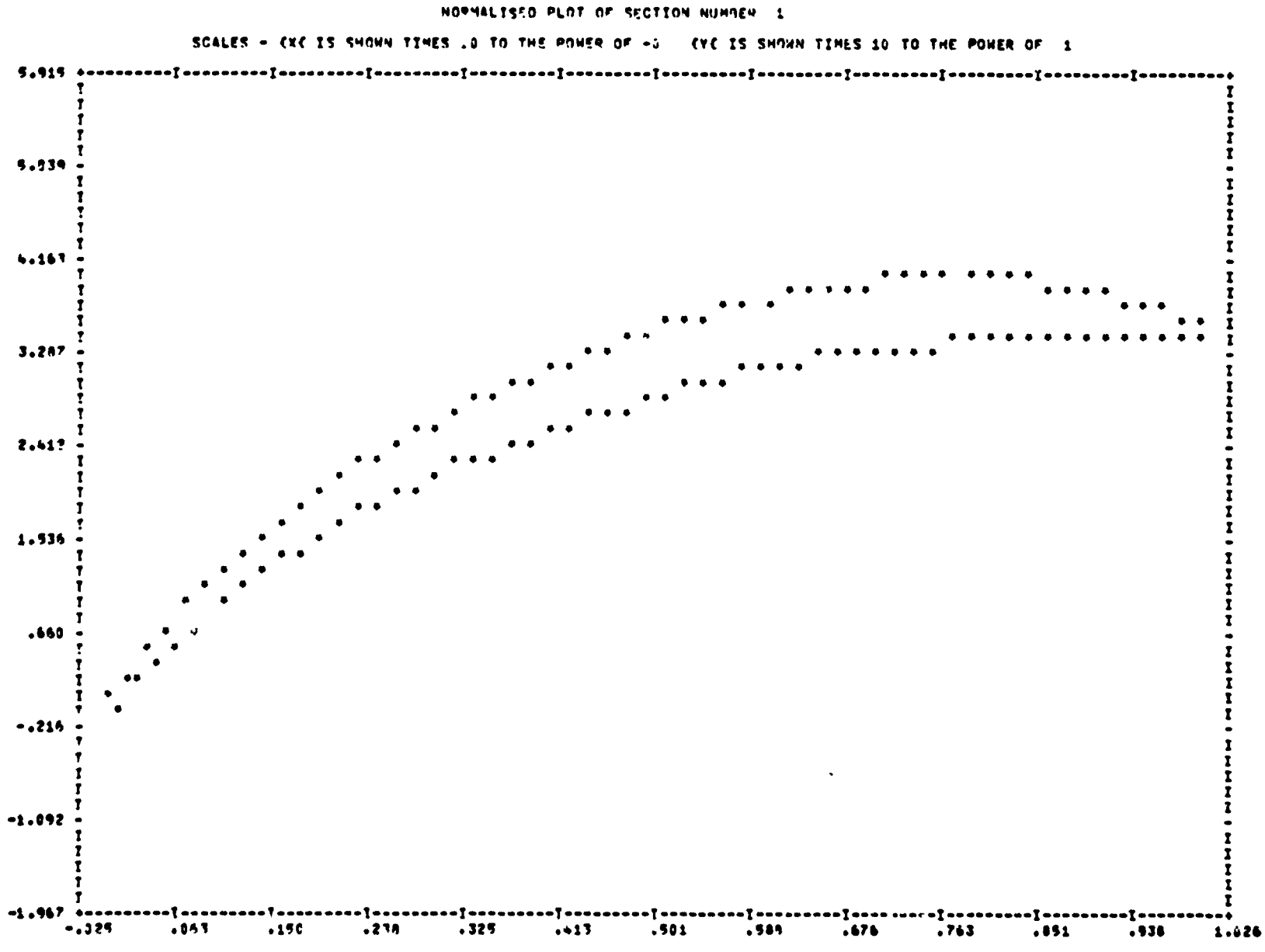
ANGLE OF INCLINATION OF (ONE) PRINCIPAL AXIS TO (XC AXIS = 17.847

PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

IPX = .00006 (AT 17.847 WITH (XC AXIS)
IPY = .00347 (AT 17.847 WITH (YC AXIS)

POINT NUMBER	MEAN LINE DATA X	Y	ANGLE	THICKNESS	SURFACE COORDINATE DATA X1	Y1	X2	Y2
1	.00530	.00000	51.399	.01059	.00116	.00330	.00944	-.00330
2	.02304	.02169	51.012	.01347	.01744	.02602	.02820	.01737
3	.04079	.04232	48.546	.01424	.03471	.04770	.04688	.03694
4	.05854	.06188	47.054	.01406	.05161	.06834	.06547	.05542
5	.07628	.08139	45.397	.02156	.06841	.09796	.08336	.07282
6	.09403	.09787	43.726	.02476	.08571	.11657	.10235	.08918
7	.11179	.11435	42.012	.02645	.10292	.12418	.12063	.10452
8	.12952	.12995	40.239	.02877	.12023	.14083	.13882	.11886
9	.14727	.14440	38.461	.03099	.13761	.15653	.15691	.13226
10	.16501	.15904	36.456	.03312	.15513	.17133	.17490	.14476
11	.18276	.17283	34.876	.03514	.17271	.18525	.19281	.15640
12	.20051	.18580	33.177	.03712	.19038	.19834	.21065	.16726
13	.21825	.19801	31.453	.03900	.20809	.21064	.22843	.17738

POINT NUMBER	MEANLINE DATA X	Y	ANGLE	THICKNESS	SURFACE COORDINATE DATA X1	Y1	X2	Y2
14	.23800	.20433	29.462	.04082	.22544	.22222	.24616	.18684
15	.25375	.21441	28.389	.04253	.24364	.23312	.26386	.19570
16	.27149	.22373	27.257	.04419	.26144	.24341	.28154	.20406
17	.28924	.23256	25.870	.04579	.27925	.25316	.29923	.21196
18	.30699	.24096	24.820	.04732	.29705	.26244	.31692	.21949
19	.32473	.24907	23.897	.04879	.31485	.27133	.33461	.22669
20	.34249	.25671	23.085	.05014	.33264	.27979	.35232	.23362
21	.36023	.26414	22.371	.05153	.35042	.28796	.37003	.24031
22	.37797	.27132	21.737	.05281	.36819	.29585	.38775	.24680
23	.39572	.27830	21.166	.05403	.38596	.30349	.40547	.25311
24	.41346	.28507	20.639	.05517	.40374	.31089	.42319	.25926
25	.43121	.29167	20.135	.05626	.42153	.31808	.44089	.26526
26	.44896	.29809	19.635	.05727	.43933	.32506	.45858	.27112
27	.46670	.30433	19.118	.05822	.45717	.33183	.47624	.27683
28	.48445	.31039	18.562	.05909	.47504	.33839	.49385	.28238
29	.50220	.31624	17.947	.05989	.49297	.34473	.51142	.28775
30	.51994	.32187	17.252	.06061	.51095	.35082	.52893	.29293
31	.53769	.32725	16.479	.06126	.52900	.35663	.54638	.29789
32	.55544	.33236	15.630	.06183	.54711	.36214	.56377	.30259
33	.57319	.33719	14.717	.06233	.56527	.36732	.58110	.30704
34	.59093	.34158	13.743	.06274	.58349	.37215	.59838	.31121
35	.60867	.34585	12.718	.06307	.60173	.37661	.61562	.31509
36	.62642	.34969	11.649	.06332	.62003	.38069	.63281	.31868
37	.64417	.35317	10.543	.06348	.63836	.38437	.64997	.32196
38	.66191	.35629	9.410	.06356	.65672	.38764	.66711	.32494
39	.67966	.35905	8.259	.06355	.67511	.39050	.68422	.32760
40	.69741	.36144	7.097	.06344	.69349	.39292	.70133	.32996
41	.71515	.36347	5.936	.06319	.71189	.39489	.71842	.33204
42	.73290	.36513	4.785	.06276	.73028	.39640	.73552	.33387
43	.75065	.36644	3.652	.06211	.74867	.39744	.75262	.33545
44	.76839	.36740	2.549	.06122	.76703	.39798	.76975	.33682
45	.78614	.36802	1.472	.06005	.78537	.39804	.78691	.33801
46	.80388	.36832	.422	.05856	.80367	.39760	.80410	.33904
47	.82163	.36829	-.601	.05672	.82193	.39665	.82133	.33993
48	.83938	.36795	-1.601	.05449	.84014	.39518	.83862	.34072
49	.85712	.36730	-2.579	.05182	.85829	.39319	.85596	.34141
50	.87487	.36635	-3.537	.04870	.87637	.39065	.87337	.34205
51	.89262	.36511	-4.476	.04509	.89439	.38759	.89086	.34264
52	.91036	.36357	-5.400	.04091	.91229	.38394	.90844	.34321
53	.92811	.36175	-6.309	.03617	.93010	.37973	.92612	.34378
54	.94586	.35965	-7.205	.03081	.94779	.37493	.94392	.34437
55	.96360	.35727	-8.091	.02479	.96535	.36954	.96186	.34500
56	.98135	.35461	-8.969	.01806	.98276	.36353	.97994	.34568
57	.99909	.35167	-9.840	.01059	1.00000	.35688	.99819	.34645


NORMALISED PLOT OF SECTION NUMBER 1
SCALES - (X(IS SHOWN TIMES .0 TO THE POWER OF -3 (Y(IS SHOWN TIMES 10 TO THE POWER OF 1
5.915
5.039
4.163
3.287
2.411
1.536
.660
-.216
-1.092
-1.967
-.329
.063
.150
.238
.325
.413
.501
.589
.676
.763
.851
.938
1.026

DIMENSIONAL RESULTS - ALL RESULTS REFER TO A BLADE OF SPECIFIED CHORD

BLADE CHORD = 2.3[illegible]E+00

L.E.RADIUS = 1.17[illegible]E-02 CENTERED AT X= -2.21336E+00 Y= -7.A[illegible]

SECTION AREA = 2.47[illegible]E-01

SECOND MOMENTS OF AREA ABOUT CENTROID

IX = 9.4[illegible]E-03
IY = 7.7[illegible]E-02
IXY = 2.4[illegible]E-02

PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

I2Y = 1.54[illegible]E-01 (AT 17.947 WITH (YC AXIS)
I2X = 8.51[illegible]E-02 (AT 17.947 WITH (YC AXIS)

PT NO	SURFACE-----ONE X	Y	SURFACE-----TWO X	Y	PT NO	SURFACE-----ONE X	Y	SURFACE-----TWO X	Y
1	-2.[illegible]E+00	-7.[illegible]E-01	-2.[illegible]E+00	-7.[illegible]E-01	2	-2.[illegible]E+00	-7.24[illegible]E-01	-2.15[illegible]E+00	-7.[illegible]E-01
3	-2.[illegible]E+00	-6.[illegible]E-01	-2.[illegible]E+00	-7.[illegible]E-01	4	-2.[illegible]E+00	-6.[illegible]E-01	-2.[illegible]E+00	-6.[illegible]E-01
5	-2.[illegible]E+00	-5.[illegible]E-01	-2.[illegible]E+00	-6.[illegible]E-01	6	-2.[illegible]E+00	-5.[illegible]E-01	-1.[illegible]E+00	-5.[illegible]E-01
7	-1.[illegible]E+00	-5.[illegible]E-01	-1.[illegible]E+00	-5.[illegible]E-01	8	-1.95[illegible]E+00	-4.[illegible]E-01	-1.91[illegible]E+00	-4.[illegible]E-01
9	-1.[illegible]E+00	-4.[illegible]E-01	-1.[illegible]E+00	-4.[illegible]E-01	10	-1.[illegible]E+00	-4.[illegible]E-01	-1.[illegible]E+00	-4.[illegible]E-01
11	-1.[illegible]E+00	-3.[illegible]E-01	-1.[illegible]E+00	-4.[illegible]E-01	12	-1.[illegible]E+00	-3.[illegible]E-01	-1.[illegible]E+00	-4.[illegible]E-01
13	-1.[illegible]E+00	-3.[illegible]E-01	-1.[illegible]E+00	-3.[illegible]E-01	14	-1.[illegible]E+00	-2.[illegible]E-01	-1.[illegible]E+00	-3.[illegible]E-01
15	-1.[illegible]E+00	-2.[illegible]E-01	-1.[illegible]E+00	-3.[illegible]E-01	16	-1.[illegible]E+00	-2.[illegible]E-01	-1.[illegible]E+00	-3.[illegible]E-01
17	-1.[illegible]E+00	-2.[illegible]E-01	-1.[illegible]E+00	-3.[illegible]E-01	18	-1.[illegible]E+00	-1.[illegible]E-01	-1.[illegible]E+00	-2.[illegible]E-01
19	-1.[illegible]E+00	-1.[illegible]E-01	-1.[illegible]E+00	-2.[illegible]E-01	20	-1.[illegible]E+00	-1.[illegible]E-01	-1.[illegible]E+00	-2.[illegible]E-01
21	-1.[illegible]E+00	-1.[illegible]E-01	-1.[illegible]E+00	-2.[illegible]E-01	22	-1.[illegible]E+00	-1.[illegible]E-01	-1.[illegible]E+00	-2.[illegible]E-01
23	-1.[illegible]E+00	-1.[illegible]E-01	-1.[illegible]E+00	-2.[illegible]E-01	24	-1.[illegible]E+00	-9.[illegible]E-02	-1.[illegible]E+00	-2.[illegible]E-01
25	-1.[illegible]E+00	-7.[illegible]E-02	-1.[illegible]E+00	-1.[illegible]E-01	26	-1.[illegible]E+00	-5.[illegible]E-02	-1.[illegible]E+00	-1.[illegible]E-01
27	-1.[illegible]E+00	-4.[illegible]E-02	-1.[illegible]E+00	-1.[illegible]E-01	28	-1.[illegible]E+00	-2.[illegible]E-02	-1.[illegible]E+00	-1.[illegible]E-01
29	-1.[illegible]E+00	-1.[illegible]E-02	-1.[illegible]E+00	-1.[illegible]E-01	30	-1.[illegible]E+00	-1.[illegible]E-03	-1.[illegible]E+00	-1.[illegible]E-01
31	-1.[illegible]E+00	1.[illegible]E-02	-1.[illegible]E+00	-1.[illegible]E-01	32	-1.[illegible]E+00	2.[illegible]E-02	-9.[illegible]E-01	-1.[illegible]E-01
33	-9.[illegible]E-01	3.[illegible]E-02	-9.[illegible]E-01	-9.[illegible]E-02	34	-9.[illegible]E-01	4.[illegible]E-02	-8.[illegible]E-01	-9.[illegible]E-02
35	-8.[illegible]E-01	5.[illegible]E-02	-8.[illegible]E-01	-8.[illegible]E-02	36	-8.[illegible]E-01	6.[illegible]E-02	-8.[illegible]E-01	-7.[illegible]E-02
37	-8.[illegible]E-01	7.[illegible]E-02	-7.[illegible]E-01	-6.[illegible]E-02	38	-7.[illegible]E-01	8.[illegible]E-02	-7.[illegible]E-01	-5.[illegible]E-02
39	-7.[illegible]E-01	8.[illegible]E-02	-7.[illegible]E-01	-5.[illegible]E-02	40	-6.[illegible]E-01	9.[illegible]E-02	-6.[illegible]E-01	-4.[illegible]E-02
41	-6.[illegible]E-01	9.[illegible]E-02	-6.[illegible]E-01	-4.[illegible]E-02	42	-5.[illegible]E-01	9.[illegible]E-02	-5.[illegible]E-01	-3.[illegible]E-02
43	-5.[illegible]E-01	1.[illegible]E-01	-5.[illegible]E-01	-3.[illegible]E-02	44	-5.[illegible]E-01	1.[illegible]E-01	-5.[illegible]E-01	-3.[illegible]E-02
45	-4.[illegible]E-01	1.[illegible]E-01	-4.[illegible]E-01	-3.[illegible]E-02	46	-4.[illegible]E-01	1.[illegible]E-01	-4.[illegible]E-01	-2.[illegible]E-02
47	-3.[illegible]E-01	1.[illegible]E-01	-3.[illegible]E-01	-2.[illegible]E-02	48	-3.[illegible]E-01	1.[illegible]E-01	-3.[illegible]E-01	-2.[illegible]E-02
49	-3.[illegible]E-01	9.[illegible]E-02	-3.[illegible]E-01	-2.[illegible]E-02	50	-2.[illegible]E-01	8.[illegible]E-02	-2.[illegible]E-01	-2.[illegible]E-02
51	-2.[illegible]E-01	7.[illegible]E-02	-2.[illegible]E-01	-2.[illegible]E-02	52	-1.[illegible]E-01	7.[illegible]E-02	-2.[illegible]E-01	-1.[illegible]E-02
53	-1.[illegible]E-01	6.[illegible]E-02	-1.[illegible]E-01	-1.[illegible]E-02	54	-1.[illegible]E-01	5.[illegible]E-02	-1.[illegible]E-01	-1.[illegible]E-02
55	-7.71[illegible]E-02	3.[illegible]E-02	-8.[illegible]E-02	-1.[illegible]E-02	56	-3.[illegible]E-02	2.[illegible]E-02	-4.[illegible]E-02	-1.[illegible]E-02

POINTS DESCRIBING LEADING EDGE RADIUS

POINT NO.	X	Y
1	-2.20415E+00	-7.89863E-01
2	-2.20497E+00	-7.90785E-01
3	-2.20588E+00	-7.91617E-01
4	-2.20687E+00	-7.92349E-01
5	-2.20794E+00	-7.92974E-01
6	-2.20906E+00	-7.93483E-01
7	-2.21023E+00	-7.93873E-01
8	-2.21144E+00	-7.94138E-01
9	-2.21266E+00	-7.94275E-01
10	-2.21390E+00	-7.94284E-01
11	-2.21513E+00	-7.94163E-01
12	-2.21633E+00	-7.93915E-01
13	-2.21751E+00	-7.93542E-01
14	-2.21864E+00	-7.93048E-01
15	-2.21971E+00	-7.92439E-01
16	-2.22072E+00	-7.91721E-01
17	-2.22164E+00	-7.90901E-01
18	-2.22247E+00	-7.89990E-01
19	-2.22320E+00	-7.88997E-01
20	-2.22383E+00	-7.87933E-01
21	-2.22434E+00	-7.86809E-01
22	-2.22473E+00	-7.85639E-01
23	-2.22499E+00	-7.84434E-01
24	-2.22513E+00	-7.83207E-01
25	-2.22514E+00	-7.81974E-01
26	-2.22502E+00	-7.80746E-01
27	-2.22477E+00	-7.79537E-01
28	-2.22440E+00	-7.78361E-01
29	-2.22390E+00	-7.77230E-01
30	-2.22329E+00	-7.76158E-01
31	-2.22257E+00	-7.75154E-01

CARTESIAN COORDINATES ON STREAMSURFACE 1

POINT NO	Z1	X1	Y1	Z2	X2	Y2
1	6.94093E+00	-2.20238E+00	-7.76174E-01	6.94184E+00	-2.18412E+00	-7.90154E-01
2	6.95147E+00	-2.16549E+00	-7.25119E-01	6.95255E+00	-2.14274E+00	-7.44202E-01
3	6.96137E+00	-2.12842E+00	-6.76991E-01	6.96268E+00	-2.10155E+00	-7.00727E-01
4	6.97075E+00	-2.09114E+00	-6.31129E-01	6.97227E+00	-2.06057E+00	-6.59661E-01
5	6.97956E+00	-2.05365E+00	-5.87518E-01	6.98137E+00	-2.01990E+00	-6.20942E-01
6	6.98814E+00	-2.01594E+00	-5.46092E-01	6.99002E+00	-1.97926E+00	-5.84496E-01
7	6.99626E+00	-1.97799E+00	-5.06840E-01	6.99827E+00	-1.93895E+00	-5.50307E-01
8	7.00403E+00	-1.93983E+00	-4.69726E-01	7.00616E+00	-1.89885E+00	-5.18332E-01
9	7.01150E+00	-1.90146E+00	-4.34707E-01	7.01373E+00	-1.85896E+00	-4.88454E-01
10	7.01870E+00	-1.86288E+00	-4.01754E-01	7.02100E+00	-1.81928E+00	-4.60563E-01
11	7.02567E+00	-1.82412E+00	-3.70641E-01	7.02802E+00	-1.77979E+00	-4.34567E-01
12	7.03243E+00	-1.78519E+00	-3.41415E-01	7.03481E+00	-1.74046E+00	-4.10371E-01
13	7.03900E+00	-1.74613E+00	-3.13957E-01	7.04141E+00	-1.70126E+00	-3.87819E-01
14	7.04542E+00	-1.70696E+00	-2.88147E-01	7.04784E+00	-1.66217E+00	-3.66727E-01
15	7.05169E+00	-1.66773E+00	-2.63849E-01	7.05414E+00	-1.62314E+00	-3.46968E-01
16	7.05783E+00	-1.62847E+00	-2.40911E-01	7.06031E+00	-1.58414E+00	-3.28399E-01
17	7.06386E+00	-1.58920E+00	-2.19209E-01	7.06640E+00	-1.54515E+00	-3.10838E-01

POINT NO	X1	Y1	Z1	X2	Y2
18	7.[illegible]E+00	-1.6[illegible]E+00	-1.[illegible]E-01	7.[illegible]E+00	-1.[illegible]E+00	-2.94117E-01
19	7.[illegible]E+00	-1.[illegible]E+00	-1.[illegible]E-01	7.07934E+00	-1.46717E+00	-2.78130E-01
20	7.08143E+00	-1.47148E+00	-1.63[illegible]E-01	7.08422E+00	-1.42859E+00	-2.62770E-01
21	7.[illegible]E+00	-1.43[illegible]E+00	-1.41[illegible]E-01	7.09165E+00	-1.39903E+00	-2.47954E-01
22	7.[illegible]E+00	-1.39[illegible]E+00	-1.24[illegible]E-01	7.09683E+00	-1.34936E+00	-2.33576E-01
23	7.[illegible]E+00	-1.35[illegible]E+00	-1.07[illegible]E-01	7.10157E+00	-1.31089E+00	-2.19590E-01
24	7.[illegible]E+00	-1.31[illegible]E+00	-9.1[illegible]E-02	7.10728E+00	-1.27183E+00	-2.05[illegible]E-01
25	7.[illegible]E+00	-1.27[illegible]E+00	-7.5[illegible]E-02	7.11294E+00	-1.23279E+00	-1.9[illegible]E-01
26	7.[illegible]E+00	-1.23[illegible]E+00	-5.96[illegible]E-02	7.11966E+00	-1.19379E+00	-1.79[illegible]E-01
27	7.[illegible]E+00	-1.19[illegible]E+00	-4.45[illegible]E-02	7.12435E+00	-1.15496E+00	-1.66[illegible]E-01
28	7.[illegible]E+00	-1.15[illegible]E+00	-2.99[illegible]E-02	7.12959E+00	-1.11631E+00	-1.54435E-01
29	7.[illegible]E+00	-1.11[illegible]E+00	-1.53[illegible]E-02	7.13[illegible]E+00	-1.07728E+00	-1.42681E-01
30	7.13649E+00	-1.07811E+00	-2.36[illegible]E-03	7.14034E+00	-1.03967E+00	-1.31155E-01
31	7.14196E+00	-1.03[illegible]E+00	1.[illegible]E-02	7.14576E+00	-1.0[illegible]E+00	-1.2[illegible]E-01
32	7.14794E+00	-9.94[illegible]E-01	2.[illegible]E-02	7.15141E+00	-9.61966E-01	-1.09596E-01
33	7.15[illegible]E+00	-9.[illegible]E-01	3.44[illegible]E-02	7.15[illegible]E+00	-9.23648[illegible]E-01	-9.96636E-02
34	7.15[illegible]E+00	-9.14[illegible]E-01	4.[illegible]E-02	7.16[illegible]E+00	-8.85[illegible]E-01	-9.33241E-02
35	7.16[illegible]E+00	-8.74[illegible]E-01	5.51044E-02	7.16[illegible]E+00	-8.47[illegible]E-01	-8.[illegible]E-02
36	7.16[illegible]E+00	-8.3[illegible]E-01	6.43[illegible]E-02	7.17[illegible]E+00	-8.09[illegible]E-01	-7.36[illegible]E-02
37	7.17[illegible]E+00	-7.93[illegible]E-01	7.37[illegible]E-02	7.17[illegible]E+00	-7.71[illegible]E-01	-6.62433E-02
38	7.17[illegible]E+00	-7.54[illegible]E-01	7.93[illegible]E-02	7.18[illegible]E+00	-7.33[illegible]E-01	-5.95513E-02
39	7.18[illegible]E+00	-7.16[illegible]E-01	8.63[illegible]E-02	7.19[illegible]E+00	-6.96[illegible]E-01	-5.35719E-02
40	7.19[illegible]E+00	-6.75[illegible]E-01	9.17[illegible]E-02	7.19[illegible]E+00	-6.58556E-01	-4.82481E-02
41	7.19[illegible]E+00	-6.35[illegible]E-01	9.69[illegible]E-02	7.19[illegible]E+00	-6.2[illegible]E-01	-4.35916E-02
42	7.[illegible]E+00	-5.94[illegible]E-01	9.96[illegible]E-02	7.20[illegible]E+00	-5.82[illegible]E-01	-3.94665E-02
43	7.[illegible]E+00	-5.54[illegible]E-01	1.01[illegible]E-01	7.20[illegible]E+00	-5.45447E-01	-3.54995E-02
44	7.[illegible]E+00	-5.[illegible]E-01	1.[illegible]E-01	7.21[illegible]E+00	-5.07679E-01	-3.24413E-02
45	7.[illegible]E+00	-4.73[illegible]E-01	1.03[illegible]E-01	7.21[illegible]E+00	-4.69[illegible]E-01	-3.01[illegible]E-02
46	7.[illegible]E+00	-4.33[illegible]E-01	1.0[illegible]E-01	7.22[illegible]E+00	-4.31[illegible]E-01	2.77761E-02
47	7.[illegible]E+00	-3.[illegible]E-01	1.01[illegible]E-01	7.22[illegible]E+00	-3.93[illegible]E-01	-2.57579E-02
48	7.23[illegible]E+00	-3.[illegible]E-01	9.71[illegible]E-02	7.23[illegible]E+00	-3.55[illegible]E-01	-2.41[illegible]E-02
49	7.23[illegible]E+00	-3.12[illegible]E-01	9.27[illegible]E-02	7.23[illegible]E+00	-3.17[illegible]E-01	-2.[illegible]E-02
50	7.24[illegible]E+00	-2.72[illegible]E-01	8.71[illegible]E-02	7.24[illegible]E+00	-2.79[illegible]E-01	-2.[illegible]E-02
51	7.25[illegible]E+00	-2.32[illegible]E-01	8.[illegible]E-02	7.25[illegible]E+00	-2.40652E-01	-1.96[illegible]E-02
52	7.27[illegible]E+00	-1.93[illegible]E-01	7.22[illegible]E-02	7.25[illegible]E+00	-2.01[illegible]E-01	-1.83[illegible]E-02
53	7.27[illegible]E+00	-1.54[illegible]E-01	6.[illegible]E-02	7.26[illegible]E+00	-1.62496E-01	-1.71045E-02
54	7.27[illegible]E+00	-1.14[illegible]E-01	5.[illegible]E-02	7.26[illegible]E+00	-1.23644E-01	-1.57641E-02
55	7.27[illegible]E+00	-7.44[illegible]E-02	4.[illegible]E-02	7.27116E+00	-8.41011E-02	-1.43719E-02
56	7.27[illegible]E+00	-3.[illegible]E-02	2.68217E-02	7.27656E+00	-4.4230[illegible]E-02	-1.28926E-02
57	7.28255E+00	[illegible].84217E-14	1.19478E-02	7.28201E+00	-1.99232E-03	-1.12605E-02

POINT NO	XSEMI	YSEMI
1	6.94194E+00	-2.19412E+00	-7.90154E-01
2	6.94162E+00	-2.19407E+00	-7.91007E-01
3	6.94140E+00	-2.19[illegible]E+00	-7.91057E-01
4	6.94118E+00	-2.19[illegible]E+00	-7.92710E-01
5	6.94034E+00	-2.19[illegible]E+00	-7.93377E-01
6	6.94[illegible]E+00	-2.19[illegible]E+00	-7.93[illegible]E-01
7	6.94[illegible]E+00	-2.19[illegible]E+00	-7.94350E-01
8	6.94[illegible]E+00	-2.19[illegible]E+00	-7.94[illegible]E-01
9	6.94[illegible]E+00	-2.19[illegible]E+00	-7.94[illegible]E-01
10	6.93[illegible]E+00	-2.19[illegible]E+00	-7.94[illegible]E-01
11	6.93[illegible]E+00	-2.19409E+00	-7.94[illegible]E-01
12	6.93969E+00	-2.19[illegible]E+00	-7.94402E-01
13	6.93954E+00	-2.19[illegible]E+00	-7.94272E-01
14	6.93946E+00	-2.19[illegible]E+00	-7.93920E-01
15	6.93938E+00	-2.19954E+00	-7.93251E-01

POINT NO	ZSEMI	XSEMI	YSEMI
16	6.93933E+00	-2.20053E+00	-7.92572E-01
17	6.93939E+00	-2.20145E+00	-7.91789E-01
18	6.93934E+00	-2.20227E+00	-7.90912E-01
19	6.93929E+00	-2.20310E+00	-7.89951E-01
20	6.93932E+00	-2.20362E+00	-7.88914E-01
21	6.93933E+00	-2.20412E+00	-7.87815E-01
22	6.93946E+00	-2.20451E+00	-7.86665E-01
23	6.93956E+00	-2.20477E+00	-7.85477E-01
24	6.93967E+00	-2.20491E+00	-7.84263E-01
25	6.93981E+00	-2.20491E+00	-7.83077E-01
26	6.93997E+00	-2.20490E+00	-7.81913E-01
27	6.94013E+00	-2.20455E+00	-7.80604E-01
28	6.94032E+00	-2.20418E+00	-7.79422E-01
29	6.94051E+00	-2.20369E+00	-7.78282E-01
30	6.94072E+00	-2.20309E+00	-7.77195E-01
31	6.94093E+00	-2.20239E+00	-7.76174E-01

4. DISCUSSION OF EXAMPLE B

This example uses only the aerodynamic section of the program, and demonstrates the turbulent mixing calculation and the blade wake transfer calculation. The machine for which the computation is made is the so-called NACA Five-Stage Compressor that is described in References 2 and 3. A conventional multi-stage analysis calculation is set up, with a computing station at each blade edge (that is, there are two stations between each blade row). For each of the ten blade rows in the machine, fixed relative outlet flow angle and (two-dimensional) loss coefficient distributions are specified. The distributions are ones that describe well the performance of the blade rows at an operating point in the viscinity of the machine's design point, except that the loss coefficients do not reflect any variation in blade section performance with blade section location. In practical terms, this means that no additional rotor tip losses are incorporated. The wake transfer analysis was developed to account for migration of boundary layer material and is therefore applicable to the diffusion loss component of the relative total pressure loss coefficients. However, the subject compressor operates transonically in all stages at design speed, and so the rotor loss coefficients in the input data generally include a shock loss component in addition to the diffusion loss component. The input data item that controls the wake transfer rate, CONTR, is set to 1.0. The value is probably lower than it should be, and this compensates to some extent for the fact that (for the rotors) the whole loss coefficient is being manipulated instead of just the diffusion loss portion thereof. The input eddy viscosity, CONMX, is set to 2.0 ft^2/sec which is higher than the probable correct value.

A listing of the input data cards is shown in the next sub section, and the corresponding output from the program follows. The program has computed the results with difficulty, although just a few more iterations are apparently required for total convergence. With a final IVFAIL of 5 and final IFFAIL of 0, the result may be taken to be converged for most practical purposes. The following points should be noted when examining the results. When wake transfer calculations are made, the loss coefficients shown in the results differ from those in the input. When turbulent mixing calculations are made, the loss coefficients shown in the results differ from those in the input and efficiencies computed for streamlines may take on apparently impossible values because both of these parameters are computed from conditions on "streamlines".

It is of some interest to examine the effects of the wake transfer and mixing calculations upon the computed compressor performance, and shown below are some performance parameters for the four possible calculation modes involving (or not involving) wake transfer and mixing. The final station (outlet) total temperature difference between casing and hub streamlines is shown as indicative of the effects of the various calculations

upon the distributions of properties of the flow. All computations were made with identical data, except that the input data items NTRANS and NMIX were varied as shown.

NTRANS	NMIX	Total Pressure Ratio	Isentropic Efficiency	(T case - T hub) at outlet, deg.
0	0	5.188	.8313	40.9
0	1	5.264	.8341	3.9
1	0	4.524	.8073	259.4
1	1	4.512	.8086	194.8

It is apparent that the wake transfer calculation can drastically effect the machine overall performance and the distribution of properties of the flow. Also, the mixing calculation had considerably less effect on the overall performance, but did modify the distributions appreciably. It should be recalled that the calculations were somewhat simplified in that the relative outlet angles and base (two-dimensional) loss coefficients were fixed throughout.

Some final notes are given, as follows.

1) Correlation of empirical and computed results is needed to establish appropriate vales for the wake transfer rate constant, CONTR, and the eddy inviscosity, CONMX.

2) In order to correctly apply the wake transfer calculation to transonic blade rows the computer program should be modified so that shock and diffusion loss coefficient components may be separately manipulated.

3) If it is desired to use the wake transfer calculation when computing stations are located within blade rows, the program will need modification. Probably the only change would be to replace I-1 with I + NLI (I) (separately computed) wherever it occurs in the call statement starting on card AR. 225.

4) Both the wake transfer and mixing calculations substantially increase computation time. For a fixed number of iterations, each of these options taken separately increases computation time by a factor of approximately three, and taken together by a factor of approximately six. In the case of the wake transfer calculation option, taken above or with the mixing calculation option, this is further compounded by the fact that it increases the number of iterations required for solution by a factor of two or three.

5. INPUT DATA CARD LISTING FOR EXAMPLE B

```
NACA 5-STAGE COMPRESSOR  FIXED CASCADE 2-D PERFORMANCE
  0  1  0
NACA 5-STAGE COMPRESSOR  MIXING AND WAKE TRANSFERS CALCULATED
0.0
 23     25      1                                  1  1
0.0
0.0
1.0            2.0
69.5           1.0
  2
-9.0           4.35
-9.0           10.0
  2
-3.0           4.35
-3.0           10.0
  2
0.0            5.0
0.416          10.0
  2
2.5            5.53
2.085          10.0
  2
3.25           5.7
3.25           10.0
  2
5.25           6.02
5.25           10.0
  2
6.425          6.2
6.76           10.0
  2
8.964          6.62
8.539          10.0
  2
9.625          6.75
9.625          10.0
  2
11.625         7.00
11.625         10.0
  2
```

12.759	7.2[illegible]	
13.053	10.[illegible]	
2		
15.268	7.46	
14.963	10.0	
2		
16.0	7.57	
16.0	10.[illegible]	
2		
18.0	7.69	
18.0	10.[illegible]	
2		
19.124	7.78	
19.349	10.[illegible]	
2		
21.375	7.93	
21.150	10.[illegible]	
2		
22.125	7.99	
22.125	10.[illegible]	
2		
24.125	8.1	
24.125	10.0	
2		
25.25	8.16	
25.385	10.0	
2		
27.249	8.27	
27.114	10.0	
2		
28.0	8.25	
28.0	10.[illegible]	
2		
30.0	8.25	
30.0	10.[illegible]	
2		
33.0	8.25	
33.0	10.0	
1		
	14.7	518.7

```
  0
  0
  5  0  0  0  5  1 -1 -1
12605.1
5.53          -.291          .891
0.0
6.543         -19.619        .18722
0.0
7.6457        -33.921        .12786
0.0
8.8046        -43.668        .15225
0.0
10.0          -50.414        .17483
0.0
  0
  5  0  0  0  5  1 -1 -1
0.0
6.02          7.568          .17768
0.0
6.89          3.419          .17578
0.0
7.954         .052           .3445
0.0
0.0
8.909         -1.405         .12632
0.0
10.0          -3.0           .2588
0.0
  0
  5  0  0  0  5  1 -1 -1
12605.1
6.67          -0.669         .15772
0.0
7.329         -21.282        .16791
0.0
8.147         -32.124        .19193
0.0
9.044         -40.554        .12631
0.0
10.0          -47.429        .17585
```

```
0.0
  1
  5  0  0  0  5  1 -1 -1
0.0
7.03          7.233         .74[illegible]
0.0
7.637         4.457         .[illegible]19
0.0
8.351         3.02[illegible]        .[illegible]704
0.0
9.144         1.619         .4642
0.0
10.0          -.139         .[illegible]3785
0.0
  0
  5  0  0  0  5  1 -1 -1
12635.1
7.46          -20.757       .[illegible]28
0.0
7.966         -27.656       .[illegible]67
0.0
8.571         -35.58[illegible]      .9177
0.0
9.254         -42.677       .11717
0.0
10.0          -48.951       .12[illegible]61
0.0
  0
  5  0  0  0  5  1 -1 -1
0.0
7.69          5.591         .[illegible]8337
0.0
8.137         3.940         .[illegible]8533
0.0
8.696         2.293         .07518
0.0
9.312         .389          .6186
0.0
10.0          -1.71[illegible]       .[illegible]4876
0.0
```

```
  5   0   0   0   5   1  -1  -1
0.0
8.25          4.94          .05978
0.0
8.5842        3.279         .04923
0.0
8.99375       1.934         .04480
0.0
9.4688        .537          .04151
0.0
10.0          -.907         .03818
0.0
  0
0.0
.0031
.0034
.0076
.0069
.0090
.0095
.0191
.0174
.0235
.0186
.0329
.0304
.0336
.0299
.0515
.0473
.0480
.0449
.0736
.0717
.0803
.0821
```

6. OUTPUT DATA FOR EXAMPLE B

PROGRAM UD0300 - COMPRESSOR DESIGN - CONTROL SECTION

TITLE = NACA 5-STAGE COMPRESSOR FIXED CASCADE 2-D PERFORMANCE
NUMBER OF ANALYTIC MEANLINE BLADEROWS = 0
THERE WILL BE AN ENTRY TO THE AERODYNAMIC SECTION
NUMBER OF ARBITRARY MEANLINE BLADEROWS = 0

PROGRAM UD0300 - COMPRESSOR DESIGN - AERODYNAMIC SECTION

INPUT DATA

```
TITLE                                          = NACA 5-STAGE COMPRESSOR  MIXING AND WAKE TRANSFERS CALCULATED

SPECIFIC HEAT AT CONSTANT PRESSURE             =  .24000
GAS CONSTANT                                   = 53.3260
GRAVITATIONAL CONSTANT                         = 32.1740
JOULES EQUIVALENT                              = 774.160

NUMBER OF STATIONS                             = 23
NUMBER OF STREAMLINES                          = 11
MAX NUMBER OF PASSES                           = 25
MAX NUMBER OF ARBITRARY PASSES                 = 10
BOUNDARY LAYER CALC INDICATOR                  =  1
NUMBER OF RUNNING POINTS                       =  1
STREAMLINE DISTRIBUTION INDICATOR              = -0
NUMBER OF LOSS/D-FACTOR CURVE SETS             = -0
NUMBER OF LOSS/T.E.LOSS CURVE SETS             = -0
STREAMLINE INPUT INDICATOR                     = -0
STREAMLINE OUTPUT INDICATOR                    = -0
PRECISION PLOT INDICATOR                       = -0
MAX NUMBER OF LINES/PAG                        = 80
WAKE TRANSPORT CALC INDICATOR                  =  1
MAINSTREAM MIXING CALC INDICATOR               =  1
NO OF STATIONS FROM ANALYTIC SECN              = -0
LINE-PRINTER PLOT INDICATOR                    = -0
MOMENTUM EQUATION FORM INDICATOR               = -0

GRAVITATIONAL CONSTANT                         = 32.1740
JOULES EQUIVALENT                              = 778.160
LINEAR DIMENSION SCALE FACTOR                  = 12.0000
BASIC TOLERANCE                                =  .00100
KINEMATIC VISCOSITY                            =  .00018
B.L. SHAPE FACTOR                              =  .70000

PLOTTING SCALE FOR DIMENSIONS                  =  0.000
PLOTTING SCALE FOR PRESSURES                   = -0.000
MINIMUM RADIUS ON PLOT                         = -0.000
MINIMUM PRESSURE ON PLOT                       = -0.000
MAXIMUM M-SQUARED IN RELAXATION FACTOR         =  .6000
CONSTANT IN RELAXATION FACTOR                  =  6.0000

WAKE TRANSFER CONSTANT                         = 1.00000
TURBULENT MIXING CONSTANT                      = 2.00000

POINTS TO BE COMPUTED

NO       FLOWRATE     SPEED FACTOR

 1        59.500          1.000

ANNULUS / COMPUTING STATION GEOMETRY

STATION  1  SPECIFIED BY  2 POINTS

       XSTN          RSTN

     -9.0000        4.3500
     -9.0000       10.0000

STATION  2  SPECIFIED BY  2 POINTS

       XSTN          RSTN

     -3.0000        4.3500
     -3.0000       10.0000

STATION  3  SPECIFIED BY  2 POINTS

       XSTN          RSTN

      0.0000        5.0000
       .4160       10.0000
```

STATION 4 SPECIFIED BY 2 POINTS

XSTN	RSTN
2.5000	5.5300
2.0450	10.1500

STATION 5 SPECIFIED BY 2 POINTS

XSTN	RSTN
3.2300	5.7000
3.2500	10.1000

STATION 6 SPECIFIED BY 2 POINTS

XSTN	RSTN
5.2500	6.3200
5.2300	10.0000

STATION 7 SPECIFIED BY 2 POINTS

XSTN	RSTN
6.4200	6.6300
6.7500	10.0000

STATION 8 SPECIFIED BY 2 POINTS

XSTN	RSTN
8.8944	6.8200
9.6190	10.0000

STATION 9 SPECIFIED BY 2 POINTS

XSTN	RSTN
9.4250	6.7500
9.6250	10.0000

STATION 10 SPECIFIED BY 2 POINTS

XSTN	RSTN
11.4250	7.0300
11.4250	10.0000

STATION 11 SPECIFIED BY 2 POINTS

XSTN	RSTN
12.7500	7.2200
13.0550	10.0000

STATION 12 SPECIFIED BY 2 POINTS

XSTN	RSTN
15.2000	7.4500
14.9450	10.0000

STATION 13 SPECIFIED BY 2 POINTS

XSTN	RSTN
16.0000	7.6300
16.0000	10.0000

STATION 14 SPECIFIED BY 2 POINTS

XSTN	RSTN
18.0000	7.6800
18.0000	10.0000

STATION 15 SPECIFIED BY 2 POINTS

XSTN	RSTN
19.1250	7.7500
19.3490	10.0000

STATION 16 SPECIFIED BY 2 POINTS

XSTN	RSTN
21.3750	7.6300
21.1500	10.0000

STATION 17 SPECIFIED BY 2 POINTS

XSTN	RSTN
22.1250	7.5000
22.1250	10.0000

STATION 18 SPECIFIED BY 2 POINTS

XSTN	RSTN
24.1250	8.1100
24.1250	10.0000

STATION 19 SPECIFIED BY 2 POINTS

XSTN	RSTN
25.2500	8.1500
25.3450	10.0000

STATION 20 SPECIFIED BY 2 POINTS

XSTN	RSTN
27.2500	8.2500
27.1140	10.0000

STATION 21 SPECIFIED BY 2 POINTS

XSTN	RSTN
28.0000	8.2500
29.0000	10.0000

STATION 22 SPECIFIED BY 2 POINTS

XSTN	RSTN
30.0000	8.5500
30.0000	10.0000

STATION 23 SPECIFIED BY 2 POINTS

XSTN	RSTN
33.0000	8.6500
33.0000	10.0000

STATION CALCULATION DATA

STATION 1 NDATA= 1 NTER=-0 NDIMEN=-0 NMACH=-0

DATAC	TOTAL PRESSURE	TOTAL TEMPERATURE	WHIRL ANGLE
-0.0000	14.7000	518.700	-0.000

STATION 2 NDATA= 0 NTER=-0 NDIMEN=-0 NMACH=-0 NWORK=-0 NLOSS=-0 NL1= -0 NL2= -0 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2=-0 NOUT3=-0 NBLADE= -0

STATION 3 NDATA= 0 NTER=-0 NDIMEN=-0 NMACH=-0 NWORK=-0 NLOSS=-0 NL1= -0 NL2= -0 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2=-0 NOUT3=-0 NBLADE= -0

STATION 4 NDATA= 5 NTEST= 0 NDIMEN= 0 NMACH= 0 NWORK= 5 NLOSS= 1 NL1= -1 NL2= -1 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2=-0 NOUT3=-0 NRLADE= -0

SPEED = 12635.10

DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8	DATA9
5.5700	-.231	.014130	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
6.5430	-19.018	.047220	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
7.6457	-33.921	.110460	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
9.0046	-43.468	.155360	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
10.0000	-50.414	.174100	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000

STATION 5 NDATA= 0 NTEST=-0 NDIMEN=-0 NMACH=-0 NWORK=-0 NLOSS=-0 NL1= -0 NL2= -0 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2=-0 NOUT3=-0 NRLADE= -0

STATION 6 NDATA= 5 NTEST= 0 NDIMEN= 0 NMACH= 0 NWORK= 5 NLOSS= 1 NL1= -1 NL2= -1 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2=-0 NOUT3=-0 NRLADE= -0

SPEED = 0.00

DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8	DATA9
5.4200	7.568	.173640	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
6.5900	3.414	.092720	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
7.9500	.352	.034460	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
9.4000	-1.436	.025320	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
10.0000	-3.300	.025400	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000

STATION 7 NDATA= 0 NTEST=-0 NDIMEN=-0 NMACH=-0 NWORK=-0 NLOSS=-0 NL1= -0 NL2= -0 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2=-0 NOUT3=-0 NRLADE= -0

STATION 8 NDATA= 5 NTEST= 0 NDIMEN= 0 NMACH= 0 NWORK= 5 NLOSS= 1 NL1= -1 NL2= -1 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2=-0 NOUT3=-0 NRLADE= -0

SPEED = 12605.10

DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8	DATA9
6.5200	-9.058	.033320	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
7.5233	-21.342	.087910	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
8.8473	-34.126	.131530	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
9.6440	-40.556	.126310	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
10.0000	-47.429	.175430	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000

STATION 9 NDATA= 0 NTEST=-0 NDIMEN=-0 NMACH=-0 NWORK=-0 NLOSS=-0 NL1= -0 NL2= -0 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2=-0 NOUT3=-0 NRLADE= -0

STATION 10 NDATA= 5 NTEST= 0 NDIMEN= 0 NMACH= 0 NWORK= 5 NLOSS= 1 NL1= -1 NL2= -1 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2=-0 NOUT3=-0 NRLADE= -0

SPEED = 0.00

DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8	DATA9
7.0300	7.233	.074040	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
7.6277	4.457	.044190	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
8.3510	2.325	.027440	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
9.1400	1.210	.019420	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
10.0000	-.199	.017150	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000

STATION 11 NDATA= 0 NTEST=-0 NDIMEN=-0 NMACH=-0 NWORK=-0 NLOSS=-0 NL1= -0 NL2= -0 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2=-0 NOUT3=-0 NRLADE= -0

STATION 12 NDATA= 5 NTEST= 0 NDIMEN= 0 NMACH= 0 NWORK= 5 NLOSS= 1 NL1= -1 NL2= -1 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2=-0 NOUT3=-0 NRLADE= -0

SPEED = 12605.10

DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8	DATA9
7.4600	-21.727	.065210	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
7.9660	-27.655	.079070	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
8.5710	-35.580	.094770	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
9.2540	-42.877	.111710	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000
10.0000	-45.331	.120410	-0.0000	-0.00000	-0.00000	-0.0000	-0.0000	-0.0000	-0.0000

STATION 13 NDATA= 0 NITER= 0 NDIMEN= 0 NMACH= 0 NWORK= 0 NLOSS= 0 NL1= 0 NL2= 0 NEVAL= 0 NCURVE= 0 NLITER= 0 NOEL= 0
NOUT1= 0 NOUT2= 0 NOUT3= 0 NBLADE= 0

STATION 14 NDATA= 5 NITER= 0 NDIMEN= 0 NMACH= 0 NWORK= 5 NLOSS= 1 NL1= -1 NL2= -1 NEVAL= 0 NCURVE= 0 NLITER= 0 NOEL= 0
NOUT1= 0 NOUT2= 0 NOUT3= 0 NBLADE= 0

SPEED = 0.00

DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8	DATA9
7.6700	5.591	.043370	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
8.1370	3.340	.045330	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
8.6240	2.295	.045180	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
9.3120	.389	.061450	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
10.0300	-1.710	.044760	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000

STATION 15 NDATA= 0 NITER= 0 NDIMEN= 0 NMACH= 0 NWORK= 0 NLOSS= 0 NL1= 0 NL2= 0 NEVAL= 0 NCURVE= 0 NLITER= 0 NOEL= 0
NOUT1= 0 NOUT2= 0 NOUT3= 0 NBLADE= 0

STATION 16 NDATA= 5 NITER= 0 NDIMEN= 0 NMACH= 0 NWORK= 5 NLOSS= 1 NL1= -1 NL2= -1 NEVAL= 0 NCURVE= 0 NLITER= 0 NOEL= 0
NOUT1= 0 NOUT2= 0 NOUT3= 0 NBLADE= 0

SPEED = 12665.10

DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8	DATA9
7.9300	-34.987	.047890	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
8.3531	-36.177	.044510	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
8.8199	-42.325	.047730	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
9.3799	-46.427	.056470	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
10.0700	-50.687	.060810	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000

STATION 17 NDATA= 0 NITER= 0 NDIMEN= 0 NMACH= 0 NWORK= 0 NLOSS= 0 NL1= 0 NL2= 0 NEVAL= 0 NCURVE= 0 NLITER= 0 NOEL= 0
NOUT1= 0 NOUT2= 0 NOUT3= 0 NBLADE= 0

STATION 18 NDATA= 5 NITER= 0 NDIMEN= 0 NMACH= 0 NWORK= 5 NLOSS= 1 NL1= -1 NL2= -1 NEVAL= 0 NCURVE= 0 NLITER= 0 NOEL= 0
NOUT1= 0 NOUT2= 0 NOUT3= 0 NBLADE= 0

SPEED = 0.00

DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8	DATA9
8.1300	4.495	.039950	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
8.4974	3.320	.039710	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
8.9118	1.959	.040690	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
9.4267	.319	.042970	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
10.0000	-1.581	.044400	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000

STATION 19 NDATA= 0 NITER= 0 NDIMEN= 0 NMACH= 0 NWORK= 0 NLOSS= 0 NL1= 0 NL2= 0 NEVAL= 0 NCURVE= 0 NLITER= 0 NOEL= 0
NOUT1= 0 NOUT2= 0 NOUT3= 0 NBLADE= 0

STATION 20 NDATA= 5 NITER= 0 NDIMEN= 0 NMACH= 0 NWORK= 5 NLOSS= 1 NL1= -1 NL2= -1 NEVAL= 0 NCURVE= 0 NLITER= 0 NOEL= 0
NOUT1= 0 NOUT2= 0 NOUT3= 0 NBLADE= 0

SPEED = 12635.10

DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8	DATA9
8.2300	-41.022	.042000	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
8.5634	-43.245	.034780	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
8.9828	-46.220	.030040	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
9.4631	-49.375	.033280	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
10.0000	-52.904	.035500	-0.0000	-0.000000	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000

STATION 21 NDATA= 0 NITER= 0 NDIMEN= 0 NMACH= 0 NWORK= 0 NLOSS= 0 NL1= 0 NL2= 0 NEVAL= 0 NCURVE= 0 NLITER= 0 NOEL= 0
NOUT1= 0 NOUT2= 0 NOUT3= 0 NBLADE= 0

STATION 22 NDATA= 5 NITER= 0 NDIMEN= 0 NMACH= 0 NWORK= 5 NLOSS= 1 NL1= -1 NL2= -1 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2=-0 NOUT3=-0 NBLADE= -0

SPEED = 0.01

DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8	DATA9
0.2500	4.946	.039780	-0.0030	-0.000030	-0.000030	-0.0003	-0.0000	-0.0000	-0.0000
5.5442	3.273	.044230	-0.0000	-0.000118	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
9.4937	1.934	.045000	-0.0000	-0.000018	-0.000335	-0.0000	-0.0000	-0.0000	-0.0000
9.4958	.337	.041310	-0.0000	-0.000010	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000
10.0000	-.937	.038180	-0.0000	-0.000015	-0.000000	-0.0000	-0.0000	-0.0000	-0.0000

STATION 23 NDATA= 0 NITER=-0 NDIMEN=-0 NMACH=-0 NWORK=-0 NLOSS=-0 NL1= -0 NL2= -0 NEVAL=-0 NCURVE=-0 NLITER= -0 NDEL= -0
NOUT1=-0 NOUT2=-0 NOUT3=-0 NBLADE= -0

BLOCKAGE FACTOR SPECIFICATIONS

STATION	WALL BLOCKAGE	WAKE BLOCKAGE	WAKE DISTRIBUTION FACTOR
[illegible]	0.02220	-2.02000	-0.000
	.00310	-0.000000	-0.000
	.00140	-0.000000	-0.000
	.00070	-0.000000	-0.000
	.00040	-0.000000	-0.000
	.00030	-0.000000	-0.000
	.00020	-0.000000	-0.000
	.00010	-0.000000	-0.000
	.00010	-0.000000	-0.000
	.00010

QVIEW.FOR.POINT.NO=.1

STATION 1 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	4.3500	-9.0000	0.0000	593.98	0.00	593.98	0.00	593.98	0.00	0.000	0.000
2	4.9152	-9.0100	.5350	594.47	0.00	593.95	2.76	593.97	0.00	.267	0.000
3	5.4808	-9.0000	1.1701	595.55	0.00	593.94	5.60	593.96	0.00	.410	0.000
4	6.0453	-9.0000	1.8450	596.94	0.00	593.94	8.86	593.96	0.00	.469	0.000
5	6.6100	-9.0000	2.5200	598.34	0.00	593.95	11.68	593.96	0.00	.470	0.000
6	7.1750	-9.0000	3.1950	599.74	0.00	593.95	14.48	593.96	0.00	.432	0.000
7	7.7400	-9.0100	3.8700	601.13	0.00	593.95	17.30	593.96	0.00	.366	0.000
8	8.3050	-9.0100	4.5450	602.53	0.00	593.96	20.14	593.96	0.00	.286	0.000
9	8.8700	-9.0100	5.2200	603.93	0.00	593.95	22.98	593.95	0.00	.191	0.000
10	9.4350	-9.0100	5.8950	605.33	0.00	593.95	25.79	593.95	0.00	.095	0.000
11	10.0010	-9.0000	6.5700	606.73	0.00	593.95	28.60	593.95	0.00	0.000	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.5469	14.7300	11.8364	518.700	499.342	.065153	124.448	117.442	.975611	0.000	0.000
2	.5443	14.7300	11.9183	518.700	499.342	.065153	124.448	117.442	.975611	0.000	.267
3	.5423	14.7300	11.9825	518.700	499.342	.065154	124.448	117.443	.975611	0.000	.410
4	.5410	14.7300	12.0267	518.700	499.342	.065154	124.448	117.443	.975611	0.000	.469
5	.5408	14.7300	12.0467	518.700	499.342	.065154	124.448	117.443	.975611	0.000	.470
6	.5413	14.7300	12.0367	518.700	499.342	.065154	124.448	117.443	.975611	0.000	.432
7	.5423	14.7300	12.0167	518.700	499.342	.065154	124.448	117.443	.975611	0.000	.366
8	.5439	14.7300	11.9467	518.700	499.342	.065154	124.448	117.443	.975611	0.000	.286
9	.5460	14.7300	11.8306	518.700	499.342	.065154	124.448	117.443	.975611	0.000	.191
10	.5484	14.7300	11.6965	518.700	499.342	.065154	124.448	117.443	.975611	0.000	.095
11	.5490	14.7300	11.3966	518.700	499.342	.065154	124.448	117.443	.975611	0.000	0.000

STATION 2 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	4.3500	-3.0300	0.0000	552.03	0.00	548.90	58.78	552.03	21.25	6.113	0.000
2	4.9624	-3.0300	.5929	566.50	0.00	564.23	50.32	566.50	26.61	5.157	0.000
3	5.5223	-3.0300	1.1724	578.16	0.00	575.43	43.39	578.13	33.34	4.324	0.000
4	6.0964	-3.0300	1.7461	587.47	0.00	584.32	36.73	587.47	42.04	3.585	0.000
5	6.6503	-3.0300	2.3093	594.89	0.00	591.12	30.29	594.89	53.68	2.919	0.000
6	7.2202	-3.0300	2.8702	600.69	0.00	597.20	24.26	600.69	70.09	2.315	0.000
7	7.7744	-3.0300	3.4294	605.09	0.00	601.80	18.52	605.09	94.84	1.764	0.000
8	8.3367	-3.0300	3.9867	608.27	0.00	605.12	13.38	608.27	136.23	1.260	0.000
9	8.8953	-3.0300	4.5400	610.39	0.00	607.36	8.03	610.39	226.16	.801	0.000
10	9.4493	-3.0300	5.0953	611.59	0.00	608.68	3.08	611.59	487.47	.383	0.000
11	10.0100	-3.0300	5.6500	611.98	0.00	609.08	0.00	611.98	0.00	0.000	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.5372	14.7300	12.3731	518.700	493.342	.067514	124.448	118.432	.975611	0.000	6.113
2	.5212	14.7300	13.2156	518.700	491.342	.069034	124.448	118.079	.975611	0.000	5.157
3	.5075	14.7300	12.9145	518.700	490.342	.066677	124.448	117.815	.975611	0.000	4.324
4	.5016	14.7300	13.0014	518.700	489.342	.066369	124.448	117.596	.975611	0.000	3.585
5	.5019	14.7300	13.0746	518.700	489.342	.066122	124.448	117.420	.975611	0.000	2.919
6	.5045	14.7300	13.1393	518.700	489.342	.065927	124.448	117.282	.975611	0.000	2.315
7	.5094	14.7300	13.1915	518.700	489.342	.065778	124.448	117.176	.975611	0.000	1.764
8	.5162	14.7300	13.2342	518.700	489.342	.065670	124.448	117.099	.975611	0.000	1.260
9	.5251	14.7300	13.2698	518.700	489.342	.065598	124.448	117.047	.975611	0.000	.801
10	.5351	14.7300	13.2955	518.700	489.342	.065557	124.448	117.018	.975611	0.000	.383
11	.5456	14.7300	13.3122	518.700	489.342	.065544	124.448	117.009	.975611	0.000	0.000

STATION 3 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	5.0000	0.0000	0.0000	662.31	0.00	647.60	138.80	662.31	-630.39	12.097	4.756
2	5.4913	.0431	.4933	666.65	0.00	554.51	116.43	664.65	-1461.22	9.933	4.756
3	5.9401	.0836	.9723	674.56	0.00	597.72	95.70	674.54	-944.70	8.156	4.756
4	6.4034	.1219	1.4659	679.62	0.00	575.24	77.10	679.62	-417.61	6.516	4.756
5	6.9574	.1628	1.9632	683.62	0.00	591.00	59.78	683.62	-219.42	5.017	4.756
6	7.4830	.2043	2.4639	686.29	0.00	664.91	43.96	686.29	-136.06	3.637	4.756
7	7.9574	.2431	2.9579	687.57	0.00	659.97	28.75	687.57	-98.81	2.396	4.756
8	8.4432	.2831	3.4552	687.62	0.00	687.44	15.31	687.62	-82.19	1.326	4.756
9	8.9721	.3235	3.9654	686.63	0.00	686.62	-4.19	686.63	-69.97	.358	4.756
10	9.4946	.3711	4.4993	684.23	0.00	684.14	-8.01	684.24	-54.94	-.671	4.756
11	10.0000	.4160	5.0173	684.38	0.00	684.39	0.00	684.38	0.00	0.000	4.756

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.6115	14.7000	11.3946	518.700	440.199	.0637e2	124.488	115.728	.975611	0.000	16.853
2	.6214	14.7000	11.3267	518.700	441.446	.0636930	124.488	115.559	.975611	0.033	14.749
3	.6274	14.7000	11.2729	518.700	442.338	.0633133	124.488	115.401	.975611	0.000	12.912
4	.6324	14.7000	11.2259	518.700	443.265	.0633135	124.488	115.264	.975611	0.000	11.270
5	.6365	14.7000	11.1885	518.700	443.913	.0632976	124.488	115.155	.975611	0.000	9.775
6	.6395	14.7000	11.1637	518.700	444.504	.0632876	124.488	115.042	.975611	0.000	8.393
7	.6429	14.7000	11.1314	518.700	444.962	.0632828	124.488	115.047	.975611	0.000	7.151
8	.6443	14.7000	11.1512	518.700	445.355	.0632829	124.488	115.045	.975611	0.000	6.008
9	.6437	14.7000	11.1704	518.700	445.469	.0632859	124.488	115.071	.975611	0.000	5.010
10	.6379	14.7000	11.1828	518.700	445.743	.0632933	124.488	115.138	.975611	0.000	4.000
11	.6377	14.7000	11.1414	518.700	445.725	.0632947	124.488	115.134	.975611	0.000	4.756

STATION 3.15 AT THE LEADING EDGE OF A BLADE ROTATING AT 12605.1 RPM NUMBER OF BLADES IN ROW = 18

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	INCIDENCE ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE
1	550.21	860.31	.3101	-39.707	0.700	0.000	0.000	7.4276
2	592.09	906.38	.8374	-42.043	0.300	0.000	0.000	7.5633
3	636.63	941.34	.8761	-44.227	0.000	0.100	0.000	7.6336
4	710.23	983.35	.9157	-46.243	0.300	0.000	0.000	7.8261
5	765.21	1026.10	.9560	-48.263	0.100	0.000	0.000	8.0346
6	820.13	1069.37	.9966	-50.179	0.300	0.000	0.000	8.2344
7	875.06	1113.09	1.0375	-51.951	0.000	0.000	0.000	8.6334
8	930.00	1157.37	1.0784	-53.550	0.000	0.000	0.000	9.0430
9	985.04	1202.29	1.1200	-55.173	0.000	0.000	0.000	9.4670
10	1043.23	1247.96	1.1622	-56.741	0.000	0.000	0.000	9.8348
11	1100.41	1295.92	1.2071	-58.112	0.300	0.000	0.000	13.8724

STATION 4 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	5.5300	2.5100	0.0000	660.00	604.95	644.67	141.39	845.30	118.79	12.373	-5.306
2	5.9056	2.4835	.3781	649.27	559.70	638.57	117.22	857.22	97.02	10.422	-5.306
3	6.3113	2.4593	.7753	644.33	515.86	633.09	96.26	823.82	84.04	8.613	-5.306
4	6.7126	2.4352	1.1775	637.12	477.60	632.44	77.37	795.89	72.74	6.943	-5.306
5	7.1151	2.4116	1.5819	634.17	445.34	631.34	59.46	774.44	54.48	5.425	-5.306
6	7.5043	2.3897	2.0474	630.06	421.39	628.53	44.37	757.99	45.69	4.038	-5.306
7	8.0153	2.3709	2.4960	620.98	406.60	620.23	30.13	742.24	37.65	2.782	-5.306
8	8.4772	2.3564	2.9599	610.82	398.46	613.57	17.61	729.30	34.32	1.655	-5.306
9	8.9491	2.3426	3.4334	613.08	393.86	613.02	6.80	723.31	31.50	.617	-5.306
10	9.4224	2.3356	3.9091	621.21	396.52	621.19	-4.47	728.72	28.72	-.407	-5.306
11	10.0000	2.3050	4.4892	624.91	586.12	624.91	.00	723.94	*6830E2.37	.000	-5.306

STREAM-LINE	MACH NUMBER	PRESSURE TOTAL	PRESSURE STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.4046	21.6124	14.0329	579.942	513.243	.073798	139.166	123.178	.976304	42.504	7.066
2	.7684	21.1960	14.3310	579.219	516.173	.074034	139.013	124.338	.977110	60.767	5.115
3	.7351	20.4744	14.0778	577.211	521.737	.075459	138.531	125.217	.977584	38.767	3.315
4	.7092	20.0418	14.7993	577.314	524.604	.076136	138.535	125.905	.977912	36.822	1.644
5	.6440	20.0441	14.9575	576.374	526.945	.076605	138.430	126.457	.978187	35.090	.121
6	.6726	20.0235	15.0462	577.080	529.277	.076979	138.531	127.027	.978678	33.777	-1.360
7	.6556	20.2754	15.1330	577.302	532.519	.077601	138.637	127.805	.979706	33.217	-2.956
8	.6427	20.1445	15.2591	581.238	536.279	.076844	139.329	128.707	.981052	33.116	-3.653
9	.6366	20.1140	15.3160	581.243	538.021	.076876	139.541	129.132	.981589	32.052	-4.688
10	.6333	20.0979	15.3339	581.577	538.409	.076945	139.579	129.218	.981641	30.406	-5.712
11	.6122	19.9741	15.5104	625.398	582.384	.071926	150.249	139.773	.993728	54.059	-5.304

STATION 4 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE ROTATING AT 12605.1 RPM. NUMBER OF BLADES IN ROW = 10

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	534.30	664.61	.5966	-.291	0.000	-.291	0.000	0.0000	.03034	0.0000	.4420
2	549.71	555.44	.5477	-7.493	0.000	-7.693	0.000	0.0000	.06063	0.0000	.4536
3	533.22	526.37	.5354	-15.437	0.000	-15.437	0.000	0.0000	.07407	0.0000	.4524
4	738.17	684.54	.6136	-22.305	0.000	-22.305	0.000	0.0000	.08094	0.0000	.4407
5	744.45	713.32	.6399	-23.161	0.000	-23.161	0.000	0.0000	.05436	0.0000	.4214
6	432.55	732.35	.6574	-33.123	0.000	-33.123	0.000	0.0000	.09422	0.0000	.3969
7	441.64	781.40	.7014	-37.419	0.000	-37.419	0.000	0.0000	.11796	0.0000	.3695
8	932.53	811.55	.7160	-41.163	0.000	-41.163	0.000	0.0000	.14724	0.0000	.3412
9	944.40	855.16	.7560	-44.409	0.000	-44.409	0.000	0.0000	.19337	0.0000	.3128
10	1236.47	915.10	.8043	-47.247	0.000	-47.247	0.000	0.0000	.14756	0.0000	.2838
11	1130.00	966.81	.8534	-50.414	0.000	-50.414	0.000	0.0000	.50171	0.0000	.2675

STREAM-LINE	INLET THROUGH STATION 4 PRESSURE RATIO	INLET THROUGH STATION 4 ISENTROPIC EFFICIENCY	INLET THROUGH STATION 4 DELTA H ON H1	STATION 3 THROUGH STATION 4 PRESSURE RATIO	STATION 3 THROUGH STATION 4 ISENTROPIC EFFICIENCY	STATION 3 THROUGH STATION 4 DELTA H ON H1
1	1.4034	.9727	.1181	1.4034	.9727	.1181
2	1.4400	.9404	.1167	1.4400	.9404	.1167
3	1.4214	.9274	.1147	1.4214	.9274	.1147
4	1.4369	.9093	.1130	1.4369	.9093	.1130
5	1.3375	.8941	.1122	1.3375	.8941	.1122
6	1.3394	.8745	.1126	1.3394	.8745	.1126
7	1.3741	.8430	.1130	1.3705	.8430	.1130
8	1.3704	.7996	.1192	1.3704	.7996	.1192
9	1.3583	.7725	.1215	1.3583	.7725	.1215
10	1.3472	.7705	.1212	1.3472	.7705	.1212
11	1.3588	.4422	.2069	1.3588	.4422	.2069

MEAN VALUES	INLET TO STA. 4	STA. 3 TO STA. 4
PRESSURE RATIO	1.3893	1.3890
ISEN EFFY	.8008	.8008
DELTA H ON H1	.1228	.1228

STATION 4 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	MESH-POINT COORDS X-COORD	MESH-POINT COORDS L-COORD	VELOCITIES MERIDIONAL	VELOCITIES TANGENTIAL	VELOCITIES AXIAL	VELOCITIES RADIAL	VELOCITIES TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	5.7001	3.2200	0.0000	704.50	566.12	631.72	133.39	903.78	-21.75	10.931	0.000
2	5.8574	3.2500	.3079	687.03	532.40	677.03	119.90	871.45	-47.14	10.043	0.000
3	5.9345	3.2500	.7345	679.63	525.00	670.73	103.37	865.36	-101.56	8.762	0.000
4	6.0265	3.2500	1.1205	670.01	469.94	664.92	87.16	818.68	-414.89	7.668	0.000
5	7.2326	3.2500	1.5324	664.72	442.45	660.68	73.13	797.40	317.36	6.316	0.000
6	7.6543	3.2500	1.9508	657.93	419.24	655.11	60.87	779.61	136.58	5.309	0.000
7	8.0827	3.2500	2.3827	647.58	404.07	645.63	49.46	763.30	95.85	4.379	0.000
8	8.5249	3.2500	2.8269	637.50	394.72	636.33	38.59	749.81	74.62	3.470	0.000
9	8.9824	3.2500	3.2853	626.65	381.31	625.36	29.28	741.59	61.01	2.666	0.000
10	9.4466	3.2500	3.7469	639.48	366.34	639.39	22.78	737.26	52.82	2.040	0.000
11	10.0000	3.2500	4.3000	447.87	596.84	447.87	.00	746.19	*093811.12	.000	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.4139	21.0972	13.6520	581.045	513.679	.0371776	139.545	123.283	.976344	36.787	10.931
2	.7421	20.4739	14.0163	580.144	516.356	.0373149	139.212	124.045	.978065	37.987	10.043
3	.7561	20.4438	14.2743	574.198	514.646	.0374354	138.769	124.475	.977575	36.884	8.762
4	.7319	20.6372	14.4967	577.232	521.434	.0375093	138.536	125.144	.977827	35.022	7.468
5	.7133	20.8472	14.6700	576.528	524.014	.0375636	138.683	125.764	.978198	33.523	6.316
6	.6933	21.0771	14.8130	577.280	526.734	.0376033	138.837	126.409	.978780	32.063	5.303
7	.6749	21.2771	14.9330	577.492	528.791	.0376343	138.977	126.998	.979347	31.064	4.374
8	.6624	21.4004	15.0143	577.263	530.460	.0376546	139.258	127.836	.980874	30.765	3.672
9	.6561	21.4143	15.0356	576.953	530.596	.0376622	139.526	128.043	.981460	30.765	3.666
10	.6498	21.4436	15.0562	576.779	530.779	.0376729	139.741	128.276	.981971	30.795	3.048
11	.6127	20.8975	15.3900	625.733	579.490	.0371549	150.176	139.056	.999206	33.118	.000

STATION 5 IS AT THE LEADING EDGE OF A BLADE ROTATING AT 0.0 RPM NUMBER OF BLADES IN ROW = 10

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	INCIDENCE ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE
1	0.00	931.74	.8119	34.785	0.000	0.000	0.000	-8.1985
2	0.00	871.45	.7623	37.907	0.000	0.000	0.000	-8.9431
3	0.00	845.90	.7361	38.867	0.000	0.000	0.000	-9.5397
4	0.00	833.89	.7214	39.022	0.000	0.000	0.000	-9.8528
5	0.00	737.40	.6409	39.523	0.000	0.000	0.000	-10.0727
6	0.00	779.51	.6933	32.444	0.000	0.000	0.000	-10.3371
7	0.00	765.30	.6767	31.963	0.000	0.000	0.000	-10.7490
8	0.00	757.85	.6705	31.765	0.000	0.000	0.000	-11.2927
9	0.00	749.58	.6641	30.943	0.000	0.000	0.000	-11.8192
10	0.00	737.26	.6448	29.795	0.000	0.000	0.000	-12.4188
11	0.00	746.19	.6127	33.118	0.000	0.000	0.000	-14.0304

STATION 6 FLOW-FIELD DESCRIPTION

STREAM-LINE	MERIDIONAL POINT COORDS RADIUS	MERIDIONAL POINT COORDS X-COORD	MERIDIONAL POINT COORDS L-COORD	VELOCITIES MERIDIONAL	VELOCITIES TANGENTIAL	VELOCITIES AXIAL	VELOCITIES RADIAL	VELOCITIES TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STREAMLINE STATION LEAN ANGLE
1	5.6203	5.2600	1.6100	648.46	72.87	541.86	84.85	553.28	-241.83	8.900	0.000
2	5.3813	5.2200	.3913	628.35	62.49	624.77	90.39	631.45	-52.40	8.248	0.000
3	5.2724	5.2500	.0744	590.64	46.14	645.05	85.29	652.31	-56.56	7.532	0.000
4	7.0353	5.2530	1.0053	648.39	31.39	543.91	76.18	649.14	-74.83	6.733	0.000
5	7.4553	5.2500	1.4355	662.40	20.36	638.99	66.19	642.72	-87.59	5.905	0.000
6	7.8473	5.2503	1.8275	637.22	10.08	634.73	56.37	637.32	-88.11	5.075	0.000
7	8.2315	5.2500	2.2119	630.44	.50	626.70	46.62	630.49	-82.60	4.240	0.000
8	8.6206	5.2503	2.6008	621.55	-10.11	620.63	36.73	621.63	-73.51	3.388	0.000
9	9.0137	5.2500	3.0437	613.74	-20.47	613.12	27.46	614.09	-53.88	2.564	0.000
10	9.4106	5.2503	3.4406	612.10	-31.38	611.74	19.69	612.30	-47.80	1.944	0.000
11	13.0000	5.2500	7.0300	639.31	-43.55	639.31	0.00	640.79	0.00	0.000	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.4746	19.0253	13.2649	581.375	556.503	.0378932	139.674	133.961	.985562	7.568	8.909
2	.5203	20.0197	15.6301	580.577	547.349	.0383708	139.339	131.376	.981497	5.680	8.298
3	.5711	20.1638	15.9254	574.404	543.496	.0381120	138.937	130.439	.979033	4.056	7.532
4	.5913	20.3021	16.1705	577.408	542.340	.0381411	138.591	130.176	.979042	2.771	6.739
5	.6010	20.2446	16.2359	577.044	542.710	.0381451	138.500	130.250	.979098	1.815	5.905
6	.5979	20.2445	16.3497	577.329	543.726	.0381607	138.606	130.434	.979404	.947	5.075
7	.5867	20.1717	16.4229	577.446	545.488	.0381742	138.891	130.912	.980135	-.073	4.240
8	.5721	20.0793	16.4615	579.457	547.701	.0381972	139.408	131.448	.980996	-.932	3.388
9	.5647	20.0141	16.4782	580.815	549.438	.0381001	139.696	131.665	.981598	-1.947	2.564
10	.5335	20.0530	16.6101	580.497	549.739	.0381208	139.619	131.937	.981519	-3.928	1.844
11	.5379	20.1006	16.5543	625.411	591.243	.0375639	150.099	141.898	.998866	-5.900	0.000

STATION 6 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE ROTATING AT 0.0 RPM. NUMBER OF BLADES = 18

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	0.00	553.36	.4734	7.568	0.000	7.568	0.000	0.0000	.28389	0.0000	.3509
2	0.00	631.46	.5399	5.680	0.000	5.680	0.000	0.0000	.14745	0.0000	.3274
3	0.00	652.31	.5710	4.056	0.000	4.056	0.000	0.0000	.09366	0.0000	.3092
4	0.00	643.46	.5688	2.771	0.000	2.771	0.000	0.0000	.05976	0.0000	.2998
5	0.00	642.72	.5610	1.415	0.000	1.415	0.000	0.0000	.04962	0.0000	.2892
6	0.00	637.32	.5578	.487	0.000	.487	0.000	0.0000	.03622	0.0000	.2819
7	0.00	630.69	.5509	-.073	0.000	-.073	0.000	0.0000	.02169	0.0000	.2783
8	0.00	621.63	.5421	-.932	0.000	-.932	0.000	0.0000	.00695	0.0000	.2767
9	0.00	614.09	.5367	-1.947	0.000	-1.947	0.000	0.0000	.00685	0.0000	.2753
10	0.00	612.90	.5335	-2.928	0.000	-2.928	0.000	0.0000	.00283	0.0000	.2778
11	0.00	640.78	.5578	-3.960	0.000	-3.960	0.000	0.0000	.02100	0.0000	.2547

STREAM-LINE	INLET THROUGH STATION 5 PRESSURE RATIO	INLET THROUGH STATION 5 ISENTROPIC EFFICIENCY	INLET THROUGH STATION 5 DELTA H ON H1	STATION 5 THROUGH STATION 6 PRESSURE RATIO	STATION 5 THROUGH STATION 6 ISENTROPIC EFFICIENCY	STATION 5 THROUGH STATION 6 DELTA H ON H1
1	1.2942	.6264	.1220	.9918	-51.4861	.0106
2	1.3511	.7727	.1193	.9942	-14.6098	.0109
3	1.3931	.8403	.1154	.9746	-5.9816	.0112
4	1.4152	.8695	.1153	.9633	-11.5731	.0004
5	1.4309	.8776	.1126	.9979	-12.8350	.0003
6	1.3772	.8456	.1134	.9313	-5.7051	.0004
7	1.3723	.8195	.1134	.9444	-11.6812	.0001
8	1.3643	.7943	.1174	.9359	1.7832	-.0007
9	1.3618	.7898	.1138	.9950	1.5239	-.0009
10	1.3643	.7732	.1241	.9970	1.3018	-.0007
11	1.3713	.8549	.2097	1.0032	-1.7945	-.0005

INLET TO STA. 6	STA. 5 TO STA. 6
MEAN VALUES	
PRESSURE RATIO	1.3693 .9863
ISEN EFFY	.7844 137.0004
DELTA H ON H1	.1229 -.0008

STATION 7 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	9.2093	6.4250	1.4400	586.43	56.18	578.82	94.46	589.12	98.91	9.240	5.038
2	9.3577	6.6548	.3791	691.61	54.79	645.41	89.38	653.41	104.18	7.910	5.038
3	9.4735	6.8446	.0704	757.43	44.82	666.53	81.30	666.99	179.53	6.991	5.038
4	9.5217	6.9195	1.1355	773.34	31.39	669.14	72.46	673.79	743.84	6.179	5.038
5	9.5402	6.9497	1.1355	774.26	20.68	671.25	61.95	674.39	-434.12	5.247	5.038
6	9.5423	6.9535	1.1347	772.26	10.61	671.03	48.07	672.91	-163.06	4.193	5.035
7	9.5359	6.9435	1.1344	769.49	.56	668.51	35.42	669.65	-79.21	3.032	5.038
8	9.5274	6.9487	1.1343	693.93	-10.05	663.66	21.28	664.07	-56.70	1.832	5.038
9	9.5147	6.9868	1.1337	658.65	-20.59	656.62	6.19	658.97	-40.77	.556	5.038
10	9.5070	6.9214	1.1341	656.46	-28.05	654.33	-8.15	655.02	-29.84	-.881	5.038
11	10.0010	6.7600	1.8147	641.19	-39.09	641.19	0.00	682.31	0.00	0.000	5.038

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.5124	19.3903	16.1404	578.402	549.523	.079522	138.817	131.885	.962888	5.472	14.278
2	.5721	20.1345	16.8147	577.3644	546.7767	.080049	138.046	130.906	.963546	4.806	12.949
3	.6049	20.5639	17.1844	576.8424	545.4803	.080077	137.637	130.153	.964144	4.453	12.029
4	.6015	20.5259	17.1580	576.9344	545.7118	.080181	137.741	130.674	.979423	2.713	11.216
5	.5926	20.2301	16.9064	577.4407	546.3622	.080117	138.576	129.495	.974240	1.745	10.285
6	.5803	19.9378	16.6799	577.7750	546.8660	.080091	139.617	129.826	.979581	.904	9.321
7	.5672	19.8651	16.5853	577.8958	546.9855	.079691	139.878	129.826	.980200	.047	8.071
8	.5618	20.0474	16.7373	579.0894	548.2398	.079455	139.127	130.320	.980897	-.867	6.870
9	.5615	20.0427	16.7027	580.4481	549.5447	.079334	139.115	130.644	.981675	-1.713	5.594
10	.5725	20.0565	16.8193	580.4481	549.5274	.079539	139.435	130.867	.981545	-2.508	4.237
11	.5749	20.1218	16.8458	625.079	586.340	.074015	150.163	140.866	.999101	-3.281	5.038

STATION 7 IS AT THE LEADING EDGE OF A BLADE ROTATING AT 12605.1 RPM. NUMBER OF BLADES IN ROW = 10

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	INCIDENCE ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE
1	682.00	857.65	.7467	-46.361	0.000	0.000	0.000	9.7449
2	719.15	913.58	.8144	-45.555	0.000	0.000	0.000	10.8365
3	756.09	974.04	.8836	-44.705	0.000	0.000	0.000	11.9508
4	796.27	1040.36	.9579	-43.861	0.000	0.000	0.000	13.1562
5	833.82	1096.31	.9981	-43.340	0.000	0.000	0.000	14.1336
6	874.12	1067.24	.9514	-42.398	0.000	0.000	0.000	12.5151
7	917.25	1135.19	.9956	-41.369	0.000	0.000	0.000	12.9384
8	961.69	1176.41	1.0133	-40.838	0.000	0.000	0.000	13.4262
9	1009.21	1219.81	1.0270	-40.319	0.000	0.000	0.000	13.9008
10	1052.37	1263.57	1.1044	-39.812	0.000	0.000	0.000	14.2943
11	1100.00	1327.21	1.1190	-39.119	0.000	0.000	0.000	20.8102

STATION 8 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT LOCUS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	5.5203	8.8640	6.0000	610.14	524.26	631.36	103.14	872.91	-1216.44	9.732	-5.492
2	5.6449	8.8434	.2113	690.73	542.97	643.43	97.25	880.38	247.98	8.594	-5.492
3	5.1706	8.8111	.5521	641.75	576.15	636.20	83.79	858.44	202.03	7.502	-5.492
4	7.6658	8.7936	.8527	643.14	543.70	639.11	71.93	842.17	255.54	6.422	-5.492
5	7.7781	8.7528	1.1339	651.68	514.32	649.80	60.37	830.17	186.64	5.365	-5.492
6	6.0985	8.7220	1.4333	708.96	487.24	655.11	49.29	817.92	93.28	4.303	-5.492
7	6.6260	8.6903	1.7143	653.60	467.89	652.59	38.45	803.82	54.88	3.197	-5.492
8	6.7700	8.6573	2.1749	647.50	454.53	646.03	22.37	790.29	38.88	2.036	-5.492
9	6.8260	8.6236	2.5176	649.92	434.94	649.85	9.42	782.53	28.86	.930	-5.492
10	6.6895	8.5992	2.9117	657.85	410.96	657.80	-4.32	775.64	21.06	-.428	-5.492
11	10.0303	9.5390	3.3996	336.95	733.20	336.93	0.30	806.92	0.00	0.000	-5.492

STREAM-LINE	MACH NUMBER TOTAL	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.7365	29.0673	20.2717	644.474	545.069	.093574	155.634	140.417	.982486	45.656	4.240
2	.7438	29.0748	20.3339	647.917	543.422	.093544	155.500	140.021	.980663	44.341	3.102
3	.7233	29.0735	20.8137	644.443	587.123	.095940	155.626	140.909	.981520	41.619	2.010
4	.7079	29.0164	21.0912	642.556	599.638	.096465	155.677	141.513	.981736	40.211	.929
5	.6963	29.0399	21.2351	644.412	601.044	.097235	155.619	141.855	.981591	38.282	.124
6	.6854	29.0424	21.3741	644.435	594.167	.097776	155.724	142.360	.981634	36.566	-.189
7	.6713	29.0253	21.5295	650.801	597.396	.098266	156.207	143.305	.982941	34.648	-.396
8	.6573	29.0652	21.7495	656.455	602.045	.097554	156.973	144.500	.985548	33.110	-.458
9	.6497	29.0991	21.8311	656.997	605.267	.097419	157.403	145.250	.985530	32.791	-.662
10	.6497	29.3347	21.9524	660.590	606.529	.097313	157.935	145.567	.986705	32.934	-.921
11	.6173	28.6556	22.1647	701.920	711.745	.095422	183.822	170.819	1.023391	63.319	5.492

STATION 9 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE ROTATING AT 12605.1 RPM. NUMBER OF BLADES IN ROW = 10

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	728.20	514.93	.5222	-9.668	0.000	-9.668	0.000	0.0000	-.01970	0.0000	.5649
2	767.91	571.31	.5772	-14.323	0.000	-14.323	0.000	0.0000	.01133	0.0000	.5027
3	806.77	627.97	.6710	-18.311	0.000	-18.311	0.000	0.0000	.05372	0.0000	.4829
4	851.97	700.06	.7144	-21.307	0.000	-21.307	0.000	0.0000	.08404	0.0000	.4615
5	891.61	765.52	.8175	-24.643	0.000	-24.643	0.000	0.0000	.09068	0.0000	.4433
6	940.22	773.91	.8003	-31.959	0.000	-31.959	0.000	0.0000	.07331	0.0000	.4239
7	986.96	799.66	.8673	-35.377	0.000	-35.377	0.000	0.0000	.06394	0.0000	.4014
8	1034.71	823.35	.9450	-38.278	0.000	-38.278	0.000	0.0000	.10666	0.0000	.3759
9	1083.86	863.75	.9165	-41.198	0.000	-41.198	0.000	0.0000	.11435	0.0000	.3468
10	1043.75	912.77	.9364	-43.889	0.000	-43.889	0.000	0.0000	.11562	0.0000	.3150
11	1100.00	995.07	.9810	-47.429	0.000	-47.429	0.000	0.0000	.14776	0.0000	.3196

STREAM-LINE	INLET THROUGH STATION 6 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1	STATION 7 THROUGH STATION 8 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1
1	1.9774	.8649	.25	1.5016	1.0152	.1211
2	2.0147	.9419	.2	1.4733	.9495	.1184
3	2.0051	.8744	.2	1.4365	.9406	.1193
4	1.9911	.8742	.2	1.4472	.9119	.1221
5	2.0027	.8770	.2	1.4305	.9110	.1230
6	2.0002	.8724	.2	1.4329	.9147	.1230
7	1.9790	.8521	.2	1.4507	.8941	.1248
8	1.9773	.8334	.2	1.4496	.8672	.1263
9	1.9705	.8367	.2	1.4482	.8511	.1303
10	1.9332	.7469	.2	1.4391	.8415	.1301
11	1.9309	.4467	.4	1.4246	.4743	.2242

MEAN VALUES	INLET TO STA. 8	STA. 7 TO STA. 8
PRESSURE RATIO	1.9857	1.4487
ISEN EFFY	.7979	.8456
DELTA H ON H1	.2712	.1323

STATION 9 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	9.7303	9.6230	0.0000	639.49	594.67	622.02	96.65	865.96	-46.37	8.032	0.000
2	9.0115	9.6230	.6516	672.75	573.22	665.97	95.49	883.86	-65.04	8.159	0.000
3	8.2911	9.6230	1.3110	668.79	554.66	653.24	89.38	871.43	-116.51	7.378	0.000
4	7.5543	9.6230	1.9743	674.91	535.38	664.68	75.73	856.84	-420.54	6.500	0.000
5	7.4519	9.6230	2.0668	674.04	509.13	670.72	66.72	844.72	-547.78	5.651	0.000
6	9.1719	9.6230	1.4319	677.93	484.73	674.98	58.42	833.06	200.59	4.950	0.000
7	8.4311	9.6230	1.7911	675.28	465.63	673.34	51.20	820.26	115.50	4.349	0.000
8	8.2230	9.6230	1.8731	670.74	450.19	669.37	43.39	807.55	71.97	3.726	0.000
9	8.1961	9.6230	1.8931	671.44	432.12	670.47	37.00	798.51	63.60	3.156	0.000
10	8.5164	9.6230	1.7197	676.10	414.43	675.35	31.55	793.01	37.79	2.700	0.000
11	17.0000	9.6230	0.2330	361.09	759.74	361.09	-.30	841.18	*133064.00	-.000	0.000

STREAM-LINE	MACH NUMBER	PRESSURE TOTAL	PRESSURE STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.7246	28.5327	21.0484	651.141	598.642	.091991	156.230	141.274	.984707	43.371	8.832
2	.7496	29.4275	21.3343	649.347	594.381	.094022	155.781	140.179	.981869	40.432	8.159
3	.7351	29.0450	21.3895	648.432	595.242	.093013	155.624	140.458	.981491	39.474	7.378
4	.7215	29.1132	21.3191	651.373	597.241	.092739	155.619	140.348	.981567	38.670	6.500
5	.7102	28.9332	21.3111	651.033	598.355	.092339	155.671	140.421	.981713	37.067	5.651
6	.6990	28.7641	21.1437	649.342	598.144	.091743	155.256	140.995	.982121	35.581	4.950
7	.6882	28.6212	21.0422	651.175	599.148	.091841	156.232	142.845	.983076	34.588	4.349
8	.6773	28.4844	20.9348	652.990	600.960	.091718	156.831	143.551	.984366	33.867	3.726
9	.6737	28.4722	20.9172	653.838	602.577	.091621	157.332	144.018	.985347	33.762	3.156
10	.6549	28.4211	21.0163	650.123	603.795	.091683	157.470	144.411	.985947	34.501	2.700
11	.6461	29.1379	22.0193	764.591	705.982	.084135	183.567	169.436	1.021938	64.879	-.000

STATION 9 IS AT THE LEADING EDGE OF A BLADE ROTATING AT 0.0 RPM NUMBER OF BLADES IN ROW = 23

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	INCIDENCE ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE
1	0.00	496.96	.7246	43.371	0.000	0.000	0.000	-13.1548
2	0.00	491.67	.7164	40.432	0.000	0.000	0.000	-14.4346
3	0.00	471.43	.7151	39.474	0.000	0.000	0.000	-15.0307
4	0.00	456.34	.7215	38.670	0.000	0.000	0.000	-15.5347
5	0.00	446.72	.7102	37.067	0.000	0.000	0.000	-15.7599
6	0.00	433.06	.6990	35.581	0.000	0.000	0.000	-15.8697
7	0.00	420.26	.6882	34.588	0.000	0.000	0.000	-16.0442
8	0.00	407.55	.6773	33.867	0.000	0.000	0.000	-16.3690
9	0.00	398.51	.6739	32.762	0.000	0.000	0.000	-16.7103
10	0.00	393.01	.6586	34.501	0.000	0.000	0.000	-17.1614
11	0.00	441.18	.0461	64.879	0.000	0.000	0.000	-16.3004

STATION 10 ..FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	M-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.0101	11.6250	0.0000	545.05	69.17	539.72	82.43	549.52	56.89	8.741	0.000
2	7.2743	11.6250	.2643	592.49	62.22	594.48	80.45	597.20	186.15	7.785	0.000
3	7.5276	11.6250	.5175	601.10	51.60	602.70	73.51	609.35	-612.07	6.954	0.000
4	7.7807	11.6250	.7707	617.94	43.36	616.38	66.24	619.46	-188.37	6.157	0.000
5	8.0338	11.6250	1.0238	622.89	37.58	620.12	58.97	624.02	-132.13	5.404	0.000
6	8.2868	11.6250	1.2768	622.64	32.03	619.94	51.47	622.91	-97.92	4.739	0.000
7	8.5550	11.6250	1.5450	614.51	27.69	614.47	43.62	617.12	-72.11	4.056	0.000
8	8.8470	11.6250	1.8370	608.53	20.53	607.47	35.38	608.41	-53.02	3.427	0.000
9	9.1393	11.6250	2.1293	601.13	13.52	603.43	29.05	601.34	-40.16	2.827	0.000
10	9.4316	11.6250	2.4216	594.23	9.83	596.79	23.36	599.26	-31.17	2.292	0.000
11	10.0000	11.6250	2.9900	694.03	-2.41	694.03	-.00	694.03	*760257.00	-.030	0.000

STREAM-LINE	MACH NUMBER	PRESSURE TOTAL	PRESSURE STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.4490	27.8516	24.2384	651.518	624.400	.104631	156.364	150.336	.996538	7.233	8.741
2	.4494	28.4207	24.8192	654.763	620.665	.105529	155.938	148.816	.984184	5.980	7.785
3	.5001	28.7315	24.9332	644.292	618.396	.105775	155.830	148.415	.983568	4.857	6.954
4	.5030	29.1424	25.2119	644.909	616.373	.105932	155.738	148.075	.983061	4.009	6.157
5	.5124	29.4944	25.4121	644.158	615.726	.106026	155.731	148.015	.982963	3.453	5.404
6	.5115	29.8324	25.6221	643.439	617.751	.105894	156.009	148.266	.983443	3.021	4.739
7	.5059	29.4737	25.2441	651.506	619.833	.105637	156.311	148.755	.984071	2.536	4.056
8	.4941	29.7646	25.2309	654.240	622.337	.105554	156.777	149.375	.984982	1.953	3.427
9	.4911	29.9928	25.2161	654.936	624.396	.105231	157.112	149.692	.985618	1.288	2.827
10	.4893	29.7474	24.9112	655.200	625.317	.105429	157.248	150.076	.985721	.559	2.292
11	.5207	29.5064	24.6781	763.252	723.173	.091436	183.181	173.562	1.020433	-.199	-.000

STATION 10 IS WITHIN .02 PT IN. TRAILING EDGE OF A BLADE ROTATING AT ..... 0.0 RPM NUMBER OF BLADES IN ROW = 10

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	0.00	544.482	.4491	7.233	0.000	7.233	0.000	0.0000	.08193	0.0000	.4974
2	0.00	597.196	.4931	5.980	0.000	5.980	0.000	0.0000	.10789	0.0000	.4293
3	0.00	609.357	.5031	4.857	0.000	4.857	0.000	0.0000	.10033	0.0000	.4081
4	0.00	618.445	.5093	4.009	0.000	4.009	0.000	0.0000	.07385	0.0000	.3934
5	0.00	624.082	.5124	3.453	0.000	3.453	0.000	0.0000	.06146	0.0000	.3799
6	0.00	623.991	.5115	3.021	0.000	3.021	0.000	0.0000	.06419	0.0000	.3705
7	0.00	617.112	.5059	2.536	0.000	2.536	0.000	0.0000	.05346	0.0000	.3676
8	0.00	608.453	.4991	1.953	0.000	1.953	0.000	0.0000	.03293	0.0000	.3695
9	0.00	601.338	.4911	1.288	0.000	1.288	0.000	0.0000	.01691	0.0000	.3746
10	0.00	599.260	.4893	.559	0.000	.559	0.000	0.0000	.01430	0.0000	.3826
11	0.00	694.03	.5267	-.199	0.000	-.199	0.000	0.0000	.04010	0.0000	.3560

STREAM-LINE	INLET THROUGH STATION 10 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA M ON M1	STATION 9 THROUGH STATION 10 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA M ON M1
1	1.4947	.7917	.4491	.9761	-9.3907	.0067
2	1.0422	.8421	.3526	.9702	-4.5150	.0010
3	1.0245	.8378	.3218	.9744	-5.0717	.0013
4	1.0155	.8477	.3010	.9813	-3.8246	.0008
5	1.0100	.8438	.2870	.9848	-3.7335	.0006
6	1.0097	.8433	.2752	.9835	-4.0692	.0010
7	1.0063	.8301	.2650	.9873	-7.1715	.0025
8	1.0068	.8154	.2534	.9893	-6.6232	.0027
9	1.0121	.8029	.2461	.9904	-1.7956	.0015
10	1.0131	.8120	.2412	.9940	-1.2213	.0014
11	2.0113	.4683	.4715	1.0147	-1.9887	-.0021

MEAN VALUES	INLET TO STA.10	STA. 9 TO STA.10
PRESSURE RATIO	1.9806	.9872
ISEN EFFY	.7820	27.5330
DELTA M ON M1	.2710	-.0001

STATION 11 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.2210	12.7590	1.0300	625.21	53.57	619.88	81.47	627.30	-25.98	7.488	6.037
2	7.4395	12.7422	.2308	657.41	54.33	653.44	72.12	659.65	-30.12	6.299	6.037
3	7.6702	12.8164	.4527	659.58	50.24	656.81	61.19	661.59	-33.62	5.340	6.037
4	7.9159	12.4327	.6806	663.57	43.98	661.59	51.76	665.02	-35.09	4.474	6.037
5	8.1747	12.8690	.9200	665.45	37.74	664.10	42.37	666.52	-36.41	3.650	6.037
6	8.4470	12.8338	1.1738	653.04	32.23	652.77	34.35	654.38	-37.46	2.846	6.037
7	8.7329	12.8130	1.4224	638.53	28.60	638.11	29.34	639.07	-38.34	2.058	6.037
8	9.0324	12.7907	1.6849	622.24	26.34	622.13	26.97	623.06	-39.07	1.287	6.037
9	9.3455	12.9438	1.9373	647.31	13.74	647.30	13.42	647.45	-38.06	.538	6.037
10	9.6721	13.0140	2.1923	644.71	6.67	644.68	-6.29	644.56	-38.15	-.241	6.037
11	10.0000	13.0590	2.4455	738.41	2.12	738.41	0.00	738.42	0.00	0.000	6.037

STREAM-LINE	MACH NUMBER TOTAL	PRESSURE TOTAL	PRESSURE STATIC	TEMPERATURE TOTAL	TEMPERATURE STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.6155	28.0659	21.4153	650.008	617.241	.102431	156.002	148.138	.985456	4.827	13.525
2	.6438	28.6650	21.4437	644.005	612.797	.103320	155.791	147.071	.983638	4.726	12.336
3	.6684	29.7336	21.4762	640.148	612.776	.104456	155.937	147.066	.983745	4.556	11.377
4	.6948	28.4445	21.5109	644.447	612.947	.103541	155.807	147.035	.983383	4.788	10.511
5	.7245	28.4811	21.5442	644.824	613.463	.103770	155.957	147.085	.983356	4.244	9.687
6	.7579	28.4130	21.5781	643.592	613.923	.103732	156.132	147.318	.983819	3.780	8.888
7	.7921	28.4273	21.6091	641.048	615.535	.103577	156.403	147.729	.984166	3.413	8.085
8	.8259	28.4727	21.6424	642.488	617.250	.103526	156.717	148.212	.984826	3.085	7.280
9	.8600	28.7354	21.6773	644.121	619.209	.103432	156.996	148.638	.985565	2.815	6.479
10	.8921	28.7322	21.7063	644.960	620.395	.103430	157.192	148.845	.985965	.778	5.699
11	.9524	29.4134	21.8094	743.258	717.484	.089572	183.182	172.292	1.020562	.164	6.037

STATION 11 IS AT THE LEADING EDGE OF A BLADE ROTATING AT 12605.1 RPM NUMBER OF BLADES IN ROW = 18

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	INCIDENCE ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE
1	794.20	959.24	.7102	-40.430	0.000	0.000	0.000	13.6435
2	818.35	1107.93	.8203	-44.296	0.000	0.000	0.000	14.2680
3	843.72	1031.96	.8727	-47.271	0.000	0.000	0.000	14.5760
4	870.73	1056.44	.8741	-50.252	0.000	0.000	0.000	14.9010
5	899.23	1089.37	.8474	-53.318	0.000	0.000	0.000	15.1160
6	929.17	1115.73	.9141	-55.905	0.000	0.000	0.000	15.2671
7	960.62	1142.43	.9401	-58.514	0.000	0.000	0.000	15.4755
8	993.71	1171.64	.9622	-61.170	0.000	0.000	0.000	15.7537
9	1028.03	1203.23	.9868	-63.954	0.000	0.000	0.000	16.0362
10	1067.49	1234.24	1.0134	-66.373	0.000	0.000	0.000	16.5036
11	1102.80	1263.11	1.0378	-68.076	0.000	0.000	0.000	21.0443

STATION 12 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.4600	15.2080	0.0300	666.60	570.34	655.61	62.70	871.65	-60342.46	5.463	-6.847
2	7.6366	15.2454	.1977	643.89	560.27	651.59	55.16	861.08	170.05	4.839	-6.847
3	7.8307	15.2255	.3734	645.85	549.01	644.12	47.23	847.66	116.69	4.194	-6.847
4	8.0412	15.1442	.5454	647.31	538.52	645.04	39.70	836.57	93.07	3.524	-6.847
5	8.2685	15.1713	.8113	646.48	509.83	645.69	32.53	823.36	70.87	2.884	-6.847
6	8.5045	15.1426	1.1320	638.36	491.97	639.37	25.12	806.33	53.41	2.254	-6.847
7	8.7535	15.1129	1.3789	628.41	477.02	629.17	17.62	786.95	40.46	1.606	-6.847
8	9.0296	15.0737	1.6309	623.23	454.84	622.15	10.40	774.61	32.64	.947	-6.847
9	9.3113	15.0457	1.8848	624.57	437.92	624.57	3.38	762.81	30.48	.337	-6.847
10	9.6063	15.0233	2.1415	611.17	430.38	611.16	-3.99	747.49	30.48	-.337	-6.847
11	10.0000	14.9630	2.5342	416.06	623.89	416.06	.00	749.89	*323493.37	.000	-6.847

STREAM-LINE	MACH NUMBER	PRESSURE TOTAL	PRESSURE STATIC	TEMPERATURE TOTAL	TEMPERATURE STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.6912	41.0496	31.4148	721.420	656.403	.122218	173.238	158.065	.984490	60.925	-1.384
2	.6966	41.0491	31.4120	721.331	656.332	.122955	173.221	158.144	.984157	60.691	-1.008
3	.7029	41.0477	31.4075	721.351	656.353	.123775	173.126	158.175	.984668	60.367	-.6044
4	.7091	41.0463	31.4033	721.372	656.373	.123722	173.180	159.193	.984871	59.932	-.1923
5	.7114	41.0460	31.4014	721.381	656.382	.124038	173.246	159.207	.985252	59.364	.2964
6	.7136	41.0458	31.3989	721.391	656.392	.124053	173.431	160.496	.985516	57.709	.7004
7	.7208	40.9830	30.7189	720.771	655.809	.123959	173.438	161.377	.987082	57.202	.8241
8	.7241	38.7741	30.9156	765.957	675.341	.123976	174.110	162.136	.987922	56.571	.9014
9	.7241	39.2874	31.0440	720.769	677.150	.123946	174.146	162.564	.988346	55.036	.9540
10	.7241	39.2575	31.1247	767.346	691.432	.123470	174.707	163.549	.989060	53.451	.9184
11	.6315	38.1224	31.4508	675.343	826.741	.102455	210.140	198.910	1.035969	36.302	.6847

STATION 12 IS WITHIN .04 IN. TRAILING EDGE OF A BLADE ROTATING AT 12605.1 RPM NUMBER OF BLADES IN ROW = 18

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	920.60	706.31	.5031	-10.757	0.000	-20.757	0.000	0.0000	-.04254	0.0000	.5264
2	9[illegible].01	711.21	.5065	-[illegible].142	0.000	-23.142	0.000	0.0000	.02113	0.0000	.4887
3	4[illegible].71	737.44	.5247	-[illegible].411	0.000	-25.411	0.000	0.0000	.04418	0.0000	.4734
4	4[illegible].33	757.34	.5447	-[illegible].681	0.000	-29.681	0.000	0.0000	.05540	0.0000	.4634
5	4[illegible].21	7[illegible].89	.5711	-31.762	0.000	-31.762	0.0036	0.0000	.06774	0.0000	.4540
6	4[illegible].63	777.72	.6138	-34.770	0.000	-34.770	0.0000	0.0000	.08606	0.0000	.4460
7	3[illegible].74	744.76	.6255	-37.748	0.000	-37.748	0.0000	0.0000	.09633	0.0000	.4587
8	3[illegible].26	920.36	.5441	-40.560	0.000	-43.560	0.0000	0.0000	.09846	0.0000	.4506
9	1[illegible].26	8[illegible].[illegible]	.6717	-43.193	0.000	-43.193	0.0000	0.0000	.09128	0.0000	.4596
10	1[illegible].57	875.10	.5441	-40.701	0.000	-40.701	0.0000	0.0000	.11621	0.0000	.4375
11	11[illegible].03	632.29	.4482	-44.651	0.000	-44.651	0.0000	0.0000	.42009	0.0000	.3527

STREAM-LINE	INLET THROUGH STATION 12 PRESSURE RATIO	INLET THROUGH STATION 12 ISENTHROPIC EFFICIENCY	INLET THROUGH STATION 12 DELTA H ON H1	STATION 11 THROUGH STATION 12 PRESSURE RATIO	STATION 11 THROUGH STATION 12 ISENTROPIC EFFICIENCY	STATION 11 THROUGH STATION 12 DELTA H ON H1
1	2.7451	.8739	.3916	1.4240	1.0035	.1105
2	2.7429	.8731	.3693	1.4320	.9743	.1104
3	2.7414	.8832	.3907	1.4228	.9529	.1111
4	2.7743	.8634	.3911	1.4151	.9332	.1111
5	2.7[illegible].0	.8501	.3917	1.4067	.9211	.1109
6	2.7[illegible].[illegible]	.8[illegible]8	.[illegible]933	1.3983	.8995	.1109
7	2.7[illegible].[illegible]	.8[illegible]5	.[illegible]952	1.3868	.8746	.1113
8	2.7[illegible].7	.8[illegible]5	.[illegible]3[illegible]	1.3811	.8717	.1110
9	2.[illegible].[illegible]	.8[illegible]3	.[illegible]3[illegible]	1.3777	.8749	.1105
10	2.[illegible].56	.[illegible]025	.[illegible]4[illegible]4	1.3362	.8352	.1114
11	2.[illegible]934	.[illegible]945	.[illegible]5[illegible]6	1.[illegible]318	.6153	.1472

MEAN VALUES	INLET TO STA.12	STA.11 TO STA.12
PRESSURE RATIO	2.7236	1.3891
ISEN EFFY	.7933	.8654
DELTA H ON H1	.4154	.1137

STATION 11 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORD. R-COORD	MESH-POINT COORD. L-COORD	VELOCITIES MERIDIONAL	VELOCITIES TANGENTIAL	VELOCITIES AXIAL	VELOCITIES RADIAL	VELOCITIES TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.5350	0.0000	670.41	553.63	667.93	50.98	869.22	-66.92	4.876	0.000
2	7.[illegible]39	.1734	672.09	540.20	668.78	54.35	865.22	-80.58	4.629	0.000
3	7.[illegible]30	.3536	668.43	539.68	665.58	49.39	855.65	-120.13	4.255	0.000
4	7.[illegible]97	.5374	655.35	525.14	653.89	44.50	847.55	-218.72	3.946	0.000
5	7.[illegible]63	.7165	654.13	567.43	653.96	39.30	833.69	-678.91	3.460	0.000
6	7.[illegible]41	1.[illegible]41	653.34	490.54	652.72	35.95	814.98	1532.98	3.078	0.000
7	7.[illegible]8	1.[illegible]880	646.45	474.49	644.15	29.78	800.42	-361.41	2.693	0.000
8	7.[illegible]46	1.[illegible]314	637.02	457.34	636.95	24.70	784.52	171.34	2.222	0.000
9	7.[illegible]74	1.[illegible]773	631.17	441.12	631.81	20.81	770.04	130.07	1.883	0.000
10	7.[illegible]57	2.[illegible]357	622.90	424.33	622.67	16.90	756.24	102.14	1.599	0.000
11	10.0000	2.4700	443.80	624.95	443.80	.00	766.58	*685254.25	.000	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.6993	40.5277	21.9382	723.467	661.098	.1205?9	173.?02	158.664	.9M6092	J9.531	4.876
2	.6873	40.?679	22.?055	721.?15	659.526	.1316?2	173.260	158.110	.985091	39.152	4.?20
3	.6819	40.0247	23.0174	721.741	660.359	.1?23J8	173.218	158.493	.984903	38.?86	4.?65
4	.6723	40.?516	23.1142	721.447	662.059	.1?28?1	173.?43	158.694	.985061	38.?82	3.8?6
5	.6601	40.5??8	30.2122	722.275	664.460	.1?31?5	173.?W8	159.665	.9M5498	37.?2?	3.6??
6	.6454	40.1?41	31.4?00	722.?61	667.159	.1?3?06	173.?11	160.106	.986147	36.?97	3.?75
7	.6393	40.0461	31.6102	723.?47	670.?79	.1?33?6	173.?5?	160.?82	.986?64	36.?29	3.?47
8	.6167	39.?9?5	31.?4M5	72?.116	673.363	.1?3J5?	174.?28	161.?37	.987776	35.653	3.?21
9	.6041	39.5?25	30.9?W3	726.?W?	676.?05	.1?34?6	174.?92	162.410	.988466	34.950	3.?W?
10	.5?13	39.4170	31.1531	76?.?27	678.958	.1?35?2	174.415	162.933	.988959	34.?56	1.?55
11	.5456	34.4437	31.3394	871.000	822.118	.1031W8	209.041	197.308	1.034141	54.620	.000

STATION 13 IS AT THE LEADING EDGE OF A BLADE ROTATING AT 6.0 RPM NUMBER OF BLADES IN ROW = 10

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	INCIDENCE ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE
1	0.00	669.22	.6499	39.531	0.?20	0.000	0.000	-19.2389
2	0.00	665.22	.6473	39.152	0.?00	0.000	0.000	-19.0148
3	0.00	9?4.64	.6519	3A.?86	0.?00	0.000	0.000	-20.0372
4	0.00	867.?5	.6723	3A.?99	0.?00	0.000	0.000	-20.8836
5	0.00	A33.69	.8501	37.?23	0.?10	0.000	0.000	-20.6?31
6	0.00	817.44	.6459	36.377	0.000	0.?00	0.000	-21.0203
7	0.00	800.42	.6109	36.329	0.000	0.000	0.000	-21.1697
8	0.00	7M5.5?	.6167	35.?59	0.000	0.?03	0.000	-21.3073
9	0.00	77?.04	.?J41	34.?50	0.?10	0.000	0.000	-21.4942
10	0.00	75A.27	.?339	3W.763	0.000	0.000	0.000	-22.1498
11	0.00	746.56	.?156	54.?20	0.?00	0.000	0.000	-20.9212

STATION 14 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	MESH-POINT COORDS X-COORD	MESH-POINT COORDS L-COORD	VELOCITIES MERIDIONAL	VELOCITIES TANGENTIAL	VELOCITIES AXIAL	VELOCITIES RADIAL	VELOCITIES TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.6300	19.0100	0.0100	606.81	59.69	6J4.71	49.55	609.71	112.94	4.667	0.000
2	7.A442	19.0?J0	.1?A?	615.46	53.42	613.67	46.?6	617.75	208.30	4.346	0.000
3	8.0?02	19.?0??	.3?02	620.93	46.72	619.31	43.42	622.59	510.58	4.011	0.000
4	8.2?5?	19.?W??	.?W??	623.10	39.76	621.61	39.?6	624.?6	1764?3.38	3.676	0.000
5	8.4353	19.?W??	.7?53	622.68	36.?5	621.43	36.15	623.?6	-674.79	3.332	0.000
6	8.6?45	19.?J??	.9?45	620.?5	32.?6	619.23	32.09	619.67	-360.97	2.971	0.000
7	8.A955	19.?J??	1.1?55	617.?4	27.?4	6?7.91	27.04	617.?6	-265.27	2.585	0.000
8	9.1477	19.?J??	1.4?75	602.?1	9.43	602.?7	22.?2	602.?8	-163.70	2.179	0.000
9	9.6147	19.?J??	1.?3?7	591.91	.?4	591.64	13.?4	591.91	-102.?6	1.?5?	0.000
10	10.0945	19.?W??	2.0145	5A3.?8	-8.04	589.23	13.?2	589.50	-?2.55	1.3??	0.000
11	10.0000	19.?J??	2.?200	617.A1	-18.44	617.A1	-.??	618.08	*851821.50	-.000	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.6723	39.6588	31.9152	725.044	696.119	.1321?8	174.012	166.588	.985158	5.591	4.687
2	.6735	39.7214	31.9?A?	723.133	691.150	.1325?6	173.5?6	165.924	.9A7232	4.961	4.346
3	.6A34	39.A?3?	3A.?390	723.045	690.790	.1326?7	173.531	165.790	.9A7061	4.3?6	4.?11
4	.6A?3	39.A3A6	3A.?2?3	722.?62	69?.?34	.1326?6	173.516	166.?31	.9A6?91	3.653	3.676
5	.6A?3	39.?1?7	35.?170	723.035	640.?22	.1320?3	173.533	155.?74	.9A706?	3.022	3.332
6	.6A03	39.?3?6	35.?1A4	723.?71	691.?46	.1325?6	173.?A?	166.?42	.9A7?A?	2.3?6	2.971
7	.6?62	39.?5?9	35.?199	723.?25	692.?52	.1325?9	173.?A?	166.?44	.9A7?56	1.?6?	2.5?4
8	.6A6?	39.?A?8	35.?2A8	723.?5?	692.?5?	.1325??	173.?3?	166.?44	.9A?2??	.?6?	2.?7?
9	.6A?4	39.?A65	35.?2A8	723.?5?	692.?5?	.1325??	173.?3?	166.?44	.9A?2??	.?6?	2.?7?
10	.6A?9	39.?A65	35.?2A8	723.?5?	692.?5?	.1325??	173.?3?	166.?44	.9A?2??	.?6?	2.?7?
11	.6A?9	39.?A65	35.?2A8	723.?5?	692.?5?	.1325??	173.?3?	166.?44	.9A?2??	.?6?	2.?7?

STATION 14 IS WITHIN 10 PCT THE TRAILING EDGE OF A BLADE ROW AT 0.0 RPM NUMBER OF BLADES IN ROW = 18

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	0.00	604.71	.4723	5.591	0.000	5.591	0.000	0.0000	.10959	0.0000	.4028
2	0.00	617.75	.4795	4.361	0.000	4.361	0.000	0.0000	.11421	0.0000	.3935
3	0.00	622.59	.4819	3.804	0.000	3.804	0.000	0.0000	.11667	0.0000	.3584
4	0.00	624.37	.4829	3.553	0.000	3.553	0.000	0.0000	.10689	0.0000	.3545
5	0.00	623.34	.4820	3.021	0.000	3.021	0.000	0.0000	.06947	0.0000	.3524
6	0.00	617.11	.4769	2.374	0.000	2.374	0.000	0.0000	.06879	0.0000	.3496
7	0.00	606.40	.4702	1.963	0.000	1.963	0.000	0.0000	.04766	0.0000	.3489
8	0.00	595.74	.4636	.899	0.000	.899	0.000	0.0000	.03234	0.0000	.3487
9	0.00	591.91	.4579	-.473	0.000	-.473	0.000	0.0000	.02241	0.0000	.3493
10	0.00	584.56	.4599	-.762	0.000	-.762	0.000	0.0000	.00454	0.0000	.3495
11	0.00	614.38	.4361	-1.710	0.000	-1.710	0.000	0.0000	.11131	0.0000	.3771

STREAM-LINE	INLET THROUGH STATION 14 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1	STATION 13 THROUGH STATION 14 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1
1	2.6911	.8210	.3978	.9734	-4.7912	.0015
2	2.7263	.8324	.3941	.9764	-4.4130	.0015
3	2.7401	.8362	.3940	.9781	-3.9491	.0014
4	2.7461	.8381	.3939	.9778	-4.1015	.0016
5	2.7343	.8351	.3940	.9811	-5.0203	.0021
6	2.7127	.8314	.3944	.9852	-7.5240	.0066
7	2.6964	.8262	.3957	.9853	41.4015	-.0361
8	2.6787	.8183	.3974	.9898	3.9324	-.0007
9	2.6693	.8121	.3974	.9904	2.0534	-.0013
10	2.6651	.8110	.3943	.9941	.8617	-.0020
11	2.6430	.6759	.6740	1.0395	-.8726	-.0031

MEAN VALUES — INLET TO STA.14 — STA.13 TO STA.14

	INLET TO STA.14	STA.13 TO STA.14
PRESSURE RATIO	2.6865	.9866
ISEN EFFY	.7861	20.5201
DELTA H ON H1	.4147	-.0002

STATION 15 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.7900	14.1240	0.0000	646.52	44.13	644.57	52.14	648.31	-76.24	4.648	5.787
2	7.6142	14.1401	.1500	649.61	46.28	647.80	45.72	651.36	-91.72	4.037	5.787
3	4.1134	14.1577	.3144	648.58	43.74	648.20	41.61	651.05	-105.14	3.655	5.787
4	4.3013	14.1769	.5243	646.88	38.86	643.61	37.20	650.84	-121.30	3.283	5.787
5	4.4845	14.1973	.7273	646.62	34.63	647.73	32.82	649.43	-130.42	2.904	5.787
6	4.7189	14.2192	.9487	645.56	29.23	644.93	28.12	648.03	-135.89	2.497	5.787
7	4.9473	14.2423	1.1735	640.30	17.53	639.85	22.93	640.54	-135.40	2.053	5.787
8	5.1994	14.2658	1.4011	633.70	4.20	633.41	16.49	633.77	-126.76	1.524	5.787
9	5.4633	14.2928	1.6222	627.74	-1.40	627.71	9.05	627.76	-114.45	.882	5.787
10	5.7207	14.3196	1.8341	624.63	-3.03	624.59	1.55	624.60	-93.29	.170	5.787
11	13.0303	14.3490	2.2314	656.84	-10.95	656.84	-.00	656.93	*8006J11.87	-.000	5.787

STREAM-LINE	MACH NUMBER	PRESSURE LOSS RATIO TOTAL	PRESSURE LOSS RATIO STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.5338	30.6447	31.1765	724.764	649.744	.130877	173.943	165.549	.987637	4.259	10.235
2	.5047	30.7765	31.3145	725.495	652.723	.131120	173.519	165.054	.987103	4.077	9.824
3	.5165	30.7732	31.3300	725.112	651.341	.131183	173.567	165.082	.987130	3.854	9.442
4	.5346	30.7626	31.3306	725.246	650.045	.131082	173.591	165.131	.987191	3.623	9.070
5	.5524	30.7533	31.3343	725.497	648.799	.131026	173.639	165.216	.987309	3.382	8.688
6	.5724	30.7765	31.3444	725.767	648.124	.130904	173.732	165.367	.987527	3.134	8.284
7	.5977	30.7935	31.3477	726.048	648.347	.130729	173.731	165.347	.987669	1.564	7.840
8	.6020	30.8343	31.3456	724.349	648.472	.130526	173.875	165.833	.988210	.858	7.315
9	.6471	30.2751	31.4941	724.955	691.960	.130356	173.917	166.046	.988521	.165	6.664
10	.6644	30.2142	31.3472	724.940	692.477	.130230	173.936	166.194	.988728	-.531	5.957
11	.6647	38.7876	39.4524	844.369	832.159	.108506	208.337	199.718	1.032719	-.955	5.787

STATION 15 IS AT THE LEADING EDGE OF A BLADE ROTATING AT 12605.1 RPM. NUMBER OF BLADES IN ROW = 18

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	INCIDENCE ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE
1	955.93	1044.55	.4034	-61.373	0.000	0.000	0.000	16.3978
2	973.31	1021.33	.8147	-51.660	0.000	0.000	0.000	16.9161
3	992.43	1008.77	.8319	-52.574	0.000	0.000	0.000	17.4176
4	1013.17	1003.27	.8375	-53.445	0.000	0.000	0.000	17.9559
5	1035.19	1011.71	.8449	-54.309	0.000	0.000	0.000	18.4469
6	1058.54	1030.26	.8625	-55.345	0.000	0.000	0.000	19.0342
7	1083.21	1059.52	.8903	-56.482	0.000	0.000	0.000	19.6419
8	1108.94	1095.09	.9200	-57.572	0.000	0.000	0.000	20.2473
9	1134.84	1132.25	.9490	-58.611	0.000	0.000	0.000	20.8366
10	1160.07	1160.60	.9730	-59.765	0.000	0.000	0.000	21.4905
11	1180.00	1298.00	.9130	-59.407	0.000	0.000	0.000	23.8568

STATION 15 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.9363	21.1760	0.0000	598.24	955.61	592.64	43.74	750.77	113.17	4.193	-6.203
2	8.0763	21.1892	.1452	594.80	955.31	593.45	39.34	746.46	112.30	3.850	-6.203
3	8.2337	21.1961A	.3175	593.49	952.60	592.34	36.11	746.26	111.92	3.485	-6.203
4	8.4084	21.2028A	.4927	594.19	952.77	593.32	32.23	746.42	111.89	3.109	-6.203
5	8.5794	21.2085A	.6704	595.01	953.37	594.19	28.16	746.76	112.01	2.721	-6.203
6	8.7463	21.2140A	.8511	595.25	953.42	594.77	23.36	747.06	112.29	2.308	-6.203
7	9.0377	21.2579	1.0440	594.47	953.49	594.16	19.19	747.14	112.81	1.850	-6.203
8	9.2244	21.2814	1.3070	595.34	953.42	594.67	14.16	747.28	113.68	1.367	-6.203
9	9.5445	21.3044	1.5345	597.74	953.00	597.71	8.73	747.96	114.91	.835	-6.203
10	9.8943	21.3327	1.7794	599.41	952.81	599.41	2.68	748.52	116.51	.251	-6.203
11	10.0000	21.3400	2.0422	476.40	518.16	476.40	.00	703.92	*5670.00	.000	-6.203

STREAM-LINE	MACH NUMBER	PRESSURE TOTAL	PRESSURE STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.5633	52.5586	42.3376	765.365	738.162	.134972	188.416	177.159	.987776	37.171	-2.010
2	.5623	52.4137	42.4708	764.241	737.376	.135428	188.302	177.114	.987533	37.374	-2.455
3	.5633	52.3400	42.5950	765.423	738.485	.135562	188.598	177.476	.987822	37.317	-2.716
4	.5674	52.3799	42.7271	766.533	740.034	.135736	188.886	177.827	.988084	36.938	-3.094
5	.5732	52.4769	42.8834	768.144	742.729	.135839	189.158	178.263	.988447	36.494	-3.603
6	.5841	52.7416	43.1323	771.002	746.393	.135910	189.598	178.776	.988922	36.095	-3.974
7	.5974	52.7335	43.1427	771.166	747.047	.135936	189.840	179.305	.989405	35.634	-4.346
8	.6097	52.7612	43.2705	772.236	748.728	.136107	190.121	179.695	.989713	34.845	-4.837
9	.6241	52.7753	43.4112	772.706	749.718	.136342	190.234	179.932	.989836	33.789	-5.367
10	.6365	52.6558	43.5364	774.335	752.198	.136204	190.638	180.527	.990463	32.721	-5.952
11	.4732	51.0400	43.7972	583.023	921.942	.128288	231.125	221.230	1.038819	47.401	-6.203

STATION 15 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE ROTATING AT 12605.1 RPM. NUMBER OF BLADES IN ROW = 18

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	872.30	730.20	.5485	-34.347	0.300	-34.967	0.000	0.0000	.00262	0.0000	.5076
2	888.73	734.28	.5531	-34.114	0.303	-34.114	0.000	0.0000	.01790	0.0000	.4927
3	905.94	748.94	.5646	-37.588	0.000	-37.588	0.000	0.0000	.02796	0.0000	.4806
4	925.14	762.70	.5719	-38.834	0.000	-38.834	0.000	0.0000	.03492	0.0000	.4661
5	945.66	780.42	.5844	-40.447	0.000	-40.447	0.000	0.0000	.04241	0.0000	.4509
6	967.80	798.84	.5972	-42.134	0.000	-42.134	0.000	0.0000	.05104	0.0000	.4358
7	990.43	819.25	.6117	-43.783	0.000	-43.783	0.000	0.0000	.05514	0.0000	.4212
8	1013.23	845.46	.6306	-45.382	0.000	-45.382	0.000	0.0000	.05156	0.0000	.4066
9	1036.96	876.15	.6530	-46.978	0.000	-46.978	0.000	0.0000	.04568	0.0000	.3908
10	1060.93	895.39	.6664	-48.028	0.000	-48.624	0.000	0.0000	.05543	0.0000	.3738
11	1100.00	752.03	.5355	-50.687	0.000	-50.687	0.000	0.0000	.20297	0.0000	.4319

STREAM-LINE	INLET THROUGH STATION 16 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1	STATION 15 THROUGH STATION 16 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1
1	3.5756	.8543	.5115	1.6242	1.0033	.0332
2	3.6445	.8470	.5126	1.3034	.9771	.0955
3	3.7451	.8541	.5150	1.3247	.9619	.0967
4	3.6491	.8514	.5171	1.3262	.9541	.0880
5	3.6497	.8477	.5135	1.3274	.9420	.0894
6	3.6373	.8429	.5253	1.3293	.9316	.0910
7	3.6473	.8378	.5253	1.3332	.9239	.0926
8	3.6401	.8347	.5275	1.3349	.9272	.0937
9	3.6503	.8135	.5244	1.3417	.9334	.0940
10	3.6520	.8271	.5314	1.3429	.9176	.0957
11	3.6721	.4462	.4256	1.3159	.7453	.1094

MEAN VALUES	INLET TO STA.16	STA.15 TO STA.16
PRESSURE RATIO	3.5788	1.3321
ISEN EFFY	.8048	.9217
DELTA H ON H1	.5456	.0926

STATION 17 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	7.9301	22.1220	0.0000	616.63	449.95	613.29	41.53	761.63	-55.36	3.461	0.000
2	8.1114	22.1250	.1814	613.04	447.86	611.85	39.33	759.21	-65.64	3.585	0.000
3	8.2479	22.1290	.3178	611.47	446.13	610.74	35.28	757.63	-92.67	3.334	0.000
4	8.4253	22.1350	.4953	610.67	442.32	609.81	32.49	756.03	-144.46	3.050	0.000
5	8.6145	22.1360	.6845	609.58	438.54	608.88	28.81	749.75	-208.20	2.709	0.000
6	8.8027	22.1430	.8727	608.38	429.34	608.61	24.59	744.75	-269.05	2.316	0.000
7	8.9941	22.1490	1.0641	607.09	421.09	607.71	20.31	739.63	-425.87	1.914	0.000
8	9.2034	22.1570	1.2734	605.51	411.72	606.29	16.03	734.70	-7380.29	1.566	0.000
9	9.4744	22.1680	1.5444	603.62	402.70	604.47	13.91	729.78	575.45	1.281	0.000
10	9.7123	22.1760	1.7824	602.61	397.37	602.13	9.74	725.68	430.95	.919	0.000
11	10.0000	22.1890	2.0100	604.57	520.73	504.57	0.00	725.09	0.00	0.001	0.000

STREAM-LINE	MACH NUMBER	PRESSURE TOTAL	PRESSURE STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.5719	52.6037	41.9493	787.169	734.100	.153472	188.970	177.336	.989614	35.933	3.861
2	.5737	52.7766	42.1335	787.143	734.045	.154178	188.628	177.116	.988687	36.153	3.585
3	.5753	52.9443	42.2754	787.375	734.662	.154571	188.710	177.279	.989070	35.982	3.334
4	.5767	53.0746	42.3933	787.212	734.301	.154867	188.951	177.576	.988235	35.916	3.050
5	.5779	53.1911	42.4991	787.322	734.349	.155034	189.197	177.971	.934533	35.603	2.709
6	.5774	53.2745	42.5741	787.357	734.424	.155170	189.439	178.422	.988937	35.209	2.316
7	.5782	53.3521	42.6443	787.357	734.511	.155416	189.811	178.886	.989301	34.706	1.914
8	.5785	53.4037	42.6943	787.447	734.511	.155575	190.031	179.312	.989652	34.081	1.566
9	.5784	53.3746	42.6743	787.317	734.363	.155575	190.340	179.604	.989918	33.691	1.281
10	.5789	53.4195	42.7174	787.405	734.545	.155816	190.417	179.900	.990037	33.201	.919
11	.6488	51.2775	43.5515	960.362	916.614	.129319	230.467	219.987	1.037837	48.983	0.000

STATION 17 IS AT THE LEADING EDGE OF A BLADE ROTATING AT 0.0 RPM NUMBER OF BLADES IN ROW = 10

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	INCIDENCE ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE
1	0.00	761.63	.5719	35.933	0.000	0.000	0.000	-19.9949
2	0.00	759.21	.5703	36.153	0.000	0.000	0.000	-20.0143
3	0.00	757.63	.5693	35.982	0.000	0.000	0.000	-20.5016
4	0.00	756.03	.5687	35.916	0.000	0.000	0.000	-21.3011
5	0.00	749.75	.5619	35.603	0.000	0.000	0.000	-22.1173
6	0.00	744.75	.5574	35.209	0.000	0.000	0.000	-22.7297
7	0.00	739.63	.5529	34.706	0.000	0.000	0.000	-23.0906
8	0.00	736.70	.5495	34.081	0.000	0.000	0.000	-23.3735
9	0.00	729.78	.5443	33.691	0.000	0.000	0.000	-24.0385
10	0.00	725.68	.5409	33.201	0.000	0.000	0.000	-25.6086
11	0.00	725.09	.4389	48.983	0.000	0.000	0.000	-23.5738

STATION 19 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	8.1101	24.1250	0.0000	608.19	47.81	607.30	32.30	610.06	-941.64	3.100	0.000
2	8.2355	24.1250	.1355	592.32	41.15	591.59	29.03	593.77	-366.96	2.858	0.000
3	8.3466	24.1250	.2466	581.08	35.98	580.49	26.54	582.20	-158.11	2.618	0.000
4	8.5533	24.1250	.4533	564.36	31.48	563.83	24.21	565.19	-112.77	2.363	0.000
5	8.7264	24.1250	.6264	551.73	28.73	607.47	22.38	608.47	-112.32	2.110	0.000
6	8.9043	24.1250	.8043	612.24	21.14	611.92	19.74	612.80	-143.97	1.868	0.000
7	9.1016	24.1250	1.0016	609.03	14.55	609.41	16.47	609.80	-176.88	1.559	0.000
8	9.3042	24.1250	1.2042	595.21	7.37	595.37	12.32	595.56	-140.74	1.233	0.000
9	9.5261	24.1250	1.4261	597.04	-.10	597.83	9.22	597.90	-98.27	.884	0.000
10	9.7483	24.1250	1.6483	616.17	-8.07	615.14	5.93	616.22	-99.42	.550	0.000
11	10.0000	24.1250	1.9000	593.62	-16.46	593.62	0.00	593.85	0.00	0.000	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.4522	52.3446	49.4437	786.963	757.393	.162112	189.327	181.894	.989213	4.495	3.100
2	.4326	51.7319	49.0355	787.457	759.039	.161861	188.930	182.184	.983592	4.043	2.858
3	.4311	51.7107	49.0219	787.078	759.473	.161814	189.043	182.274	.989701	3.544	2.618
4	.4410	52.0156	49.2147	788.165	758.667	.162021	189.155	182.080	.983426	3.032	2.363
5	.4513	52.3492	49.4313	788.336	758.030	.162217	189.321	181.927	.989200	2.517	2.110
6	.4540	52.4005	49.4684	788.396	758.405	.162179	189.326	182.032	.989314	1.976	1.868
7	.4496	52.2998	49.3934	788.240	760.072	.161861	189.747	182.417	.989803	1.376	1.559
8	.4403	52.0832	49.2735	788.453	761.939	.161534	189.949	182.865	.990371	.709	1.233
9	.4419	52.1371	49.3351	788.073	762.327	.161529	190.038	182.958	.990460	-.009	.884
10	.4475	52.2617	49.6228	788.391	760.588	.161936	190.174	182.541	.989871	-.748	.550
11	.3475	51.0052	46.7144	978.344	929.599	.132697	230.147	223.104	1.037647	-1.589	0.000

STATION 19 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE ROTATING AT 0.0 RPM NUMBER OF BLADES IN ROW = 10

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	0.00	610.06	.4522	4.495	0.000	4.495	0.000	0.0000	.04415	0.0000	.3363
2	0.00	593.77	.4326	4.043	0.000	4.043	0.000	0.0000	.11051	0.0000	.3237
3	0.00	582.20	.4311	3.544	0.000	3.544	0.000	0.0000	.12018	0.0000	.3112
4	0.00	565.19	.4410	3.032	0.000	3.032	0.000	0.0000	.08873	0.0000	.3005
5	0.00	608.47	.4513	2.517	0.000	2.517	0.000	0.0000	.05031	0.0000	.2913
6	0.00	612.80	.4540	1.976	0.000	1.976	0.000	0.0000	.03119	0.0000	.2824
7	0.00	609.80	.4496	1.376	0.000	1.376	0.000	0.0000	.03890	0.0000	.2732
8	0.00	595.56	.4403	.709	0.000	.709	0.000	0.0000	.05628	0.0000	.2644
9	0.00	597.90	.4419	-.009	0.000	-.009	0.000	0.0000	.04309	0.0000	.2568
10	0.00	616.22	.4575	-.748	0.000	-.748	0.000	0.0000	-.01343	0.0000	.2495
11	0.00	593.85	.3375	-1.589	0.000	-1.589	0.000	0.0000	.00099	0.0000	.2838

STREAM-LINE	INLET THROUGH STATION 18 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1	STATION 17 THROUGH STATION 18 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1
1	3.5619	.8391	.5208	.9988	-.1519	.0022
2	3.6192	.8342	.5141	.9949	-2.2034	.0019
3	3.6171	.8330	.5146	.9922	-3.0964	.0017
4	3.5385	.8304	.5135	.9968	-3.1836	.0012
5	3.5912	.8433	.5208	.9929	-3.2431	.0007
6	3.5947	.8383	.5224	.9946	-10.6491	.0001
7	3.5574	.8330	.5242	.9915	7.1703	-.0003
8	3.5416	.8259	.5228	.9870	4.9834	-.0008
9	3.5467	.8212	.5276	.9884	3.1214	-.0011
10	3.5824	.8360	.5276	.9980	.4571	-.0013
11	3.4697	.5024	.8437	.9947	1.0288	-.0015

MEAN VALUES	INLET TO STA.18	STA.17 TO STA.18
PRESSURE RATIO	3.5460	.9907
ISEN EFFY	.7983	58.9411
DELTA H ON H1	.5453	-.0008

STATION 19 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	4.1601	25.2406	0.0100	634.25	38.46	633.63	27.49	635.42	-85.53	2.529	4.196
2	4.2497	25.2995	.1101	612.14	34.42	611.65	24.32	613.13	-97.36	2.277	4.196
3	4.4393	25.2702	.2703	614.28	33.31	613.92	21.13	615.18	-123.62	1.971	4.196
4	4.7329	25.2314	.4340	618.77	30.17	618.53	19.14	619.50	-161.35	1.680	4.196
5	4.9512	25.3961	.5624	623.80	25.70	623.60	15.83	624.33	-175.33	1.454	4.196
6	4.9313	25.3172	.7420	627.04	20.26	626.94	13.42	627.42	-163.74	1.263	4.196
7	5.1247	25.3211	.9213	627.81	14.09	627.7	11.27	627.97	-161.33	1.029	4.196
8	5.3374	25.3336	1.1705	628.06	7.48	628.02	9.51	628.11	-198.52	.645	4.195
9	5.5349	25.3509	1.3735	630.93	1.25	630.92	2.39	630.93	-267.21	.262	4.196
10	5.7501	25.3357	1.5944	635.11	-2.94	635.11	-.84	635.12	-272.64	-.075	4.196
11	10.0000	25.3850	1.9449	599.11	-6.79	599.11	0.00	599.15	0.00	0.000	4.196

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	STATIC	TEMPERATURES TOTAL	STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.4719	52.4101	44.9472	781.062	754.965	.160961	189.260	181.196	.989042	3.470	6.725
2	.4561	51.4778	44.0393	767.294	756.317	.162736	188.952	181.444	.989351	3.256	6.473
3	.4545	51.3547	44.0143	767.052	756.170	.162744	189.039	181.481	.989380	3.104	6.167
4	.4507	51.0411	43.8243	766.409	756.473	.163741	189.218	181.554	.989474	2.791	5.876
5	.4431	52.1390	45.0102	765.360	755.325	.166666	189.446	181.002	.989688	2.359	5.650
6	.4453	52.2372	45.0373	765.159	757.399	.166541	189.637	181.776	.989747	1.850	5.459
7	.4456	52.2549	45.0445	765.230	757.700	.166538	189.739	181.964	.989853	1.285	5.225
8	.4455	52.2599	45.0470	765.392	758.004	.166466	189.814	181.935	.989942	.682	4.881
9	.4473	53.3914	46.1460	765.600	758.476	.166344	189.944	182.034	.990075	.113	4.459
10	.4705	52.4175	44.8452	781.237	758.971	.160246	190.269	182.153	.990233	-.265	4.121
11	.4310	50.4425	45.1344	969.768	929.897	.131141	230.344	223.175	1.038413	-.646	4.195

STATION 19 IS AT THE LEADING EDGE OF A BLADE ROTATING AT 12005.1 RPM. NUMBER OF BLADES IN ROW = 18

STREAM-LINE	BLADE SPEED	RELATIVE V-LOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	INCIDENCE ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE
1	497.60	1067.49	.7952	-53.364	0.000	0.000	0.000	20.4830
2	511.97	1064.95	.7939	-55.387	0.000	0.000	0.000	20.9294
3	529.08	1065.17	.7954	-57.223	0.000	0.000	0.000	21.4541
4	545.21	1104.92	.8195	-55.933	0.000	0.000	0.000	22.0481
5	561.74	1125.36	.8356	-57.376	0.000	0.000	0.000	22.6435
6	564.39	1149.69	.8523	-57.912	0.000	0.000	0.000	23.1301
7	1164.15	1172.34	.8691	-57.021	0.000	0.000	0.000	23.6546
8	1120.01	1198.51	.8871	-58.341	0.000	0.000	0.000	24.1093
9	1144.84	1222.92	.9053	-59.441	0.000	0.000	0.000	24.6755
10	1172.02	1249.36	.9253	-60.436	0.000	0.000	0.000	25.3530
11	1193.19	1292.51	.9622	-61.572	0.000	0.000	0.000	26.4351

STATION 20 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	4.2301	27.2430	0.0100	516.12	395.49	555.84	18.16	707.02	-164.20	1.766	-4.362
2	4.3555	27.2386	.1229	565.59	410.27	609.37	15.36	701.15	-197.28	1.609	-4.362
3	4.4303	27.2291	.2411	587.81	434.93	607.43	14.11	700.16	-210.06	1.425	-4.362
4	4.5403	27.2177	.4110	599.43	469.30	599.31	12.29	698.94	-230.82	1.237	-4.362
5	4.6015	27.2054	.5730	571.09	307.82	571.09	10.54	696.73	-264.59	1.056	-4.362
6	4.8725	27.1924	.7444	574.69	383.20	574.62	8.78	693.65	-324.85	.875	-4.362
7	9.1913	27.1785	.9239	578.33	376.50	578.29	6.39	691.18	-510.14	.692	-4.362
8	9.3422	27.1642	1.1194	583.32	365.95	583.37	4.81	688.67	4249.85	.472	-4.362
9	9.5384	27.1492	1.3122	588.11	351.77	588.11	2.65	685.28	259.24	.258	-4.362
10	9.7429	27.1336	1.5173	545.35	343.69	545.35	.36	678.78	140.17	.036	-4.362
11	10.0000	27.1140	1.7751	473.09	474.37	473.09	0.00	669.96	0.00	0.000	-4.362

STREAM-LINE	MACH NUMBER	PRESSURE TOTAL	PRESSURE STATIC	TEMPERATURE TOTAL	TEMPERATURE STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROP'	FLOW ANGLE	(PHI+GAMMA)
1	.5004	66.5115	55.4032	843.693	802.287	.197846	202.532	192.549	.988879	36.004	-2.596
2	.5243	66.5010	55.9163	846.102	805.193	.197529	203.064	193.246	.989615	35.812	-2.753
3	.5371	66.5017	56.1122	847.393	806.601	.197608	203.374	193.584	.989845	35.837	-2.937
4	.5019	66.5060	55.1292	844.919	807.358	.197738	203.644	193.888	.990107	35.442	-3.125
5	.4493	66.7298	56.2141	844.594	809.261	.197839	203.903	194.208	.990346	34.819	-3.306
6	.4974	66.8036	56.6161	850.850	810.600	.197951	204.159	194.544	.990605	36.080	-3.488
7	.4351	66.8491	56.5441	851.931	811.944	.197935	204.414	194.844	.990823	33.224	-3.679
8	.4943	66.8438	56.9343	852.130	812.672	.198231	204.513	195.041	.990926	32.099	-3.889
9	.4984	66.9422	57.1760	852.222	813.144	.198509	204.533	195.155	.990943	31.985	-4.104
10	.4624	67.1734	57.0441	852.135	814.396	.198459	204.704	195.503	.991267	30.417	-4.326
11	.4737	64.9164	54.1494	1049.317	1007.908	.153122	250.876	241.912	1.042020	45.077	-4.362

STATION 20 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE ROTATING AT 12605.1 RPM. NUMBER OF BLADES IN ROW = 10

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	805.30	776.58	.5547	-41.022	0.000	-41.022	0.000	0.0000	-.00718	0.0000	.4673
2	818.79	792.42	.5686	-41.407	0.000	-41.407	0.000	0.0000	.01142	0.0000	.4703
3	833.04	772.58	.5591	-42.712	0.000	-42.712	0.000	0.0000	.02106	0.0000	.4596
4	951.43	769.35	.5098	-43.759	0.000	-43.759	0.000	0.0000	.02596	0.0000	.4460
5	958.14	967.74	.6795	-44.910	0.000	-44.910	0.000	0.0000	.03924	0.0000	.4310
6	966.43	829.52	.5942	-46.147	0.000	-46.147	0.000	0.0000	.03298	0.0000	.4159
7	1015.80	853.99	.6117	-47.374	0.000	-47.374	0.000	0.0000	.03622	0.0000	.4012
8	1027.64	862.15	.6115	-48.597	0.000	-48.597	0.000	0.0000	.03566	0.0000	.3861
9	1049.23	912.32	.6529	-49.861	0.000	-49.861	0.000	0.0000	.03042	0.0000	.3704
10	1071.73	934.19	.6680	-51.200	0.000	-51.200	0.000	0.0000	.03503	0.0000	.3547
11	1100.07	764.37	.5542	-52.904	0.000	-52.904	0.000	0.0000	.02206	0.0000	.4496

STREAM-LINE	INLET THROUGH STATION 21 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1	STATION 19 THROUGH STATION 20 PRESSURE RATIO	ISENTROPIC EFFICIENCY	DELTA H ON H1
1	.9314	.8004	.0209	1.2710	1.0134	.0701
2	.9244	.8535	.0312	1.2330	.9842	.0747
3	.9307	.8511	.0347	1.2324	.9705	.0758
4	.9371	.8492	.0373	1.2316	.9626	.0762
5	.9419	.8471	.0379	1.2799	.9507	.0753
6	.9453	.8448	.0400	1.2748	.9439	.0766
7	.9476	.8424	.0416	1.2792	.9437	.0772
8	.9508	.8423	.0424	1.2800	.9435	.0774
9	.9511	.8413	.0430	1.2788	.9433	.0766
10	.9521	.8355	.0446	1.2740	.9393	.0762
11	.9141	.8202	1.0133	1.2969	.8379	.0891

MEAN VALUES	INLET TO STA.20	STA.19 TO STA.20
PRESSURE RATIO	4.5336	1.2794
ISEN EFFY	.8117	.9434
DELTA H ON H1	.8648	.0773

STATION 21 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	4.2803	24.0300	3.4100	533.17	392.74	533.11	7.90	711.40	-51.67	.763	0.000
2	4.3712	24.0300	.1213	576.29	400.35	576.13	7.90	705.07	-63.46	.776	0.000
3	4.4073	24.0300	.0573	577.77	404.72	579.72	7.27	763.79	-76.97	.723	0.000
4	4.5593	24.0300	.0343	576.23	401.02	576.24	6.59	702.06	-96.52	.655	0.000
5	4.8119	24.0300	.0334	577.01	394.99	577.78	9.31	699.90	-127.62	.595	0.000
6	4.9833	24.0300	.7333	580.28	386.71	581.24	5.49	697.33	-167.16	.542	0.000
7	5.1620	24.0300	.3120	583.42	376.68	583.41	4.36	694.48	-338.22	.488	0.000
8	5.3492	24.0300	1.0992	586.74	365.65	586.72	4.57	691.35	-1175.53	.447	0.000
9	5.5446	24.0300	1.2944	589.00	355.37	588.98	4.57	687.90	1007.90	.445	0.000
10	5.7475	24.0300	1.4975	589.74	348.74	589.72	4.59	685.14	290.40	.446	0.000
11	10.0000	24.0300	1.7300	403.15	492.64	493.13	0.00	682.92	0.00	0.000	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.5120	66.5416	55.6473	846.190	803.373	.184928	203.061	192.954	.999574	33.509	.763
2	.5084	66.4334	55.7702	847.931	806.104	.184632	203.437	193.479	.999076	35.192	.776
3	.5057	66.3512	55.8727	847.310	806.593	.184193	203.448	193.606	.999071	35.106	.723
4	.5042	66.3067	55.9145	847.041	807.025	.183991	203.674	193.930	.999182	34.833	.655
5	.5033	66.2817	55.9343	846.964	807.201	.183922	203.745	194.112	.999366	34.354	.596
6	.5030	66.2797	55.9354	846.999	807.236	.183926	203.820	194.120	.999578	34.680	.542
7	.5039	66.3024	55.9207	847.128	807.192	.183940	203.918	194.086	.999759	34.847	.488
8	.4951	66.3598	56.0307	847.745	812.173	.184045	204.467	194.921	.999906	31.931	.443
9	.4924	66.4636	56.0994	847.280	812.903	.184237	204.597	195.097	.999994	31.103	.445
10	.4303	66.4445	56.7283	845.460	813.302	.184675	204.506	195.192	1.000087	28.328	.446
11	.4337	65.2047	57.0397	1043.709	1004.900	.153456	250.490	241.176	1.041348	44.978	0.000

STATION 21 IS AT THE LEADING EDGE OF A BLADE ROTATING AT 0.0 RPM. NUMBER OF BLADES IN ROW = 10

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	INCIDENCE ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE
1	0.000	711.[illegible]	.5121	33.504	0.168	0.000	0.000	-20.4545
2	0.000	705.[illegible]	.5088	35.192	0.000	0.000	0.000	-21.6056
3	0.000	703.[illegible]	.5057	35.106	0.000	0.000	0.000	-22.3592
4	0.000	702.[illegible]	.5042	34.833	0.000	0.000	0.000	-22.9846
5	0.000	701.[illegible]	.5033	34.354	0.000	0.000	0.000	-23.5112
6	0.000	701.[illegible]	.5030	34.680	0.000	0.000	0.000	-23.9916
7	0.000	701.[illegible]	.5039	34.847	0.000	0.000	0.000	-24.4486
8	0.000	704.[illegible]	.4951	31.931	0.000	0.000	0.000	-24.8107
9	0.000	707.[illegible]	.4924	31.103	0.000	0.000	0.000	-25.0898
10	0.000	707.[illegible]	.4303	30.328	0.000	0.000	0.000	-25.5614
11	0.000	642.[illegible]	.4337	44.978	0.000	0.000	0.000	-25.5120

STATION 22 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	MESH-POINT COORDS X-COORD	MESH-POINT COORDS L-COORD	VELOCITIES MERIDIONAL	VELOCITIES TANGENTIAL	VELOCITIES AXIAL	VELOCITIES RADIAL	VELOCITIES TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	4.0500	30.0000	1.0100	527.13	45.56	527.13	0.00	529.10	0.00	0.000	0.000
2	[illegible]	30.[illegible]	.[illegible]	535.76	40.00	535.76	.50	537.25	-725.[illegible]	.054	0.000
3	[illegible]	30.[illegible]	.[illegible]	542.03	33.99	542.03	.68	543.[illegible]	-526.[illegible]	.072	0.000
4	[illegible]	30.[illegible]	.[illegible]	543.54	28.18	543.54	.93	544.27	-462.43	.08[illegible]	0.000
5	[illegible]	30.[illegible]	.[illegible]	544.75	23.14	544.75	1.00	545.24	-410.30	.106	0.000
6	[illegible]	30.[illegible]	.[illegible]	547.09	18.58	547.09	1.23	548.26	-369.68	.124	0.000
7	[illegible]	30.[illegible]	.[illegible]	2.31	13.51	552.31	1.50	552.48	-336.86	.155	0.000
8	[illegible]	30.[illegible]	1.[illegible]	[illegible].79	[illegible].16	554.79	1.44	554.86	-327.35	.190	0.000
9	[illegible]	30.[illegible]	1.[illegible]	[illegible].27	2.65	553.27	2.28	553.28	-287.10	.236	0.000
10	[illegible]	30.[illegible]	1.[illegible]	[illegible].21	-2.80	552.50	2.31	552.52	-241.46	.291	0.000
11	10.0900	30.1000	1.7500	[illegible]5.44	-8.95	565.44	0.00	565.51	0.00	0.000	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.3761	66.6811	59.7543	847.002	824.107	.195773	203.424	197.434	.990690	4.940	0.000
2	.3719	66.0753	59.7565	846.383	824.366	.195646	203.732	197.967	.990850	4.270	.655
3	.3691	66.3201	59.7962	846.041	824.497	.195747	203.770	197.874	.991738	3.599	.072
4	.3674	66.2514	59.7967	845.871	824.721	.195719	203.849	197.933	.990798	2.964	.087
5	.3674	66.2534	59.7988	845.849	825.111	.195633	203.964	198.027	.990906	2.433	.106
6	.3693	66.3267	59.7758	846.409	825.397	.195545	204.048	198.045	.990982	1.938	.128
7	.3724	66.4267	59.7327	847.455	825.556	.195570	204.229	198.133	.991021	1.401	.155
8	.3340	65.5467	59.7803	841.394	825.774	.195542	204.334	198.189	.991076	.845	.190
9	.3428	66.0393	59.7988	842.073	826.201	.195470	204.402	198.288	.991190	.275	.236
10	.3430	66.5259	59.8190	841.798	826.303	.195479	204.431	198.319	.991208	-.290	.291
11	.3620	65.6511	59.9595	1043.097	1016.486	.159332	250.343	243.957	1.040739	-.907	0.000

STATION 22 IS WITHIN .02 AT IN. TRAILING EDGE OF A BLADE ROTATING AT 0.0 RPM. NUMBER OF BLADES IN ROW = 10

STREAM-LINE	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE	BLADE ANGLE	LEAN ANGLE	PRESS DIFF ACROSS BLADE	LOSS COEFF	DIFFUSION FACTOR	DELTA P ON Q
1	0.00	529.10	.3761	4.940	[illegible]	4.940	0.000	0.0000	.09921	0.0000	.1769
2	0.00	537.27	.3818	4.270	[illegible]	4.270	0.000	0.0000	.07017	0.0000	.1731
3	0.00	543.10	.3860	3.589	[illegible]	3.589	0.000	0.0000	.06018	0.0000	.1619
4	0.00	546.27	.3883	2.964	0.000	2.964	0.000	0.0000	.05937	0.0000	.1509
5	0.00	546.26	.3883	2.433	0.000	2.433	0.000	0.0000	.04971	0.0000	.1406
6	0.00	545.96	.3881	2.031	0.000	2.031	0.000	0.0000	.03818	0.0000	.1309
7	0.00	545.46	.3878	1.801	0.000	1.801	0.000	0.0000	.02443	0.0000	.1221
8	0.00	545.06	.3875	1.744	0.000	1.744	0.000	0.0000	.01604	0.0000	.1164
9	0.00	544.86	.3873	1.744	0.000	1.744	0.000	0.0000	.01594	0.0000	.1075
10	0.00	544.32	.3870	-.694	0.000	-.694	0.000	0.0000	.02112	0.0000	.1009
11	0.00	545.31	.3520	-.907	0.000	-.907	0.000	0.0000	.07167	0.0000	.3541

STREAM-LINE	INLET THROUGH STATION 22 PRESSURE RATIO	INLET THROUGH STATION 22 ISENTROPIC EFFICIENCY	INLET THROUGH STATION 22 DELTA H ON H1	STATION 21 THROUGH STATION 22 PRESSURE RATIO	STATION 21 THROUGH STATION 22 ISENTROPIC EFFICIENCY	STATION 21 THROUGH STATION 22 DELTA H ON H1
1	4.4417	.8431	.2341	.9930	-1.5931	.0018
2	4.4600	.8414	.2346	.9964	-1.0143	.0016
3	4.4707	.8442	.2359	.9966	-.6437	.0013
4	4.4765	.8462	.2379	.9965	-.4352	.0009
5	4.4800	.8481	.2394	.9933	-5.0937	.0003
6	4.4814	.8491	.2395	.9938	17.2736	-.0001
7	4.5143	.8604	.2405	.9967	3.4940	-.0004
8	4.5233	.8607	.2405	.9977	2.0944	-.0006
9	4.5247	.8601	.2414	.9953	2.0944	-.0007
10	4.5246	.8342	.2413	.9980	2.1630	-.0007
11	4.4671	.8341	.2422	.9965	-3.3327	-.0006

MEAN VALUES	INLET TO STA.22	STA.21 TO STA.22
PRESSURE RATIO	4.5120	.9932
ISEN EFFY	.8085	-97.5260
DELTA H ON H1	.6648	.0000

STATION 23 FLOW-FIELD DESCRIPTION

STREAM-LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	4.2500	31.0000	0.0000	539.75	27.34	539.73	0.00	540.45	0.00	0.000	0.000
2	4.3761	33.0000	.1731	542.69	26.99	542.63	-.43	543.36	0.00	-.045	0.000
3	4.5000	35.0000	.3464	543.14	26.15	543.14	-.81	543.77	0.00	-.064	0.000
4	4.6200	37.0000	.5194	543.40	24.36	543.43	-.96	544.04	0.00	-.068	0.000
5	4.7350	39.0000	.6921	543.53	21.07	543.58	-1.07	544.15	0.00	-.071	0.000
6	4.8450	41.0000	.8644	543.58	16.03	543.64	-.97	544.18	0.00	-.073	0.000
7	4.9500	43.0000	1.0361	543.58	10.29	543.61	-.97	544.15	0.00	-.057	0.000
8	5.0500	45.0000	1.2072	543.61	7.15	543.64	-.95	544.18	0.00	-.032	0.000
9	5.1450	47.0000	1.3776	543.70	5.32	543.73	-.95	544.21	0.00	-.013	0.000
10	5.2350	49.0000	1.5473	543.77	5.32	543.80	-.95	544.27	0.00	-.006	0.000
11	5.3200	51.0000	1.7160	543.84	2.64	543.87	0.00	544.30	0.00	0.000	0.000

STREAM-LINE	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT	ENTHALPIES TOTAL	ENTHALPIES STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.3443	66.2321	63.7362	844.161	823.956	.196034	203.559	197.725	.990515	2.920	0.000
2	.3491	66.2256	63.7329	843.347	824.319	.195777	203.833	197.957	.990795	2.447	-.045
3	.3526	66.2237	63.7351	842.881	824.581	.195704	203.877	197.972	.990813	2.755	-.064
4	.3547	66.2277	63.7439	842.713	824.713	.195714	203.927	198.003	.990850	2.551	-.069
5	.3559	66.2331	63.7502	842.713	824.749	.195649	204.050	198.107	.990907	2.264	-.071
6	.3563	66.2377	63.7543	842.811	824.807	.195634	204.133	198.166	.990946	1.887	-.070
7	.3560	66.2395	63.7546	842.907	824.847	.195626	204.177	198.217	.990976	1.471	-.057
8	.3552	66.2386	63.7535	842.998	824.891	.195576	204.222	198.266	.991008	1.070	-.032
9	.3542	66.2365	63.7507	843.114	824.964	.195526	204.277	198.317	.991052	.743	-.013
10	.3532	66.2350	63.7488	843.256	825.057	.195480	204.340	198.384	.991106	.552	-.006
11	.3617	65.6207	63.9496	1342.879	1016.311	.159306	250.291	243.915	1.040720	.268	0.000

ANNULUS WALL BOUNDARY LAYER CALCULATION RESULTS

STATION NUMBER	1	2	3	4	5	6	7	8	9	10
HUB DISPLACEMENT THICKNESS	0.000000	.01003	.00804	.01101	.00957	.02561	.02138	.02085	.01944	.03506
CASE DISPLACEMENT THICKNESS	0.000000	.00431	.00994	.04923	.04206	.01363	.01238	.14185	.11283	.01292
BLOCKAGE AREA FRACTION	0.000000	.00313	.00350	.01391	.01408	.00918	.00846	.05506	.04609	.01472

STATION NUMBER	11	12	13	14	15	16	17	18	19	20
HUB DISPLACEMENT THICKNESS	.02617	.02070	.12014	.03038	.02537	.03523	.03237	.03563	.03176	.04339
CASE DISPLACEMENT THICKNESS	.01178	.00794	.07133	.02415	.02071	.06443	.05369	.03214	.03220	.07395
BLOCKAGE AREA FRACTION	.01179	.04645	.03488	.02320	.02062	.04962	.04399	.03553	.03496	.06796

STATION NUMBER	21	22	23
HUB DISPLACEMENT THICKNESS	.04224	.06497	.06209
CASE DISPLACEMENT THICKNESS	.03946	.04184	.04437
BLOCKAGE AREA FRACTION	.03934	.05977	.05962

POINT NO. 1 PASS 25 THE CALCULATION IS NOT FULLY CONVERGED IVFAIL = 5 IFFAIL = 0

SPEED FACTOR = 1.003 FLOW = 69.500 TOTAL PRESSURE RATIO = 4.512 ISENTROPIC EFFICIENCY = .8886 POWER = 8.1378E+03

REFERENCES

1. Wennerstrom, A.J. and Hearsey, R.M., "The Design of an Axial Compressor Stage for a Total Pressure Ratio of 3 to 1", ARL 71-0061, AD 727 001, Aerospace Research Laboratories, Wright-Patterson Air Force Base, Ohio, 1971.

2. Sandercock, D.M., Kovach, K., and Lieblein, S., "Experimental Investigation of a Five Stage Axial Flow Research Compressor with Transonic Rotors in All Stages I-Compressor Design", NACA RME54F24, National Advisory Committee for Aeronautics, Washington, D.C., 1954.

3. Kovach, K., and Sandercock, D.M., "Experimental Investigation of a Five Stage Axial Flow Research Compressor with Transonic Rotors in All Stages II -Compressor Overall Performance", NACA RME54G01, National Advisory Committee for Aeronautics, Washington, D.C., 1954.

U.S.Government Printing Office. 1975 – 657-020/491