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Techniques of Water-Resources Investigations
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Chapter C3

A MODEL FOR SIMULATION OF FLOW IN SINGULAR AND INTERCONNECTED CHANNELS

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Book 7

AUTOMATED DATA PROCESSING AND COMPUTATIONS

Appendix IV, FORTRAN IV Program Listing

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C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #  BR   1
C #    BRANCH-NETWORK FLOW MODEL USING A LINEAR-IMPLICIT TECHNIQUE              #  BR   2
C #                          VERSION 79/04/19                                   #  BR   3
C #      BY R. W. SCHAFFRANEK, R. A. BALTZER, AND D. E. GOLDBERG                #  BR   4
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #  BR   5
C #                                                                             #  BR   6
C #   THIS PROGRAM CALCULATES TRANSIENT FLOW IN A NETWORK OF                    #  BR   7
C #   INTERCONNECTED OPEN CHANNELS.  TIME DERIVATIVES ARE APPROXIMATED          #  BR   8
C #   AS CENTERED IN SPACE AND TIME; SPATIAL DERIVATIVES ARE TREATED            #  BR   9
C #   AS CENTERED IN SPACE AND WEIGHTED IN TIME ACCORDING TO A USER             #  BR  10
C #   DEFINED WEIGHTING FACTOR.  A LINEAR MATRIX SOLUTION IS EFFECTED           #  BR  11
C #   WITH ITERATIVE IMPROVEMENT OF RESULTS OPTIONALLY SPECIFIABLE.             #  BR  12
C #   THE 4*N BY 4*N MATRIX (N IS THE NUMBER OF BRANCHES) IS SOLVED             #  BR  13
C #   BY GAUSS ELIMINATION USING MAXIMUM PIVOT STRATEGY.                        #  BR  14
C #                                                                             #  BR  15
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #  BR  16
C #                          ARRAY DIMENSIONS                                   #  BR  17
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #  BR  18
C #                                                                             #  BR  19
C #   MAXIMUM BRANCHES:    MXBH=15       MAXIMUM JUNCTIONS:    MXJN=15        #  BR  20
C #   X-SECTIONS PER BRANCH: NSEC=4      SEGMENTS PER BRANCH: NSEG=3           #  BR  21
C #   MAX CROSS SECTIONS:    NBSEC=60    MAX POINTS PER X-SECT:  MXPT=20       #  BR  22
C #   MAX BOUNDARY LOCATIONS: MXBY=5     MAX MEASURED LOCATIONS: MXMD=5        #  BR  23
C #   MAXIMUM Z(T) B.V.D : MAXZBD=720    MAXIMUM Q(T) B.V.D.: MAXQBD=360       #  BR  24
C #   MAX COMPUTED PER DAY: MAXCZQ=288 MAX MEASURED DATA: MAXMZQ=288            #  BR  25
C #                                                                             #  BR  26
C #   DIMENSION MAXQBD ONE-HALF OF MAXZBD                                       #  BR  27
C #                                                                             #  BR  28
C #   BRNAME(10,MXBH),IJF(MXBH),IJT(MXBH),NSEC(MXBH),XSKT(MXBH),               #  BR  29
C #   BU(2*MXBH),BUU(4*MXBH),BMX(4*MXBH),AM((4*MXBH)**2),ROW(4*MXBH),          #  BR  30
C #   QMAX(NBSEC),QMIN(NBSEC),                                                  #  BR  31
C #   QSUM(NBSEC),IPT(NBSEC),ZQMIN(NBSEC),AQMIN(NBSEC)                          #  BR  32
C #   ZQMAX(NBSEC),AQMAX(NBSEC),ITQMAX(NBSEC),ITQMIN(NBSEC),                   #  BR  33
C #   Z(NBSEC),Q(NBSEC),A(NBSEC),B(NBSEC),R(NBSEC)                              #  BR  34
C #   ZP(NBSEC),QP(NBSEC),AP(NBSEC),BP(NBSEC),RP(NBSEC),                       #  BR  35
C #   WANGLE(NBSEC),BETVEL(NBSEC),ZA(MXPT,NBSEC),ZQCOMP(MAXCZQ,NBSEC),         #  BR  36
C #   AA(MXPT,NBSEC),BB(MXPT,NBSEC),IDX(MXJN,MXBH),DATUM(MXBY),                #  BR  37
C #   ICT(MXJN),W(MXJN),U(2*NBSEC),UU(4*NBSEC),T(NBSEC),DX(NBSEC),             #  BR  38
C #   RN(4,NBSEC),IJVOL(MXBY),IDONLY(MXBY),IJVKT(MXBY),ISTAPR(MXBY),           #  BR  39
C #   IFVOL(8,31,MXBY),ITVOL(8,31,MXBY),FVSTAT(31,MXBY),ISTATN(MXBY),          #  BR  40
C #   ITYPE(MXBY),IBJNC(MXBY),NDATA(MXBY),DTT(MXBY),ZQ(MAXZBD,MXBY),           #  BR  41
C #   MSTATN(MXMD),MTYPE(MXMD),MSEC(MXMD),MDATA(MXMD),MBCH(MXMD),              #  BR  42
C #   ZQMEAS(MAXMZQ,MXMD),IZDATA(MAXZBD),IQDATA(MAXQBD),                       #  BR  43
C #   INDATA(MAXZBD/2),ZQBVCO(4,MXBY),IZQBVE(MXBY)                             #  BR  44
C #                                                                             #  BR  45
C #   SET MAXIMUM RECORD SIZE OF DEFILE FILE 50 STATEMENT OF OUT                #  BR  46
C #   SUBROUTINE TO 52 TIMES MXBY.                                              #  BR  47
C #                                                                             #  BR  48
      REAL ZQCOMP(288,60),ZQ(720,5),ZQMEAS(288,5)                               BR  49
      REAL QMAX(60),QMIN(60),QSUM(60),ZQMIN(60),AQMIN(60),ZQMAX(60),AQMA        BR  50
     1X(60)                                                                     BR  51
      REAL A(60),B(60),Z(60),Q(60),DX(60),T(60),RN(4,60),ZP(60),QP(60),A        BR  52
     1P(60),BP(60),RP(60),WANGLE(60),BETVEL(60),R(60),ZA(20,60),AA(20,60        BR  53
     2),BB(20,60)                                                               BR  54
      REAL W(15),DTT(5),DATUM(5),ZQBVCO(4,5)                                    BR  55
      REAL LAMBDA,MU                                                            BR  56
      REAL AM(3600),BMX(60)                                                     BR  57
      REAL *8C1,C2,C3,C4,UUIJP1,UUIJP2,UUIJP3,UUIJP4,U(120),UU(240),BU(3        B9  58
     10),BUU(60)                                                                BR  59
      INTEGER BRNAME(10,15),ISTATN(5),MSTATN(5)                                 BR  60
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      INTEGER *2IJF(15),IJT(15),NSEC(15),IPT(60),ITYPE(5),IBJNC(5),NDATA BR  61
     1(5),IDX(15,15),ICT(15),XSKT(15),MTYPE(5),MSEC(5),MDATA(5),MBCH(5), BR  62
     2IZQBVE(5)/5*0/,ITQMIN(60),ITQMAX(60),ROW(60)                       B9  63
      INTEGER IFVOL(8,31,5),FVSTAT(31,5),ISTAPR(5)                       BR  64
      INTEGER*2 IJVOL(5),IDONLY(5),IJVKT(5),ITVOL(8,31,5)                BR  65
      INTEGER *2IZDATA(720)                                              BR  66
      INTEGER IQDATA(360),INDATA(360)                                    BR  67
      EQUIVALENCE (INDATA(1),IQDATA(1),IZDATA(1))                        BR  68
      INTEGER READER/ 5/,PRINTR/ 6/,PUNCH/ 7/,GINDEX/ 8/,TDDATA/98/      BR  69
      INTEGER *2IRDPDY,IYR,IMO,IDA,IHR,IMN,NYR,NMO,NDA,NHR,NMN,LISTB,LIS BR  70
     1TA,MDREAD,MIYR,MIMO,MIDA,MIHR,MIMN,MKYR,MKMO,MKDA,MKHR,MKMN        BR  71
      INTEGER *2JYR,JMO,JDA,JHR,JMN,MYR,MMO,MDA,MHR,MMN                  BR  72
      INTEGER *2RTCODE/0/,DTYPE/' Z'/,STRIP/-1/,ZTYPE/' Z'/,QTYPE/' Q'/  BR  73
      INTEGER *2IDETA(6)/'  ','T ','D ','Q ','F ','R '/,TYPETA           BR  74
      INTEGER *2EN/'EN'/,ME/'ME'/,IUNIT,OUNIT,UNIT/'FT'/,MT/' M'/,TUNIT/ BR  75
     1' F'/,DC/' C'/,IBLK/'  '/                                          BR  76
      INTEGER *2DPERM(12)/31,28,31,30,31,30,31,31,30,31,30,31/           BR  77
      LOGICAL PRTMSG/.FALSE./,NOCONV/.TRUE./,ERROR/.FALSE./,OPLOTS,FOUND BR  78
     1,STAGES,NOEXTP,NOPRIT,DAYSUM/.FALSE./,MOREBD/.FALSE./,DTPRT,PTPLT  BR  79
      COMMON /DATIME/ KYR,KMO,KDA,KHR,KMN,IDTM,M,NSTEPS,INHR,INMN,IDTPDY BR  80
     1,LASTN                                                             BR  81
      COMMON /OUTPUT/ NETNAM(20),NBCH,NBND,IOTOPT,IPLOPT,IPLDEV,STAGES,Z BR  82
     1DATUM,IUNIT,OUNIT                                                  BR  83
      COMMON /MEDATA/ MDT,KTMEAS,LETIME,KETIME,MEITIM,MEKTIM,IPLMSG,MIYR BR  84
     1,MIMO,MIDA,MIHR,MIMN                                               BR  85
      DATA MXPT/20/,MAXCZQ/288/,MAXS/60/,MAXQBD/360/,MAXZBD/720/,MXBH/15 BR  86
     1/,MXJN/15/,MXBY/5/,MXMD/5/,MAXMZQ/288/                            BR  87
      DATA AIRDEN/0.002509/,QZCONV/1.0/,ZTMIN/9999999./,ZTMAX/-9999999./ BR  88
C     STATEMENT FUNCTION FOR LOCATING ELEMENTS IN COEFFICIENT MATRIX      BR  89
      IAR(I,J)=I+II*(J-1)                                                BR  90
C                                                                        BR  91
C     READ PROGRAM CONTROL PARAMETERS AND ASSIGN DEFAULTS                BR  92
C                                                                        BR  93
      XSKT(1)=MAXS                                                       BR  94
      QMAX(1)=ZTMAX                                                      BR  95
      CALL MOVE(QMAX(1),QMAX(2),MAXS-1,4)                                BR  96
      QMIN(1)=ZTMIN                                                      BR  97
      CALL MOVE(QMIN(1),QMIN(2),MAXS-1,4)                                BR  98
      QSUM(1)=0.0                                                        BR  99
      CALL MOVE(QSUM(1),QSUM(2),MAXS-1,4)                                BR 100
      BMX(1)=0.0                                                         BR 101
      CALL MOVE(BMX(1),BMX(2),MAXS-1,4)                                  BR 102
      READ (READER,1390) NETNAM                                          BR 103
      WRITE (PRINTR,1400)                                                BR 104
      READ (READER,1410) IUNIT,NBCH,NJNC,NBND,NSTEPS,OUNIT,LUGEOM,NIT,IO BR 105
     1TOPT,IPLOPT,IPLDEV,IPRMSG,IPLMSG,IEXOPT,TYPETA,INHR,INMN,IDTM,THET BR 106
     2A,QQTOL,ZZTOL,WSPEED,WSDRAG,H2ODEN,CHI,IPUNIN                      BR 107
      IF (IUNIT.NE.ME) IUNIT=EN                                          BR 108
      IF (NBCH.LE.0.OR.NBCH.GT.MXBH) GO TO 1380                          BR 109
      IF (NJNC.LE.0.OR.NJNC.GT.MXJN) GO TO 1380                          BR 110
      IF (NBND.LE.0.OR.NBND.GT.MXBY) GO TO 1380                          BR 111
      II=4*NBCH                                                          BR 112
      IISQ=II*II                                                         BR 113
      AM(1)=0.0                                                          BR 114
      CALL MOVE(AM(1),AM(2),IISQ-1,4)                                    BR 115
      IF (IUNIT.EQ.EN) GO TO 10                                          BR 116
      UNIT=MT                                                            BR 117
      TUNIT=DC                                                           BR 118
      AIRDEN=0.001293                                                    BR 119
      IF (ZZTOL.LE.0.0) ZZTOL=0.003048                                   BR 120
      IF (H2ODEN.LE.0.0) H2ODEN=1.011                                    BR 121
      GO TO 20                                                           BR 122
   10 IF (H2ODEN.LE.0.0) H2ODEN=1.9617                                   BR 123
      IF (ZZTOL.LE.0.0) ZZTOL=0.01                                       BR 124
   20 IF (WSDRAG.LE.0.0) WSDRAG=0.0026                                   BR 125
      QTOL=999999.                                                       BR 126
      IF (OUNIT.NE.ME) OUNIT=EN                                          BR 127
      IF (LUGEOM.NE.10) LUGEOM=5                                         BR 128
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      IF (NIT.LE.0) NIT=5                                                    BR 129
      IF (IOTOPT.GT.4) IOTOPT=0                                              BR 130
      IF (IPLOPT.GT.4.OR.IPLDEV.GT.3) IPLOPT=0                               BR 131
      PTPLT=IOTOPT.EQ.3                                                      BR 132
      DAYSUM=IOTOPT.EQ.2.OR.IOTOPT.EQ.4                                      BR 133
      NOPRIT=IOTOPT.NE.1                                                     BR 134
      DTPRT=IOTOPT.EQ.0.OR.IOTOPT.EQ.1                                       BR 135
      PRTMSG=IPRMSG.NE.0                                                     BR 136
      NOEXTP=IEXOPT.EQ.0                                                     BR 137
      IF (TYPETA.EQ.0.OR.TYPETA.GT.6) TYPETA=1                               BR 138
      IF (INHR.LT.0.OR.INHR.GT.24.OR.INMN.LT.0.OR.INMN.GT.59) GO TO 1380     BR 139
      IF (THETA.LE.0.0.OR.THETA.GT.1.0) THETA=1.0                            BR 140
      DTHETA=(1.0-THETA)/THETA                                               BR 141
      IF (CHI.LE.0.0.OR.CHI.GT.1.0) CHI=THETA                                BR 142
      ONECHI=1.0-CHI                                                         BR 143
      DCHI=ONECHI/CHI                                                        BR 144
      OPLOTS=IPLOPT.NE.0.AND.IPLDEV.NE.0.AND.IOTOPT.NE.3                     BR 145
      STAGES=IPLOPT.EQ.2.OR.IPLOPT.EQ.4                                      BR 146
      IF (IUNIT.EQ.OUNIT) GO TO 40                                           BR 147
      NOCONV=.FALSE.                                                         BR 148
      IF (IUNIT.EQ.ME) GO TO 30                                              BR 149
      QZCONV=0.02832                                                         BR 150
      IF (STAGES) QZCONV=30.48                                               BR 151
      GO TO 40                                                               BR 152
   30 QZCONV=35.31                                                           BR 153
      IF (STAGES) QZCONV=3.281                                               BR 154
C                                                                            BR 155
C     READ BRANCH IDENTIFICATION PARAMETERS, INITIAL-VALUE DATA, AND         BR 156
C     CROSS-SECTION DATA                                                     BR 157
C                                                                            BR 158
   40 CALL ARBIN(AA,BB,ZA,IPT,XSKT,MXPT,MAXS)                                BR 159
      DO 90 I=1,NBCH                                                         BR 160
      READ (READER,1420) IUF(I),IUT(I),NSEC(I),(BRNAME(K,I),K=1,10)          BR 161
      IF (I.GT.1) XSKT(I)=XSKT(I-1)-NSEC(I-1)                                BR 162
      NS=NSEC(I)                                                             BR 163
      IU=MAXS-XSKT(I)                                                        BR 164
      DO 90 J=1,NS                                                           BR 165
      IU=IU+1                                                                BR 166
      IF (J.NE.NS) GO TO 50                                                  BR 167
      READ (READER,1440) Z(IU),Q(IU)                                         BR 168
      GO TO 60                                                               BR 169
   50 READ (READER,1430) Z(IU),Q(IU),DX(IU),T(IU),(RN(K,IU),K=1,3)           BR 170
      RN(4,IU)=RN(1,IU)                                                      BR 171
      IF (T(IU).EQ.0.0.AND.IUNIT.EQ.EN) T(IU)=59.0                           BR 172
      IF (T(IU).EQ.0.0.AND.IUNIT.EQ.ME) T(IU)=15.0                           BR 173
   60 IF (Q(IU).EQ.0.0) GO TO 70                                             BR 174
      QIU=ABS(Q(IU)*0.005)                                                   BR 175
      IF (QTOL.GT.QIU) QTOL=QIU                                              BR 176
   70 READ (READER,1470) WANGLE(IU),BETVEL(IU)                               BR 177
      IF (BETVEL(IU).LT.1.0) BETVEL(IU)=1.0                                  BR 178
      READ (LUGEOM,1460) IPT(IU)                                             BR 179
C     INITIALIZE FIRST FORWARD VALUES                                        BR 180
      ZP(IU)=Z(IU)                                                           BR 181
      QP(IU)=Q(IU)                                                           BR 182
      ND=IPT(IU)                                                             BR 183
      IF (ND.LT.2.OR.ND.GT.MXPT) GO TO 1240                                  BR 184
      READ (LUGEOM,1470) (ZA(K,IU),AA(K,IU),BB(K,IU),K=1,ND)                 BR 185
      DO 80 K=2,ND                                                           BR 186
      IF (ZA(K-1,IU).GE.ZA(K,IU)) GO TO 1250                                 BR 187
   80 CONTINUE                                                               BR 188
      IF (Z(IU).NE.0.0)                                                      BR 189
     1CALL ARB(ZP(IU),I,U,AP(IU),BP(IU),RP(IU),&1340,&1350)                  BR 190
      IF (ZA(1,IU).LT.ZTMIN) ZTMIN=ZA(1,IU)                                  BR 191
      IF (ZA(ND,IU).GT.ZTMAX) ZTMAX=ZA(ND,IU)                                BR 192
   90 CONTINUE                                                               BR 193
      ZDATUM=(ZTMAX+ZTMIN)*0.5                                               BR 194
      IF (QTOL.EQ.999999.) QTOL=1.0                                          BR 195
      IF (QQTOL.LE.0.0) QQTOL=QTOL                                           BR 196
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C                                                                       BR 197
C     READ EXTERNAL INFLOW/OUTFLOW AT INTERNAL JUNCTIONS                BR 198
C                                                                       BR 199
      READ (READER,1480) (W(J),J=1,NJNC)                                BR 200
C                                                                       BR 201
C     READ BOUNDARY-VALUE DATA FOR EXTERNAL JUNCTIONS                   BR 202
C                                                                       BR 203
      READ (READER,1490) IDTYPE,LISTB,LISTA                             BR 204
      IF (IDTYPE.EQ.2314) TDDATA=97                                     BR 205
      DO 340 L=1,NBND                                                   BR 206
      READ (READER,1500) ITYPE(L),IBJNC(L),NDATA(L),DTT(L),ISTATN(L),IYR BR 207
     1,IMO,IDA,IHR,IMN,NYR,NMO,NDA,NHR,NMN,IRDPDY,DATUM(L),IDONLY(L)    BR 208
      IF (IBJNC(L).LE.0.OR.IBJNC(L).GT.MXJN) GO TO 1300                 BR 209
      IF (IDONLY(L).EQ.1) GO TO 320                                     BR 210
C     THE BOUNDARY-VALUE DATA RECORDED AT THE GREATEST FREQUENCY MUST   BR 211
C     BE THE FIRST DATA SET SPECIFIED FOR RETRIEVAL FROM DIRECT-ACCESS  BR 212
C     STORAGE                                                           BR 213
      ND=NDATA(L)                                                       BR 214
      CDATUM=DATUM(L)                                                   BR 215
      IF (ITYPE(L).EQ.IBLK) ITYPE(L)=ZTYPE                              BR 216
      IF (ND.EQ.1) GO TO 100                                            BR 217
      IF (DTT(L).EQ.0.0.AND.IRDPDY.EQ.0) GO TO 1270                     BR 218
      IF (IRDPDY.EQ.0) IRDPDY=1440./DTT(L)                              BR 219
      IF (DTT(L).EQ.0.0) DTT(L)=1440./IRDPDY                            BR 220
      IF (IRDPDY.NE.1440./DTT(L)) GO TO 1270                            BR 221
      DTT(L)=DTT(L)*60.                                                 BR 222
      INTER=1440/IRDPDY                                                 BR 223
  100 IF (L.NE.1) GO TO 110                                             BR 224
      CALL DTCODE(IYR,IMO,IDA,IHR,IMN,IITIME,IETIME,&1270)              BR 225
      CALL DTCODE(NYR,NMO,NDA,NHR,NMN,NITIME,NETIME,&1270)              BR 226
  110 IF (ND.NE.0) GO TO 280                                            BR 227
C     READ BOUNDARY-VALUE DATA FROM DIRECT-ACCESS STORAGE               BR 228
      DTYPE=ZTYPE                                                       BR 229
      IF (ITYPE(L).EQ.QTYPE) DTYPE=QTYPE                                BR 230
      IF (L.NE.1) GO TO 220                                             BR 231
      CALL DADIO(PRINTR,PUNCH,GINDEX,TDDATA,LISTB,RTCODE)               BR 232
      IF (RTCODE.NE.0) GO TO 1270                                       BR 233
      IREM=NYR-IYR                                                      BR 234
      IF (IREM) 1270,130,120                                            BR 235
  120 IF (IREM.GT.1) GO TO 1270                                         BR 236
      LEAPDY=(4-(IYR-IYR/4*4))/4                                        BR 237
      NETIME=NETIME+(365+LEAPDY)*1440                                   BR 238
  130 ND=(NETIME-IETIME)/INTER+1                                        BR 239
      NDFIRT=ND                                                         BR 240
      NDPART=ND                                                         BR 241
      IF (IDTM.EQ.0) IDTM=1440/IRDPDY                                   BR 242
      IF (NSTEPS.EQ.0) NSTEPS=((ND-1)*INTER)/IDTM+1                     BR 243
      IF (DTYPE.EQ.QTYPE) GO TO 140                                     BR 244
C     CHECK IF NUMBER OF BOUNDARY-VALUE DATA REQUESTED EXCEEDS ARRAY    BR 245
C     DIMENSIONS                                                        BR 246
      IF (ND.LE.MAXZBD) GO TO 230                                       BR 247
      MAXBD=MAXZBD                                                      BR 248
      GO TO 150                                                         BR 249
  140 IF (ND.LE.MAXQBD) GO TO 230                                       BR 250
      MAXBD=MAXQBD                                                      BR 251
  150 MOREBD=.TRUE.                                                     BR 252
      JETIME=IETIME+(MAXBD-1)*INTER                                     BR 253
      LEAPDY=(4-(IYR-IYR/4*4))/4                                        BR 254
      IETIYR=(365+LEAPDY)*1440                                          BR 255
      JYR=IYR                                                           BR 256
      IF (JETIME.LE.IETIYR) GO TO 160                                   BR 257
      JETIME=JETIME-IETIYR                                              BR 258
      JYR=JYR+1                                                         BR 259
      IF (JYR.GT.99) JYR=0                                              BR 260
  160 JDAYN=(JETIME-1)/1440+1                                           BR 261
      IREM=JDAYN                                                        BR 262
      DPERM(2)=28+(4-(JYR-JYR/4*4))/4                                   BR 263
      DO 170 K=1,12                                                     BR 264
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      IF (IREM.LE.DPERM(K)) GO TO 180                                    BR 265
  170 IREM=IREM-DPERM(K)                                                 BR 266
  180 JMO=K                                                              BR 267
      JDA=IREM                                                           BR 268
      IREM=JETIME-(JDAYN-1)*1440                                         BR 269
      JHR=IREM/60                                                        BR 270
      JMN=0                                                              BR 271
      IF (JHR.NE.0) GO TO 200                                            BR 272
      JHR=24                                                             BR 273
      JDA=JDA-1                                                          BR 274
      IF (JDA.NE.0) GO TO 200                                            BR 275
      JMO=JMO-1                                                          BR 276
      IF (JMO.NE.0) GO TO 190                                            BR 277
      JYR=JYR-1                                                          BR 278
      IF (JYR.LT.0) JYR=99                                               BR 279
      JMO=12                                                             BR 280
  190 JDA=DPERM(JMO)                                                     BR 281
  200 CALL DTCODE(JYR,JMO,JDA,JHR,JMN,JITIME,JETIME,&1270)               BR 282
      IF (JYR.EQ.IYR) GO TO 210                                          BR 283
      LEAPDY=(4-(IYR-IYR/4*4))/4                                         BR 284
      JETIME=JETIME+(365+LEAPDY)*1440                                    BR 285
  210 NDPART=(JETIME-IETIME)/INTER+1                                     BR 286
  220 IF (.NOT.MOREBD) GO TO 230                                         BR 287
      CALL DADI(ISTATN(L),DTYPE,IYR,IMO,IDA,IHR,IMN,JYR,JMO,JDA,JHR,JMN, BR 288
     1INDATA(1),IRDPDY,STRIP,PRTMSG,RTCODE)                              BR 289
      ND=(JETIME-IETIME)/INTER+1                                         BR 290
      GO TO 240                                                          BR 291
  230 CALL DADI(ISTATN(L),DTYPE,IYR,IMO,IDA,IHR,IMN,NYR,NMO,NDA,NHR,NMN, BR 292
     1INDATA(1),IRDPDY,STRIP,PRTMSG,RTCODE)                              BR 293
      ND=(NETIME-IETIME)/INTER+1                                         BR 294
  240 IF (RTCODE.NE.0.AND.(RTCODE.NE.4.OR.STRIP.GE.0).AND.(RTCODE.NE.10. BR 295
     1OR.STRIP.GE.0)) GO TO 1270                                         BR 296
      IF (ITYPE(L).EQ.QTYPE) GO TO 260                                   BR 297
      DO 250 K=1,ND                                                      BR 298
  250 ZQ(K,L)=IZDATA(K)*0.01+CDATUM-ZDATUM                               BR 299
      GO TO 320                                                          BR 300
  260 DO 270 K=1,ND                                                      BR 301
  270 ZQ(K,L)=IQDATA(K)                                                  BR 302
      GO TO 320                                                          BR 303
C     READ STAGE/DISCHARGE RATING CURVE COEFFICIENTS                     BR 304
  280 IF (ND.NE.1) GO TO 290                                             BR 305
      READ (READER,1450) (ZQBVCO(K,L),K=1,4)                             BR 306
      IF (ITYPE(L).NE.QTYPE) ZQBVCO(1,L)=ZQBVCO(1,L)-ZDATUM              BR 307
      IZQBVE(L)=1                                                        BR 308
      GO TO 320                                                          BR 309
C     READ BOUNDARY-VALUE DATA FROM CARDS                                BR 310
  290 IF (L.NE.1) GO TO 300                                              BR 311
      NDFIRT=ND                                                          BR 312
      NDPART=ND                                                          BR 313
      IF (IDTM.EQ.0) IDTM=1440/IRDPDY                                    BR 314
      IF (NSTEPS.EQ.0) NSTEPS=((ND-1)*INTER)/IDTM+1                      BR 315
  300 READ (READER,1510) (ZQ(K,L),K=1,ND)                                BR 316
      IF (ITYPE(L).EQ.QTYPE) GO TO 320                                   BR 317
      DO 310 K=1,ND                                                      BR 318
  310 ZQ(K,L)=ZQ(K,L)+CDATUM-ZDATUM                                      BR 319
  320 DO 330 I=1,NBCH                                                    BR 320
      IF (IBJNC(L).EQ.IJT(I)) IJVOL(L)=MAXS-XSKT(I)+NSEC(I)              BR 321
      IF (IBJNC(L).EQ.IJF(I)) IJVOL(L)=MAXS-XSKT(I)+1                    BR 322
  330 CONTINUE                                                           BR 323
  340 CONTINUE                                                           BR 324
      IDTPDY=1440/IDTM                                                   BR 325
      DT=IDTM*60.                                                        BR 326
      IF (INHR.NE.0.OR.INMN.NE.0) GO TO 350                              BR 327
      INHR=IHR                                                           BR 328
      INMN=IMN                                                           BR 329
C                                                                        BR 330
C     READ MEASURED DATA; BEGIN DATE, BEGIN TIME, AND DATA FREQUENCY ARE BR 331
C     ASSUMED CONSTANT FOR ALL MEASURED DATA SETS INPUT AS SPECIFIED ON  BR 332
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C     FIRST MEASURED-DATA DEFINITION CARD.  ALL MEASURED DATA INPUT      BR 333
C     MUST BE WHOLLY CONTAINED WITHIN A SINGLE DAY.  ALL MEASURED DATA   BR 334
C     INPUT FOR LINE-PRINTER PLOTTING MUST BE AT THE COMPUTATION TIME-   BR 335
C     STEP FREQUENCY.                                                    BR 336
C                                                                        BR 337
  350 L=0                                                                BR 338
  360 L=L+1                                                              BR 339
      IF (L.GT.MXMD) GO TO 540                                           BR 340
      IF (L.GT.1) GO TO 430                                              BR 341
      READ (READER,1500,END=550) MTYPE(L),MUNC,MDATA(L),CDTT,MSTATN(L),M BR 342
     1IYR,MIMO,MIDA,MIHR,MIMN,MKYR,MKMO,MKDA,MKHR,MKMN,MDREAD,CDATUM,MSE BR 343
     2C(L),MBCH(L)                                                       BR 344
      IF (CDTT.EQ.0.0.AND.MDREAD.EQ.0) GO TO 1280                        BR 345
      IF (MDREAD.EQ.0) MDREAD=1440./CDTT                                 BR 346
      IF (CDTT.EQ.0.0) CDTT=1440./MDREAD                                 BR 347
      IF (MDREAD.NE.1440./CDTT) GO TO 1280                               BR 348
      MDT=CDTT                                                           BR 349
      CALL DTCODE(MIYR,MIMO,MIDA,MIHR,MIMN,IITIME,MEITIM,&1280)          BR 350
      CALL DTCODE(MKYR,MKMO,MKDA,MKHR,MKMN,NITIME,MEKTIM,&1280)          BR 351
      IREM=MKYR-MIYR                                                     BR 352
      IF (IREM) 1280,380,370                                             BR 353
  370 IF (IREM.GT.1) GO TO 1280                                          BR 354
      LEAPDY=(4-(MIYR-MIYR/4*4))/4                                       BR 355
      MEKTIM=MEKTIM+(365+LEAPDY)*1440                                    BR 356
  380 IF (MDATA(L).NE.0) GO TO 460                                       BR 357
      ND=(MEKTIM-MEITIM)/MDT+1                                           BR 358
      IF (ND.LT.1.OR.ND.GT.MAXMZQ) GO TO 1310                            BR 359
  390 MDATA(L)=ND                                                        BR 360
      DTYPE=ZTYPE                                                        BR 361
      IF (MTYPE(L).EQ.QTYPE) DTYPE=QTYPE                                 BR 362
      CALL DADI(MSTATN(L),DTYPE,MIYR,MIMO,MIDA,MIHR,MIMN,MKYR,MKMO,MKDA, BR 363
     1MKHR,MKMN,INDATA(1),MDREAD,STRIP,PRTMSG,RTCODE)                    BR 364
      IF (RTCODE.NE.0.AND.(RTCODE.NE.4.OR.STRIP.GE.0).AND.(RTCODE.NE.10. BR 365
     1OR.STRIP.GE.0)) GO TO 1280                                         BR 366
      IF (MTYPE(L).EQ.QTYPE) GO TO 410                                   BR 367
      DO 400 K=1,ND                                                      BR 368
  400 ZQMEAS(K,L)=IZDATA(K)*0.01+CDATUM                                  BR 369
      GO TO 480                                                          BR 370
  410 DO 420 K=1,ND                                                      BR 371
  420 ZQMEAS(K,L)=IQDATA(K)                                              BR 372
      GO TO 480                                                          BR 373
  430 READ (READER,1520,END=550) MTYPE(L),MUNC,MDATA(L),CDTT,MSTATN(L),M BR 374
     1DREAD,CDATUM,MBCH(L),MSEC(L)                                       BR 375
      IF (CDTT.NE.0.0.OR.MDREAD.NE.0.0) GO TO 440                        BR 376
      MDREAD=1440/MDT                                                    BR 377
      GO TO 450                                                          BR 378
  440 IF (CDTT.EQ.0.0.AND.MDREAD.NE.1440/MDT) GO TO 1280                 BR 379
      IF (MDREAD.EQ.0.AND.CDTT.NE.MDT) GO TO 1280                        BR 380
  450 IF (MDATA(L).EQ.0) GO TO 390                                       BR 381
  460 ND=MDATA(L)                                                        BR 382
      IF (ND.LT.1.OR.ND.GT.MAXMZQ) GO TO 1310                            BR 383
      READ (READER,1510) (ZQMEAS(K,L),K=1,ND)                            BR 384
      IF (MTYPE(L).EQ.QTYPE) GO TO 480                                   BR 385
      DO 470 K=1,ND                                                      BR 386
  470 ZQMEAS(K,L)=ZQMEAS(K,L)+CDATUM                                     BR 387
  480 IF (NOCONV) GO TO 500                                              BR 388
      DO 490 K=1,ND                                                      BR 389
  490 ZQMEAS(K,L)=ZQMEAS(K,L)*QZCONV                                     BR 390
C     DETERMINE BRANCH NUMBER OF MEASURED DATA: FIRST BRANCH ASSOCIATED  BR 391
C     WITH JUNCTION WILL INDICATE LOCATION.                              BR 392
  500 IF (MBCH(L).EQ.0.AND.MSEC(L).EQ.0) GO TO 510                       BR 393
      IF (MBCH(L).LE.0.OR.MBCH(L).GT.MXBH) GO TO 1320                    BR 394
      IF (MSEC(L).LE.0.OR.MSEC(L).GT.NSEC(MBCH(L))) GO TO 1320           BR 395
      GO TO 360                                                          BR 396
  510 DO 530 I=1,NBCH                                                    BR 397
      MSEC(L)=NSEC(I)                                                    BR 398
      IF (IUT(I).EQ.MUNC) GO TO 520                                      BR 399
      MSEC(L)=1                                                          BR 400
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      IF (IJF(I).NE.MJNC) GO TO 530                                          BR 401
  520 MBCH(L)=I                                                              BR 402
      GO TO 360                                                              BR 403
  530 CONTINUE                                                               BR 404
      GO TO 1330                                                             BR 405
  540 READ (READER,1520,END=550)                                             BR 406
      WRITE (PRINTR,1720) MXMD                                               BR 407
C                                                                            BR 408
C     ASSIGN UNINITIALIZED STAGE VALUE AT BOUNDARY-VALUE-DATA LOCATION       BR 409
C     TO FIRST STAGE VALUE OF BOUNDARY-VALUE-DATA INPUT                      BR 410
C                                                                            BR 411
  550 KTMEAS=L-1                                                             BR 412
      DO 600 I=1,NBCH                                                        BR 413
      NS=NSEC(I)                                                             BR 414
      IJ=MAXS-XSKT(I)                                                        BR 415
      DO 600 J=1,NS                                                          BR 416
      IJ=IJ+1                                                                BR 417
      IF (Z(IJ).NE.0.0) GO TO 600                                            BR 418
      IF (J.NE.1.AND.J.NE.NS) GO TO 590                                      BR 419
      FOUND=.FALSE.                                                          BR 420
      DO 580 L=1,NBND                                                        BR 421
      IF (IZQBVE(L).EQ.1) GO TO 580                                          BR 422
      IF (ITYPE(L).NE.ZTYPE) GO TO 580                                       BR 423
      IF (J.EQ.NS) GO TO 560                                                 BR 424
      IF (IBJNC(L).EQ.IJF(I)) GO TO 570                                      BR 425
      GO TO 580                                                              BR 426
  560 IF (IBJNC(L).NE.IJT(I)) GO TO 580                                      BR 427
  570 FOUND=.TRUE.                                                           BR 428
      Z(IJ)=ZQ(1,L)+ZDATUM                                                   BR 429
      ZP(IJ)=Z(IJ)                                                           BR 430
      CALL ARB(ZP(IJ),I,J,AP(IJ),BP(IJ),RP(IJ),&1340,&1350)                  BR 431
  580 CONTINUE                                                               BR 432
      IF (FOUND) GO TO 600                                                   BR 433
  590 ERROR=.TRUE.                                                           BR 434
      WRITE (PRINTR,1640) I,J                                                BR 435
  600 CONTINUE                                                               BR 436
      IF (ERROR) STOP                                                        BR 437
C                                                                            BR 438
C     PRINT OUT COMPUTATION CONTROL CARD INFORMATION                         BR 439
C                                                                            BR 440
      WRITE (PRINTR,1530) IUNIT,OUNIT,MXBH,NBCH,MXJN,NJNC,MXBY,NBND,LUGE    BR 441
     1OM,IOTOPT,IPLOPT,IPLDEV,IPRMSG,IPLMSG,IEXOPT,IPUNIN,TYPETA,NIT,NST    BR 442
     2EPS,THETA,CHI,IDTM,QQTOL,ZZTOL,WSPEED,WSDRAG,H2ODEN,ZDATUM             BR 443
      DO 610 L=1,NBND                                                        BR 444
      IF (IZQBVE(L).EQ.1) GO TO 610                                          BR 445
      WRITE (PRINTR,1540) IBJNC(L),DATUM(L)                                  BR 446
  610 CONTINUE                                                               BR 447
      WRITE (PRINTR,1550)                                                    BR 448
C                                                                            BR 449
C     PRINT OUT CROSS-SECTION DATA                                           BR 450
C                                                                            BR 451
      DO 650 I=1,NBCH                                                        BR 452
      NS=NSEC(I)                                                             BR 453
      IJ=MAXS-XSKT(I)                                                        BR 454
      WRITE (PRINTR,1560) NETNAM,I,IJF(I),IJT(I),(BRNAME(K,I),K=1,10)        BR 455
      DO 650 J=1,NS                                                          BR 456
      IJ=IJ+1                                                                BR 457
      ND=IPT(IJ)                                                             BR 458
      WRITE (PRINTR,1570) J,UNIT,UNIT,UNIT                                   BR 459
      WRITE (PRINTR,1580) (ZA(K,IJ),AA(K,IJ),BB(K,IJ),K=1,ND)                BR 460
      WRITE (PRINTR,1590) Z(IJ),Q(IJ),BETVEL(IJ)                             BR 461
      IF (Z(IJ).LE.ZA(ND,IJ).AND.Z(IJ).GE.ZA(1,IJ)) GO TO 620                BR 462
      ERROR=.TRUE.                                                           BR 463
      WRITE (PRINTR,1650) Z(IJ),I,J                                          BR 464
  620 IF (J.EQ.NS) GO TO 650                                                 BR 465
      WRITE (PRINTR,1600)                                                    BR 466
      WRITE (PRINTR,1610) DX(IJ),UNIT,T(IJ),TUNIT,WANGLE(IJ),RN(1,IJ)        BR 467
      IF (RN(3,IJ).NE.0.0) GO TO 630                                         BR 468
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      IF (RN(2,IJ).EQ.0.0) GO TO 640                                    BR 469
      WRITE (PRINTR,1620) RN(2,IJ),IDETA(TYPETA)                        BR 470
      GO TO 640                                                         BR 471
  630 WRITE (PRINTR,1630) RN(2,IJ),IDETA(TYPETA),RN(3,IJ),IDETA(TYPETA) BR 472
  640 WRITE (PRINTR,1600)                                               BR 473
      IF (J.NE.NS) WANGLE(IJ)=COS(0.01745329*WANGLE(IJ))                BR 474
  650 CONTINUE                                                          BR 475
      IF (ERROR) STOP                                                   BR 476
      IF (IUNIT.EQ.EN) GO TO 660                                        BR 477
      WSPEED=WSPEED*1000./3600.                                         BR 478
      G=9.806                                                           BR 479
      CN=1.                                                             BR 480
      GO TO 670                                                         BR 481
  660 G=32.174                                                          BR 482
      WSPEED=WSPEED*5280./3600.                                         BR 483
      CN=1.486                                                          BR 484
  670 TWOG=2.0*G                                                        BR 485
      TWOCSQ=2.0*CN*CN                                                  BR 486
      CW=WSDRAG*AIRDEN/(H2ODEN*G)*WSPEED*WSPEED                         BR 487
C                                                                       BR 488
C     APPLY STAGE COMPUTATION DATUM                                     BR 489
C                                                                       BR 490
      IF (ZDATUM.EQ.0.0) GO TO 690                                      BR 491
      DO 680 I=1,NBCH                                                   BR 492
      NS=NSEC(I)                                                        BR 493
      IJ=MAXS-XSKT(I)                                                   BR 494
      DO 680 J=1,NS                                                     BR 495
      IJ=IJ+1                                                           BR 496
      Z(IJ)=Z(IJ)-ZDATUM                                                BR 497
      ZP(IJ)=Z(IJ)                                                      BR 498
      ND=IPT(IJ)                                                        BR 499
      DO 680 K=1,ND                                                     BR 500
  680 ZA(K,IJ)=ZA(K,IJ)-ZDATUM                                          BR 501
C                                                                       BR 502
C     CALCULATE NUMBER OF BRANCHES AT EACH JUNCTION AND ASSIGN INDICES  BR 503
C                                                                       BR 504
  690 DO 710 J=1,NJNC                                                   BR 505
      ICT(J)=0                                                          BR 506
      DO 710 I=1,NBCH                                                   BR 507
      IF (IJF(I).NE.J) GO TO 700                                        BR 508
      ICT(J)=ICT(J)+1                                                   BR 509
      IDX(J,ICT(J))=-I                                                  BR 510
  700 IF (IJT(I).NE.J) GO TO 710                                        BR 511
      ICT(J)=ICT(J)+1                                                   BR 512
      IDX(J,ICT(J))=I                                                   BR 513
  710 CONTINUE                                                          BR 514
C                                                                       BR 515
C     BEGIN COMPUTATION LOOP                                            BR 516
C                                                                       BR 517
      KYR=IYR                                                           BR 518
      KMO=IMO                                                           BR 519
      KDA=IDA                                                           BR 520
      KHR=INHR                                                          BR 521
      KMN=INMN                                                          BR 522
      LETIME=IETIME                                                     BR 523
      KT=(INHR*60+INMN-1)/IDTM                                          BR 524
      IF (PTPLT) KT=0                                                   BR 525
      ICHK=0                                                            BR 526
      CALL GEMXPI(AM,BMX,ROW,II,IS,ICHK)                                BR 527
      DPERM(2)=28+(4-MOD(KYR,4))/4                                      BR 528
      CALL OUT(NSEC,XSKT,QMIN,QSUM,QMAX,ITQMIN,ZQMIN,AQMIN,ITQMAX,ZQMAX, BR 529
     1AQMAX,RN,MAXS,ISTATN,IJVKT,IFVOL,ITVOL,FVSTAT,ISTAPR,MXBY,        BR 530
     2PRINTR,PUNCH)                                                     BR 531
      IF (OPLOTS) CALL OPLOT(NSEC,XSKT,BRNAME,IJF,IJT,ISTATN,           BR 532
     1ZQCOMP,IBJNC,MBCH,MSEC,MDATA,ZQMEAS,MAXCZQ,MAXS,MAXMZQ,PRINTR)    BR 533
      IF (PTPLT) CALL PRTPLT(NSEC,XSKT,BRNAME,IJF,IJT,ISTATN,ZQCOMP,IBJN BR 534
     1C,MBCH,MSEC,MDATA,ZQMEAS,MAXCZQ,MAXS,MAXMZQ,IYR,IMO,IDA,IHR,IMN,PR BR 535
     2INTR)                                                             BR 536
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      KTMATS=0                                                          BR 537
      ND=1                                                              BR 538
      N=0                                                               BR 539
      DO 1230 M=1,NSTEPS                                                BR 540
      LASTN=N                                                           BR 541
      KT=KT+1                                                           BR 542
C                                                                       BR 543
C     PREPARATION FOR NEXT TIME STEP                                    BR 544
C                                                                       BR 545
      DO 790 I=1,NBCH                                                   BR 546
      NS=NSEC(I)                                                        BR 547
      IJ=MAXS-XSKT(I)                                                   BR 548
      DO 790 J=1,NS                                                     BR 549
      IJ=IJ+1                                                           BR 550
      IF (IOTOPT.NE.4) GO TO 740                                        BR 551
      DO 730 L=1,NBND                                                   BR 552
      IF (IJ.NE.IJVOL(L)) GO TO 730                                     BR 553
      IF ((Q(IJ).GT.0.0.AND.QP(IJ).GT.0.0).OR.(Q(IJ).LT.0.0.AND.QP(IJ).L BR 554
     1T.0.0).OR.(Q(IJ).EQ.0.0.AND.QP(IJ).EQ.0.0)) GO TO 720             BR 555
      DTZERO=(-Q(IJ)*DT)/(QP(IJ)-Q(IJ))                                 BR 556
      IFVOL(IJVKT(L),1,L)=IFVOL(IJVKT(L),1,L)+Q(IJ)*0.01*DTZERO         BR 557
      ITVOL(IJVKT(L),1,L)=KHR*100+KMN                                   BR 558
      IJVKT(L)=IJVKT(L)+1                                               BR 559
      IFVOL(IJVKT(L),1,L)=IFVOL(IJVKT(L),1,L)+QP(IJ)*0.01*(DT-DTZERO)   BR 560
      GO TO 730                                                         BR 561
  720 IFVOL(IJVKT(L),1,L)=IFVOL(IJVKT(L),1,L)+Q(IJ)*0.01*DT             BR 562
  730 CONTINUE                                                          BR 563
  740 ZTEMP=Z(IJ)                                                       BR 564
      QTEMP=Q(IJ)                                                       BR 565
      Z(IJ)=ZP(IJ)                                                      BR 566
      Q(IJ)=QP(IJ)                                                      BR 567
      QIJ=Q(IJ)                                                         BR 568
      IF (STAGES) GO TO 750                                             BR 569
      ZQCOMP(KT,IJ)=QIJ*QZCONV                                          BR 570
      GO TO 760                                                         BR 571
  750 ZQCOMP(KT,IJ)=(Z(IJ)+ZDATUM)*QZCONV                               BR 572
  760 QSUM(IJ)=QSUM(IJ)+QIJ                                             BR 573
      IF (QIJ.LE.QMAX(IJ)) GO TO 770                                    BR 574
      QMAX(IJ)=QIJ                                                      BR 575
      ZQMAX(IJ)=ZP(IJ)+ZDATUM                                           BR 576
      AQMAX(IJ)=AP(IJ)                                                  BR 577
      ITQMAX(IJ)=KHR*100+KMN                                            BR 578
  770 IF (QIJ.GE.QMIN(IJ)) GO TO 780                                    BR 579
      QMIN(IJ)=QIJ                                                      BR 580
      ZQMIN(IJ)=ZP(IJ)+ZDATUM                                           BR 581
      AQMIN(IJ)=AP(IJ)                                                  BR 582
      ITQMIN(IJ)=KHR*100+KMN                                            BR 583
  780 IF (NOEXTP) GO TO 790                                             BR 584
C     (IEXOPT=0) USE CURRENT VALUES AS INITIAL VALUES FOR UNKNOWNS      BR 585
C     (IEXOPT=1) EXTRAPOLATE INITIAL VALUES FOR UNKNOWNS FROM CURRENT   BR 586
      ZP(IJ)=2.*ZP(IJ)-ZTEMP                                            BR 587
      QP(IJ)=2.*QP(IJ)-QTEMP                                            BR 588
  790 CONTINUE                                                          BR 589
C                                                                       BR 590
C     BEGIN ITERATIVE IMPROVEMENT LOOP                                  BR 591
C                                                                       BR 592
      DO 1190 N=1,NIT                                                   BR 593
C                                                                       BR 594
C     CALCULATE BRANCH MATRICES                                         BR 595
C                                                                       BR 596
      DO 820 I=1,NBCH                                                   BR 597
      IJ=MAXS-XSKT(I)                                                   BR 598
      IJP1=IJ+1                                                         BR 599
      NSM1=NSEC(I)-1                                                    BR 600
      CALL ARB(Z(IJP1),I,1,A(IJP1),B(IJP1),R(IJP1),&1360,&1350)         BR 601
      IF (M.EQ.NSTEPS) GO TO 800                                        BR 602
      CALL ARB(ZP(IJP1),I,1,AP(IJP1),BP(IJP1),RP(IJP1),&1360,&1350)     BR 603
  800 DO 820 J=1,NSM1                                                   BR 604
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      IJ=IJ+1                                                                BR 605
      DXIJ=DX(IJ)                                                            BR 606
      QIJ=Q(IJ)                                                              BR 607
      ZIJ=Z(IJ)                                                              BR 608
      JP1=J+1                                                                BR 609
      IJP1=IJ+1                                                              BR 610
      QIJP1=Q(IJP1)                                                          BR 611
      ZIJP1=Z(IJP1)                                                          BR 612
      CALL ARB(ZIJP1,I,JP1,A(IJP1),B(IJP1),R(IJP1),&1360,&1350)              BR 613
      IF (M.EQ.NSTEPS) GO TO 820                                             BR 614
      CALL ARB(ZP(IJP1),I,JP1,AP(IJP1),BP(IJP1),RP(IJP1),&1360,&1350)        BR 615
      BAVG=CHI*((BP(IJ)+BP(IJP1))*0.5)+ONECHI*((B(IJ)+B(IJP1))*0.5)          BR 616
      AAVG=CHI*((AP(IJ)+AP(IJP1))*0.5)+ONECHI*((A(IJ)+A(IJP1))*0.5)          BR 617
      RAVG=CHI*((RP(IJ)+RP(IJP1))*0.5)+ONECHI*((R(IJ)+R(IJP1))*0.5)          BR 618
      QAVG=CHI*((QP(IJ)+QP(IJP1))*0.5)+ONECHI*((QIJ+QIJP1)*0.5)              BR 619
      BETCOR=(BETVEL(IJ)+BETVEL(IJP1))*0.5                                   BR 620
      IF (TYPETA.NE.1) RN(4,IJ)=SETA(TYPETA,IUNIT,G,QAVG,AAVG,RAVG,T(IJ)     BR 621
     1,RN(1,IJ))                                                             BR 622
      RNIJ=RN(4,IJ)                                                          BR 623
      AAVGSQ=AAVG*AAVG                                                       BR 624
      AAVGCU=AAVGSQ*AAVG                                                     BR 625
      LAMBDA=DXIJ/(TWOG*AAVG*DT*THETA)                                       BR 626
      SIGMA=ABS(QAVG)*RNIJ*RNIJ*DXIJ*CHI/(TWOCSQ*AAVGSQ*RAVG**1.3333333*     BR 627
     1THETA)                                                                 BR 628
      MU=2.0*BETCOR*QAVG/(G*AAVGSQ)                                          BR 629
      EPSLON=(LAMBDA-DCHI*SIGMA)*(QIJ+QIJP1)-MU*DTHETA*(QIJP1-QIJ)-DTHET     BR 630
     1A*(ZIJP1-ZIJ)+BETCOR*QAVG*QAVG/(G*THETA*AAVGCU)*(AP(IJP1)-AP(IJ))+     BR 631
     2CW*BAVG*WANGLE(IJ)*DXIJ/(THETA*AAVG)                                   BR 632
      ZETA=LAMBDA+SIGMA+MU                                                   BR 633
      OMEGA=LAMBDA+SIGMA-MU                                                  BR 634
      GAMMA=DXIJ*BAVG/(2.*DT*THETA)                                          BR 635
      DELTA=GAMMA*(ZIJ+ZIJP1)-DTHETA*(QIJP1-QIJ)                             BR 636
      DET=1./(1.-ZETA*GAMMA)                                                 BR 637
C     SEGMENT MATRIX COMPUTATION                                             BR 638
      IJ4=(IJ-1)*4                                                           BR 639
      IJ4P1=IJ4+1                                                            BR 640
      IJ4P2=IJ4+2                                                            BR 641
      IJ4P3=IJ4+3                                                            BR 642
      IJ4P4=IJ4+4                                                            BR 643
      UU(IJ4P1)=(1.+ZETA*GAMMA)*DET                                          BR 644
      UU(IJ4P2)=(-OMEGA-ZETA)*DET                                            BR 645
      UU(IJ4P3)=(-2.*GAMMA)*DET                                              BR 646
      UU(IJ4P4)=(1.+OMEGA*GAMMA)*DET                                         BR 647
      IJ2=(IJ-1)*2                                                           BR 648
      IJ2P1=IJ2+1                                                            BR 649
      IJ2P2=IJ2+2                                                            BR 650
      U(IJ2P1)=(EPSLON-ZETA*DELTA)*DET                                       BR 651
      U(IJ2P2)=(DELTA-EPSLON*GAMMA)*DET                                      BR 652
      I4=(I-1)*4                                                             BR 653
      I4P1=I4+1                                                              BR 654
      I4P2=I4+2                                                              BR 655
      I4P3=I4+3                                                              BR 656
      I4P4=I4+4                                                              BR 657
      I2=(I-1)*2                                                             BR 658
      I2P1=I2+1                                                              BR 659
      I2P2=I2+2                                                              BR 660
      IF (J.GT.1) GO TO 810                                                  BR 661
      BUU(I4P1)=UU(IJ4P1)                                                    BR 662
      BUU(I4P2)=UU(IJ4P2)                                                    BR 663
      BUU(I4P3)=UU(IJ4P3)                                                    BR 664
      BUU(I4P4)=UU(IJ4P4)                                                    BR 665
      BU(I2P1)=U(IJ2P1)                                                      BR 666
      BU(I2P2)=U(IJ2P2)                                                      BR 667
      GO TO 820                                                              BR 668
C     BRANCH MATRIX COMPUTATION                                              BR 669
  810 C1=BUU(I4P1)                                                           BR 670
      C2=BUU(I4P2)                                                           BR 671
      C3=BUU(I4P3)                                                           BR 672
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      C4=BUU(I4P4)                                                    BR 673
      UUIJP1=UU(IJ4P1)                                                BR 674
      UUIJP2=UU(IJ4P2)                                                BR 675
      UUIJP3=UU(IJ4P3)                                                BR 676
      UUIJP4=UU(IJ4P4)                                                BR 677
      BUU(I4P1)=UUIJP1*C1+UUIJP2*C3                                   BR 678
      BUU(I4P2)=UUIJP1*C2+UUIJP2*C4                                   BR 679
      BUU(I4P3)=UUIJP3*C1+UUIJP4*C3                                   BR 680
      BUU(I4P4)=UUIJP3*C2+UUIJP4*C4                                   BR 681
      C1=BU(I2P1)                                                     BR 682
      C2=BU(I2P2)                                                     BR 683
      BU(I2P1)=UUIJP1*C1+UUIJP2*C2+U(IJ2P1)                           BR 684
      BU(I2P2)=UUIJP3*C1+UUIJP4*C2+U(IJ2P2)                           BR 685
  820 CONTINUE                                                        BR 686
C                                                                     BR 687
C     IS THIS THE FIRST ITERATION (N=1) OF THIS TIME STEP (M) ?       BR 688
C                                                                     BR 689
      IF (N.NE.1) GO TO 880                                           BR 690
      IF (DTPRT) CALL DTOUT(Q,Z,A,B)                                  BR 691
      IF (.NOT.PTPLT) GO TO 830                                       BR 692
      IF (KT.LT.MAXCZQ.AND.KHR.NE.24) GO TO 840                       BR 693
      KETIME=IETIME+(M-1)*IDTM                                        BR 694
      CALL LNPLOT                                                     BR 695
      KT=0                                                            BR 696
      GO TO 840                                                       BR 697
  830 IF (KT.LT.IDTPDY) GO TO 840                                     BR 698
      IF (DAYSUM) CALL DAILY                                          BR 699
      KT=0                                                            BR 700
      IF (.NOT.OPLOTS) GO TO 840                                      BR 701
      KETIME=IETIME+(M-1)*IDTM                                        BR 702
      CALL ZQPLOT                                                     BR 703
  840 IF (M.EQ.NSTEPS) GO TO 1370                                     BR 704
      KMN=KMN+IDTM                                                    BR 705
      IF (KMN.LT.60) GO TO 850                                        BR 706
      KHR=KHR+KMN/60                                                  BR 707
      KMN=MOD(KMN,60)                                                 BR 708
  850 IF (KHR.LT.24.OR.(KHR.EQ.24.AND.KMN.EQ.0)) GO TO 860            BR 709
      KHR=KHR-24                                                      BR 710
      KDA=KDA+1                                                       BR 711
  860 IF (KDA.LE.DPERM(KMO)) GO TO 870                                BR 712
      KDA=1                                                           BR 713
      KMO=KMO+1                                                       BR 714
  870 IF (KMO.LT.13) GO TO 880                                        BR 715
      KMO=1                                                           BR 716
      KYR=KYR+1                                                       BR 717
      IF (KYR.GT.99) KYR=0                                            BR 718
      DPERM(2)=28+(4-MOD(KYR,4))/4                                    BR 719
  880 IF (NOPRIT) GO TO 890                                           BR 720
      LASTN=N-1                                                       BR 721
      CALL DTOUT(QP,ZP,AP,BP)                                         BR 722
C                                                                     BR 723
C     SET UP NETWORK MATRIX AND VECTOR                                BR 724
C                                                                     BR 725
  890 NN=1                                                            BR 726
      MM=1                                                            BR 727
      DO 900 I=1,NBCH                                                 BR 728
C     INSERT BRANCH MATRICES                                          BR 729
      NNN=IAR(NN,MM)                                                  BR 730
      I4=(I-1)*4                                                      BR 731
      I2=(I-1)*2                                                      BR 732
      AM(NNN)=BUU(I4+1)                                               BR 733
      NNN=NNN+II                                                      BR 734
      AM(NNN)=BUU(I4+2)                                               BR 735
      NNN=NNN+II                                                      BR 736
      AM(NNN)=-1.                                                     BR 737
      NNN=IAR(NN+1,MM)                                                BR 738
      AM(NNN)=BUU(I4+3)                                               BR 739
      NNN=NNN+II                                                      BR 740
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      AM(NNN)=BUU(I4+4)                                                  BR 741
      NNN=NNN+II+II                                                      BR 742
      AM(NNN)=-1.                                                        BR 743
C     CONSTRUCT RIGHT SIDE VECTOR                                        BR 744
      BMX(NN)=-BU(I2+1)                                                  BR 745
      BMX(NN+1)=-BU(I2+2)                                                BR 746
      NN=NN+2                                                            BR 747
      MM=MM+4                                                            BR 748
  900 CONTINUE                                                           BR 749
C                                                                        BR 750
C     INSERT BOUNDARY CONDITIONS FOR INTERNAL JUNCTIONS                  BR 751
C                                                                        BR 752
      DO 930 J=1,NJNC                                                    BR 753
      IF (ICT(J).EQ.1) GO TO 930                                         BR 754
      NBPJ=ICT(J)                                                        BR 755
C     INSERT DISCHARGE CONTINUITY                                        BR 756
      DO 910 I=1,NBPJ                                                    BR 757
      IBCH=IDX(J,I)                                                      BR 758
      MM=4+(IABS(IBCH)-1)*4                                              BR 759
      IF (IBCH.LT.0) MM=MM-2                                             BR 760
      NNN=IAR(NN,MM)                                                     BR 761
      AM(NNN)=IBCH/IABS(IBCH)                                            BR 762
  910 CONTINUE                                                           BR 763
      BMX(NN)=-W(J)                                                      BR 764
      NN=NN+1                                                            BR 765
C     INSERT STAGE COMPATIBILITY                                         BR 766
      IBCH=IDX(J,1)                                                      BR 767
      MO=3+(IABS(IBCH)-1)*4                                              BR 768
      IF (IBCH.LT.0) MO=MO-2                                             BR 769
      DO 920 I=2,NBPJ                                                    BR 770
      IBCH=IDX(J,I)                                                      BR 771
      MM=3+(IABS(IBCH)-1)*4                                              BR 772
      NNN=IAR(NN,MO)                                                     BR 773
      AM(NNN)=1.                                                         BR 774
      IF (IBCH.LT.0) MM=MM-2                                             BR 775
      NNN=IAR(NN,MM)                                                     BR 776
      AM(NNN)=-1.                                                        BR 777
      BMX(NN)=0.                                                         BR 778
      NN=NN+1                                                            BR 779
  920 CONTINUE                                                           BR 780
  930 CONTINUE                                                           BR 781
C                                                                        BR 782
C     RETRIEVE ADDITIONAL BOUNDARY-VALUE DATA FROM DIRECT-ACCESS STORAGE BR 783
C                                                                        BR 784
      IF (N.NE.1) GO TO 1080                                             BR 785
      IF (.NOT.MOREBD) GO TO 1080                                        BR 786
      K=ND*DT/DTT(1)+1.                                                  BR 787
      IF (K.LE.NDPART) GO TO 1080                                        BR 788
      DO 1070 L=1,NBND                                                   BR 789
      IF (IDONLY(L).EQ.1.OR.NDATA(L).NE.0) GO TO 1070                    BR 790
      INTER=DTT(L)/60.                                                   BR 791
      IRDPDY=1440/INTER                                                  BR 792
      DTYPE=ZTYPE                                                        BR 793
      IF (ITYPE(L).EQ.QTYPE) DTYPE=QTYPE                                 BR 794
      IF (L.NE.1) GO TO 1010                                             BR 795
      ND=NDFIRT-NDPART+1                                                 BR 796
      NDFIRT=ND                                                          BR 797
      NDPART=ND                                                          BR 798
      IF (ND.GT.MAXBD) GO TO 940                                         BR 799
      MOREBD=.FALSE.                                                     BR 800
      GO TO 1010                                                         BR 801
  940 METIME=JETIME+(MAXBD-1)*INTER                                      BR 802
      LEAPDY=(4-(JYR-JYR/4*4))/4                                         BR 803
      IETJYR=(365+LEAPDY)*1440                                           BR 804
      MYR=JYR                                                            BR 805
      IF (METIME.LE.IETJYR) GO TO 950                                    BR 806
      METIME=METIME-IETJYR                                               BR 807
      MYR=MYR+1                                                          BR 808
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      IF (MYR.GT.99) MYR=0                                                BR 809
  950 JDAYN=(METIME-1)/1440+1                                             BR 810
      IREM=JDAYN                                                          BR 811
      DPERM(2)=28+(4-(MYR-MYR/4*4))/4                                     BR 812
      DO 960 K=1,12                                                       BR 813
      IF (IREM.LE.DPERM(K)) GO TO 970                                     BR 814
  960 IREM=IREM-DPERM(K)                                                  BR 815
  970 MMO=K                                                               BR 816
      MDA=IREM                                                            BR 817
      IREM=METIME-(JDAYN-1)*1440                                          BR 818
      MHR=IREM/60                                                         BR 819
      MMN=0                                                               BR 820
      IF (MHR.NE.0) GO TO 990                                             BR 821
      MHR=24                                                              BR 822
      MDA=MDA-1                                                           BR 823
      IF (MDA.NE.0) GO TO 990                                             BR 824
      MMO=MMO-1                                                           BR 825
      IF (MMO.NE.0) GO TO 980                                             BR 826
      MYR=MYR-1                                                           BR 827
      IF (MYR.LT.0) MYR=99                                                BR 828
      MMO=12                                                              BR 829
  980 MDA=DPERM(MMO)                                                      BR 830
  990 CALL DTCODE(MYR,MMO,MDA,MHR,MMN,MITIME,METIME,&1270)                BR 831
      IF (MYR.EQ.JYR) GO TO 1000                                          BR 832
      LEAPDY=(4-(JYR-JYR/4*4))/4                                          BR 833
      METIME=METIME+(365+LEAPDY)*1440                                     BR 834
 1000 NDPART=(METIME-JETIME)/INTER+1                                      BR 835
 1010 IF (.NOT.MOREBD) GO TO 1020                                         BR 836
      CALL DADI(ISTATN(L),DTYPE,JYR,JMO,JDA,JHR,JMN,MYR,MMO,MDA,MHR,MMN,  BR 837
     1INDATA(1),IRDPDY,STRIP,PRTMSG,RTCODE)                               BR 838
      ND=(METIME-JETIME)/INTER+1                                          BR 839
      GO TO 1030                                                          BR 840
 1020 CALL DADI(ISTATN(L),DTYPE,JYR,JMO,JDA,JHR,JMN,NYR,NMO,NDA,NHR,NMN,  BR 841
     1INDATA(1),IRDPDY,STRIP,PRTMSG,RTCODE)                               BR 842
      ND=(NETIME-JETIME)/INTER+1                                          BR 843
 1030 IF (RTCODE.NE.0.AND.(RTCODE.NE.4.OR.STRIP.GE.0).AND.(RTCODE.NE.10.  BR 844
     1OR.STRIP.GE.0)) GO TO 1270                                          BR 845
      IF (ITYPE(L).EQ.QTYPE) GO TO 1050                                   BR 846
      CDATUM=DATUM(L)                                                     BR 847
      DO 1040 K=1,ND                                                      BR 848
 1040 ZQ(K,L)=IZDATA(K)*0.01+CDATUM-ZDATUM                                BR 849
      GO TO 1070                                                          BR 850
 1050 DO 1060 K=1,ND                                                      BR 851
 1060 ZQ(K,L)=IQDATA(K)                                                   BR 852
 1070 CONTINUE                                                            BR 853
      JETIME=METIME                                                       BR 854
      JYR=MYR                                                             BR 855
      JMO=MMO                                                             BR 856
      JDA=MDA                                                             BR 857
      JHR=MHR                                                             BR 858
      JMN=MMN                                                             BR 859
      ND=1                                                                BR 860
C                                                                         BR 861
C     INSERT BOUNDARY CONDITIONS FOR EXTERNAL JUNCTIONS                   BR 862
C                                                                         BR 863
 1080 DO 1140 L=1,NBND                                                    BR 864
      IF (IDONLY(L).EQ.1) GO TO 1140                                      BR 865
      IBCH=IDX(IBJNC(L),1)                                                BR 866
      MM=1+(IABS(IBCH)-1)*4                                               BR 867
      IF (ITYPE(L).EQ.QTYPE) MM=MM+1                                      BR 868
      IF (IBCH.GT.0) MM=MM+2                                              BR 869
      NNN=IAR(NN,MM)                                                      BR 870
      AM(NNN)=1.                                                          BR 871
C     DETERMINE BOUNDARY CONDITION FROM STAGE/DISCHARGE BOUNDARY-         BR 872
C     CONDITION EQUATION                                                  BR 873
      IF (IZQBVE(L).EQ.0) GO TO 1110                                      BR 874
      IF (IBCH.LT.0) GO TO 1090                                           BR 875
      IJ=MAXS-XSKT(IBCH)+NSEC(IBCH)                                       BR 876
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      GO TO 1100                                                        BR 877
 1090 IBCH=-IBCH                                                        BR 878
      IJ=MAXS-XSKT(IBCH)+1                                              BR 879
 1100 ZQPIJ=ZP(IJ)                                                      BR 880
      IF (ITYPE(L).EQ.QTYPE) ZQPIJ=QP(IJ)                               BR 881
      BMX(NN)=ZQBVCO(1,L)+(ZQBVCO(2,L)+(ZQBVCO(3,L)+ZQBVCO(4,L)*ZQPIJ)*Z BR 882
     1QPIJ)*ZQPIJ                                                       BR 883
      GO TO 1130                                                        BR 884
C     PARABOLIC INTERPOLATION FOR BOUNDARY CONDITION FROM BOUNDARY-VALUE BR 885
C     DATA                                                              BR 886
 1110 K=ND*DT/DTT(L)+1.                                                 BR 887
      TH=(ND*DT-(K-1)*DTT(L))/DTT(L)                                    BR 888
      IF (NDATA(L).EQ.0) GO TO 1115                                     BR 889
      K=M*DT/DTT(L)+1.                                                  BR 890
      TH=(M*DT-(K-1)*DTT(L))/DTT(L)                                     BR 891
 1115 IF (K.NE.1) GO TO 1120                                            BR 892
      K=2                                                               BR 893
      TH=TH-1.                                                          BR 894
 1120 BMX(NN)=.5*TH*(ZQ(K+1,L)-ZQ(K-1,L)+TH*(ZQ(K+1,L)+ZQ(K-1,L)-2.*ZQ(K BR 895
     1,L)))+ZQ(K,L)                                                     BR 896
 1130 NN=NN+1                                                           BR 897
 1140 CONTINUE                                                          BR 898
C                                                                       BR 899
C     SOLVE MATRIX OF LINEAR EQUATIONS                                  BR 900
C                                                                       BR 901
      IF (II.NE.NN-1) GO TO 1260                                        BR 902
      CALL GEMXP(IS,ICHK)                                               BR 903
      KTMATS=KTMATS+1                                                   BR 904
      AM(1)=0.0                                                         BR 905
      CALL MOVE(AM(1),AM(2),IISQ-1,4)                                   BR 906
      IF (IS.EQ.1) GO TO 1290                                           BR 907
C                                                                       BR 908
C     CALCULATE INTERMEDIATE VALUES                                     BR 909
C                                                                       BR 910
      NN=1                                                              BR 911
      BIGQ=0.0                                                          BR 912
      BIGZ=0.0                                                          BR 913
      DO 1180 I=1,NBCH                                                  BR 914
      IJ=MAXS-XSKT(I)                                                   BR 915
      IJP1=IJ+1                                                         BR 916
      ZTEMP=ZP(IJP1)                                                    BR 917
      QTEMP=QP(IJP1)                                                    BR 918
      ZP(IJP1)=BMX(NN)                                                  BR 919
      QP(IJP1)=BMX(NN+1)                                                BR 920
      ZTOL=ABS(ZTEMP-ZP(IJP1))                                          BR 921
      QTOL=ABS(QTEMP-QP(IJP1))                                          BR 922
      IF (ZTOL.LE.BIGZ) GO TO 1150                                      BR 923
      BIGZ=ZTOL                                                         BR 924
      IBIGZ=I                                                           BR 925
      JBIGZ=1                                                           BR 926
 1150 IF (QTOL.LE.BIGQ) GO TO 1160                                      BR 927
      BIGQ=QTOL                                                         BR 928
      IBIGQ=I                                                           BR 929
      JBIGQ=1                                                           BR 930
 1160 CONTINUE                                                          BR 931
      NN=NN+4                                                           BR 932
      NSM1=NSEC(I)-1                                                    BR 933
      DO 1180 J=1,NSM1                                                  BR 934
      IJ=IJ+1                                                           BR 935
      IJP1=IJ+1                                                         BR 936
      IJ2=(IJ-1)*2                                                      BR 937
      IJ4=(IJ-1)*4                                                      BR 938
      ZTEMP=ZP(IJP1)                                                    BR 939
      QTEMP=QP(IJP1)                                                    BR 940
      ZP(IJP1)=UU(IJ4+1)*ZP(IJ)+UU(IJ4+2)*QP(IJ)+U(IJ2+1)               BR 941
      QP(IJP1)=UU(IJ4+3)*ZP(IJ)+UU(IJ4+4)*QP(IJ)+U(IJ2+2)               BR 942
      ZTOL=ABS(ZTEMP-ZP(IJP1))                                          BR 943
      QTOL=ABS(QTEMP-QP(IJP1))                                          BR 944
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      IF (ZTOL.LE.BIGZ) GO TO 1170                                          BR 945
      BIGZ=ZTOL                                                             BR 946
      IBIGZ=I                                                               BR 947
      JBIGZ=J+1                                                             BR 948
 1170 IF (QTOL.LE.BIGQ) GO TO 1180                                          BR 949
      BIGQ=QTOL                                                             BR 950
      IBIGQ=I                                                               BR 951
      JBIGQ=J+1                                                             BR 952
 1180 CONTINUE                                                              BR 953
      IF (BIGZ.LE.ZZTOL.AND.BIGQ.LE.QQTOL) GO TO 1220                       BR 954
 1190 CONTINUE                                                              BR 955
      IF (NOCONV) GO TO 1210                                                BR 956
      IF (IUNIT.EQ.ME) GO TO 1200                                           BR 957
      BIGZ=BIGZ*0.3048                                                      BR 958
      BIGQ=BIGQ*0.02832                                                     BR 959
      GO TO 1210                                                            BR 960
 1200 BIGZ=BIGZ*3.281                                                       BR 961
      BIGQ=BIGQ*35.31                                                       BR 962
 1210 WRITE (PRINTR,1810) KHR,KMN,KYR,KMO,KDA,IBIGZ,JBIGZ,BIGZ,IBIGQ,JBI   BR 963
     1GQ,BIGQ                                                               BR 964
 1220 ND=ND+1                                                               BR 965
 1230 CONTINUE                                                              BR 966
C                                                                           BR 967
C     TERMINATE EXECUTION                                                   BR 968
C                                                                           BR 969
      GO TO 1370                                                            BR 970
 1240 WRITE (PRINTR,1660) MXPT                                              BR 971
      STOP                                                                  BR 972
 1250 WRITE (PRINTR,1670) I,J                                               BR 973
      STOP                                                                  BR 974
 1260 WRITE (PRINTR,1680)                                                   BR 975
      GO TO 1370                                                            BR 976
 1270 WRITE (PRINTR,1690)                                                   BR 977
      STOP                                                                  BR 978
 1280 WRITE (PRINTR,1700)                                                   BR 979
      STOP                                                                  BR 980
 1290 WRITE (PRINTR,1710)                                                   BR 981
      GO TO 1370                                                            BR 982
 1300 WRITE (PRINTR,1730) IBJNC(L),MXJN                                     BR 983
      STOP                                                                  BR 984
 1310 WRITE (PRINTR,1740) MAXMZQ                                            BR 985
      STOP                                                                  BR 986
 1320 WRITE (PRINTR,1750) MBCH(L),MSEC(L)                                   BR 987
      STOP                                                                  BR 988
 1330 WRITE (PRINTR,1760) MJNC                                              BR 989
      STOP                                                                  BR 990
 1340 WRITE (PRINTR,1770)                                                   BR 991
      STOP                                                                  BR 992
 1350 WRITE (PRINTR,1780)                                                   BR 993
      STOP                                                                  BR 994
 1360 WRITE (PRINTR,1790)                                                   BR 995
      IF (DAYSUM) CALL DAILY                                                BR 996
      IF (DTPRT) CALL DTOUT(QP,ZP,AP,BP)                                    BR 997
 1370 CONTINUE                                                              BR 998
      IF (M.EQ.NSTEPS.AND.IPUNIN.EQ.1) CALL PINCO(Z,Q,DX,T,WANGLE,BETVEL    BR 999
     1)                                                                     BR1000
      KETIME=NETIME                                                         BR1001
      IF (PTPLT.AND.KT.NE.0) CALL LNPLOT                                    BR1002
      IF (LISTA.NE.0) CALL DADIO(PRINTR,PUNCH,GINDEX,TDDATA,LISTA,RTCODE    BR1003
     1)                                                                     BR1004
      WRITE (PRINTR,1820) KTMATS                                            BR1005
      IF (.NOT.OPLOTS) STOP                                                 BR1006
      IF (KT.EQ.0) STOP                                                     BR1007
      CALL ZQPLOT                                                           BR1008
      STOP                                                                  BR1009
 1380 WRITE (PRINTR,1800)                                                   BR1010
      STOP                                                                  BR1011
C                                                                           BR1012
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C     INPUT/OUTPUT FORMAT STATEMENTS                                    BR1013
C                                                                       BR1014
C                                                                       BR1015
 1390 FORMAT (20A4)                                                     BR1016
 1400 FORMAT ('1',38X,' UNSTEADY FLOW COMPUTATION IN A NETWORK OF OPEN C BR1017
     1HANNELS '//' ',46X,'BRANCH-NETWORK MODEL (VERSION 79/04/19)'//' ',5 BR1018
     22X,'A FOUR-POINT IMPLICIT SCHEME'//' ',55X,'LINEAR MATRIX SOLUTION BR1019
     3'/' ',42X,'BY GAUSS ELIMINATION USING MAXIMUM PIVOT STRATEGY'/)    BR1020
 1410 FORMAT (A2,3I2,I4,A2,2I2,7I1,2I2,I4,F3.2,F5.1,F5.3,F5.2,2F5.4,F3.2 BR1021
     1,I1)                                                              BR1022
 1420 FORMAT (3I2,10A4)                                                 BR1023
 1430 FORMAT (2F10.3,10X,2F10.2,3E10.4)                                 BR1024
 1440 FORMAT (2F10.3)                                                   BR1025
 1450 FORMAT (4E10.4)                                                   BR1026
 1460 FORMAT (I2)                                                       BR1027
 1470 FORMAT (3F10.3)                                                   BR1028
 1480 FORMAT (10F8.2)                                                   BR1029
 1490 FORMAT (I4,33X,I2,6X,I2)                                          BR1030
 1500 FORMAT (A2,I2,I3,F2.0,I8,7X,5(I2,1X),5X,5(I2,1X),2X,I4,F7.3,7X,I1, BR1031
     1T78,I2)                                                           BR1032
 1510 FORMAT (F10.3)                                                    BR1033
 1520 FORMAT (A2,I2,I3,F2.0,I8,44X,I4,F7.3,5X,I2,I1)                    BR1034
 1530 FORMAT (/39X,'================================================== BR1035
     1===='//49X,'UNITS OF INPUT (EN/ME)      =',A9/49X,'UNITS OF OUTPUT  BR1036
     2(EN/ME)     =',A9/49X,'BRANCHES (1<=N<=',I2,')         =',I9/49X,'JU BR1037
     3NCTIONS (2<=N<=',I2,')        =',I9/49X,'BOUNDARY VALUES (1<=N<=',I BR1038
     42,') =',I9/49X,'GEOMETRY INPUT UNIT (5/10) =',I9/49X,'PRINTOUT OPT BR1039
     5ION (0<=N<=4)  =',I9/49X,'PLOT OPTION (0<=N<=4)       =',I9/49X,'PL BR1040
     6OTTER DEVICE (0<=N<=3)    =',I9/49X,'PRINT MESSAGE OPTION (0/1) =', BR1041
     7I9/49X,'PLOT MESSAGE OPTION (0/1)  =',I9/49X,'EXTRAPOLATION OPTION BR1042
     8 (0/1) =',I9/49X,'PUNCH INITIAL COND. (0/1)  =',I9/49X,'FRICTION T BR1043
     9YPE (1<=N<=6)     =',I9/49X,'MAXIMUM ITERATIONS          =',I9/49X,' BR1044
     $NUMBER OF STEPS              =',I9/49X,'DERIVATIVE FACTOR (0<=N<=1)= BR1045
     $',F9.2/49X,'GEOMETRY FACTOR (0<=N<=1)  =',F9.2/49X,'TIME INCREMENT BR1046
     $(MINUTES)     =',I9/49X,'DISCHARGE CONVERGENCE       =',F9.1/49X,'ST BR1047
     $AGE CONVERGENCE           =',F9.4/49X,'WIND SPEED(MPH/KPH)         = BR1048
     $',F9.1/49X,'SURFACE DRAG COEFFICIENT    =',F9.4/49X,'WATER DENSITY  BR1049
     $              =',F9.4/49X,'STAGE COMPUTATION DATUM     =',F9.3)     BR1050
 1540 FORMAT (49X,'BVD(',I2,') DATUM CORRECTION    =',F9.3)             BR1051
 1550 FORMAT (/39X,'================================================== BR1052
     1====')                                                            BR1053
 1560 FORMAT ('1CHANNEL GEOMETRY FOR ',20A4//' BRANCH ',I2,' FROM JUNCTI BR1054
     1ON ',I2,' TO ',I2,' : ',10A4)                                     BR1055
 1570 FORMAT (/'  CROSS SECTION',I3,' :',6X,'STAGE',16X,'AREA',17X,'WIDT BR1056
     1H'/27X,'(',A2,')',14X,'(',A2,'**2)',17X,'(',A2,')')               BR1057
 1580 FORMAT (21X,F10.2,11X,F10.1,11X,F10.1)                            BR1058
 1590 FORMAT (/'  INITIAL VALUES:  STAGE=',F6.2,'  DISCHARGE=',F9.1,10X, BR1059
     1'BETA=',F6.3)                                                     BR1060
 1600 FORMAT (2X,'------------------------------------------------------ BR1061
     1-----------------')                                               BR1062
 1610 FORMAT (2X,'LENGTH=',F8.1,' ',A2,';',9X,' TEMP= ',F4.1,' DEG',A2,' BR1063
     1;',9X,' WIND= ',F5.1,' DEG'//2X,'ETA=',E13.6)                     BR1064
 1620 FORMAT ('+',18X,' + (',E13.6,')*',A1)                             BR1065
 1630 FORMAT ('+',18X,2(' + (',E13.6,')*',A1),'**2')                    BR1066
 1640 FORMAT (' ERROR,     INITIAL STAGE VALUE UNSPECIFIED IN BRANCH ',I BR1067
     12,' SECTION ',I2)                                                 BR1068
 1650 FORMAT (' ERROR,     INITIAL STAGE',F7.2,' OUT OF DEFINED RANGE OF BR1069
     1 CHANNEL GEOMETRY FOR BRANCH ',I2,' SECTION ',I2)                 BR1070
 1660 FORMAT (' ERROR,     IMPROPER NUMBER OF CROSS-SECTIONAL DATA (2<=I BR1071
     1PT<=',I2,')')                                                     BR1072
 1670 FORMAT (' ERROR,     DUPLICATE, OR OUT-OF-ORDER, STAGES IN CHANNEL BR1073
     1-GEOMETRY TABLE FOR BRANCH ',I2,' SECTION ',I2)                   BR1074
 1680 FORMAT (' ERROR,     MATRIX NOT SQUARE')                          BR1075
 1690 FORMAT (' ERROR,     INVALID BOUNDARY-VALUE DATA PARAMETER(S)')   BR1076
 1700 FORMAT (' ERROR,     INVALID MEASURED DATA PARAMETER(S)')         BR1077
 1710 FORMAT (' ERROR,     MATRIX IS SINGULAR')                         BR1078
 1720 FORMAT (' ERROR,     TOO MANY MEASURED DATA LOCATIONS (MXMD=',I2,' BR1079
     1)')                                                               BR1080
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 1730 FORMAT (' ERROR,      JUNCTION ',I2,' OF BOUNDARY-VALUE DATA IMPROP BR1081
     1ERLY SPECIFIED (0<IBUNC<=',I2,')')                                BR1082
 1740 FORMAT (' ERROR,      IMPROPER NUMBER OF MEASURED DATA SPECIFIED (1 BR1083
     1<=MDATA<=',I3,')')                                                BR1084
 1750 FORMAT (' ERROR,      INVALID BRANCH ',I2,' SECTION ',I2,' SPECIFIE BR1085
     1D FOR MEASURED DATA')                                             BR1086
 1760 FORMAT (' ERROR,      JUNCTION ',I2,' OF MEASURED DATA NOT FOUND')  BR1087
 1770 FORMAT (' ERROR,      INITIAL VALUE(S) OUT OF DEFINED RANGE OF CHAN BR1088
     1NEL GEOMETRY')                                                    BR1089
 1780 FORMAT (' ERROR,      INITIAL OR COMPUTED STAGE RESULTS IN ZERO OR  BR1090
     1NEGATIVE AREA AND/OR TOP WIDTH')                                  BR1091
 1790 FORMAT (' ERROR,      COMPUTED STAGE OUT OF DEFINED RANGE OF CHANNE BR1092
     1L GEOMETRY')                                                      BR1093
 1800 FORMAT (' ERROR,      INVALID COMPUTATION CONTROL PARAMETER(S)')    BR1094
 1810 FORMAT (' WARNING,    MAXIMUM ITERATIONS EXCEEDED AT ',I2,':',I2,'  BR1095
     1ON ',I2,'/',I2,'/',I2,'     Z-ZP(',I2,',',I2,')=',F7.4,' Q-QP(',I2 BR1096
     2,',',I2,')=',F7.1)                                                BR1097
 1820 FORMAT (/' NUMBER OF SOLUTIONS = ',I4/)                           BR1098
      END                                                               BR1099


      SUBROUTINE OUT(NSEC,XSKT,QMIN,QSUM,QMAX,ITQMIN,ZQMIN,AQMIN,ITQMAX, OT   1
     1ZQMAX,AQMAX,RN,MAXS,ISTATN,IUVKT,IFVOL,ITVOL,FVSTAT,ISTAPR,       OT   2
     2MXBY,PRINTR,PUNCH)                                                OT   3
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # OT   4
C #   THIS SUBROUTINE PRINTS FLOW COMPUTATION RESULTS IN TABULAR FORM #  OT   5
C #   AND OPTIONALLY PUNCHES INITIAL CONDITIONS AT THE END OF A RUN.  #  OT   6
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # OT   7
C #                                                                   #  OT   8
      INTEGER PRINTR,PUNCH                                              OT   9
      INTEGER *2EN/'EN'/,MT/' M'/,IUNIT,OUNIT,UNIT/'FT'/,IBLK/'  '/,ASTK OT  10
     1/' *'/,IPART,FVUNIT                                               OT  11
      INTEGER *2NSEC(1),XSKT(1),ITQMIN(1),ITQMAX(1)                     OT  12
      REAL A(1),B(1),Z(1),Q(1),DX(1),T(1),RN(4,1),QMIN(1),QSUM(1),QMAX(1 OT  13
     1),ZQMIN(1),AQMIN(1),ZQMAX(1),AQMAX(1),WANGLE(1),BETVEL(1)         OT  14
      LOGICAL IFIRST/.TRUE./,ILAST,PRTDAY,PRTIME,PARTDY/.FALSE./,STAGES OT  15
      COMMON /DATIME/ KYR,KMO,KDA,KHR,KMN,IDTM,M,NSTEPS,INHR,INMN,IDTPDY OT  16
     1,LASTN                                                            OT  17
      COMMON /OUTPUT/ NETNAM(20),NBCH,NBND,IOTOPT,IPLOPT,IPLDEV,STAGES,Z OT  18
     1DATUM,IUNIT,OUNIT                                                 OT  19
      INTEGER ISTATN(1),BLANK/'    '/                                   OT  20
      INTEGER FVNAME(20),FVYEAR,FVSTAT(31,1),ISTAPR(1)                  OT  21
      INTEGER*2 MONTHS(5,12)/' J','AN','UA','RY','  ',' F','EB','RU','AR OT  22
     1','Y ','  ','MA','RC','H ','  ','  ','AP','RI','L ','  ','  ',' M' OT  23
     2,'AY','  ','  ','  ','  ',' J','UN','E ','  ','  ',' J','UL','Y ','  ', OT  24
     3'  ','AU','GU','ST','  ','SE','PT','EM','BE','R ',' O','CT','OB',' OT  25
     4ER','  ',' N','OV','EM','BE','R ',' D','EC','EM','BE','R '/       OT  26
      INTEGER IFVOL(8,31,1)                                             OT  27
      INTEGER*2 IUVKT(1),ITVOL(8,31,1),FVDATA(12)                       OT  28
      INTEGER *2IDTTHR(8),IDTUHR(8),IDTTMN(8),IDTUMN(8)                 OT  29
      INTEGER *2DPERM(12)/31,28,31,30,31,30,31,31,30,31,30,31/          OT  30
      LOGICAL EMPTY                                                     OT  31
      REAL *8ERRVAL                                                     OT  32
      EXTERNAL CREATE                                                   OT  33
      COMMON /IHC236/ EMPTY,LOGUN                                       OT  34
      REAL REPEAT(7)/4H,1(',4H,2(',4H,3(',4H,4(',4H,5(',4H,6(',4H,7('/  OT  35
      REAL PRTFMT(11)/4H(' ',4H,T12,4H7,I6,4H,T5,,4HI2,4,4HX,I6,4H,7(',  OT  36
     14H (',,4H4I1,,4H')',,4HI6))/                                      OT  37
C     SET DEFINE FILE 50 MAXIMUM RECORD SIZE TO 52 TIMES MXBY           OT  38
      DEFINE FILE 50(367,260,L,NEXREC)                                  OT  39
      QCONVT=1.0                                                        OT  40
      FVFACT=0.0001                                                     OT  41
      LASTM=0                                                           OT  42
      KTLINE=60                                                         OT  43
      NUMXS=MAXS-XSKT(NBCH)+NSEC(NBCH)                                  OT  44
      IF (IOTOPT.NE.4) GO TO 80                                         OT  45
      DPERM(2)=28+(4-(KYR-KYR/4*4))/4                                   OT  46
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      EMPTY=.FALSE.                                                          OT  47
      CALL ERRSAV(236,ERRVAL)                                                OT  48
      CALL ERRSET(236,2,-1,1,CREATE,236)                                     OT  49
      READ (50'367) FVNAME,FVYEAR,FVDATA,FVUNIT                              OT  50
      IF (EMPTY) GO TO 30                                                    OT  51
      DO 10 K=1,20                                                           OT  52
      IF (FVNAME(K).NE.NETNAM(K)) GO TO 20                                   OT  53
   10 CONTINUE                                                               OT  54
      IF (FVUNIT.NE.OUNIT) GO TO 20                                          OT  55
      IF (FVYEAR.EQ.KYR) GO TO 60                                            OT  56
      IF (FVYEAR.EQ.KYR+1.AND.KMO.EQ.12.AND.KDA.EQ.31) GO TO 60              OT  57
   20 WRITE (PRINTR,570)                                                     OT  58
      STOP                                                                   OT  59
   30 DO 40 K=1,20                                                           OT  60
   40 FVNAME(K)=NETNAM(K)                                                    OT  61
      FVUNIT=OUNIT                                                           OT  62
      FVYEAR=KYR                                                             OT  63
      IF (KMO.EQ.12.AND.KDA.EQ.31) FVYEAR=FVYEAR+1                           OT  64
      DO 50 MO=1,12                                                          OT  65
   50 FVDATA(MO)=0                                                           OT  66
      WRITE (50'367) FVNAME,FVYEAR,FVDATA,FVUNIT                             OT  67
      CALL ERRSTR(236,ERRVAL)                                                OT  68
   60 DO 70 L=1,MXBY                                                         OT  69
      IJVKT(L)=1                                                             OT  70
      DO 70 K=1,8                                                            OT  71
      ITVOL(K,1,L)=0                                                         OT  72
   70 IFVOL(K,1,L)=0                                                         OT  73
   80 CONTINUE                                                               OT  74
      ASSIGN 100 TO ICONVT                                                   OT  75
      ASSIGN 240 TO NCONVT                                                   OT  76
      IF (OUNIT.EQ.EN) GO TO 85                                              OT  77
      UNIT=MT                                                                OT  78
      FVFACT=0.1                                                             OT  79
   85 IF (IUNIT.EQ.OUNIT) RETURN                                             OT  80
      QCONVT=0.02832                                                         OT  81
      ASSIGN 110 TO ICONVT                                                   OT  82
      ASSIGN 230 TO NCONVT                                                   OT  83
      IF (IUNIT.EQ.EN) RETURN                                                OT  84
      QCONVT=35.31                                                           OT  85
      ASSIGN 120 TO ICONVT                                                   OT  86
      ASSIGN 220 TO NCONVT                                                   OT  87
      RETURN                                                                 OT  88
      ENTRY DTOUT(Q,Z,A,B)                                                   OT  89
C                                                                            OT  90
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #  OT  91
C #   SECONDARY ENTRY POINT TO OUTPUT FLOW RESULTS AT EACH TIME STEP  #      OT  92
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #  OT  93
C                                                                            OT  94
      PRTDAY=KMN.EQ.0.OR.M.EQ.NSTEPS                                         OT  95
      IF (.NOT.IFIRST) GO TO 90                                              OT  96
      IFIRST=.FALSE.                                                         OT  97
      PRTDAY=.TRUE.                                                          OT  98
      WRITE (PRINTR,620) NETNAM                                              OT  99
      WRITE (PRINTR,640)                                                     OT 100
      WRITE (PRINTR,630) UNIT,UNIT,UNIT,UNIT,UNIT,UNIT,UNIT,UNIT,UNIT,UN    OT 101
     1IT,UNIT                                                                OT 102
      WRITE (PRINTR,640)                                                     OT 103
   90 CONTINUE                                                               OT 104
      PRTIME=.TRUE.                                                          OT 105
      DO 170 I=1,NBCH                                                        OT 106
      IBXS=0                                                                 OT 107
      NSM1=NSEC(I)-1                                                         OT 108
      IJ=MAXS-XSKT(I)                                                        OT 109
      DO 170 J=1,NSM1                                                        OT 110
      IJ=IJ+1                                                                OT 111
      IJP1=IJ+1                                                              OT 112
      GO TO ICONVT, (100,110,120)                                            OT 113
C     NO CONVERSION REQUIRED                                                 OT 114
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  100 ZIJ=Z(IJ)+ZDATUM                                                    OT 115
      ZIJP1=Z(IJP1)+ZDATUM                                                OT 116
      QIJ=Q(IJ)                                                           OT 117
      QIJP1=Q(IJP1)                                                       OT 118
      AIJ=A(IJ)                                                           OT 119
      AIJP1=A(IJP1)                                                       OT 120
      BIJ=B(IJ)                                                           OT 121
      BIJP1=B(IJP1)                                                       OT 122
      GO TO 130                                                           OT 123
C     CONVERT FROM ENGLISH TO METRIC                                      OT 124
  110 ZIJ=(Z(IJ)+ZDATUM)*0.3048                                           OT 125
      ZIJP1=(Z(IJP1)+ZDATUM)*0.3048                                       OT 126
      QIJ=Q(IJ)*0.02832                                                   OT 127
      QIJP1=Q(IJP1)*0.02832                                               OT 128
      AIJ=A(IJ)*0.0929                                                    OT 129
      AIJP1=A(IJP1)*0.0929                                                OT 130
      BIJ=B(IJ)*0.3048                                                    OT 131
      BIJP1=B(IJP1)*0.3048                                                OT 132
      GO TO 130                                                           OT 133
C     CONVERT FROM METRIC TO ENGLISH                                      OT 134
  120 ZIJ=(Z(IJ)+ZDATUM)*3.281                                            OT 135
      ZIJP1=(Z(IJP1)+ZDATUM)*3.281                                        OT 136
      QIJ=Q(IJ)*35.31                                                     OT 137
      QIJP1=Q(IJP1)*35.31                                                 OT 138
      AIJ=A(IJ)*10.76                                                     OT 139
      AIJP1=A(IJP1)*10.76                                                 OT 140
      BIJ=B(IJ)*3.281                                                     OT 141
      BIJP1=B(IJP1)*3.281                                                 OT 142
  130 VIJ=QIJ/AIJ                                                         OT 143
      VIJP1=QIJP1/AIJP1                                                   OT 144
      DZ=ZIJ-ZIJP1                                                        OT 145
      IBXS=IBXS+1                                                         OT 146
      IEXS=IBXS+1                                                         OT 147
      IF (PRTDAY) GO TO 150                                               OT 148
      IF (.NOT.PRTIME) GO TO 140                                          OT 149
      WRITE (PRINTR,750) KHR,KMN,ZIJ,VIJ,QIJ,AIJ,BIJ,DZ,I,LASTN,IBXS,IEX OT 150
     1S,RN(4,IJ),ZIJP1,VIJP1,QIJP1,AIJP1,BIJP1                            OT 151
      GO TO 160                                                           OT 152
  140 WRITE (PRINTR,650) ZIJ,VIJ,QIJ,AIJ,BIJ,DZ,I,IBXS,IEXS,RN(4,IJ),ZIJ OT 153
     1P1,VIJP1,QIJP1,AIJP1,BIJP1                                          OT 154
      GO TO 170                                                           OT 155
  150 WRITE (PRINTR,660) KYR,KMO,KDA,KHR,KMN,ZIJ,VIJ,QIJ,AIJ,BIJ,DZ,I,LA OT 156
     1STN,IBXS,IEXS,RN(4,IJ),ZIJP1,VIJP1,QIJP1,AIJP1,BIJP1                OT 157
      PRTDAY=.FALSE.                                                      OT 158
  160 PRTIME=.FALSE.                                                      OT 159
  170 CONTINUE                                                            OT 160
      IF (KHR.NE.24.AND.M.NE.NSTEPS) RETURN                               OT 161
      WRITE (PRINTR,640)                                                  OT 162
      WRITE (PRINTR,670)                                                  OT 163
      KT=M-LASTM                                                          OT 164
      DO 190 I=1,NBCH                                                     OT 165
      NSM1=NSEC(I)-1                                                      OT 166
      IJ=MAXS-XSKT(I)                                                     OT 167
      DO 180 J=1,NSM1                                                     OT 168
      IJ=IJ+1                                                             OT 169
      IJP1=IJ+1                                                           OT 170
      QMINIJ=QMIN(IJ)*QCONVT                                              OT 171
      QBARIJ=QSUM(IJ)*QCONVT/KT                                           OT 172
      QMAXIJ=QMAX(IJ)*QCONVT                                              OT 173
      QMNJP1=QMIN(IJP1)*QCONVT                                            OT 174
      QBRJP1=QSUM(IJP1)*QCONVT/KT                                         OT 175
      QMXJP1=QMAX(IJP1)*QCONVT                                            OT 176
      WRITE (PRINTR,680) QMINIJ,QBARIJ,QMAXIJ,QMNJP1,QBRJP1,QMXJP1       OT 177
      QMIN(IJ)=+9999999.                                                  OT 178
      QMAX(IJ)=-9999999.                                                  OT 179
      QSUM(IJ)=0.0                                                        OT 180
  180 CONTINUE                                                            OT 181
      QMIN(IJP1)=+9999999.                                                OT 182
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      QMAX(IJP1)=-9999999.                                                    OT 183
      QSUM(IJP1)=0.0                                                          OT 184
  190 CONTINUE                                                                OT 185
      WRITE (PRINTR,690)                                                      OT 186
      IFIRST=.TRUE.                                                           OT 187
      LASTM=M                                                                 OT 188
      RETURN                                                                  OT 189
      ENTRY DAILY                                                             OT 190
C                                                                             OT 191
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #   OT 192
C #   SECONDARY ENTRY POINT TO OUTPUT DAILY SUMMARIES OF FLOW RESULTS #       OT 193
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #   OT 194
C                                                                             OT 195
      IF (KTLINE+NUMXS.LT.60) GO TO 200                                       OT 196
      WRITE (PRINTR,620) NETNAM                                               OT 197
      WRITE (PRINTR,700)                                                      OT 198
      WRITE (PRINTR,710) UNIT,UNIT,UNIT,UNIT,UNIT,UNIT,UNIT,UNIT,UNIT        OT 199
      WRITE (PRINTR,700)                                                      OT 200
      KTLINE=9                                                                OT 201
  200 ILAST=M.EQ.NSTEPS                                                       OT 202
      IPART=IBLK                                                              OT 203
      KT=M-LASTM                                                              OT 204
      IF (KT.EQ.IDTPDY) GO TO 210                                             OT 205
      IPART=ASTK                                                              OT 206
      PARTDY=.TRUE.                                                           OT 207
  210 DO 270 I=1,NBCH                                                         OT 208
      IJ=MAXS-XSKT(I)                                                         OT 209
      NS=NSEC(I)                                                              OT 210
      DO 270 J=1,NS                                                           OT 211
      IJ=IJ+1                                                                 OT 212
      GO TO NCONVT, (220,230,240)                                             OT 213
C     CONVERT FROM METRIC TO ENGLISH                                          OT 214
  220 ZQMIN(IJ)=ZQMIN(IJ)*3.281                                               OT 215
      ZQMAX(IJ)=ZQMAX(IJ)*3.281                                               OT 216
      QMIN(IJ)=QMIN(IJ)*35.31                                                 OT 217
      QSUM(IJ)=QSUM(IJ)*35.31                                                 OT 218
      QMAX(IJ)=QMAX(IJ)*35.31                                                 OT 219
      AQMIN(IJ)=AQMIN(IJ)*10.76                                               OT 220
      AQMAX(IJ)=AQMAX(IJ)*10.76                                               OT 221
      GO TO 240                                                               OT 222
C     CONVERT FROM ENGLISH TO METRIC                                          OT 223
  230 ZQMIN(IJ)=ZQMIN(IJ)*0.3048                                              OT 224
      ZQMAX(IJ)=ZQMAX(IJ)*0.3048                                              OT 225
      QMIN(IJ)=QMIN(IJ)*0.02832                                               OT 226
      QSUM(IJ)=QSUM(IJ)*0.02832                                               OT 227
      QMAX(IJ)=QMAX(IJ)*0.02832                                               OT 228
      AQMIN(IJ)=AQMIN(IJ)*0.0929                                              OT 229
      AQMAX(IJ)=AQMAX(IJ)*0.0929                                              OT 230
      GO TO 240                                                               OT 231
C     NO CONVERSION REQUIRED                                                  OT 232
  240 VQMIN=QMIN(IJ)/AQMIN(IJ)                                                OT 233
      VQMAX=QMAX(IJ)/AQMAX(IJ)                                                OT 234
      QBARIJ=QSUM(IJ)/KT                                                      OT 235
      MINHR=ITQMIN(IJ)/100                                                    OT 236
      MINMN=ITQMIN(IJ)-MINHR*100                                              OT 237
      MAXHR=ITQMAX(IJ)/100                                                    OT 238
      MAXMN=ITQMAX(IJ)-MAXHR*100                                              OT 239
      IF (I.EQ.1.AND.J.EQ.1) GO TO 250                                        OT 240
      WRITE (PRINTR,730) MINHR,MINMN,ZQMIN(IJ),VQMIN,QMIN(IJ),AQMIN(IJ),     OT 241
     1I,J,QBARIJ,MAXHR,MAXMN,ZQMAX(IJ),VQMAX,QMAX(IJ),AQMAX(IJ)              OT 242
      GO TO 260                                                               OT 243
  250 WRITE (PRINTR,720) IPART,KYR,KMO,KDA,MINHR,MINMN,ZQMIN(IJ),VQMIN,Q     OT 244
     1MIN(IJ),AQMIN(IJ),I,J,QBARIJ,MAXHR,MAXMN,ZQMAX(IJ),VQMAX,QMAX(IJ),    OT 245
     2AQMAX(IJ)                                                               OT 246
  260 KTLINE=KTLINE+1                                                         OT 247
      QMIN(IJ)=+9999999.                                                      OT 248
      QMAX(IJ)=-9999999.                                                      OT 249
      QSUM(IJ)=0.0                                                            OT 250
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  270 CONTINUE                                                          OT 251
      LASTM=M                                                           OT 252
      IF (IOTOPT.NE.4) GO TO 330                                        OT 253
      IF (KYR.NE.FVYEAR.OR.KT.NE.IDTPDY) GO TO 310                      OT 254
      JDAYN=KDA                                                         OT 255
      KM1=KMO-1                                                         OT 256
      IF (KM1.EQ.O) GO TO 290                                           OT 257
      DO 280 K=1,KM1                                                    OT 258
  280 JDAYN=JDAYN+DPERM(K)                                              OT 259
  290 CONTINUE                                                          OT 260
      DO 300 L=1,NBND                                                   OT 261
      ND=IJVKT(L)                                                       OT 262
      DO 300 K=1,ND                                                     OT 263
      REALFV=IFVOL(K,1,L)                                               OT 264
  300 IFVOL(K,1,L)=REALFV*FVFACT*QCONVT+SIGN(O.5,REALFV)                OT 265
      WRITE (5O'JDAYN) (ISTATN(L),(ITVOL(K,1,L),IFVOL(K,1,L),K=1,8),L=1, OT 266
     1NBND)                                                             OT 267
      FVDATA(KMO)=1                                                     OT 268
C     WRITE IDENTITY RECORD TO DIRECT-ACCESS FLOW VOLUME FILE           OT 268
      WRITE (5O'367) FVNAME,FVYEAR,FVDATA,FVUNIT                        OT 268
  310 DO 320 L=1,NBND                                                   OT 269
      ND=IJVKT(L)                                                       OT 270
      IJVKT(L)=1                                                        OT 271
      DO 320 K=1,ND                                                     OT 272
      IFVOL(K,1,L)=O                                                    OT 273
  320 ITVOL(K,1,L)=O                                                    OT 274
  330 IF (ILAST) GO TO 340                                              OT 275
      IF (KTLINE+NUMXS.LT.6O) RETURN                                    OT 276
  340 WRITE (PRINTR,7OO)                                                OT 277
      IF (.NOT.PARTDY) GO TO 350                                        OT 278
      WRITE (PRINTR,74O)                                                OT 279
      PARTDY=.FALSE.                                                    OT 280
  350 IF (.NOT.ILAST) RETURN                                            OT 281
      IF (IOTOPT.NE.4) RETURN                                           OT 284
C                                                                       OT 286
C     PRINT MONTHLY SUMMARIES OF FLOW VOLUMES                           OT 287
      DO 540 MO=1,12                                                    OT 288
      IF (FVDATA(MO).EQ.O) GO TO 540                                    OT 289
      ND=DPERM(MO)                                                      OT 290
      KTSTAP=O                                                          OT 291
      DO 360 L=1,MXBY                                                   OT 292
  360 ISTAPR(L)=O                                                       OT 293
      JDAYNB=1                                                          OT 294
      KM1=MO-1                                                          OT 295
      IF (KM1.EQ.O) GO TO 380                                           OT 296
      DO 370 K=1,KM1                                                    OT 297
  370 JDAYNB=JDAYNB+DPERM(K)                                            OT 298
  380 JDAYNE=JDAYNB+DPERM(MO)-1                                         OT 299
      K=1                                                               OT 300
C     READ FLOW VOLUMES FROM DIRECT-ACCESS FILE                         OT 301
      DO 390 JDAYN=JDAYNB,JDAYNE                                        OT 302
      READ (5O'JDAYN) (FVSTAT(K,L),(ITVOL(J,K,L),IFVOL(J,K,L),J=1,8),L=1 OT 303
     1,MXBY)                                                            OT 304
  390 K=K+1                                                             OT 305
C     LOCATE NEXT FLOW VOLUME DATA STATION TO BE PRINTED                OT 306
  400 DO 440 K=1,ND                                                     OT 307
      DO 430 L=1,MXBY                                                   OT 308
      IF (FVSTAT(K,L).EQ.BLANK.OR.FVSTAT(K,L).EQ.O) GO TO 440           OT 309
      IF (KTSTAP.EQ.O) GO TO 420                                        OT 310
      DO 410 ISTA=1,KTSTAP                                              OT 311
      IF (FVSTAT(K,L).EQ.ISTAPR(ISTA)) GO TO 430                        OT 312
  410 CONTINUE                                                          OT 313
  420 KTSTAP=KTSTAP+1                                                   OT 314
      ISTPRO=FVSTAT(K,L)                                                OT 315
      ISTAPR(KTSTAP)=ISTPRO                                             OT 316
      IF (OUNIT.EQ.EN) GO TO 424                                        OT 317
      WRITE (PRINTR,585) MONTHS(1,MO),MONTHS(2,MO),MONTHS(3,MO),MONTHS(4 OT 318
     1,MO),MONTHS(5,MO),KYR,ISTPRO                                      OT 319
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      WRITE (PRINTR,590)                                                    OT 320
      GO TO 450                                                             OT 321
  424 WRITE (PRINTR,580) MONTHS(1,MO),MONTHS(2,MO),MONTHS(3,MO),MONTHS(4    OT 322
     1,MO),MONTHS(5,MO),KYR,ISTPRO                                          OT 323
      WRITE (PRINTR,590)                                                    OT 324
      GO TO 450                                                             OT 325
  430 CONTINUE                                                              OT 326
  440 CONTINUE                                                              OT 327
      GO TO 540                                                             OT 328
C     PRINT MONTHLY FLOW VOLUME SUMMARY FOR STATION ISTPRO                  OT 329
  450 NOBLNK=0                                                              OT 330
      DO 530 K=1,ND                                                         OT 331
      DO 480 L=1,MXBY                                                       OT 332
      IF (FVSTAT(K,L).EQ.BLANK.OR.FVSTAT(K,L).EQ.0) GO TO 490               OT 333
      IF (FVSTAT(K,L).NE.ISTPRO) GO TO 480                                  OT 334
      IFVSUM=IFVOL(1,K,L)                                                   OT 335
      DO 460 J=2,8                                                          OT 336
      ITIME=ITVOL(J-1,K,L)                                                  OT 337
      IF (ITIME.EQ.0) GO TO 470                                             OT 338
      IDTHR=ITIME/100                                                       OT 339
      IDTMN=ITIME-IDTHR*100                                                 OT 340
      IDTTHR(J-1)=IDTHR/10                                                  OT 341
      IDTUHR(J-1)=IDTHR-IDTTHR(J-1)*10                                      OT 342
      IDTTMN(J-1)=IDTMN/10                                                  OT 343
      IDTUMN(J-1)=IDTMN-IDTTMN(J-1)*10                                      OT 344
      IFVSUM=IFVSUM+IFVOL(J,K,L)                                            OT 345
  460 CONTINUE                                                              OT 346
      JVOL=J                                                                OT 347
      GO TO 510                                                             OT 348
  470 JVOL=J-1                                                              OT 349
      GO TO 500                                                             OT 350
  480 CONTINUE                                                              OT 351
  490 NOBLNK=NOBLNK+1                                                       OT 352
      IF (NOBLNK.GT.1) GO TO 530                                            OT 353
      WRITE (PRINTR,600)                                                    OT 354
      GO TO 530                                                             OT 355
  500 IF (JVOL.GT.1) GO TO 510                                              OT 356
      WRITE (PRINTR,610) IFVSUM,K,IFVOL(1,K,L)                              OT 357
      GO TO 520                                                             OT 358
  510 PRTFMT(7)=REPEAT(JVOL-1)                                              OT 359
      WRITE (PRINTR,PRTFMT) IFVSUM,K,IFVOL(1,K,L),(IDTTHR(J-1),IDTUHR(J-    OT 360
     11),IDTTMN(J-1),IDTUMN(J-1),IFVOL(J,K,L),J=2,JVOL)                     OT 361
  520 NOBLNK=0                                                              OT 362
  530 CONTINUE                                                              OT 363
      GO TO 400                                                             OT 364
  540 CONTINUE                                                              OT 365
      RETURN                                                                OT 366
      ENTRY PINCO(Z,Q,DX,T,WANGLE,BETVEL)                                   OT 367
C                                                                           OT 368
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #   OT 369
C #   SECONDARY ENTRY POINT TO PUNCH INITIAL CONDITIONS AT END OF RUN #     OT 370
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #   OT 371
C                                                                           OT 372
      DO 560 I=1,NBCH                                                       OT 373
      IJ=MAXS-XSKT(I)                                                       OT 374
      NSM1=NSEC(I)-1                                                        OT 375
      DO 550 J=1,NSM1                                                       OT 376
      IJ=IJ+1                                                               OT 377
      ZIJ=Z(IJ)+ZDATUM                                                      OT 378
      WRITE (PUNCH,760) ZIJ,Q(IJ),DX(IJ),T(IJ),(RN(K,IJ),K=1,3)             OT 379
      WINDIJ=ARCOS(WANGLE(IJ))/0.01745329                                   OT 380
  550 WRITE (PUNCH,770) WINDIJ,BETVEL(IJ)                                   OT 381
      ZIJ=Z(IJ+1)+ZDATUM                                                    OT 382
  560 WRITE (PUNCH,780) ZIJ,Q(IJ+1)                                         OT 383
      RETURN                                                                OT 384
C                                                                           OT 385
C     OUTPUT FORMAT STATEMENTS                                              OT 386
C                                                                           OT 387
```

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C                                                                       OT 388
  570 FORMAT (' EXECUTION TERMINATED DUE TO INCORRECT ATTEMPT TO UPDATE OT 389
     1CUMULATIVE FLOW-VOLUME FILE')                                     OT 390
  580 FORMAT ('1',5A2,'19',I2,' FLOW IN MILLIONS OF CUBIC FEET AT STATIO OT 391
     1N ',I8/)                                                          OT 392
  585 FORMAT ('1',5A2,'19',I2,' FLOW IN THOUSANDS OF CUBIC METERS AT STA OT 393
     1TION ',I8/)                                                       OT 394
  590 FORMAT ('    DAY    ',7('  FLOW (REV.)'),'  FLOW'/'    NO.    ',7(' OT 395
     1 VOL. (TIME)'),'  VOL.'/)                                         OT 396
  600 FORMAT (' ')                                                      OT 397
  610 FORMAT (' ',T127,I6,T5,I2,4X,I6)                                  OT 398
  620 FORMAT (1H1,T34,'FLOW RESULTS FOR ',20A4/)                        OT 399
  630 FORMAT ('    DATE     TIME| STAGE |VELOCITY|DISCHARGE|  AREA | WIDT OT 400
     1H| FALL |BRANCH SECTION|  ETA | STAGE |VELOCITY|DISCHARGE|  AREA | OT 401
     2 WIDTH|'/'  YR/MO/DY HR:MN|  (',A2,') |(',A2,'/SEC)|(',A2,'**3/S)| OT 402
     3(',A2,'**2)|  (',A2,')| (',A2,') | (ITERATIONS) |',6X,'|  (',A2,') OT 403
     4 |(',A2,'/SEC)|(',A2,'**3/S)|(',A2,'**2)|  (',A2,')|')            OT 404
  640 FORMAT ('  ---------------+-------+--------+---------+-------+----- OT 405
     1-+------+--------------+------+-------+--------+---------+-------+ OT 406
     2------+')                                                         OT 407
  650 FORMAT (16X,'|',F6.2,F8.2,F11.1,F9.1,F7.1,'|',F5.2,4X,I2,4X,I2,':' OT 408
     1,I2,2X,F6.4,'|',F6.2,F8.2,F11.1,F9.1,F7.1,'|')                    OT 409
  660 FORMAT ('  ',2(I2,'/'),I2,I3,':',I2,'|',F6.2,F8.2,F11.1,F9 1,F7.1, OT 410
     1'|',F5.2,4X,I2,1X,'(',I1,')',I2,':',I2,2X,F6.4,'|',F6.2,F8.2,F11.1 OT 411
     2,F9.1,F7.1,'|')                                                   OT 412
  670 FORMAT (16X,'|',16X,'DISCHARGE',16X,'|',28X,'|',16X,'DISCHARGE',16 OT 413
     1X,'|'/16X,'|      MINIMUM',7X,'MEAN',9X,'MAXIMUM  |',28X,'|      MIN OT 414
     2IMUM',7X,'MEAN',9X,'MAXIMUM  |')                                  OT 415
  680 FORMAT (16X,'|   ',2(F9.1,4X),1X,F9.1,'  |',28X,'|   ',2(F9.1,4X), OT 416
     11X,F9.1,'  |')                                                    OT 417
  690 FORMAT (16X,'+',41('-'),'+',28X,'+',41('-'),'+')                  OT 418
  700 FORMAT ('  -----------+-------+--------+--------+---------+-------+- OT 419
     1-------------+---------+-------+-------+--------+---------+------- OT 420
     2+')                                                               OT 421
  710 FORMAT (12X,'|',26X,'MINIMUM',9X,'|',18X,'MEAN',2X,'|',26X,'MAXIMU OT 422
     1M',9X,'|'/'      DATE     |  TIME    STAGE  VELOCITY DISCHARGE   AREA OT 423
     2|BRANCH SECTION DISCHARGE|  TIME    STAGE  VELOCITY DISCHARGE    ARE OT 424
     3A |'/'   (YR/MO/DY)|(HR:MN)    (',A2,')    (',A2,'/S)  (',A2,'**3/S) OT 425
     4(',A2,'**2)|',15X,'(',A2,'**3/S)|(HR:MN)    (',A2,')    (',A2,'/S)  OT 426
     5(',A2,'**3/S) (',A2,'**2)|')                                      OT 427
  720 FORMAT (1X,A2,2(I2,'/'),I2,' | ',I2,':',I2,'  ',F6.2,F8.2,F11.1,F9 OT 428
     1.1,'|  ',I2,6X,I2,'    ',F8.1,' | ',I2,':',I2,'  ',F6.2,F8.2,F11.1, OT 429
     2F9.1,'|')                                                         OT 430
  730 FORMAT (11X,' | ',I2,':',I2,'  ',F6.2,F8.2,F11.1,F9.1,'|  ',I2,6X, OT 431
     1I2,'    ',F8.1,' | ',I2,':',I2,'  ',F6.2,F8.2,F11.1,F9.1,'|')     OT 432
  740 FORMAT ('  * IDENTIFIES A PARTIAL DAY OF RECORD')                 OT 433
  750 FORMAT (10X,I3,':',I2,'|',F6.2,F8.2,F11.1,F9.1,F7.1,'|',F5.2,4X,I2 OT 434
     1,1X,'(',I1,')',I2,':',I2,2X,F6.4,'|',F6.2,F8.2,F11.1,F9.1,F7.1,'|' OT 435
     2)                                                                 OT 436
  760 FORMAT (2F10.2,10X,2F10.2,3E10.4)                                 OT 437
  770 FORMAT (F10.2,F10.4)                                              OT 438
  780 FORMAT (2F10.2/)                                                  OT 439
      END                                                               OT 440
```

```
      SUBROUTINE OPLOT(NSEC,XSKT,BRNAME,IJF,IJT,ISTATN,ZQCOMP,          OP   1
     1IBJNC,MBCH,MSEC,MDATA,ZQMEAS,MAXCZQ,MAXS,MAXMZQ,PRINTR)           OP   2
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # OP   3
C #                          SUBROUTINE OPLOT                         # OP   4
C #   THIS FORTRAN AND DISSPLA CODED SUBROUTINE PREPARES A DAILY      # OP   5
C #   COMPUTED AND, OPTIONALLY, MEASURED DISCHARGE/STAGE HYDROGRAPH   # OP   6
C #   FOR PLOTTING ON A TEKTRONIX CRT GRAPHICS TERMINAL USING THE     # OP   7
C #   DISSPLA POSTPROCESSOR, A CALCOMP 936 (36 INCH DRUM) PLOTTER, OR # OP   8
C #   A III FR80 MICROFILM PLOTTER.                                   # OP   9
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # OP  10
C #                                                                   # OP  11
      REAL LEGEND(4,2)                                                  OP  12
```

```
      INTEGER BRNAME(10,1),ISTATN(1)                                    OP  13
      INTEGER YR,MO,DA,HR,MN,SE                                         OP  14
C     INITIALIZE CPP FOR THE NUMBER OF CURVES PER PLOT (MAXIMUM OF 5)   OP  15
      INTEGER CPP/5/,IQUAD/0/                                           OP  16
C     TO OVERRIDE PROGRAM DEFAULTS FOR LEGEND LOCATION, SET IQUAD TO    OP  17
C     DESIRED QUADRANT.                                                 OP  18
      INTEGER PRINTR                                                    OP  19
      INTEGER *2IUNIT,OUNIT,ME/'ME'/                                    OP  20
      INTEGER *2NSEC(1),XSKT(1),IJF(1),IJT(1),IBJNC(1)                  OP  21
      INTEGER *2MBCH(1),MSEC(1),MDATA(1),MIYR,MIMO,MIDA,MIHR,MIMN       OP  22
      DIMENSION ZQCOMP(MAXCZQ,1), ZQMEAS(MAXMZQ,1), ZQTIME(288), RMTIME( OP  23
     1288)                                                              OP  24
      LOGICAL LOCLEG/.TRUE./,MEPLOT/.FALSE./,IFLAG,LABSTA,STAGES        OP  25
      COMMON /DATIME/ KYR,KMO,KDA,KHR,KMN,IDTM,M,NSTEPS,INHR,INMN,IDTPDY OP  26
     1,LASTN                                                            OP  27
      COMMON /OUTPUT/ NETNAM(20),NBCH,NBND,IOTOPT,IPLOPT,IPLDEV,STAGES,Z OP  28
     1DATUM,IUNIT,OUNIT                                                 OP  29
      COMMON /MEDATA/ MDT,KTMEAS,LETIME,KETIME,MEITIM,MEKTIM,IPLMSG,MIYR OP  30
     1,MIMO,MIDA,MIHR,MIMN                                              OP  31
      DATA ZQCMAX/-999.0/,TCMAX/2400.0/                                 OP  32
      DATA SIZE/0.14/,XLEN/7.80/,YLEN/10.0/,KTPLOT/0/,HSIZ/0.105/,SIZ7/0 OP  33
     1.07/,CHARWH/0.857/,HLEG/0.087/,YLEGSP/0.080/,XLCURV/1.00/,IONE/-1/ OP  34
C     DISSPLA CHARACTER WIDTH/HEIGHT RATIO IS 6/7 (CHARWH = 0.857)       OP  35
C                                                                       OP  36
C     INITIALIZE PLOT CONTROL PARAMETERS                                OP  37
C                                                                       OP  38
      CALL JULDAT(YR,MO,DA)                                             OP  39
      CALL TIME(SE)                                                     OP  40
      SE=(SE+49)/100                                                    OP  41
      HR=SE/3600                                                        OP  42
      SE=SE-HR*3600                                                     OP  43
      MN=SE/60                                                          OP  44
      SE=SE-MN*60                                                       OP  45
      HSIZWH=CHARWH*HSIZ                                                OP  46
      SIZEWH=CHARWH*SIZE                                                OP  47
      ID=(INHR*60+INMN)/IDTM                                            OP  48
      ND=1440/IDTM                                                      OP  49
      DO 10 K=1,ND                                                      OP  50
   10 ZQTIME(K)=IDTM*K                                                  OP  51
      XORGIN=0.0                                                        OP  52
      XSTEP=1440./XLEN                                                  OP  53
      XSPACE=XLEN/12.0                                                  OP  54
      GO TO (20,30,40), IPLDEV                                          OP  55
   20 CALL COMPRS                                                       OP  56
      GO TO 50                                                          OP  57
   30 CALL CC936                                                        OP  58
      GO TO 50                                                          OP  59
   40 CALL FR80(1)                                                      OP  60
   50 IF (IPLMSG.EQ.0) GO TO 60                                         OP  61
      IONE=1                                                            OP  62
      IPLMSG=1                                                          OP  63
   60 IF (IPLOPT.LT.3) RETURN                                           OP  64
      CPP=1                                                             OP  65
      MID=1                                                             OP  66
      MEPLOT=.TRUE.                                                     OP  67
      IDM=(MIHR*60+MIMN)/MDT                                            OP  68
      MND=1440/MDT                                                      OP  69
      DO 70 K=1,MND                                                     OP  70
   70 RMTIME(K)=MDT*K                                                   OP  71
      RETURN                                                            OP  72
      ENTRY ZQPLOT                                                      OP  73
C                                                                       OP  74
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # OP  75
C #   SECONDARY ENTRY POINT TO PRODUCE GRAPHICAL PLOTS                #  OP  76
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # OP  77
C                                                                       OP  78
      IF (M.EQ.NSTEPS) ND=(KHR*60+KMN)/IDTM                             OP  79
      KD=ND-ID+1                                                        OP  80
```

```
      IF (KD.EQ.1) GO TO 460                                                OP  81
      IF (.NOT.MEPLOT) GO TO 80                                             OP  82
      MND=(KHR*60+KMN)/MDT                                                  OP  83
      IF (KETIME.LT.MEITIM.OR.LETIME.GT.MEKTIM) GO TO 460                   OP  84
C                                                                           OP  85
C     DETERMINE POSSIBLE COORDINATES FOR LOCATION OF LEGEND(P,Q)            OP  86
C     P = DESIRED QUADRANT; Q = 1 STORES X-COORD.; Q = 2 STORES Y-COORD.    OP  87
C                                                                           OP  88
   80 XPOS=XLEN-(XLCURV+.175+4.0*HSIZWH)                                    OP  89
      YPOS=YLEN-(.175+HLEG)                                                 OP  90
      LEGEND(1,1)=XPOS                                                      OP  91
      LEGEND(1,2)=YPOS                                                      OP  92
      LEGEND(2,1)=.175                                                      OP  93
      LEGEND(2,2)=YPOS                                                      OP  94
      IF (IQUAD.LE.2) GO TO 90                                              OP  95
      LEGEND(3,1)=.175                                                      OP  96
      LEGEND(3,2)=.175                                                      OP  97
      LEGEND(4,1)=XPOS                                                      OP  98
      LEGEND(4,2)=.175                                                      OP  99
C                                                                           OP 100
C     BEGIN BRANCH CURVE PLOTTING LOOP                                      OP 101
C                                                                           OP 102
   90 DO 450 I=1,NBCH                                                       OP 103
      IF (.NOT.MEPLOT) GO TO 110                                            OP 104
      DO 100 MM=1,KTMEAS                                                    OP 105
      IF (MBCH(MM).NE.I) GO TO 100                                          OP 106
      IF (MND.GT.MDATA(MM)) MND=MDATA(MM)                                   OP 107
      MDATA(MM)=MDATA(MM)-MND                                               OP 108
      MKD=MND-MID+1                                                         OP 109
      GO TO 110                                                             OP 110
  100 CONTINUE                                                              OP 111
      GO TO 450                                                             OP 112
  110 NPLOT=1                                                               OP 113
      KK=1                                                                  OP 114
      IBND=1                                                                OP 115
      NS=NSEC(I)                                                            OP 116
      IN=MAXS-XSKT(I)                                                       OP 117
      IF (NS.LE.CPP) GO TO 120                                              OP 118
      NPLOT=NS/CPP                                                          OP 119
      KK=NPLOT*CPP                                                          OP 120
      IF (KK.NE.NS) NPLOT=NPLOT+1                                           OP 121
C                                                                           OP 122
C     BEGIN LOOP CONTROLLING NUMBER OF PLOTS                                OP 123
C                                                                           OP 124
  120 DO 440 IPLOT=1,NPLOT                                                  OP 125
      IFLAG=.FALSE.                                                         OP 126
      KTPLOT=KTPLOT+1                                                       OP 127
      CALL BGNPL(IONE*KTPLOT)                                               OP 128
      CALL FLATBD                                                           OP 129
      CALL BLOWUP(1.25)                                                     OP 130
      CALL PAGE(11.0,14.0)                                                  OP 131
      CALL BANGLE(90.)                                                      OP 132
      CALL BSHIFT(7.475,0.125)                                              OP 133
      CALL NOBRDR                                                           OP 134
      CALL TITLE(BRNAME(1,I),-40,0,0,0,0,XLEN,YLEN)                         OP 135
C                                                                           OP 136
C     DETERMINE MINIMUM AND MAXIMUM DISCHARGE/STAGE FOR PLOT SCALING        OP 137
C                                                                           OP 138
      ZQMIN=+9999999.                                                       OP 139
      ZQMAX=-9999999.                                                       OP 140
      INS=(IPLOT-1)*CPP+1                                                   OP 141
      JNS=NS                                                                OP 142
      IF (IPLOT.NE.NPLOT) JNS=IPLOT*CPP                                     OP 143
      IJ=IN+INS-1                                                           OP 144
      DO 130 J=INS,JNS                                                      OP 145
      IJ=IJ+1                                                               OP 146
      DO 130 K=ID,ND                                                        OP 147
      ZQIJK=ZQCOMP(K,IJ)                                                    OP 148
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      IF (ZQIJK.LT.ZQMIN) ZQMIN=ZQIJK                                    OP 149
      IF (ZQIJK.LE.ZQMAX) GO TO 130                                      OP 150
      ZQMAX=ZQIJK                                                        OP 151
      TMAX=ZQTIME(K)                                                     OP 152
  130 CONTINUE                                                           OP 153
      IF (.NOT.MEPLOT) GO TO 150                                         OP 154
      IF (IPLOT.NE.MSEC(MM)) GO TO 150                                   OP 155
      ZQCMIN=ZQMIN                                                       OP 156
      ZQCMAX=ZQMAX                                                       OP 157
      TCMAX=TMAX                                                         OP 158
      IFLAG=.TRUE.                                                       OP 159
      DO 140 K=MID,MND                                                   OP 160
      ZQIJK=ZQMEAS(K,MM)                                                 OP 161
      IF (ZQIJK.LT.ZQMIN) ZQMIN=ZQIJK                                    OP 162
      IF (ZQIJK.LE.ZQMAX) GO TO 140                                      OP 163
      ZQMAX=ZQIJK                                                        OP 164
      TMAX=RMTIME(K)                                                     OP 165
  140 CONTINUE                                                           OP 166
      IF (ZQCMIN.LT.ZQMIN) ZQMIN=ZQCMIN                                  OP 167
      IF (ZQCMAX.GT.ZQMAX) ZQMAX=ZQCMAX                                  OP 168
C                                                                        OP 169
C     ESTABLISH PLOT ORIGIN AND SCALE                                    OP 170
C                                                                        OP 171
  150 RANGE=ZQMAX-ZQMIN                                                  OP 172
      IPOWER=ALOG10(RANGE)-1.0                                           OP 173
      IF (STAGES) IPOWER=IPOWER-1                                        OP 174
  160 YSTEP=10.0**IPOWER                                                 OP 175
      ZQNUM=AMOD(ZQMIN,YSTEP)                                            OP 176
      YORGIN=ZQMIN-ZQNUM                                                 OP 177
      IF (ZQMIN.LT.0.0.AND.ZQNUM.NE.0.0) YORGIN=YORGIN-YSTEP             OP 178
      ZQNUM=AMOD(ZQMAX,YSTEP)                                            OP 179
      YUPPER=ZQMAX-ZQNUM                                                 OP 180
      IF (ZQNUM.NE.0.0) YUPPER=YUPPER+YSTEP                              OP 181
      ZQSTEP=(YUPPER-YORGIN)/YLEN                                        OP 182
      IF (ZQSTEP.GT.YSTEP) YSTEP=2.0*YSTEP                               OP 183
      IF (ZQSTEP.GT.YSTEP) YSTEP=2.5*YSTEP                               OP 184
      IF (ZQSTEP.LE.YSTEP) GO TO 180                                     OP 185
  170 IPOWER=IPOWER+1                                                    OP 186
      IF (IPOWER.LT.6) GO TO 160                                         OP 187
      WRITE (PRINTR,470)                                                 OP 188
      RETURN                                                             OP 189
  180 ZQNUM=AMOD(ZQMIN,YSTEP)                                            OP 190
      YORGIN=ZQMIN-ZQNUM                                                 OP 191
      IF (ZQMIN.LT.0.0.AND.ZQNUM.NE.0.0) YORGIN=YORGIN-YSTEP             OP 192
      YUPPER=YLEN*YSTEP+YORGIN                                           OP 193
      IF (ZQMAX.GT.YUPPER) GO TO 170                                     OP 194
      CALL GRAPH(XORGIN,XSTEP,YORGIN,YSTEP)                              OP 195
C     IF NECESSARY INCREASE PLOT SCALE EXPONENT OF VERTICAL AXIS         OP 196
      IF (YSTEP.GT.0.5) IPOWER=ALOG10(YSTEP)                             OP 197
      ZQBASE=10.0**IPOWER                                                OP 198
      IF (ABS(YORGIN/ZQBASE).LT.9.8.OR.ABS((YLEN*YSTEP+YORGIN)/ZQBASE).L OP 199
     1T.9.8) GO TO 190                                                   OP 200
      IPOWER=IPOWER+1                                                    OP 201
      ZQBASE=10.0**IPOWER                                                OP 202
C                                                                        OP 203
C     DRAW TIME AXIS                                                     OP 204
C                                                                        OP 205
  190 CALL FRAME                                                         OP 206
      XBACK=0.5                                                          OP 207
      YPOS=-1.5*HSIZ                                                     OP 208
      YNEW=YLEN-0.14                                                     OP 209
      CALL HEIGHT(HSIZ)                                                  OP 210
      HX=XSPACE*0.5                                                      OP 211
      YNEWW=YLEN-0.07                                                    OP 212
      DO 200 K=2,24,2                                                    OP 213
      XPOS=K/2*XSPACE                                                    OP 214
      HXPOS=XPOS-HX                                                      OP 215
      CALL STRTPT(HXPOS,0.07)                                            OP 216
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```
      CALL CONNPT(HXPOS,0.00)                                          OP 217
      CALL STRTPT(XPOS,0.14)                                           OP 218
      CALL CONNPT(XPOS,0.00)                                           OP 219
      IF (K.GE.10) XBACK=1.5                                           OP 220
      XPOS=XPOS-XBACK*HSIZWH                                           OP 221
      CALL INTNO(K,XPOS,YPOS)                                          OP 222
  200 CONTINUE                                                         OP 223
      DO 210 K=2,24,2                                                  OP 224
      XPOS=K/2*XSPACE                                                  OP 225
      HXPOS=XPOS-HX                                                    OP 226
      CALL STRTPT(HXPOS,YLEN)                                          OP 227
      CALL CONNPT(HXPOS,YNEWW)                                         OP 228
      CALL STRTPT(XPOS,YLEN)                                           OP 229
      CALL CONNPT(XPOS,YNEW)                                           OP 230
  210 CONTINUE                                                         OP 231
C                                                                      OP 232
C     DRAW DISCHARGE/STAGE AXIS                                        OP 233
C                                                                      OP 234
      CALL ANGLE(90.)                                                  OP 235
      XPOS=-0.5*HSIZ                                                   OP 236
      ZQNUM=YORGIN/ZQBASE                                              OP 237
      ISPACE=2                                                         OP 238
      AZQNUM=ABS(ZQNUM)                                                OP 239
      IF (AZQNUM.GE.9.8) ISPACE=ALOG10(AZQNUM)+2.05                    OP 240
      CALL REALNO(ZQNUM,1,XPOS,-ISPACE*HSIZWH)                         OP 241
      XNEW=XLEN-0.14                                                   OP 242
      XNEWW=XLEN-0.07                                                  OP 243
      DO 220 K=1,9                                                     OP 244
      YPOS=K                                                           OP 245
      HYPOS=YPOS-0.5                                                   OP 246
      ZQNUM=(YPOS*YSTEP+YORGIN)/ZQBASE                                 OP 247
      ISPACE=2                                                         OP 248
      AZQNUM=ABS(ZQNUM)                                                OP 249
      IF (AZQNUM.GE.9.8) ISPACE=ALOG10(AZQNUM)+2.05                    OP 250
      CALL REALNO(ZQNUM,1,XPOS,YPOS-ISPACE*HSIZWH)                     OP 251
      CALL STRTPT(0.00,HYPOS)                                          OP 252
      CALL CONNPT(0.07,HYPOS)                                          OP 253
      CALL STRTPT(0.00,YPOS)                                           OP 254
      CALL CONNPT(0.14,YPOS)                                           OP 255
  220 CONTINUE                                                         OP 256
      CALL STRTPT(0.00,YLEN-0.5)                                       OP 257
      CALL CONNPT(0.07,YLEN-0.5)                                       OP 258
      DO 230 K=1,9                                                     OP 259
      YPOS=K                                                           OP 260
      HYPOS=YPOS-0.5                                                   OP 261
      CALL STRTPT(XNEWW,HYPOS)                                         OP 262
      CALL CONNPT(XLEN,HYPOS)                                          OP 263
      CALL STRTPT(XNEW,YPOS)                                           OP 264
      CALL CONNPT(XLEN,YPOS)                                           OP 265
  230 CONTINUE                                                         OP 266
      CALL STRTPT(XNEWW,YLEN-0.5)                                      OP 267
      CALL CONNPT(XLEN,YLEN-0.5)                                       OP 268
      ZQNUM=(YLEN*YSTEP+YORGIN)/ZQBASE                                 OP 269
      ISPACE=2                                                         OP 270
      AZQNUM=ABS(ZQNUM)                                                OP 271
      IF (AZQNUM.GE.9.8) ISPACE=ALOG10(AZQNUM)+2.05                    OP 272
      CALL REALNO(ZQNUM,1,XPOS,YLEN-ISPACE*HSIZWH)                     OP 273
      CALL RESET('ANGLE')                                              OP 274
      CALL RESET('HEIGHT')                                             OP 275
C                                                                      OP 276
C     DETERMINE LOCATION OF LEGEND                                     OP 277
C                                                                      OP 278
      IF (IQUAD.NE.0.AND.LOCLEG) GO TO 240                             OP 279
      LOCLEG=.FALSE.                                                   OP 280
      ICON=MOD(NS,CPP)                                                 OP 281
      IF (ICON.EQ.0.AND.CPP.LE.5) ICON=CPP                             OP 282
      IF ((CPP.GT.5.AND.NPLOT.GT.1).OR.ICON.GT.5) ICON=5               OP 283
      IF (IFLAG) ICON=ICON+1                                           OP 284
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      YLEG=ICON*(YLEGSP+HLEG)+.200                                          OP 285
      YTEST=(ZQNUM-YLEG*(ZQNUM-YORGIN/ZQBASE)/YLEN)*10.**IPOWER              OP 286
      IQUAD=2                                                               OP 287
      IF (ZQMAX.GE.YTEST.AND.TMAX.LT.540.0) IQUAD=1                         OP 288
      IF (ZQCMAX.GE.YTEST.AND.TCMAX.LT.540.0) IQUAD=1                       OP 289
C                                                                           OP 290
C     LABEL PLOT AND AXES                                                   OP 291
C                                                                           OP 292
  240 XPOS=XLEN*0.5-31.*SIZEWH                                              OP 293
      YPOS=YLEN+SIZE                                                        OP 294
      CALL MESSAG('FLOW COMPUTED BY THE BRANCH NETWORK MODEL ON   /  /      OP 295
     1    .   .   ',62,XPOS,YPOS)                                          OP 296
      XPOS=XPOS+45.0*SIZEWH                                                 OP 297
      CALL INTNO(YR,XPOS,YPOS)                                              OP 298
      XPOS=XPOS+3.0*SIZEWH                                                  OP 299
      CALL INTNO(MO,XPOS,YPOS)                                              OP 300
      XPOS=XPOS+3.0*SIZEWH                                                  OP 301
      CALL INTNO(DA,XPOS,YPOS)                                              OP 302
      XPOS=XPOS+3.0*SIZEWH                                                  OP 303
      CALL INTNO(HR,XPOS,YPOS)                                              OP 304
      XPOS=XPOS+3.0*SIZEWH                                                  OP 305
      CALL INTNO(MN,XPOS,YPOS)                                              OP 306
      XPOS=XPOS+3.0*SIZEWH                                                  OP 307
      CALL INTNO(SE,XPOS,YPOS)                                              OP 308
      XPOS=XLEN-8.*SIZEWH                                                   OP 309
      YPOS=-2.75*SIZE                                                       OP 310
      CALL MESSAG('  /  /  ',8,XPOS,YPOS)                                  OP 311
      CALL INTNO(KYR,XPOS,YPOS)                                             OP 312
      XPOS=XPOS+3.0*SIZEWH                                                  OP 313
      CALL INTNO(KMO,XPOS,YPOS)                                             OP 314
      XPOS=XPOS+3.0*SIZEWH                                                  OP 315
      CALL INTNO(KDA,XPOS,YPOS)                                             OP 316
      XPOS=XLEN*0.5-2.*SIZEWH                                               OP 317
      CALL MESSAG('TIME',4,XPOS,YPOS)                                       OP 318
      CALL ANGLE(90.)                                                       OP 319
      XPOS=-1.75*SIZE                                                       OP 320
      NOCHAR=21                                                             OP 321
      IF (STAGES) NOCHAR=16                                                 OP 322
      YPOS=(YLEN-NOCHAR*SIZEWH)*0.5                                         OP 323
      IF (OUNIT.EQ.ME) GO TO 260                                            OP 324
      IF (STAGES) GO TO 250                                                 OP 325
      CALL MESSAG('DISCHARGE, IN 10  CFS',NOCHAR,XPOS,YPOS)                 OP 326
      NOCHAR=NOCHAR-5                                                       OP 327
      GO TO 280                                                             OP 328
  250 CALL MESSAG('STAGE, IN 10  FT',NOCHAR,XPOS,YPOS)                      OP 329
      NOCHAR=NOCHAR-4                                                       OP 330
      GO TO 280                                                             OP 331
  260 IF (STAGES) GO TO 270                                                 OP 332
      NOCHAR=NOCHAR+1                                                       OP 333
      CALL MESSAG('DISCHARGE, IN 10  M /S',NOCHAR,XPOS,YPOS)                OP 334
      XPOS1=XPOS-0.5*SIZE                                                   OP 335
      YPOS1=YPOS+19.0*SIZEWH                                                OP 336
      CALL HEIGHT(SIZ7)                                                     OP 337
      CALL INTNO(3,XPOS1,YPOS1)                                             OP 338
      NOCHAR=NOCHAR-6                                                       OP 339
      GO TO 280                                                             OP 340
  270 CALL MESSAG('STAGE, IN 10  CM',NOCHAR,XPOS,YPOS)                      OP 341
      NOCHAR=NOCHAR-4                                                       OP 342
  280 XPOS=XPOS-0.5*SIZE                                                    OP 343
      YPOS=YPOS+NOCHAR*SIZEWH                                               OP 344
      CALL HEIGHT(SIZ7)                                                     OP 345
      CALL INTNO(IPOWER,XPOS,YPOS)                                          OP 346
      CALL RESET('ANGLE')                                                   OP 347
C                                                                           OP 348
C     INITIALIZE LOCATION OF LEGEND                                         OP 349
C                                                                           OP 350
      CALL HEIGHT(HLEG)                                                     OP 351
      XPOS=LEGEND(IQUAD,1)                                                  OP 352
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```
      YPOS=LEGEND(IQUAD,2)+.5*HLEG                                          OP 353
      XPOS1=XPOS+XLCURV+HSIZWH                                              OP 354
      YPOS1=YPOS-.5*HLEG                                                    OP 355
      XPOS2=XPOS1+3.0*HSIZWH                                                OP 356
      XPOS3=XPOS1                                                           OP 357
      IF (I.LT.10) XPOS3=XPOS3+HSIZWH                                       OP 358
      HSPACE=HLEG+YLEGSP                                                    OP 359
      JNS=CPP                                                               OP 360
      IF (MEPLOT) GO TO 300                                                 OP 361
      IF (NS.GT.CPP) GO TO 290                                              OP 362
      JNS=NS                                                                OP 363
      GO TO 300                                                             OP 364
  290 IF (IPLOT.LT.NPLOT-1) GO TO 300                                       OP 365
      INS=NS-KK+CPP                                                         OP 366
      JNS=INS/2                                                             OP 367
      IF (IPLOT.NE.NPLOT) JNS=JNS+MOD(INS,2)                                OP 368
C                                                                           OP 369
C     BEGIN CURVE PLOTTING LOOP                                             OP 370
C                                                                           OP 371
  300 DO 390 J=1,JNS                                                        OP 372
      JLINE=MOD(J,5)                                                        OP 373
      ISEC=J+(IPLOT-1)*CPP                                                  OP 374
      GO TO (310,320,330,340), JLINE                                        OP 375
      CALL CHNDOT                                                           OP 376
      IF (J-5) 380,350,380                                                  OP 377
  310 CALL RESET('DASH')                                                    OP 378
      IF (J-1) 380,370,380                                                  OP 379
  320 CALL DASH                                                             OP 380
      IF (J-2) 380,350,380                                                  OP 381
  330 CALL CHNDSH                                                           OP 382
      IF (J-3) 380,350,380                                                  OP 383
  340 CALL DOT                                                              OP 384
      IF (J.NE.4) GO TO 380                                                 OP 385
  350 IF (IQUAD.LE.2) GO TO 360                                             OP 386
      YPOS1=YPOS1+HSPACE                                                    OP 387
      YPOS=YPOS+HSPACE                                                      OP 388
      GO TO 370                                                             OP 389
  360 YPOS1=YPOS1-HSPACE                                                    OP 390
      YPOS=YPOS-HSPACE                                                      OP 391
  370 CALL STRTPT(XPOS,YPOS)                                                OP 392
      CALL CONNPT(XPOS+XLCURV,YPOS)                                         OP 393
      CALL MESSAG('  -',3,XPOS1,YPOS1)                                      OP 394
      CALL INTNO(I,XPOS3,YPOS1)                                             OP 395
      CALL INTNO(ISEC,XPOS2,YPOS1)                                          OP 396
C     PLOT DISCHARGE/STAGE DATA CURVES                                      OP 397
  380 IJ=IN+ISEC                                                            OP 398
      CALL CURVE(ZQTIME(ID),ZQCOMP(ID,IJ),KD,0)                             OP 399
      IF (.NOT.IFLAG) GO TO 390                                             OP 400
      CALL DASH                                                             OP 401
      IF (IQUAD.LE.2) YPOS=YPOS-HSPACE                                      OP 402
      IF (IQUAD.GT.2) YPOS=YPOS+HSPACE                                      OP 403
      CALL STRTPT(XPOS,YPOS)                                                OP 404
      CALL CONNPT(XPOS+XLCURV,YPOS)                                         OP 405
      CALL CURVE(RMTIME(IDM),ZQMEAS(MID,MM),MKD,0)                          OP 406
  390 CONTINUE                                                              OP 407
C                                                                           OP 408
C     PLOT FIELD STATION NUMBERS                                            OP 409
C                                                                           OP 410
      CALL HEIGHT(HSIZ)                                                     OP 411
      LABSTA=.FALSE.                                                        OP 412
      XPOS=LEGEND(IQUAD,1)-14.0*HSIZWH                                      OP 413
      IF (IQUAD.EQ.2.OR.IQUAD.EQ.3) XPOS=XPOS+XLCURV+18.0*HSIZWH            OP 414
      YSTNO=LEGEND(IQUAD,2)                                                 OP 415
      DO 420 L=IBND,NBND                                                    OP 416
      IF (ISTATN(L).EQ.0) GO TO 420                                         OP 417
      IF (IBJNC(L).NE.IJF(I)) GO TO 400                                     OP 418
      ISEC=1                                                                OP 419
      IF (IJF(I).GT.IJT(I)) ISEC=NSEC(I)                                    OP 420
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      GO TO 410                                                          OP 421
  400 IF (IBJNC(L).NE.IJT(I)) GO TO 420                                  OP 422
      ISEC=1                                                             OP 423
      IF (IJT(I).GT.IJF(I)) ISEC=NSEC(I)                                 OP 424
  410 IF (ISEC.GT.CPP*IPLOT) GO TO 420                                   OP 425
      ICON=MOD(ISEC,CPP)                                                 OP 426
      IF (ICON.GT.5) GO TO 420                                           OP 427
      IF (ICON.EQ.0.AND.CPP.LE.5) ICON=CPP                               OP 428
      LABSTA=.TRUE.                                                      OP 429
      YPOS=YSTNO-(ICON-1)*HSPACE                                         OP 430
      IF (IQUAD.GT.2) YPOS=YSTNO+(ICON-1)*HSPACE                         OP 431
      ISTA=ISTATN(L)                                                     OP 432
      ISTA1=ISTA/1000000                                                 OP 433
      STA2=(ISTA-ISTA1*1000000)*0.01+0.005                               OP 434
      CALL MESSAG(' (   -        )',13,XPOS,YPOS)                        OP 435
      XPOS1=XPOS+2.0*HSIZWH                                              OP 436
      IF (ISTA1.LT.10) XPOS1=XPOS1+HSIZWH                                OP 437
      CALL INTNO(ISTA1,XPOS1,YPOS)                                       OP 438
      CALL REALNO(STA2,2,XPOS+4.0*HSIZWH,YPOS)                           OP 439
      IF (.NOT.IFLAG) GO TO 420                                          OP 440
      IF (IQUAD.LE.2) YPOS=YPOS-HSPACE                                   OP 441
      IF (IQUAD.GT.2) YPOS=YPOS+HSPACE                                   OP 442
      CALL MESSAG(' ( MEASURED )',13,XPOS,YPOS)                          OP 443
      IFLAG=.FALSE.                                                      OP 444
  420 CONTINUE                                                           OP 445
      IF (.NOT.IFLAG) GO TO 430                                          OP 446
      IF (LABSTA) GO TO 430                                              OP 447
      YPOS=YSTNO                                                         OP 448
      IF (IQUAD.GT.2) YPOS=YSTNO+HSPACE                                  OP 449
      CALL MESSAG(' ( COMPUTED )',13,XPOS,YPOS)                          OP 450
      IF (IQUAD.LE.2) YPOS=YPOS-HSPACE                                   OP 451
      IF (IQUAD.GT.2) YPOS=YPOS+HSPACE                                   OP 452
      CALL MESSAG(' ( MEASURED )',13,XPOS,YPOS)                          OP 453
  430 IBND=L                                                             OP 454
      CALL ENDPL(IPLMSG*KTPLOT)                                          OP 455
  440 CONTINUE                                                           OP 456
  450 CONTINUE                                                           OP 457
C                                                                        OP 458
C     TERMINATE PLOT AND CLOSE OUT PLOT FILE                             OP 459
C                                                                        OP 460
  460 IF (M.EQ.NSTEPS) CALL DONEPL                                       OP 461
      ID=1                                                               OP 462
      LETIME=KETIME+IDTM                                                 OP 463
      IF (.NOT.MEPLOT) RETURN                                            OP 464
      IF (KETIME.LT.MEITIM) RETURN                                       OP 465
      IDM=1                                                              OP 466
      MID=MND+1                                                          OP 467
      RETURN                                                             OP 468
C                                                                        OP 469
C     OUTPUT FORMAT STATEMENT                                            OP 470
C                                                                        OP 471
C                                                                        OP 472
  470 FORMAT (/' ERROR,     STEP SIZE IN PLOT SCALE ALGORITHM EXCEEDS MA OP 473
     1XIMUM LIMIT')                                                      OP 474
      END                                                                OP 475


      SUBROUTINE PRTPLT(NSEC,XSKT,BRNAME,IJF,IJT,ISTATN,ZQCOMP,IBJNC,MBC PP   1
     1H,MSEC,MDATA,ZQMEAS,MAXCZQ,MAXS,MAXMZQ,IYR,IMO,IDA,IHR,IMN,PRINTR) PP   2
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # PP   3
C #   THIS SUBROUTINE PRODUCES A LINE-PRINTER PLOT OF STAGE OR         #  PP   4
C #   DISCHARGE DATA COMPUTED BY A FLOW MODEL. THE MAXIMUM NUMBER OF   #  PP   5
C #   POINTS PLOTTED PER PAGE OF OUTPUT IS SPECIFIABLE.                #  PP   6
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # PP   7
C #                                                                    #  PP   8
      REAL SREAL(11)                                                     PP   9
      INTEGER BRNAME(10,1),ISTATN(1)                                     PP  10
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      INTEGER YR,MO,DA,HR,MN                                                PP  11
C     INITIALIZE PAGE SIZE FOR THE NUMBER OF DATA PLOTTED PER PAGE          PP  12
      INTEGER PAGESZ/48/                                                    PP  13
      INTEGER *2IUNIT,OUNIT,ME/'ME'/,MT/' M'/,CM/'CM'/                      PP  14
      INTEGER *2VBAR/'| '/,ASTK/'* '/,OH/'O '/,SYMBOL(6)/'A ','B ','C ',   PP  15
     1'D ','E ','F '/,SYMBEG,SYMEND                                         PP  16
      INTEGER *2IYR,IMO,IDA,IHR,IMN,CHARA,CHARB                             PP  17
      INTEGER *2NSEC(1),XSKT(1),IJF(1),IJT(1),IBJNC(1)                      PP  18
      INTEGER *2MBCH(1),MSEC(1),MDATA(1),MIYR,MIMO,MIDA,MIHR,MIMN           PP  19
      DIMENSION ZQCOMP(MAXCZQ,1), ZQMEAS(MAXMZQ,1)                          PP  20
      INTEGER STANO1,STANO2,PRINTR                                          PP  21
      INTEGER ZTITLE(3)/'    ','STAG','E   '/                               PP  22
      INTEGER QTITLE(3)/'  DI','SCHA','RGE '/                               PP  23
      INTEGER *2ZUNIT(5)/'  ',' (','FT',') ','  '/                          PP  24
      INTEGER *2QUNIT(5)/' (','FT','**','3/','S)'/                          PP  25
      INTEGER DPERM(12)/31,28,31,30,31,30,31,31,30,31,30,31/                PP  26
      INTEGER *2B(101)/'| ',9*'  ','| ',9*'  ','| ',9*'  ','| ',9*'  ',' PP  27
     1| ',9*'  ','| ',9*'  ','| ',9*'  ','| ',9*'  ','| ',9*'  ','| ',9* PP  28
     2'  ','| '/                                                           PP  29
      INTEGER *2D(101)/'+ ',9*'- ','+ ',9*'- ','+ ',9*'- ','+ ',9*'- ','+ ',9*'- ',' PP  30
     1+ ',9*'- ','+ ',9*'- ','+ ',9*'- ','+ ',9*'- ','+ ',9*'- ','+ ',9* PP  31
     2'- ','+ '/                                                           PP  32
      LOGICAL MEPLOT/.FALSE./,STAGES                                        PP  33
      COMMON /DATIME/ KYR,KMO,KDA,KHR,KMN,IDTM,M,NSTEPS,INHR,INMN,IDTPDY    PP  34
     1,LASTN                                                                PP  35
      COMMON /OUTPUT/ NETNAM(20),NBCH,NBND,IOTOPT,IPLOPT,IPLDEV,STAGES,     PP  36
     1ZDATUM,IUNIT,OUNIT                                                    PP  37
      COMMON /MEDATA/ MDT,KTMEAS,LETIME,KETIME,MEITIM,MEKTIM,IPLMSG,MIYR    PP  38
     1,MIMO,MIDA,MIHR,MIMN                                                  PP  39
C                                                                           PP  40
C     INITIALIZE PLOT CONTROL PARAMETERS                                    PP  41
C                                                                           PP  42
      LASTM=0                                                               PP  43
      IF (STAGES) GO TO 30                                                  PP  44
      DO 10 K=1,3                                                           PP  45
   10 ZTITLE(K)=QTITLE(K)                                                   PP  46
      DO 20 K=1,5                                                           PP  47
   20 ZUNIT(K)=QUNIT(K)                                                     PP  48
      IF (OUNIT.EQ.ME) ZUNIT(2)=MT                                          PP  49
      GO TO 40                                                              PP  50
   30 IF (OUNIT.EQ.ME) ZUNIT(3)=CM                                          PP  51
   40 YR=IYR                                                                PP  52
      MO=IMO                                                                PP  53
      DA=IDA                                                                PP  54
      HR=IHR                                                                PP  55
      MN=IMN                                                                PP  56
      DPERM(2)=28+(4-MOD(YR,4))/4                                           PP  57
      IF (IPLOPT.LT.3) RETURN                                               PP  58
      MEPLOT=.TRUE.                                                         PP  59
      MID=1                                                                 PP  60
      ID=(INHR*60+INMN)/IDTM                                                PP  61
      RETURN                                                                PP  62
C                                                                           PP  63
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # PP  64
C #   SECONDARY ENTRY POINT TO PLOT FLOW RESULTS                          # PP  65
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # PP  66
C                                                                           PP  67
      ENTRY LNPLOT                                                          PP  68
      KT=M-LASTM                                                            PP  69
      IF (.NOT.MEPLOT) GO TO 50                                             PP  70
      IF (KETIME.LT.MEITIM.OR.LETIME.GT.MEKTIM) GO TO 420                   PP  71
      IDM=(MIHR*60+MIMN)/MDT-ID+1                                           PP  72
      MND=(KHR*60+KMN)/MDT                                                  PP  73
C                                                                           PP  74
C     BEGIN BRANCH LOOP                                                     PP  75
C                                                                           PP  76
   50 DO 410 I=1,NBCH                                                       PP  77
      IF (.NOT.MEPLOT) GO TO 80                                             PP  78
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      DO 70 MM=1,KTMEAS                                                  PP  79
      IF (MBCH(MM).NE.I) GO TO 70                                        PP  80
      IF (MDATA(MM).EQ.0) GO TO 410                                      PP  81
      IF (MND.GT.MDATA(MM)) MND=MDATA(MM)                                PP  82
      NDM=IDM+MND-1                                                      PP  83
      IF (NDM.LE.1440/MDT) GO TO 60                                      PP  84
      NDM=1440/MDT                                                       PP  85
      MND=NDM-IDM+1                                                      PP  86
   60 MDATA(MM)=MDATA(MM)-MND+MID-1                                      PP  87
      IDMM1=IDM-1                                                        PP  88
      GO TO 80                                                           PP  89
   70 CONTINUE                                                           PP  90
      GO TO 410                                                          PP  91
   80 NS=NSEC(I)                                                         PP  92
      IJ=MAXS-XSKT(I)                                                    PP  93
C                                                                        PP  94
C     BEGIN CROSS-SECTION LOOP                                           PP  95
C                                                                        PP  96
      JBEG=1                                                             PP  97
      JEND=2                                                             PP  98
      NPLOTS=(NS+1)/2                                                    PP  99
      IF (MEPLOT) NPLOTS=1                                               PP 100
      DO 400 IPLOT=1,NPLOTS                                              PP 101
      IF (IPLOT.EQ.1) GO TO 90                                           PP 102
      JBEG=JEND+1                                                        PP 103
      JEND=JEND+2                                                        PP 104
      IJ=IJP1                                                            PP 105
      IF (JEND.LE.NS) GO TO 90                                           PP 106
      JEND=JBEG                                                          PP 107
      JBEG=JEND-1                                                        PP 108
      GO TO 100                                                          PP 109
   90 IJ=IJ+1                                                           PP 110
  100 IJP1=IJ+1                                                         PP 111
      SYMBEG=SYMBOL(JBEG)                                                PP 112
      SYMEND=SYMBOL(JEND)                                                PP 113
C                                                                        PP 114
C     DETERMINE FIELD-STATION NUMBER AT CROSS-SECTION LOCATION           PP 115
C                                                                        PP 116
      IF (MEPLOT) GO TO 140                                              PP 117
      IF (JBEG.NE.1.AND.JEND.NE.NS) GO TO 170                            PP 118
      ISEC=0                                                             PP 119
      DO 130 L=1,NBND                                                    PP 120
      IF (ISTATN(L).EQ.0) GO TO 130                                      PP 121
      IF (IBJNC(L).NE.IJF(I)) GO TO 110                                  PP 122
      ISEC=1                                                             PP 123
      IF (IJF(I).GT.IJT(I)) ISEC=NS                                      PP 124
      GO TO 120                                                          PP 125
  110 IF (IBJNC(L).NE.IJT(I)) GO TO 130                                  PP 126
      ISEC=1                                                             PP 127
      IF (IJT(I).GT.IJF(I)) ISEC=NS                                      PP 128
  120 STAN01=ISTATN(L)/1000000                                           PP 129
      STAN02=ISTATN(L)-(STAN01*1000000)                                  PP 130
      STAN03=STAN02/100.+.005                                            PP 131
      GO TO 170                                                          PP 132
  130 CONTINUE                                                           PP 133
      GO TO 170                                                          PP 134
C                                                                        PP 135
C     DETERMINE DATA RANGE FOR COMPUTED VRS. MEASURED DATA PLOT          PP 136
C                                                                        PP 137
  140 IJ=IJ+MSEC(MM)-1                                                   PP 138
      ZQMIN=+9999999.                                                    PP 139
      ZQMAX=-9999999.                                                    PP 140
      DO 150 K=1,KT                                                      PP 141
      ZQIJK=ZQCOMP(K,IJ)                                                 PP 142
      IF (ZQIJK.LT.ZQMIN) ZQMIN=ZQIJK                                    PP 143
      IF (ZQIJK.GT.ZQMAX) ZQMAX=ZQIJK                                    PP 144
  150 CONTINUE                                                           PP 145
      DO 160 K=MID,MND                                                   PP 146
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      ZQIJK=ZQMEAS(K,MM)                                                    PP 147
      IF (ZQIJK.LT.ZQMIN) ZQMIN=ZQIJK                                       PP 148
      IF (ZQIJK.GT.ZQMAX) ZQMAX=ZQIJK                                       PP 149
  160 CONTINUE                                                              PP 150
      GO TO 200                                                             PP 151
C                                                                           PP 152
C     DETERMINE DATA RANGE FOR PLOTTING COMPUTED RESULTS                    PP 153
C                                                                           PP 154
  170 ZQMIN=ZQCOMP(1,IJ)                                                    PP 155
      ZQMAX=ZQMIN                                                           PP 156
      ZQIJK=ZQCOMP(1,IJP1)                                                  PP 157
      IF (ZQIJK.LT.ZQMIN) ZQMIN=ZQIJK                                       PP 158
      IF (ZQIJK.GT.ZQMAX) ZQMAX=ZQIJK                                       PP 159
      IF (KT.EQ.1) GO TO 190                                                PP 160
      DO 180 IJK=IJ,IJP1                                                    PP 161
      DO 180 K=2,KT                                                         PP 162
      ZQIJK=ZQCOMP(K,IJK)                                                   PP 163
      IF (ZQIJK.LT.ZQMIN) ZQMIN=ZQIJK                                       P7 164
      IF (ZQIJK.GT.ZQMAX) ZQMAX=ZQIJK                                       PP 165
  180 CONTINUE                                                              PP 166
      GO TO 200                                                             PP 167
  190 ZQMAX=ZQMIN+ABS(ZQMIN*0.1)                                            PP 168
C                                                                           PP 169
C     DETERMINE PLOT SCALE                                                  PP 170
C                                                                           PP 171
  200 RANGE=ZQMAX-ZQMIN                                                     PP 172
      IPOWER=ALOG10(RANGE)-1.0                                              PP 173
  210 YSTEP=10.0**IPOWER                                                    PP 174
      ZQREM=AMOD(ZQMIN,YSTEP)                                               PP 175
      YORGIN=ZQMIN-ZQREM                                                    PP 176
      IF (ZQMIN.LT.0.0.AND.ZQREM.NE.0.0) YORGIN=YORGIN-YSTEP                PP 177
      ZQREM=AMOD(ZQMAX,YSTEP)                                               PP 178
      YUPPER=ZQMAX-ZQREM                                                    PP 179
      IF (ZQREM.NE.0.0) YUPPER=YUPPER+YSTEP                                 PP 180
      ZQSTEP=(YUPPER-YORGIN)*0.1                                            PP 181
      IF (ZQSTEP.GT.YSTEP) YSTEP=2.0*YSTEP                                  PP 182
      IF (ZQSTEP.GT.YSTEP) YSTEP=2.5*YSTEP                                  PP 183
      IF (ZQSTEP.LE.YSTEP) GO TO 220                                        PP 184
      IPOWER=IPOWER+1                                                       PP 185
      IF (IPOWER.LT.6) GO TO 210                                            PP 186
      WRITE (PRINTR,550)                                                    PP 187
      RETURN                                                                PP 188
  220 ZQREM=AMOD(ZQMIN,YSTEP)                                               PP 189
      YORGIN=ZQMIN-ZQREM                                                    PP 190
      IF (ZQMIN.LT.0.0.AND.ZQREM.NE.0.0) YORGIN=YORGIN-YSTEP                PP 191
      DO 230 K=1,11                                                         PP 192
  230 SREAL(K)=YORGIN+(K-1)*YSTEP                                           PP 193
      YSTEP=YSTEP*10.0                                                      PP 194
      HSTEP=0.5*YSTEP                                                       PP 195
      YORGIN=YORGIN*100.0                                                   PP 196
      NPAGE=KT/PAGESZ+1                                                     PP 197
      IF (MOD(KT,PAGESZ).EQ.0) NPAGE=NPAGE-1                                PP 198
      KEND=0                                                                PP 199
C                                                                           PP 200
C     BEGIN PAGE LOOP                                                       PP 201
C                                                                           PP 202
      DO 400 IPAGE=1,NPAGE                                                  PP 203
      KBEG=KEND+1                                                           PP 204
      KEND=IPAGE*PAGESZ                                                     PP 205
      IF (IPAGE.EQ.NPAGE) KEND=KT                                           PP 206
      WRITE (PRINTR,470) NETNAM                                             PP 207
      IF (.NOT.MEPLOT) GO TO 240                                            PP 208
      WRITE (PRINTR,540) ZTITLE,(BRNAME(K,I),K=1,10),OH,ASTK,MBCH(MM),MS    PP 209
     1EC(MM)                                                                PP 210
      WRITE (PRINTR,510) ZUNIT,ZUNIT,YR,MO,DA,HR,MN,KYR,KMO,KDA,KHR,KMN     PP 211
      WRITE (PRINTR,500) SREAL,ASTK,OH,(VBAR,K=1,11)                        PP 212
      GO TO 270                                                             PP 213
  240 WRITE (PRINTR,480) ZTITLE,(BRNAME(K,I),K=1,10),SYMBEG,SYMEND,JBEG,    PP 214
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     1JEND                                                                    PP 215
      IF (ISEC.NE.JBEG.AND.ISEC.NE.JEND) GO TO 250                            PP 216
      WRITE (PRINTR,490) ZUNIT,ZUNIT,YR,MO,DA,HR,MN,STANO1,STANO3,SYMBOL      PP 217
     1(ISEC),KYR,KMO,KDA,KHR,KMN                                              PP 218
      GO TO 260                                                               PP 219
  250 WRITE (PRINTR,510) ZUNIT,ZUNIT,YR,MO,DA,HR,MN,KYR,KMO,KDA,KHR,KMN      PP 220
  260 WRITE (PRINTR,500) SREAL,SYMBEG,SYMEND,(VBAR,K=1,11)                    PP 221
  270 IF (IPAGE.NE.1) GO TO 280                                               PP 222
      NHOUR=HR                                                                PP 223
      NMINIT=MN                                                               PP 224
C                                                                             PP 225
C     BEGIN LOOP FOR PLOTTING COMPUTED VRS. MEASURED DATA                     PP 226
C                                                                             PP 227
  280 IF (.NOT.MEPLOT) GO TO 350                                              PP 228
      DO 340 K=KBEG,KEND                                                      PP 229
      ZQIJK=ZQCOMP(K,IJ)*100.+HSTEP                                           PP 230
      LOCA=1+(ZQIJK-YORGIN)/YSTEP                                             PP 231
      IF (NMINIT.EQ.0.OR.K.EQ.KBEG.OR.K.EQ.KEND) GO TO 300                    PP 232
      CHARA=B(LOCA)                                                           PP 233
      IF (K.LT.IDM.OR.K.GT.NDM) GO TO 290                                     PP 234
      ZQIJK=ZQMEAS(K-IDMM1,MM)*100.+HSTEP                                     PP 235
      LOCB=1+(ZQIJK-YORGIN)/YSTEP                                             PP 236
      CHARB=B(LOCB)                                                           PP 237
      B(LOCA)=ASTK                                                            PP 238
      B(LOCB)=OH                                                              PP 239
      WRITE (PRINTR,520) NHOUR,NMINIT,ZQCOMP(K,IJ),ZQMEAS(K-IDMM1,MM),B       PP 240
      B(LOCA)=CHARA                                                           PP 241
      B(LOCB)=CHARB                                                           PP 242
      GO TO 320                                                               PP 243
  290 B(LOCA)=ASTK                                                            PP 244
      WRITE (PRINTR,530) NHOUR,NMINIT,ZQCOMP(K,IJ),B                          PP 245
      B(LOCA)=CHARA                                                           PP 246
      GO TO 320                                                               PP 247
  300 CHARA=D(LOCA)                                                           PP 248
      IF (K.LT.IDM.OR.K.GT.NDM) GO TO 310                                     PP 249
      ZQIJK=ZQMEAS(K-IDMM1,MM)*100.+HSTEP                                     PP 250
      LOCB=1+(ZQIJK-YORGIN)/YSTEP                                             PP 251
      CHARB=D(LOCB)                                                           PP 252
      D(LOCA)=ASTK                                                            PP 253
      D(LOCB)=OH                                                              PP 254
      WRITE (PRINTR,520) NHOUR,NMINIT,ZQCOMP(K,IJ),ZQMEAS(K-IDMM1,MM),D       PP 255
      D(LOCA)=CHARA                                                           PP 256
      D(LOCB)=CHARB                                                           PP 257
      GO TO 320                                                               PP 258
  310 D(LOCA)=ASTK                                                            PP 259
      WRITE (PRINTR,530) NHOUR,NMINIT,ZQCOMP(K,IJ),D                          PP 260
      D(LOCA)=CHARA                                                           PP 261
  320 NMINIT=NMINIT+IDTM                                                      PP 262
      IF (NMINIT.LT.60) GO TO 330                                             PP 263
      NHOUR=NHOUR+NMINIT/60                                                   PP 264
      NMINIT=MOD(NMINIT,60)                                                   PP 265
  330 IF (NHOUR.LT.24.OR.(NHOUR.EQ.24.AND.NMINIT.EQ.0)) GO TO 340             PP 266
      NHOUR=NHOUR-24                                                          PP 267
  340 CONTINUE                                                                PP 268
      GO TO 400                                                               PP 269
C                                                                             PP 270
C     BEGIN LOOP FOR PLOTTING COMPUTED RESULTS                                PP 271
C                                                                             PP 272
  350 DO 390 K=KBEG,KEND                                                      PP 273
      ZQIJK=ZQCOMP(K,IJ)*100.+HSTEP                                           PP 274
      LOCA=1+(ZQIJK-YORGIN)/YSTEP                                             PP 275
      ZQIJK=ZQCOMP(K,IJP1)*100.+HSTEP                                         PP 276
      LOCB=1+(ZQIJK-YORGIN)/YSTEP                                             PP 277
      IF (NMINIT.EQ.0.OR.K.EQ.KBEG.OR.K.EQ.KEND) GO TO 360                    PP 278
      CHARA=B(LOCA)                                                           PP 279
      CHARB=B(LOCB)                                                           PP 280
      B(LOCA)=SYMBEG                                                          PP 281
      B(LOCB)=SYMEND                                                          PP 282
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```
      WRITE (PRINTR,520) NHOUR,NMINIT,ZQCOMP(K,IU),ZQCOMP(K,IUP1),B      PP 283
      B(LOCA)=CHARA                                                      PP 284
      B(LOCB)=CHARB                                                      PP 285
      GO TO 370                                                          PP 286
  360 CHARA=D(LOCA)                                                      PP 287
      CHARB=D(LOCB)                                                      PP 288
      D(LOCA)=SYMBEG                                                     PP 289
      D(LOCB)=SYMEND                                                     PP 290
      WRITE (PRINTR,520) NHOUR,NMINIT,ZQCOMP(K,IU),ZQCOMP(K,IUP1),D      PP 291
      D(LOCA)=CHARA                                                      PP 292
      D(LOCB)=CHARB                                                      PP 293
  370 NMINIT=NMINIT+IDTM                                                 PP 294
      IF (NMINIT.LT.60) GO TO 380                                        PP 295
      NHOUR=NHOUR+NMINIT/60                                              PP 296
      NMINIT=MOD(NMINIT,60)                                              PP 297
  380 IF (NHOUR.LT.24.OR.(NHOUR.EQ.24.AND.NMINIT.EQ.0)) GO TO 390        PP 298
      NHOUR=NHOUR-24                                                     PP 299
  390 CONTINUE                                                           PP 300
  400 CONTINUE                                                           PP 301
  410 CONTINUE                                                           PP 302
C                                                                        PP 303
C     SET PARAMETERS FOR NEXT PLOT                                       PP 304
C                                                                        PP 305
  420 ID=1                                                               PP 306
      YR=KYR                                                             PP 307
      MO=KMO                                                             PP 308
      DA=KDA                                                             PP 309
      HR=KHR                                                             PP 310
      MN=KMN                                                             PP 311
      MN=MN+IDTM                                                         PP 312
      IF (MN.LT.60) GO TO 430                                            PP 313
      HR=HR+MN/60                                                        PP 314
      MN=MOD(MN,60)                                                      PP 315
  430 IF (HR.LT.24.OR.(HR.EQ.24.AND.MN.EQ.0)) GO TO 440                  PP 316
      HR=HR-24                                                           PP 317
      DA=DA+1                                                            PP 318
  440 IF (DA.LE.DPERM(MO)) GO TO 450                                     PP 319
      DA=1                                                               PP 320
      MO=MO+1                                                            PP 321
  450 IF (MO.LT.13) GO TO 460                                            PP 322
      MO=1                                                               PP 323
      YR=YR+1                                                            PP 324
      IF (YR.GT.99) YR=0                                                 PP 325
      DPERM(2)=28+(4-MOD(YR,4))/4                                        PP 326
  460 LASTM=M                                                            PP 327
      IF (.NOT.MEPLOT) RETURN                                            PP 328
      LETIME=KETIME+IDTM                                                 PP 329
      IF (KETIME.LT.MEITIM) RETURN                                       PP 330
      MIHR=HR                                                            PP 331
      MIMN=MN                                                            PP 332
      MID=NDM-IDM+2                                                      PP 333
      RETURN                                                             PP 334
C                                                                        PP 335
C     OUTPUT FORMAT STATEMENTS                                           PP 336
C                                                                        PP 337
C                                                                        PP 338
C                                                                        PP 339
  470 FORMAT ('1',20A4,09X,'FLOW COMPUTED BY THE BRANCH-NETWORK MODEL'// PP 340
     1' ',T63,'# # # #'//' ======+======================+',99('='),'+')  PP 341
  480 FORMAT ('  TIME |',4X,3A4,6X,'|',T33,10A4,T106,'(',A1,'-',A1,') CR PP 342
     1OSS SECTIONS ',I1,'-',I1,T131,'|')                                 PP 343
  490 FORMAT (' HR:MN |',5A2,1X,5A2,1X,'| START= ',I2,2('/',I2),I3,':',I PP 344
     12,T64,'FIELD-STATION NUMBER ',I2,'-',F7.2,' (',A1,')',T111,'END= ' PP 345
     2,I2,2('/',I2),I3,':',I2,' |')                                      PP 346
  500 FORMAT (' ',' ======+======+==========+',99('='),'+'/' ',T24,1    PP 347
     11F10.2/T13,'(',A1,')',T24,'(',A1,')',T31,A1,10(9X,A1))             PP 348
  510 FORMAT (' HR:MN |',5A2,1X,5A2,1X,'| START= ',I2,2('/',I2),I3,':',I PP 349
     12,T111,'END= ',I2,2('/',I2),I3,':',I2,' |')                        PP 350
```

```
  520 FORMAT (1X,I2,':',I2,' |',F10.2,1X,F10.2,1X,101A1)                    PP 351
  530 FORMAT (1X,I2,':',I2,' |',F10.2,12X,101A1)                           PP 352
  540 FORMAT ('  TIME |',4X,3A4,6X,'|',T33,10A4,T82,'(',A1,') MEASURED (  PP 353
     1',A1,') COMPUTED AT BRANCH:SECTION ',I2,':',I1,T131,'|')             PP 354
  550 FORMAT (/' ERROR,     STEP SIZE IN PLOT SCALE ALGORITHM EXCEEDS MA  PP 355
     1XIMUM LIMIT')                                                        PP 356
      END                                                                  PP 357


      SUBROUTINE ARBIN(AA,BB,ZA,IPT,XSKT,MXPT,MAXS)                        AB   1
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #  AB   2
C #   THIS SUBROUTINE INTERPOLATES AREA AND TOP-WIDTH PROPERTIES.      #   AB   3
C #   THE HYDRAULIC RADIUS RETURNED IS AN APPROXIMATION (AREA/WIDTH).  #   AB   4
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #  AB   5
C #                                                                    #   AB   6
      INTEGER *2IPT(1),XSKT(1)                                             AB   7
      DIMENSION AA(MXPT,1), BB(MXPT,1), ZA(MXPT,1)                         AB   8
      RETURN                                                               AB   9
      ENTRY ARB(ZIJ,I,J,A,B,R,*,*)                                         AB  10
C                                                                          AB  11
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #  AB  12
C #   SECONDARY ENTRY POINT CALLED TO PERFORM INTERPOLATION            #   AB  13
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #  AB  14
C                                                                          AB  15
      IJ=MAXS-XSKT(I)+J                                                    AB  16
      IF (ZIJ.LT.ZA(1,IJ).OR.ZIJ.GT.ZA(IPT(IJ),IJ)) RETURN 1               AB  17
      ND=IPT(IJ)                                                           AB  18
      DO 10 K=2,ND                                                         AB  19
      IF (ZIJ.GT.ZA(K,IJ)) GO TO 10                                        AB  20
      ZIJK=(ZA(K,IJ)-ZIJ)/(ZA(K,IJ)-ZA(K-1,IJ))                            AB  21
      DA=AA(K,IJ)-AA(K-1,IJ)                                               AB  22
      DB=BB(K,IJ)-BB(K-1,IJ)                                               AB  23
      A=AA(K,IJ)-DA*ZIJK                                                   AB  24
      B=BB(K,IJ)-DB*ZIJK                                                   AB  25
      IF (A.LE.0.0.OR.B.LE.0.0) RETURN 2                                   AB  26
      R=A/B                                                                AB  27
      RETURN                                                               AB  28
   10 CONTINUE                                                             AB  29
      RETURN 1                                                             AB  30
      END                                                                  AB  31


      SUBROUTINE GEMXPI(AM,BMX,ROW,II,IS,ICHK)                             GE   0
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #  GE   1
C #   THIS SUBROUTINE SOLVES A SYSTEM OF EQUATIONS BY GAUSSIAN         #   GE   2
C #   ELIMINATION USING MAXIMUM COLUMN PIVOT STRATEGY.                     GE   3
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #  GE   4
      DIMENSION AM(1), BMX(1)                                              GE   5
      INTEGER*2 ROW(1)                                                     GE   6
C                                                                          GE   7
C        INITIALIZE                                                        GE   8
C                                                                          GE   9
      DO 10 K=1,II                                                         GE  10
      ROW(K)=K                                                             GE  11
   10 CONTINUE                                                             GE  12
      IF (ICHK.NE.0.AND.ICHK.NE.1) ICHK=0                                  GE  13
      RETURN                                                               GE  14
C                                                                          GE  15
C        DECOMPOSE AND SOLVE ENTRY POINT                                   GE  16
C                                                                          GE  17
      ENTRY GEMXP(IS,ICHK)                                                 GE  18
C                                                                          GE  19
C        FORWARD SOLUTION                                                  GE  20
C                                                                          GE  21
      TOL=.1E-50                                                           GE  22
      IS=0                                                                 GE  23
```

```
      JJ=-II                                                            GE  24
      DO 90 JROW=1,II                                                   GE  25
      JJ=JJ+II                                                          GE  26
C                                                                       GE  27
C        IF ICHK=1 SKIP OVER SEARCH FOR MAXIMUM PIVOT                   GE  28
C                                                                       GE  29
      IF (ICHK.NE.1) GO TO 20                                           GE  30
      MROW=ROW(JROW)                                                    GE  31
      BIGA=AM(MROW+JJ)                                                  GE  32
      IF (ABS(BIGA).GT.TOL) GO TO 60                                    GE  33
   20 ABBIGA=0.0                                                        GE  34
      IMAX=0                                                            GE  35
C                                                                       GE  36
C        SEARCH FOR MAXIMUM COEFFICIENT IN COLUMN                       GE  37
C                                                                       GE  38
      DO 30 JCOL=JROW,II                                                GE  39
      K=ROW(JCOL)+JJ                                                    GE  40
      IF (AM(K).EQ.0.0) GO TO 30                                        GE  41
      ABSA=ABS(AM(K))                                                   GE  42
      IF (ABBIGA.GE.ABSA) GO TO 30                                      GE  43
      BIGA=AM(K)                                                        GE  44
      ABBIGA=ABSA                                                       GE  45
      IMAX=JCOL                                                         GE  46
   30 CONTINUE                                                          GE  47
      IF (IMAX.EQ.0) GO TO 50                                           GE  48
C                                                                       GE  49
C        SWAP ROW POINTERS                                              GE  50
C                                                                       GE  51
      MROW=ROW(IMAX)                                                    GE  52
      IF (IMAX.EQ.JROW) GO TO 40                                        GE  53
      ROW(IMAX)=ROW(JROW)                                               GE  54
      ROW(JROW)=MROW                                                    GE  55
C                                                                       GE  56
C        TEST FOR PIVOT LESS THAN TOLERANCE (SINGULAR MATRIX)           GE  57
C                                                                       GE  58
   40 IF (ABBIGA.GT.TOL) GO TO 60                                       GE  59
   50 IS=1                                                              GE  60
      RETURN                                                            GE  61
C                                                                       GE  62
C        DIVIDE EQUATION BY LEADING COEFFICIENT                         GE  63
C                                                                       GE  64
   60 REBIGA=1.0/BIGA                                                   GE  65
      NBEG=JJ+MROW                                                      GE  66
      NEND=NBEG+II*(II-JROW)                                            GE  67
      DO 70 K=NBEG,NEND,II                                              GE  68
      IF (AM(K).NE.0.0) AM(K)=AM(K)*REBIGA                              GE  69
   70 CONTINUE                                                          GE  70
      BMX(MROW)=BMX(MROW)*REBIGA                                        GE  71
C                                                                       GE  72
C        ELIMINATE THE ITH COLUMN BELOW THE DIAGONAL                    GE  73
C                                                                       GE  74
      IF (JROW.EQ.II) GO TO 100                                         GE  75
      NBEG=NBEG+II                                                      GE  76
      JP=JROW+1                                                         GE  77
      DO 90 K1=JP,II                                                    GE  78
      KR=ROW(K1)                                                        GE  79
      KXJ=JJ+KR                                                         GE  80
      AVAL=AM(KXJ)                                                      GE  81
      IF (AVAL.EQ.0.0) GO TO 90                                         GE  82
      DO 80 K2=NBEG,NEND,II                                             GE  83
      KXJ=KXJ+II                                                        GE  84
      IF (AM(K2).EQ.0.0) GO TO 80                                       GE  85
      AM(KXJ)=AM(KXJ)-AVAL*AM(K2)                                       GE  86
   80 CONTINUE                                                          GE  87
      BMX(KR)=BMX(KR)-AVAL*BMX(MROW)                                    GE  88
   90 CONTINUE                                                          GE  89
C                                                                       GE  90
C        BACK SUBSTITUTE, PLACING THE SOLUTION IN                       GE  91
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C        AN UNOCCUPIED COLUMN OF A                                          GE  92
C                                                                           GE  93
  100 IIN=II-1                                                              GE  94
      II2=II*IIN                                                            GE  95
      AM(II)=BMX(MROW)                                                      GE  96
      DO 110 K1=1,IIN                                                       GE  97
      KB=II-K1                                                              GE  98
      KR=ROW(KB)                                                            GE  99
      AM(KB)=BMX(KR)                                                        GE 100
      IA=II2+KR                                                             GE 101
      IC=II                                                                 GE 102
      DO 110 K2=1,K1                                                        GE 1 3
      IF (AM(IA).NE.0.0) AM(KB)=AM(KB)-AM(IA)*AM(IC)                        GE 104
      IA=IA-II                                                              GE 105
      IC=IC-1                                                               GE 106
  110 CONTINUE                                                              GE 107
C                                                                           GE 108
C        RESTORE THE SOLUTION TO THE B VECTOR                               GE 109
C                                                                           GE 110
      DO 120 K=1,II                                                         GE 111
      BMX(K)=AM(K)                                                          GE 112
  120 CONTINUE                                                              GE 113
      RETURN                                                                GE 114
      END                                                                   GE 115


      FUNCTION SETA(TYPETA,IUNIT,G,Q,A,R,T,RN)                              SE   0
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #   SE   1
C #   THIS SUBPROGRAM COMPUTES BOTTOM FRICTION AS A FUNCTION OF WATER #     SE   2
C #   TEMPERATURE, FLOW DEPTH, DISCHARGE, FROUDE NUMBER, OR REYNOLDS  #     SE   3
C #   NUMBER ACCORDING TO A USER DEFINED LINEAR OR QUADRATIC          #     SE   4
C #   RELATIONSHIP FOR A BRANCH SEGMENT.  CONSTANT BOTTOM FRICTION IS #     SE   5
C #   ALSO ACCOMMODATED.  A QUADRATIC RELATIONSHIP IS DEFINED FOR THE #     SE   6
C #   KINEMATIC VISCOSITY AS A FUNCTION OF TEMPERATURE WHICH IS VALID #     SE   7
C #   IN THE FAHRENHEIT TEMPERATURE RANGE 32<=T<=95 AND THE CELSIUS   #     SE   8
C #   TEMPERATURE RANGE 0<=T<=35.  THE KINEMATIC VISCOSITY (NU) IS    #     SE   9
C #   USED AS 10**6NU = 1 M**2/SEC IN THE METRIC SYSTEM AND AS        #     SE  10
C #   10**5NU = 1 FT**2/SEC IN THE ENGLISH SYSTEM.  SET TYPETA=1 FOR  #     SE  11
C #   CONSTANT BOTTOM FRICTION (ETA), 2 FOR ETA AS A FUNCTION OF      #     SE  12
C #   TEMPERATURE, 3 FOR DEPTH, 4 FOR DISCHARGE, 5 FOR FROUDE NUMBER, #     SE  13
C #   OR 6 FOR REYNOLDS NUMBER.                                       #     SE  14
C # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #   SE  15
C #                                                                   #     SE  16
      REAL NU                                                               SE  17
      INTEGER *2TYPETA,IUNIT,EN/'EN'/,ME/'ME'/                              SE  18
      DIMENSION RN(4)                                                       SE  19
      SETA=RN(1)                                                            SE  20
      GO TO (10,20,30,40,50,60), TYPETA                                     SE  21
   10 RETURN                                                                SE  22
   20 X=T                                                                   SE  23
      GO TO 70                                                              SE  24
   30 X=R                                                                   SE  25
      GO TO 70                                                              SE  26
   40 X=ABS(Q)                                                              SE  27
      GO TO 70                                                              SE  28
   50 V=ABS(Q)/A                                                            SE  29
      X=V/SQRT(G*R)                                                         SE  30
      GO TO 70                                                              SE  31
   60 V=ABS(Q)/A                                                            SE  32
      IF (IUNIT.EQ.EN) NU=3.165276-(0.0454095-0.0002137O*T)*T               SE  33
      IF (IUNIT.EQ.ME) NU=1.794000-(0.0530429-0.00064286*T)*T               SE  34
      X=V*R/NU                                                              SE  35
   70 SETA=SETA+(RN(2)+RN(3)*X)*X                                           SE  36
      RETURN                                                                SE  37
      END                                                                   SE  38
```

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