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FILE: METEO     FORTRAN  A1  VM/SP HPO REL 4.2 - ELETRONORTE


C           DATA SET METEOS      AT LEVEL 012 AS OF 10/04/86
C           DATA SET PEL01220    AT LEVEL 009 AS OF 09/08/85
C----------------------------M E T E O  T U C U R U I  ----------------
C
C
C
C                              M  E  T  E  O
C
C
C----BASEADO NOS TRABALHOS  DE: KOK, VAN BREEMEN, KRAJEWSKI, BRADY,
C                               EDINGER, GEYER, IMBERGER EN HARLEMAN.
C
C----ESTE PROGRAMA FOI DESENVOLVIDO PELO WATERLOOPKUNDIG LABORATORIUM -
C------------------------------------ SETOR DE HIDRAULICA AMBIENTAL -
C
C********************************************** ENTRADA / SAIDA ***
C
C     .ARQUIVO  1 / CONTROLE P/ PGM METEO E OBSERVACOES METEOROLOGICAS
C     .ARQUIVO  6 / IMPRIME OBSERVACOES METEOROLOGICAS
C     .ARQUIVO  3 / IMPRIME RESULTADOS (APOS A CONVERCAO DOS DADOS   ***
C                   DE ENTRADA PARA O STRATIF)                       ***
C************************************************************** FUNCAO ***
C
C               + CALCULO DE:
C                     - TEMPERATURA DE EQUILIBRIO        (K)
C                     - COEFICIENTE DE TROCA TERMICA     (W/M**2.K)
C                 BASEADO EM DADOS METEOROLOGICOS DISPONIVEIS.
C
C               + O MODELO METEO TEM UMA CARACTERISTICA ESPECIFICA QUE
C                 DEPENDE DE DADOS METEOROLOGICOS E DA LOCALIZACAO.
C                 MODIFICACOES PODEM SER NECESSARIAS.
C               + OS DADOS PARA O PROGRAMA METEO TEM DE SER PROCESSADO
C                 PARA TODOS OS METODOS DA MESMA MANEIRA.
C               + CERTIFIQUE-SE SE TODAS AS VARIAVEIS ESTAO NA DIMENSAO
C                 CORRETA.
C               + NESTE PROGRAMA 8 METODOS ESTAO DISPONIVEIS PARA O CAL-
C                 CULO DA TEMPERATURA DE EQUILIBRIO E DO COEFICIENTE DE
C                 TROCA TERMICA   ...   VEJA LITERATURA
C
C********************************************** DIMENSIONAMENTO ***
C
      REAL*4 K01,K02,K03,K1,K2,K3,K13,K23,MNP
C
C********************************************** DECLARACAO FORMAT ***
C
  100 FORMAT(5I5,F5.2)
  201 FORMAT(I4,I3, 6X,2F6.0, 12X, 6F6.0)
  202 FORMAT(I4,I3, 6X,2F6.0, 12X, 6F6.0)
  203 FORMAT(I4,I3,    7F6.0, 24X)
  204 FORMAT(I4,I3, 6X,2F6.0, 12X,2F6.0, 18X, F6.0)
  205 FORMAT(I4,I3, 6X,2F6.0, 12X,2F6.0, 18X,F6.0)
  206 FORMAT(I4,I3, 6X,2F6.0, 12X, F6.0, 6X,4F6.0)
  207 FORMAT(I4,I3, 6X,2F6.0, 6X,6F6.0)
  208 FORMAT(I4,I3, 6X,2F6.0, 6X,6F6.0)
  701 FORMAT(1H ,I4,I3,F8.1,F8.2,F8.1)
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  709 FORMAT(1H ,I4,I3,F6.0,5F6.2,3F6.0,2F6.2)
  710 FORMAT(//,1H ,5I5,F6.2)
  702 FORMAT(1H ,9X,'==> DEVE-SE USAR A TEMPERATURA DE BULBO UMIDO',
     2        /,14X,'OU A UMIDADE RELATIVA',
     3        /,14X,'NECESSARIO CORRIGIR DADOS DE ENTRADA DO METEO ',/)
  703 FORMAT(1H ,9X,'==> UM OU MAIS DADOS ESTAO FALTANDO PARA ',
     1        /,14X,'ESTE METODO E OU NULO'/)
  704 FORMAT(1H ,
     1   ///,9X,'==> FINAL DO CALCULO PARA O METODO ',I1,/)
  705 FORMAT(1H ,   8X,'==> CALCULO USANDO UMIDADE RELATIVA',/)
  706 FORMAT(1H ,   8X,'==> CALCULO USANDO TEMP. DO BULBO UMIDO',/)
  707 FORMAT(1H ,   8X,'==> SE NECESSARIO, A PRESSAO DO VAPOR S',
     1                 'ERA CALCULADA',/)
  708 FORMAT(1H ,   9X,'==> COMB. INCORRETA DOS DADOS DE ENTRADA DO ',
     1                 'PROGRAMA METEO ||',
     2        /,14X,'NECESSARIO CORRIGIR DADOS DE ENTRADA DO METEO ||'/)
C
C*************************** LEITURA DAS INFORMACOES DE CONTROLE ***
C
      READ(1,100)  METHOD,IRH,INBT,IEA,IRM,CORR
      WRITE(6,710) METHOD,IRH,INBT,IEA,IRM,CORR
      IF(IRH.EQ.INBT) GOTO 97
C
C************************************************** CONSTANTES ***
C
      REFL   =  0.080
      GAMMA  =  0.660
C
C************************************************ KEUZE METHODE ***
C METHOD=1 :KOK        - EDINGER: WAT.RES.RES. VOL 4, 5 (1968) 1137-1143
C METHOD=2 :KOK/GROOT  - ADAPTACAO DO METODO KOK(INCLUINDO RAZAO DE IN-
C                        SOLACAO)
C METHOD=3 :KRAJEWSKI  - MODELAGEM ECOLOGICA,          17 (1982)  209- 224
C METHOD=4 :BRADY EA   - WL-153118/ HOPKINS UNIV BALTIMORE. RP-49-5/1969
C METHOD=5 :ANONYMUS   - DE ACORDO COM BRADY E GEYER                (1967)
C METHOD=6 :KOK/VAN BREEMEN - VEJA METODO 1: OUTROS COEFICIENTES.
C METHOD=7 :IMBERGER   - METEO COM MODELO DE ESTRATIFICACAO DE DYRESM.
C METHOD=8 :HARLEMAN   - METEO COM MODELO DE ESTRATIFICACAO DE MIT.
C
      GOTO ( 1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 ),METHOD
C
C************************************************** METODO KOK ***
C METHOD=1 :P   = BRILHO SOLAR  ( 0-1 ) W  = VELOCIDADE DO VENTO( M/S )
C           TA  = TEMP. DO AR   (DEGC ) TW = TEMP. BULBO UMIDO  (DEGC )
C           EA  = PRES. DE VAPOR( MB  ) RH = UMIDADE RELATIVA   (0 - 1)
C           RM  = RADIACAO GLOBAL MEDIDA AO NIVEL DAS ARVORES   (W/M2 )
C           G   = RADIACAO GLOBAL AO NIVEL DAS ARVORES          (W/M2 )
C           HTOP= VALOR DE ANGOT - RADIACAO DE ONDAS CURTAS     (W/M2 )
C           TEV = TEMPERATURA DE EQUILIBRIO                     (DEGC )
C           WK  = COEFICIENTE DE TROCA TERMICO                  (WM2K )
C
    1 CONTINUE
      READ(1,201) IJAAR,IMAAND,W,TA,RH,RM,HTOP,EA,P,TW
      IF(IMAAND .LE. 0) GOTO 99
      IF(IRH.EQ.1 .AND. IEA.EQ.0) CALL WBULB (RH,TA,TW,DU,GAMMA)
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      IF(IRH.EQ.1 .AND. IEA.EQ.1) CALL WBULB (RH,TA,TW,EA,GAMMA)
      IF(IRH.EQ.0 .AND. IEA.EQ.1) CALL WBULB (RH,TA,DU,EA,GAMMA)
      ONZIN =       W*TA*HTOP*EA*P*TW
      IF(ONZIN .LT. 0.0001) GOTO 98
C
C------CALCULO ESPECIFICO PARA TUCURUI:
      G    = (0.280+0.390*P)*HTOP
      IF(IRM.EQ.1) G = RM
C
      MNP  = 0.20+0.80*P
      ABW  = 1.52+1.64*W
      DTW  = 10.**(7.45*TW/(235.+TW))
      DTW  = 24590.63*DTW/((235.+TW)**2)
      K1   = (1.-REFL)*G
      K01  = (0.53+0.066*SQRT(EA))*MNP
      K02  =       5.72*((TA+273.)/100.)**4
      K03  =       5.72*((TW+273.)/100.)**4
      QNRST= K1 + K02*K01 - K02*MNP + K02 - K03
      K01  = 0.04*5.72*((TW+273.)/100.)**3
      K02  = 2.45*ABW*(DTW + GAMMA)
      WK   = K01 + K02
      TEV  = TW + QNRST/WK
      GOTO 90
C
C********************************************** METODO KOK/GROOT ***
C METHOD=2 :P   = BRILHO SOLAR  ( 0-1 ) W  = VELOCIDADE DO VENTO( M/S )
C           TA  = TEMP. DO AR   (DEGC ) TW = TEMP. BULBO UMIDO  (DEGC )
C           EA  = PRES. DO VAPOR( MB  ) RH = UMIDADE RELATIVA   ( 0-1 )
C           G   = RADIACAO GLOBAL AO NIVEL DAS ARVORES          (W/M2 )
C           RM  = RADIACAO GLOBAL MEDIDA AO NIVEL DAS ARVORES   (W/M2 )
C           HTOP= VAPOR DE ANGOT - RADIACAO DE ONDAS CURTAS     (W/M2 )
C           TEV = TEMPERATURA DE EQUILIBRIO                     (DEGC )
C           WK  = COEFICIENTE DE TROCA TERMICO                  (WM2K )
C
    2 CONTINUE
      READ(1,202) IJAAR,IMAAND,W,TA,RH,RM,HTOP,EA,P,TW
      W = CORR*W
      IF(IMAAND .LE. 0) GOTO 99
      IF(IRH.EQ.1 .AND. IEA.EQ.0) CALL WBULB (RH,TA,TW,DU,GAMMA)
      IF(IRH.EQ.1 .AND. IEA.EQ.1) CALL WBULB (RH,TA,TW,EA,GAMMA)
      IF(IRH.EQ.0 .AND. IEA.EQ.1) CALL WBULB (RH,TA,DU,EA,GAMMA)
      ONZIN =       W*TA*HTOP*EA*P*TW
      IF(ONZIN .LT. 0.0001) GOTO 98
C
C------CALCULO ESPECIFICO PARA TUCURUI:
      G    = (0.280+0.390*P)*HTOP
      IF(IRM.EQ.1) G = RM
C
      MNP  = 0.20+0.80*P
      ABW  = 1.52+1.64*W
      DTW  = 10.**(7.45*TW/(235.+TW))
      DTW  = 24590.63*DTW/((235.+TW)**2)
      K1   = (1.-REFL)*G
      K01  = (0.53+0.066*SQRT(EA))*MNP
      K02  =       5.72*((TA+273.)/100.)**4
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      KO3  =       5.72*((TW+273.)/100.)**4
      QNRST= K1 + KO2*KO1 - KO3*MNP
      KO1  = 0.04*5.72*((TW+273.)/100.)**3
      KO2  = 2.45*ABW*(DTW + GAMMA)
      WK   = KO1*MNP + KO2
      TEV  = TW + QNRST/WK
      GOTO 90
C
C*************************************** METODO KRAJEWSKI ***
C METHOD=3 :PA  = PRESAO          ( MB ) W  = VELOCIDADE DO VENTO( M/S )
C           TA  = TEMP. DO AR     (DEGC ) S  = FAT. DE SOMBREAMENTO(DEGC)
C           CL  = NEBULOSIDADE    ( 0-1 ) RH = UMIDADE RELATIVA    ( 0-1 )
C           HSA = RADIACAO DE  ONDAS CURTAS AO NIVEL DAS ARVORES (W/M2 )
C           TEV = TEMPERATURA DE EQUILIBRIO                      (DEGC )
C           WK  = COEFICIENTE DE TROCA TERMICO                   (WM2K )
C  OPM: ESTE METODO E FORTEMENTE DEPENDENTE DO FATOR DE SOMBREAMENTO
C
    3 CONTINUE
      IF(IRH.NE.1 .OR. IEA.NE.0) GOTO 96
      READ(1,203) IJAAR,IMAAND,PA,W,TA,S,CL,RH,HSA,
     1                         QIN1,QIN2,QIN3,TIN1,TIN2,TIN3
      IF(IMAAND .LE. 0) GOTO 99
      ONZIN =      PA*W*TA*S*CL*RH*HSA
      IF(ONZIN .LT. 0.0001) GOTO 98
C
      KO1  =       5.14*(1.-S)*(1.+0.17*CL**2)
      KO2  =       ((TA+273.)**2)/10000.
      K1   =       2.275*PA*W*TA/1000. + 23.42*RH*W*1.0646**TA
      K1   = K1 + (1.-REFL)*(1.-S)*HSA    - 308.35
      K1   = K1 + KO1*(KO2**3)/10.
      K2   = 23.42*W
      K3   = 2.275*PA*W/1000. + 4.897
      K13  = K1/K3
      K23  = K2/K3
      TEV1 = 20.
   31 TEV2 = K13 - K23*(1.0646)**TEV1
      IF(ABS(TEV1-TEV2) .LT. 0.05) GOTO 32
      TEV1 =(TEV1+TEV2)/2.
      GOTO 31
C
   32 TEV  = K13 - K23*(1.0646)**TEV2
      WK   = K3*( 0.0626*K23*(1.0646)**TEV + 1. )
      GOTO 90
C
C*************************************** METODO BRADY ***
C METHOD=4 :W   = VELOCIDADE DO VENTO                        ( M/S )
C           TW  = TEMPERATURA DO BULBO UMIDO                 (DEGC )
C           G   = RADIACAO GLOBAL AO NIVEL DAS ARVORES       (W/M2 )
C           TEV = TEMPERATURA DE EQUILIBRIO                  (DEGC )
C           WK  = COEFICIENTE DE TROCA TERMICO               (WM2K )
C
    4 CONTINUE
      IF(IEA.NE.0) GOTO 96
      READ(1,204) IJAAR,IMAAND,W,TA,RH,G,TW,
     1                         QIN1,QIN2,QIN3,TIN1,TIN2,TIN3
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      IF(IMAAND .LE. 0) GOTO 99
      IF(IRH.EQ.1) CALL WBULB (RH,TA,TW,DU,GAMMA)
      ONZIN =       W*G*TW
      IF(ONZIN .LT. 0.0001) GOTO 98
      TEV1 = 20.
C
      FW    = 70. + 3.5*(W**2)
   41 T     = (TEV1 + TW)/2.
      BETA  = 0.192 + 0.0082*T + 0.000661*T**2
      WK    = 3.72 + 0.2369*(0.26 + BETA)*FW
      TEV   = TW + G/WK
      IF(ABS(TEV1-TEV) .LT. 0.05) GOTO 42
      TEV1 = (TEV1+TEV)/2.
      GOTO 41
C
   42 CONTINUE
      GOTO 90
C
C************************************** METODO BRADY&EDINGER ***
C METHOD=5 :W    = VELOCIDADE DO VENTO                          ( M/S )
C           TW   = TEMPERATURA DO BULBO UMIDO                   (DEGC )
C           G    = RADIACAO GLOBAL AO NIVEL DAS ARVORES         (W/M2 )
C           TEV  = TEMPERATURA DE EQUILIBRIO                    (DEGC )
C           WK   = COEFICIENTE DE TROCA TERMICO                 (WM2K )
C
    5 CONTINUE
      IF(IEA.NE.0) GOTO 96
      READ(1,205) IJAAR,IMAAND,W,TA,RH,G,TW,
     1                          QIN1,QIN2,QIN3,TIN1,TIN2,TIN3
      IF(IMAAND .LE. 0) GOTO 99
      IF(IRH.EQ.1) CALL WBULB (RH,TA,TW,DU,GAMMA)
      ONZIN =       W*G*TW
      IF(ONZIN .LT. 0.0001) GOTO 98
      TEV1 = 20.
C
      FW    = 9.2 + 0.46*(W**2)
   51 T     = (TEV1 + TW)/2.
      BETA  = 0.35 + 0.015*T + 0.0012*T**2
      WK    = 4.5 + 0.05*TEV1+(0.47 + BETA)*FW
      TEV   = TW + G/WK
      IF(ABS(TEV1-TEV) .LT. 0.05) GOTO 52
      TEV1 = (TEV1+TEV)/2.
      GOTO 51
C
   52 CONTINUE
      GOTO 90
C
C************************************** METODO KOK/VAN BREEMEN ***
C METHOD=6 :P    = BRILHO SOLAR  ( 0-1 ) W  = VELOCIDADE DO VENTO( M/S )
C           TA   = TEMP. DO AR   (DEGC ) TW = TEMP. BULBO UMIDO  (DEGC )
C           EA   = PRES. DO VAPOR( MB  ) RH = UMIDADE RELATIVA   ( 0-1 )
C           G    = RADIACAO GLOBAL AO NIVEL DAS ARVORES          (W/M2 )
C           HTOP= VAPOR DE ANGOT - RADIACAO DE ONDAS CURTAS      (W/M2 )
C           TEV  = TEMPERATURA DE EQUILIBRIO                    (DEGC )
C           WK   = COEFICIENTE DE TROCA TERMICO                 (WM2K )
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C
    6 CONTINUE
      READ(1,206) IJAAR,IMAAND,W,TA,RH,HTOP,EA,P,TW,
     1                              QIN1,QIN2,QIN3,TIN1,TIN2,TIN3
      IF(IMAAND .LE. 0) GOTO 99
      IF(IRH.EQ.1 .AND. IEA.EQ.0) CALL WBULB (RH,TA,TW,DU,GAMMA)
      IF(IRH.EQ.1 .AND. IEA.EQ.1) CALL WBULB (RH,TA,TW,EA,GAMMA)
      IF(IRH.EQ.0 .AND. IEA.EQ.1) CALL WBULB (RH,TA,DU,EA,GAMMA)
      ONZIN =       W*TA*HTOP*EA*P*TW
      IF(ONZIN .LT. 0.0001) GOTO 98
C
C------CALCULO ESPECIFICO PARA BROKOPONDO:
      G    = (0.270+0.436*P)*HTOP
C
      MNP  = 0.20+0.80*P
      ABW  = 1.52+1.64*W
      DTW  = 10.**(7.45*TW/(235.+TW))
      DTW  = 24590.63*DTW/((235.+TW)**2)
      K1   = (1.-REFL)*G
      K01  = (0.53+0.077*SQRT(EA))*MNP
      K02  =       5.72*((TA+273.)/100.)**4
      K03  =       5.72*((TW+273.)/100.)**4
      QNRST= K1 + K02*K01 - K02*MNP + K02 - K03
      K01  = 0.04*5.72*((TW+273.)/100.)**3
      K02  = 2.45*ABW*(DTW + GAMMA)
      WK   = K01 + K02
      TEV  = TW + QNRST/WK
      GOTO 90
C
C*********************************************** METODO IMBERGER ***
C METHOD=7 :P   = BRILHO SOLAR   ( 0-1 ) W  = VELOCIDADE DO VENTO( M/S )
C           TA  = TEMP. DO AR    (DEGC ) EA = PRESSAO DO VAPOR    (  MB )
C           CL  = NEBULOSIDADE   ( 0-1 ) RH = UMIDADE RELATIVA    ( 0-1 )
C           RM  = RADIACAO GLOBAL MEDIDA AO NIVEL DAS ARVORES     (W/M2 )
C           TEV = TEMPERATURA DE EQUILIBRIO                       (DEGC )
C           WK  = COEFICIENTE DE TROCA TERMICO                    (WM2K )
C           SW  = RADIACAO DE ONDAS CURTAS AO NIVEL DAS ARVORES   (W/M2 )
C
    7 CONTINUE
      READ(1,207) IJAAR,IMAAND,W,TA,CL,RH,RM,HTOP,EA,P
      IF(IMAAND .LE. 0) GOTO 99
      IF(IEA .EQ. 1) CALL WBULB (RH,TA,DU,EA,GAMMA)
C
C------CALCULO ESPECIFICO PARA TUCURUI:
      SW   = (0.280+0.390*P)*HTOP
      IF(IRM.EQ.1) SW = RM
      CL   = (1.-P)**0.6
C
      ONZIN =       W*TA*CL*SW*EA
      IF(ONZIN .LT. 0.0001) GOTO 98
C
      K01  =       0.518*(1.+0.17*CL**2)
      K02  =       ((TA+273.15)/100.)**6
      K2   = SW + K01*K02 + 3.9*W*EA + 2.535*W*TA
      TEV1 = 20.
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   71 K01  =      9.28603523 - (2322.37885/(TEV1+273.15))
      K01  =      3.9*W*(10.**K01)
      K02  =    2322.37885*2.3026/((TEV1+273.15)**2)
      K03  =    0.221*(((TEV1+273.15)/100.)**3)
      K3   = K01*K02 + K03
      K1   = K2 - K01 + K3*TEV1 - 5.53*(((TEV1+273.15)/100.)**4)
      K3   = K3 + 2.535*W
      TEV2 = K1/K3
      IF(ABS(TEV1-TEV2) .LT. 0.05) GOTO 72
      TEV1 =(TEV1+TEV2)/2.
      GOTO 71
C
   72 TEV  = K1/K3
      WK   = K3
      GOTO 90
C
C*************************************************** METODO HARLEMAN ***
C METHOD=8 :P    = BRILHO SOLAR   ( 0-1 ) W  = VELOCIDADE DO VENTO( M/S )
C           TA   = TEMP. DO AR    (DEGC ) EA = PRESSAO DO VAPOR    (  MB )
C           CL   = NEBULOSIDADE   ( 0-1 ) RH = UMIDADE RELATIVA    ( 0-1 )
C           RM   = RADIACAO GLOBAL MEDIDA AO NIVEL DAS ARVORES     (W/M2 )
C           HTOP = VALOR DE ANGOT - RADIACAO DE ONDAS CURTAS       (W/M2 )
C           TEV  = TEMPERATURA DE EQUILIBRIO                       (DEGC )
C           WK   = COEFICIENTE DE TROCA TERMICO                    (WM2K )
C           CONV = FATOR DE CONVERSAO DE  MMHG --> (  MB )
C
    8 CONTINUE
      READ(1,208) IJAAR,IMAAND,W,TA,CL,RH,RM,HTOP,EA,P
      W = CORR*W
      IF(IMAAND .LE. 0) GOTO 99
      IF(IEA .EQ. 1) CALL WBULB (RH,TA,DU,EA,GAMMA)
C
C------CALCULO ESPECIFICO PARA TUCURUI:
      CL   = (1.-P)**0.6
      G    = HTOP*(1.-0.65*CL**2)
      IF (IRM.EQ.1) G = RM
C
      ONZIN =        W*TA*CL*HTOP*EA
      IF(ONZIN .LT. 0.0001) GOTO 98
C
      CONV = 0.76
      K2   =       (1.-REFL)*G
      K01  =       7.0324*(1.+0.17*CL**2)
      K02  =       ((TA+273.15)/100.)**4
      K03  =       (EA/(TA+273.15))**0.143
      K2   = K2 + (1.-REFL)*K01*K02*K03
      FACT = (0.1524/2.0)**0.14
      ABW  = CONV*(0.308+0.185*W*FACT)/(86400.)
      TEV1 = 20.
   81 K01  =                  ((TEV1+273.15)/100.)**4
      K02  =             0.04*((TEV1+273.15)/100.)**3
      K1   = K2 - (1.-REFL)*(K01-K02*TEV1)*5.671
      K1   = K1 + GAMMA*TA*ABW + 2450000.*EA*ABW
      K1   = K1 - 2450000.*ABW*(6.372-0.3989*TEV1)*((1.0646)**TEV1)
      K3   =       (1.-REFL)*K02*5.671 + GAMMA*ABW
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      K3    = K3 + 2450000.*ABW*0.3989*((1.0646)**TEV1)
      TEV2 = K1/K3
      IF(ABS(TEV1-TEV2) .LT. 0.05) GOTO 82
      TEV1 =(TEV1+TEV2)/2.
      GOTO 81
C
   82 TEV   = K1/K3
      WK    = K3
      GOTO 90
C
C********************************************************** OUTPUT ***
C
   90 CONTINUE
      WRITE(6,709) IJAAR,IMAAND,PA,W,TA,S,CL,RH,G,HTCP,EA,P,TW
      W = W*((10./2.)**0.14)
      WRITE(3,701) IJAAR,IMAAND,TEV,W,WK
C
      GOTO ( 1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 ),METHOD
C
C************************************************************ CNZIN ***
C
   96 CONTINUE
      WRITE(6,708)
      GOTO 99
C
   97 CONTINUE
      WRITE(6,702)
      GOTO 99
C
   98 CONTINUE
      WRITE(6,703)
      GOTO 99
C
C************************************************************ STOP ***
C
   99 CONTINUE
      WRITE(6,704) METHOD
      IF(IRH .EQ.1) WRITE(6,705)
      IF(INBT.EQ.1) WRITE(6,706)
      IF(IEA .EQ.1) WRITE(6,707)
 9999 STOP
      END
C
C************************************************************ WBULB ***
C
      SUBROUTINE WBULB (RH,TA,TW,EA,GAMMA)
C
  100 FORMAT(1H ,3X,'SUBROUTINA WBULB USADA MAIS DO QUE 50 ITERACOES',/)
C
      ITER = 1
      ESA  = 6.1*10.**(7.45*TA/(235.+TA))
      EA   = RH*ESA
      TW   = TA
   10 ESW  = 6.1*10.**(7.45*TW/(235.+TW))
      DEL  = (24590.63*ESW/6.1)/((235.+TW)**2)
```

```
      TW1  = (EA-ESW+TW*DEL+GAMMA*TA)/(DEL+GAMMA)
      IF( ABS(TW1-TW) .LT. 0.05) GOTO 20
      TW   = (TW1+TW)/2.
      ITER = ITER+1
      IF(ITER .GT. 50) WRITE(7,100)
      IF(ITER .GT. 50) STOP
      GOTO 10
   20 TW   = (TW1+TW)/2.
      RETURN
      END
```