SIMULACION HIDROLOGICA PARA EL ESTUDIO DE PLANICIES INUNDABLES

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ANEXO I

DERIVADAS PARA LAS RELACIONES GEOMETRICAS DEL METODO CINEMATICO PARA SECCIONES RECTANGULAR, TRAPECIAL O IRREGULAR

Desarrollo para sección rectangular de las derivadas siguientes:

$$\frac{\partial A_i^{J+1}}{\partial Y_i}, \quad \frac{\partial A_{i+1}^{J+1}}{\partial Y_{i+1}}, \quad \frac{\partial R_i^{J+1}}{\partial Y_i} \quad y \quad \frac{\partial R_{i+1}^{J+1}}{\partial Y_{i+1}}$$

Para sección rectangular se tiene:

$$A_i^{J+1} = B_i Y_i^{J+1}$$

$$R_i^{J+1} = \frac{A_i^{J+1}}{B_i + 2Y_i^{J+1}}$$

Por lo tanto para la sección i

$$\frac{\partial A_i^{J+1}}{\partial Y_i} = B_i$$

$$\frac{\partial R_i^{J+1}}{\partial Y_i} = \frac{B_i^2}{(B_i + 2Y_i^{J+1})^2}$$

Análogamente para la sección i+1

$$\frac{\partial A_{i+1}^{J+1}}{\partial Y_{i+1}} = B_{i+1}$$

$$\frac{\partial R_{i+1}^{J+1}}{\partial Y_{i+1}} = \frac{B_{i+1}^2}{(B_{i+1} + 2Y_{i+1}^{J+1})^2}$$

Desarrollo para sección trapecial de las derivadas siguientes:

$$\frac{\partial A_i^{J+1}}{\partial Y_i}, \frac{\partial A_{i+1}^{J+1}}{\partial Y_{i+1}}, \frac{\partial R_i^{J+1}}{\partial Y_i} \text{ y } \frac{\partial R_{i+1}^{J+1}}{\partial Y_{i+1}}$$

Para sección trapecial se tiene:

$$A_i^{J+1} = B_i Y_i^{J+1} + m_i (Y_i^{J+1})^2$$

$$P_i^{J+1} = B_i + 2\sqrt{m_i^2+1}\, Y_i^{J+1}$$

$$R_i^{J+1} = \frac{A_i^{J+1}}{P_i^{J+1}}$$

Por lo tanto para la sección i

$$\frac{\partial A_i^{J+1}}{\partial Y_i} = B_i + 2m_i Y_i^{J+1}$$

$$\frac{\partial R_i^{J+1}}{\partial Y_i} = \frac{\frac{\partial A_i^{J+1}}{\partial Y_i} P_i^{J+1} - 2\sqrt{m_i^2+1}\, A_i^{J+1}}{(P_i^{J+1})^2}$$

Análogamente para la sección i+1

$$\frac{\partial A_{i+1}^{J+1}}{\partial Y_{i+1}} = B_{i+1} + 2m_{i+1} Y_{i+1}^{J+1}$$

$$\frac{\partial R_{i+1}^{J+1}}{\partial y_{i+1}} = \frac{\frac{\partial A_{i+1}^{J+1}}{\partial Y_{i+1}} P_{i+1}^{J+1} - 2\sqrt{m_i^2+1}\, A_{i+1}^{J+1}}{(P_{i+1}^{J+1})^2}$$

Desarrollo para sección irregular de las derivadas siguientes:

$$\frac{\partial A_i^{J+1}}{\partial Y_i}, \quad \frac{\partial A_{i+1}^{J+1}}{\partial Y_{i+1}}, \quad \frac{\partial R_i^{J+1}}{\partial Y_i} \quad y \quad \frac{\partial R_{i+1}^{J+1}}{\partial Y_{i+1}}$$

Se observa que los términos de derivadas anteriores corresponden a características geométricas propias de la sección transversal del río.

Dando como datos tabulares los valores de profundidad, área y perímetro mojado, a diferentes niveles, de las secciones estudiadas y conociendo mediante valores de ensayo el valor de la profundidad Y_i^{J+1}, se procede a calcular gráficamente estas derivadas, de la siguiente manera:

En caso de querer determinar, por ejemplo, la derivada de A_i^{J+1} respecto a Y_i, entonces a partir de Y_i^{J+1} y de los datos tabulares se puede obtener, por interpolación, el área A_i^{J+1}, por lo que la derivada según la Figura A.1.1, será:

$$\frac{\partial A_i^{J+1}}{\partial Y_i} = \frac{A_i^{K} - A_i^{K-1}}{Y_i^{K} - Y_i^{K-1}}$$

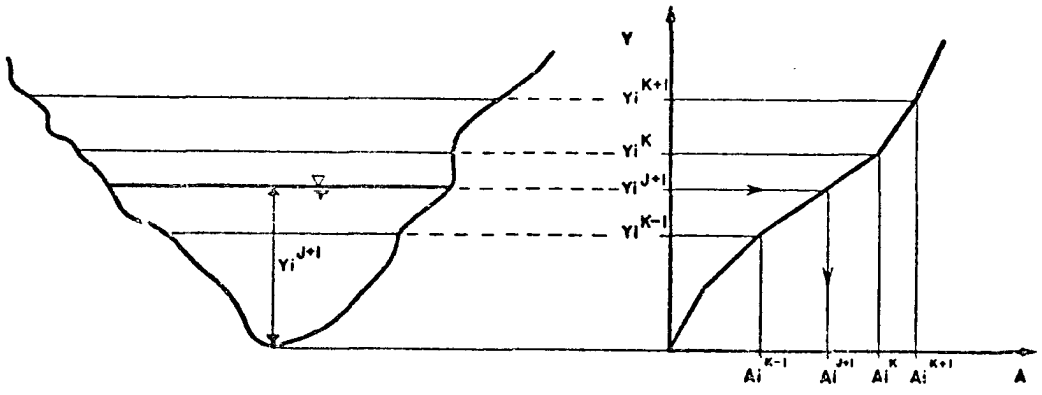
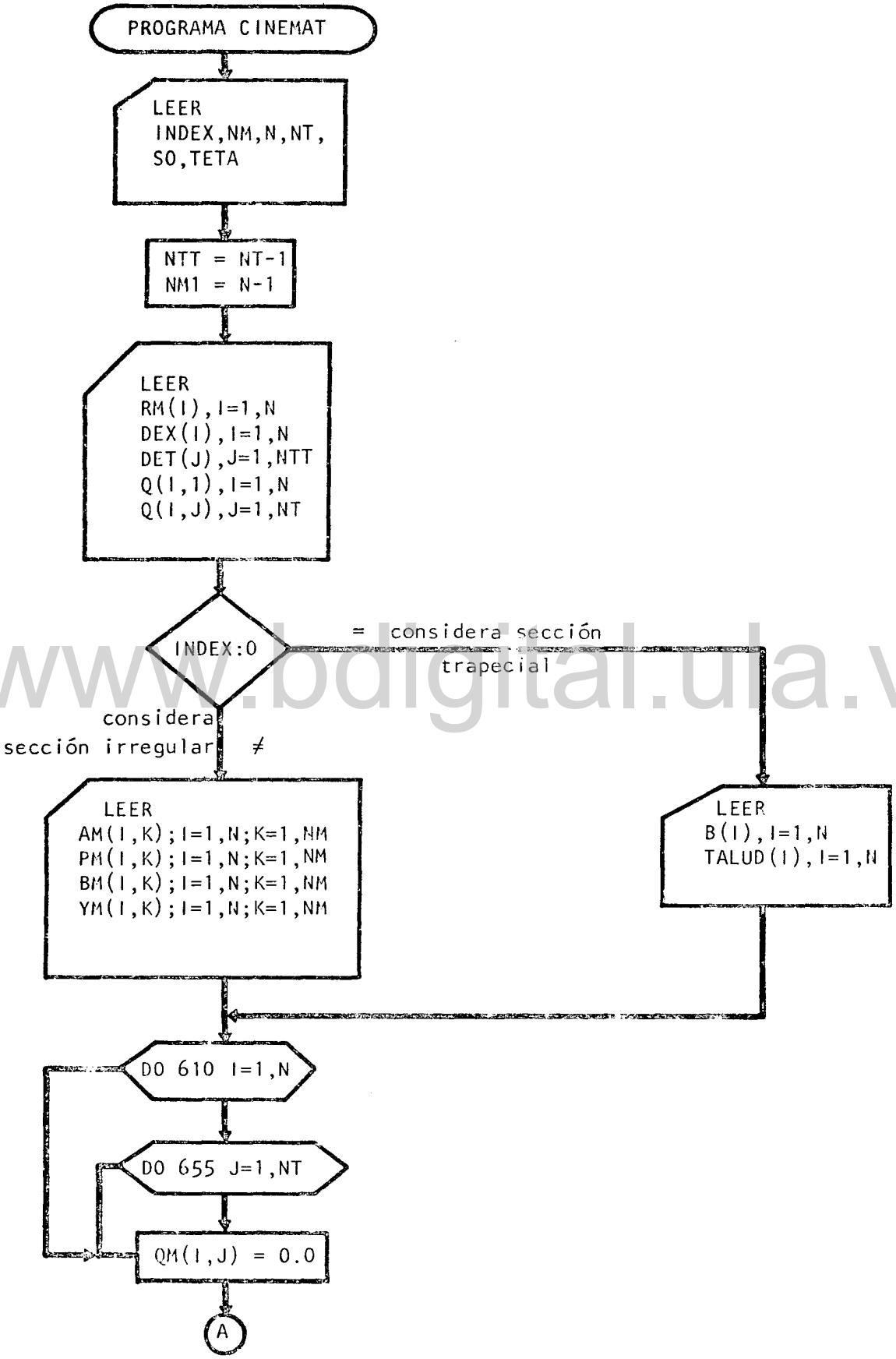


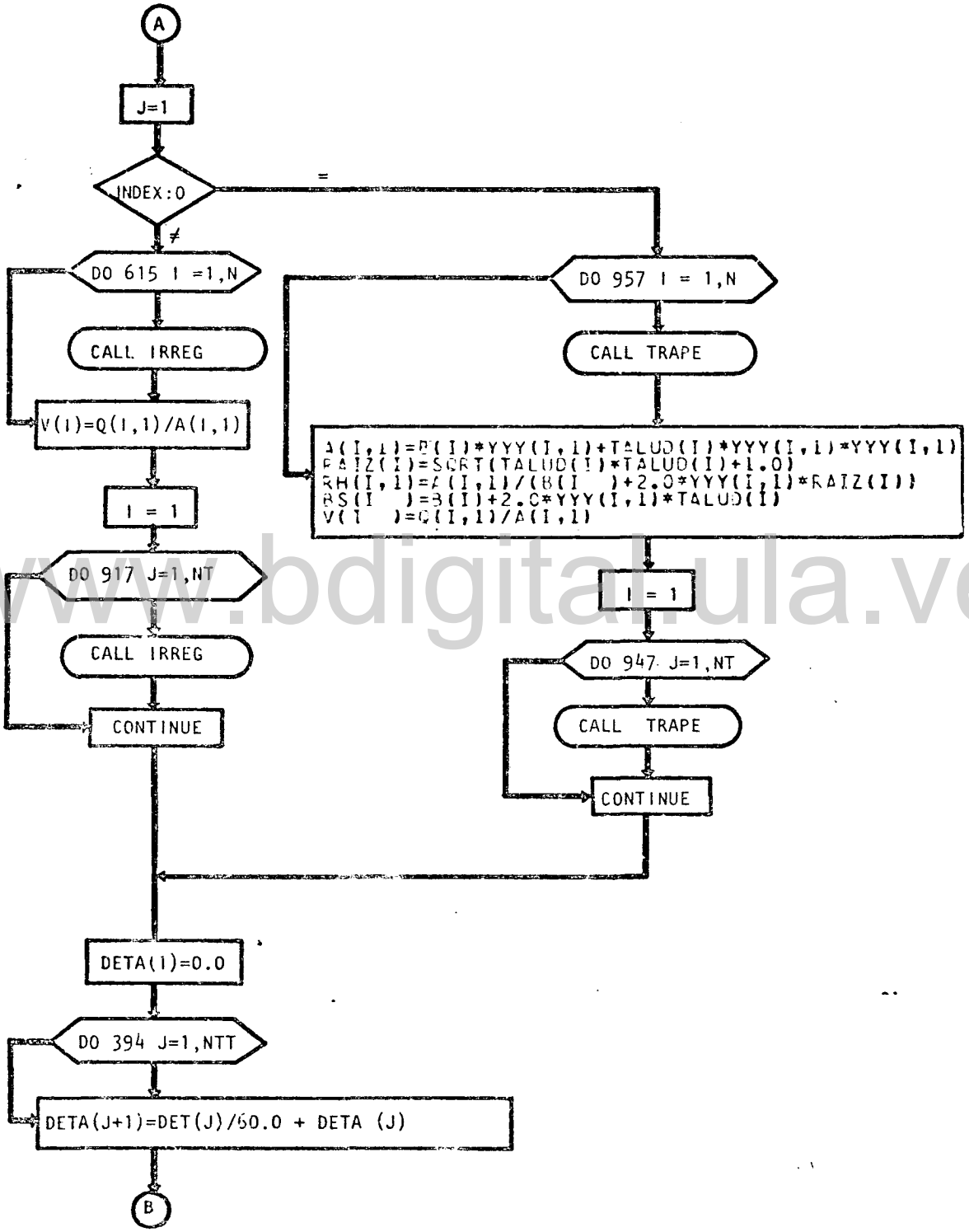
Figura A.1.1. Esquema ilustrativo de la obtención de A_i^{j+1} y su derivada respecto a y_i, mediante valores tabulares del área y la profundidad en la sección.

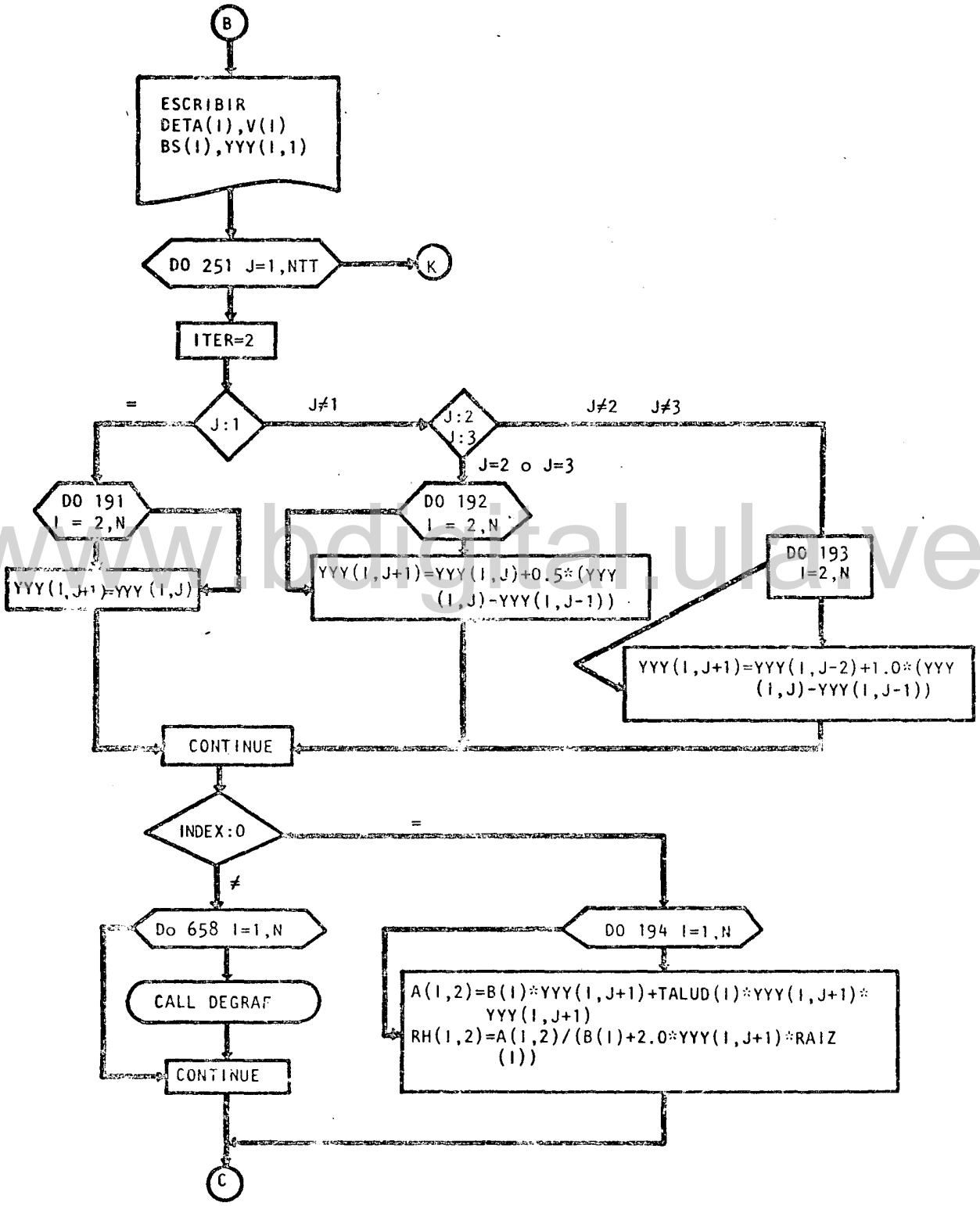
ANEXO II

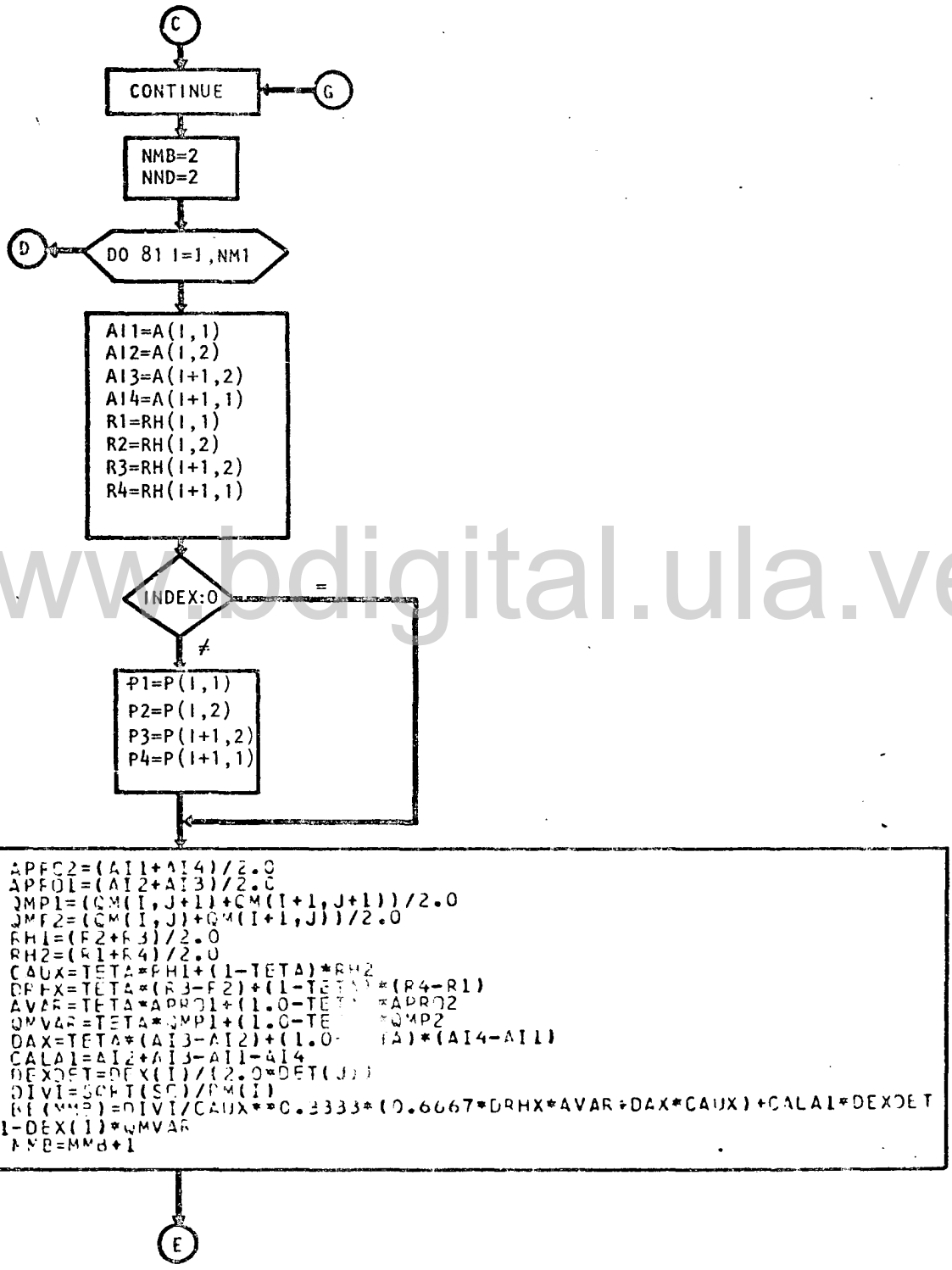
FLUJOGRAMA DETALLADO DEL PROGRAMA

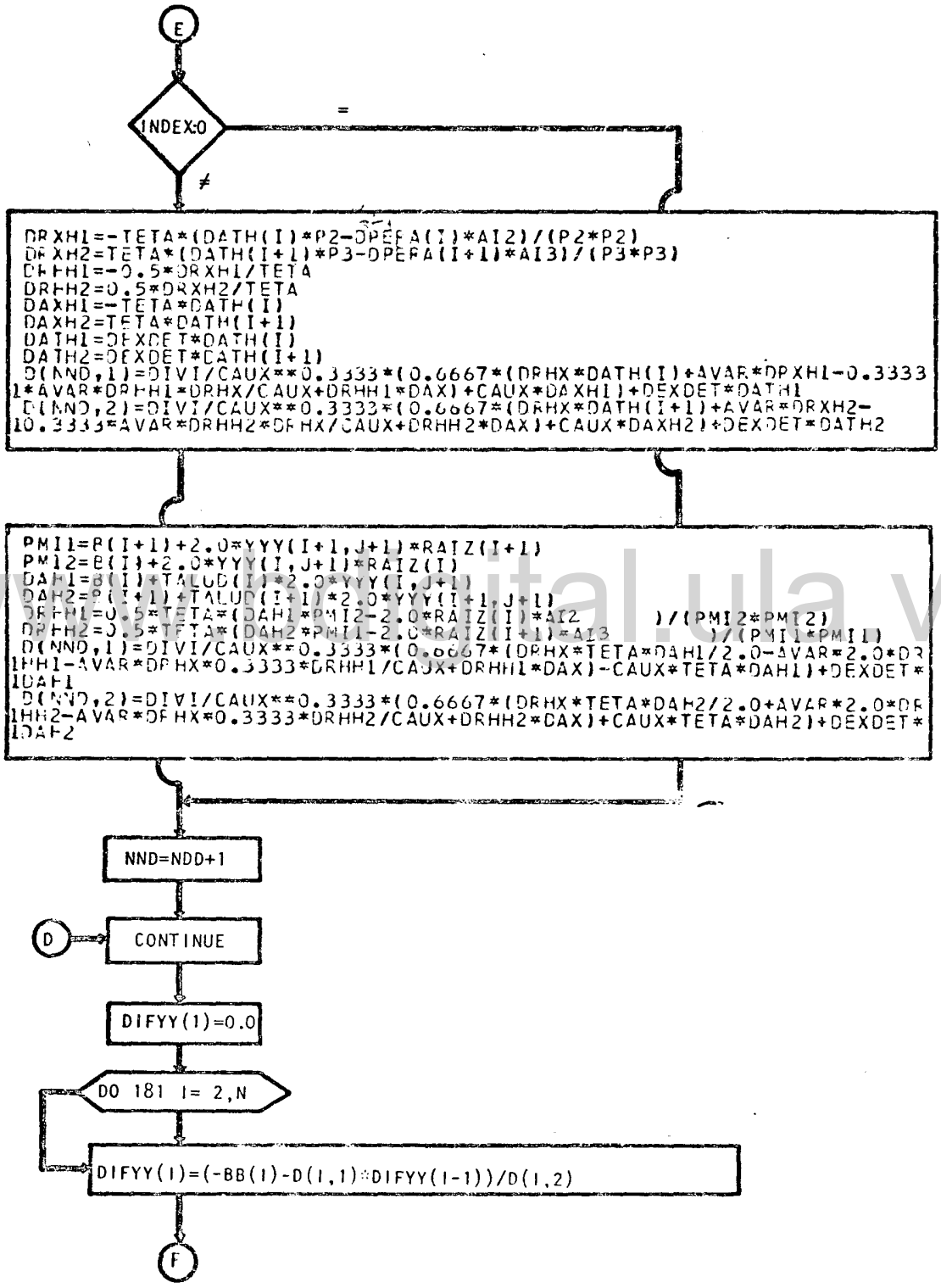
CINEMAT

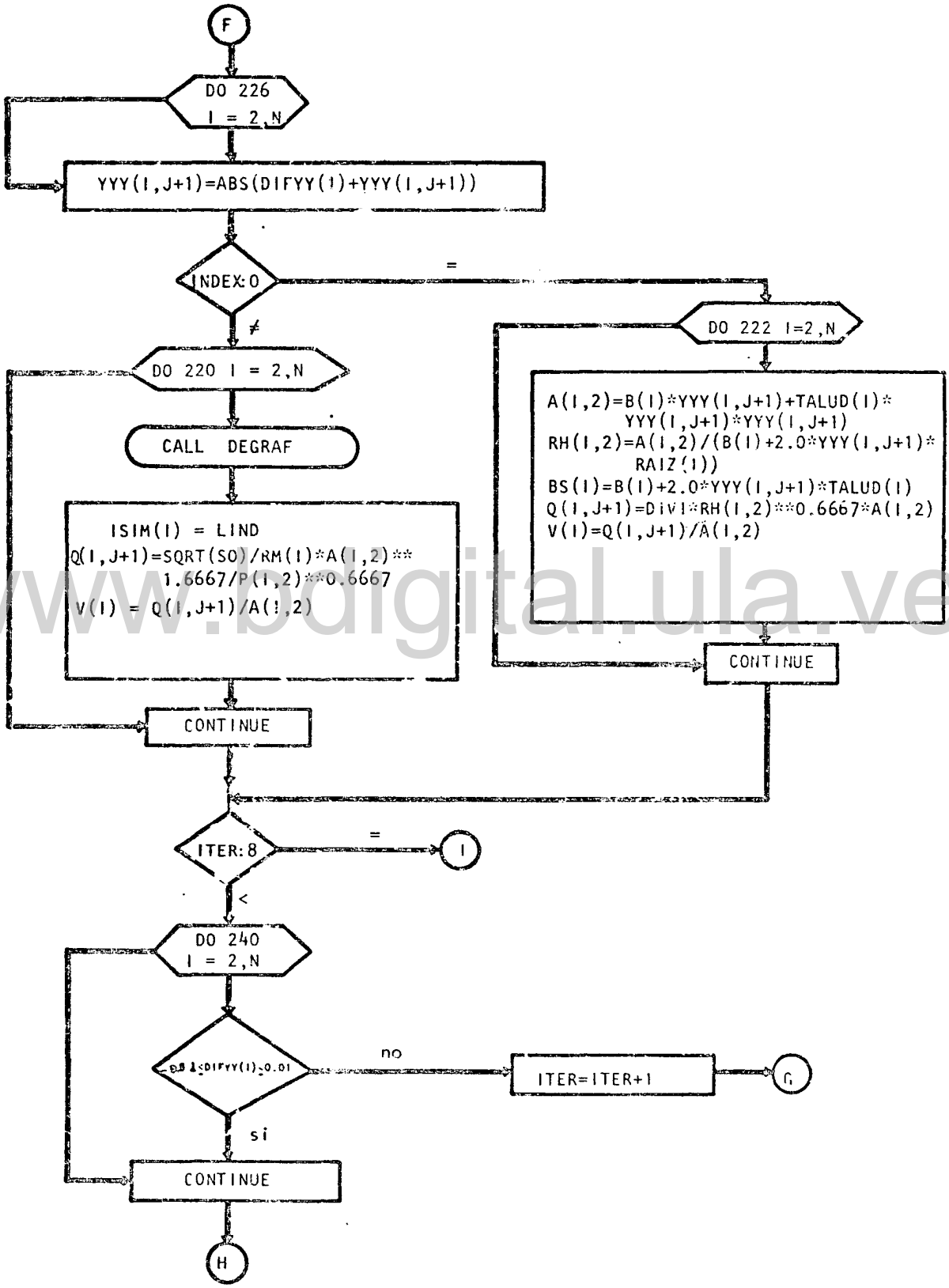


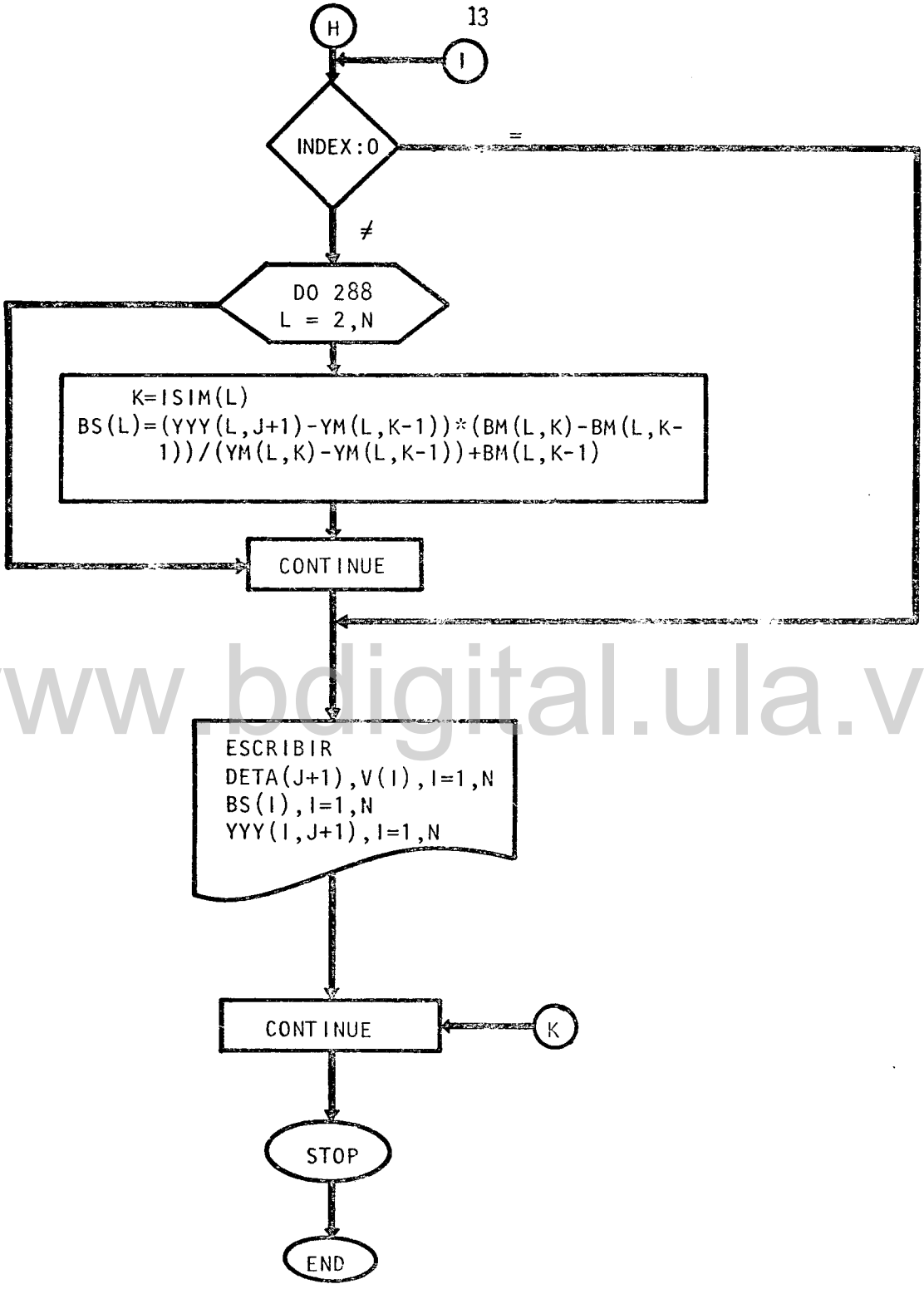


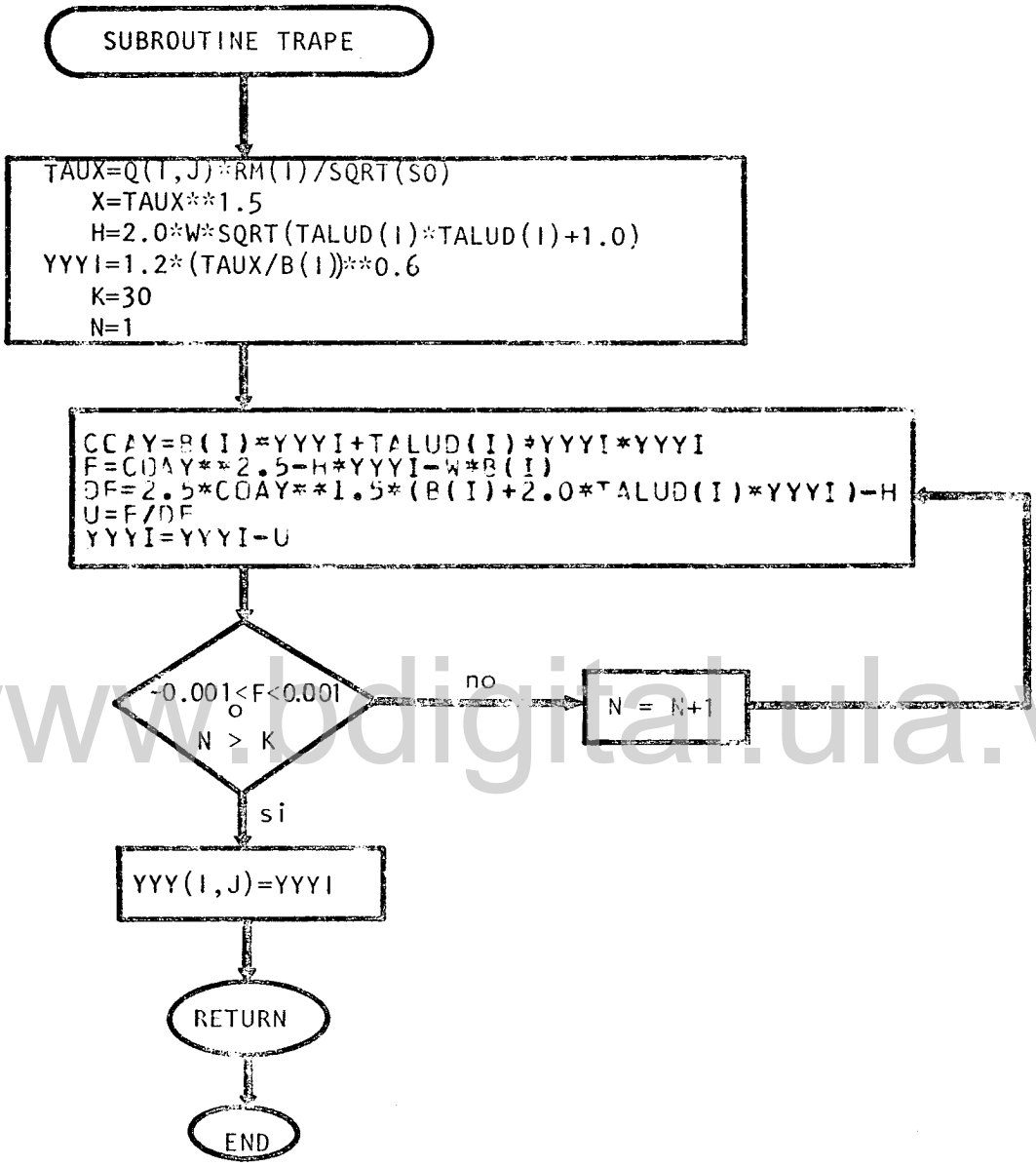


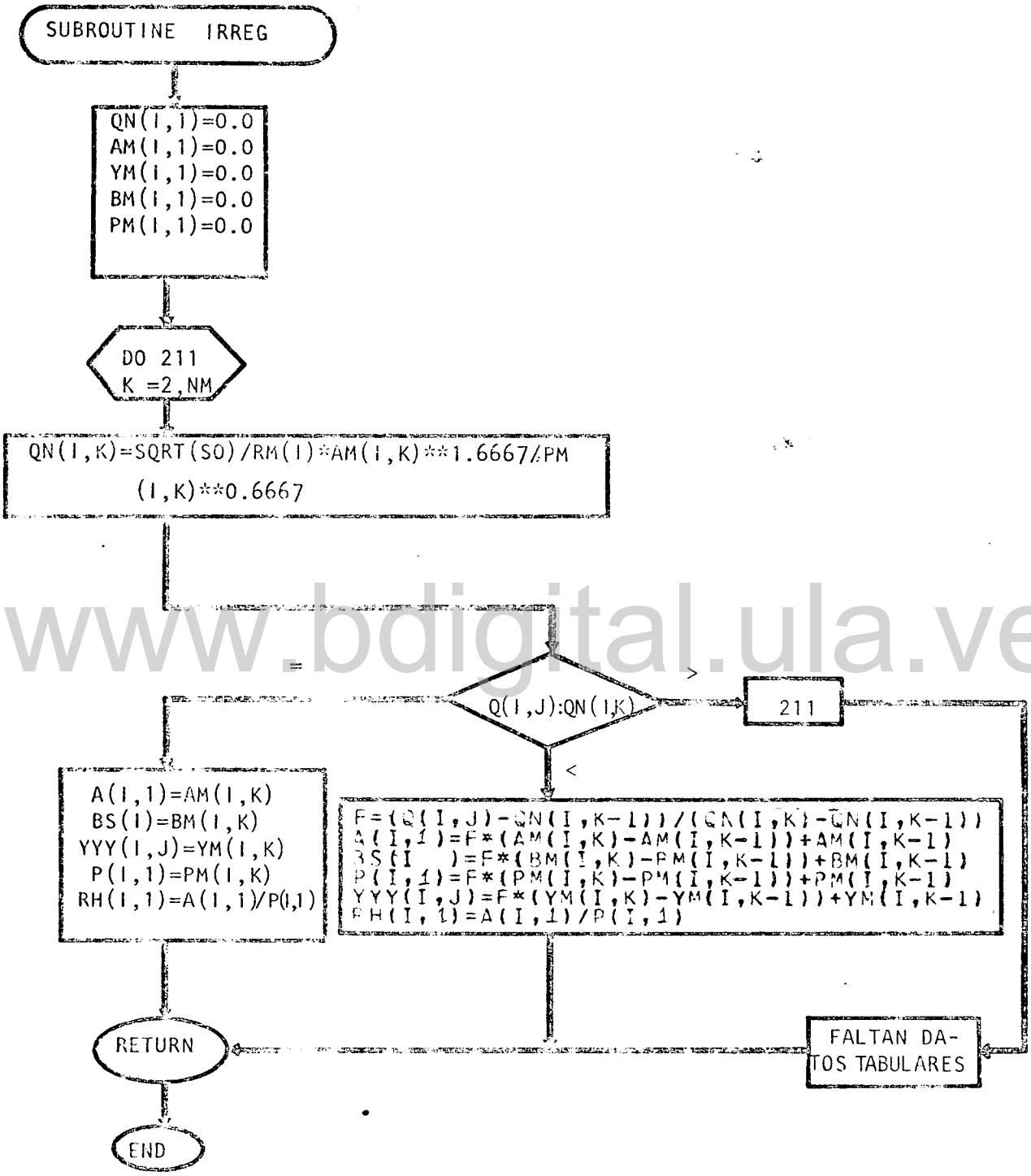


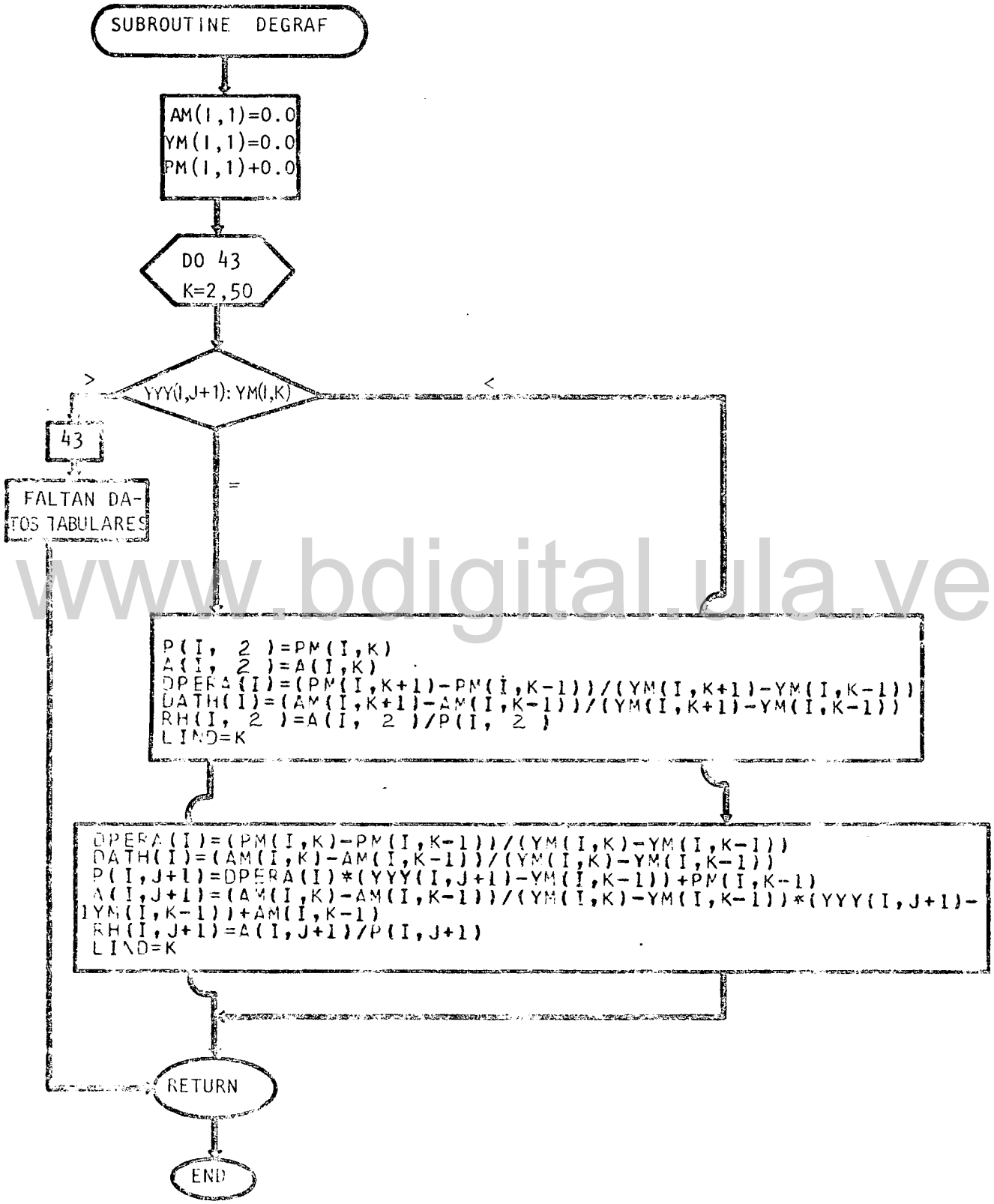












ANEXO III

LISTADO Y RESULTADOS DEL PROGRAMA

CINEMAT

MAIN

```
C      METODO CINEMATICO PARA TRANSITO DE CAUDALES,SECCION IRREGULAR
       DIMENSION DEX(10),DET(20),RM(10),QM(10,20),Q(10,20),
      1      A(10,2 ),V(10   ),BB(10),D(10,2 )
       DIMENSION         DIFYY(10),YYY(10,20),DETA(20)
       DIMENSION P(10,2 ),QN(10,50),AM(10,50),BM(10,50),PM(10,50),BS(10),
      1     DPERA(10),ISIM(10),YM(10,50)
       DIMENSION DATH(10),RH(10,2 )
       DIMENSION B(10),TALUD(10),RAIZ(10)
       READ(5,113) INDEX,NM,N,NT,SO,TETA,CRM
       NTT=NT-1
       NM1=N-1
       READ(5,53)(DEX(I),I=1,N)
       READ(5,111) (DET(J),J=1,NTT)
       READ(5,111) (Q(I,1),I=1,N)
       READ(5,111) (Q(1,J),J=1,NT)
       IF(INDEX.EQ.0) GO TO 1432
       READ(5,111) ((AM(I,K),K=1,NM),I=1,N)
       READ(5,111) ((PM(I,K),K=1,NM),I=1,N)
       READ(5,111) ((BM(I,K),K=1,NM),I=1,N)
       READ(5,111) ((YM(I,K),K=1,NM),I=1,N)
       GO TO 1433
 1432  CONTINUE
       READ(5,111)(B(I),I=1,N)
       READ(5,111)(TALUD(I),I=1,N)
 1433  CONTINUE
       DO 610 I=1,N
       DO 655 J=1,NT
  655  QM(I,J)=0.0
       RM(I)=CRM
  610  CONTINUE
       J=1
       IF(INDEX.EQ.0) GO TO 339
       DO 615 I=1,N
            CALL INTI(Q,SO,RM,A,BS,P,I,J,AM,PM,BM,YM,RH,YYY)
  615  V(I   )=Q(I,1)/A(I,1)
       I=1
       DO 917 J=1,NT
            CALL INTI(Q,SO,RM,A,BS,P,I,J,AM,PM,BM,YM,RH,YYY)
  917  CONTINUE
       GO TO 1045
  339  CONTINUE
       DO 957 I=1,N
       CALL GENER (Q,SO,RM,B,YYY,I,J, TALUD)
       A(I,1)=B(I)*YYY(I,1)+TALUD(I)*YYY(I,1)*YYY(I,1)
       RAIZ(I)=SQRT(TALUD(I)*TALUD(I)+1.0)
       RH(I,1)=A(I,1)/(B(I   )+2.0*YYY(I,1)*RAIZ(I))
       BS(I   )=B(I)+2.0*YYY(I,1)*TALUD(I)
  957  V(I   )=Q(I,1)/A(I,1)
       I=1
       DO 947 J=1,NT
       CALL GENER (Q,SO,RM,B,YYY,I,J, TALUD)
  947  CONTINUE
 1045  CONTINUE
    53 FORMAT (10F8.2)
   111 FORMAT (10F8.3)
   113 FORMAT(4I8,3F8.4)
   117 FORMAT(10F8.4)
       DETA(1)=0.0
       DO 394 J=1,NTT
  394  DETA(J+1)=DET(J)/60.0+DETA(J)
       WRITE(6,1004)
 1004  FORMAT(1H1,//,40X,'SIMULACION DEL TRANSITO EN UN CAUCE UTILIZANDO
      1 ',//,53X,'EL METODO CINEMATICO',///)
       WRITE(6,1000)           DEX(1)
 1000  FORMAT(13X,'INTERVALO DE DISTANCIA ENTRE SECCIONES =',F8.2,'MTS.')
       WRITE(6,1001)
 1001  FORMAT(13X,'TIEMPO EN MINUTOS')
       WRITE(6,1002)
 1002  FORMAT(13X,'CAUDALES EN METROS CUBICOS POR SEGUNDO')
       WRITE(6,1003)
 1003  FORMAT(13X,'ALTURAS DE AGUA EN METROS')
       WRITE(6,1008) RM(1)
 1008  FORMAT(13X,'RUGOSIDAD DE MANNING=',F6.4)
       WRITE(6,1009) SO
 1009  FORMAT(13X,'PENDIENTE DEL FONDO DEL CANAL=',F7.5)
       WRITE(6,381) ( I ,I=1,N)
       WRITE(6,383) DETA(I),(Q(I,1),I=1,N)
       WRITE(6,385)(BS(I   ),I=1,N)
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MAIN

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      WRITE(6,384)(YYY(I,1),I=1,N)
      DO 251 J=1,NTT
      ITER=2
C
C     PREDICCION PARA ITERACION INICIAL EN UNA LINEA DE TIEMPO
C
      IF(J.NE.1) GO TO 550
      DO 191 I=2,N
  191 YYY(I,J+1)=YYY(I,J)
      GO TO 518
  550 IF(J.NE.2.AND.J.NE.3) GO TO 552
      DO 192 I=2,N
  192 YYY(I,J+1)=ABS(YYY(I,J)+0.5*(YYY(I,J)-YYY(I,J-1)))
      GO TO 518
  552 DO 193 I=2,N
  193 YYY(I,J+1)=ABS(YYY(I,J-2)+1.0*(YYY(I,J)-YYY(I,J-1)))
  518 CONTINUE
C
      IF(INDEX.EQ.0) GO TO 771
      DO 658 I=1,N
          CALL INTERP(A,P,DPERA,I,LIND,J,AM,PM,YM,DATH,RH,YYY)
  658 CONTINUE
      GO TO 666
  771 DO 194 I=1,N
      A(I, 2 )=B(I     )*YYY(I,J+1)+TALUD(I)*YYY(I,J+1)*YYY(I,J+1)
  194 RH(I, 2 )=A(I, 2 )/(B(I)+2.0*YYY(I,J+1)*RAIZ(I))
  666 CONTINUE
C
  231 CONTINUE
      MMB=2
      NND=2
C     CALCULO DE VALORES RESIDUALES UTILIZANDO DATOS DE PRUEBA
C
      DO 81 I=1,NM1
      AI1=A(I,1)
      AI2=A(I,2)
      AI3=A(I+1,2)
      AI4=A(I+1,1)
      R1=RH(I,1)
      R2=RH(I,2)
      R3=RH(I+1,2)
      R4=RH(I+1,1)
      IF(INDEX.EQ.0) GO TO 1528
      P1=P(I,1)
      P2=P(I,2)
      P3=P(I+1,2)
      P4=P(I+1,1)
 1528 CONTINUE
      APRO2=(AI1+AI4)/2.0
      APRO1=(AI2+AI3)/2.0
      QMP1=(QM(I,J+1)+QM(I+1,J+1))/2.0
      QMP2=(QM(I,J)+QM(I+1,J))/2.0
      RH1=(R2+R3)/2.0
      RH2=(R1+R4)/2.0
      CAUX=TETA*RH1+(1-TETA)*RH2
      DRHX=TETA*(R3-R2)+(1-TETA)*(R4-R1)
      AVAR=TETA*APRO1+(1.0-TETA)*APRO2
      QMVAR=TETA*QMP1+(1.0-TETA)*QMP2
      DAX=TETA*(AI3-AI2)+(1.0-TETA)*(AI4-AI1)
      CALA1=AI2+AI3-AI1-AI4
      DEXDET=DEX(I)/(2.0*DET(J))
      DIVI=SQRT(SO)/RM(I)
      BB(MMB)=DIVI/CAUX**0.3333*(0.6667*DRHX*AVAR+DAX*CAUX)+CALA1*DEXDET
     1-DEX(I)*QMVAR
      MMB=MMB+1
C
C     CALCULO DE COEFICIENTES DE SISTEMA DE ECUACIONES SIMULTANEAS
C     COEFICIENTES DE MATRIZ D
      IF(INDEX.EQ.0) GO TO 4531
      DRXH1=-TETA*(DATH(I)*P2-DPERA(I)*AI2)/(P2*P2)
      DRXH2=TETA*(DATH(I+1)*P3-DPERA(I+1)*AI3)/(P3*P3)
      DRHH1=-0.5*DRXH1/TETA
      DRHH2=0.5*DRXH2/TETA
      DAXH1=-TETA*DATH(I)
      DAXH2=TETA*DATH(I+1)
      DATH1=DEXDET*DATH(I)
      DATH2=DEXDET*DATH(I+1)
      D(NND,1)=DIVI/CAUX**0.3333*(0.6667*(DRHX*DATH(I)+AVAR*DRXH1-0.3333
```

```
                              MAIN
     1*AVAR*DRHH1*DRHX/CAUX+DRHH1*DAX)+CAUX*DAXH1)+DEXDET*DATH1
      D(NND,2)=DIVI/CAUX**0.3333*(0.6667*(DRHX*DATH(I+1)+AVAR*DRXH2-
     10.3333*AVAR*DRHH2*DRHX/CAUX+DRHH2*DAX)+CAUX*DAXH2)+DEXDET*DATH2
      GO TO 3198
 4531 PMI1=B(I+1)+2.0*YYY(I+1,J+1)*RAIZ(I+1)
      PMI2=B(I)+2.0*YYY(I,J+1)*RAIZ(I)
      DAH1=B(I)+TALUD(I)*2.0*YYY(I,J+1)
      DAH2=B(I+1)+TALUD(I+1)*2.0*YYY(I+1,J+1)
      DRHH1=0.5*TETA*(DAH1*PMI2-2.0*RAIZ(I)*AI2      )/(PMI2*PMI2)
      DRHH2=0.5*TETA*(DAH2*PMI1-2.0*RAIZ(I+1)*AI3       )/(PMI1*PMI1)
      D(NND,1)=DIVI/CAUX**0.3333*(0.6667*(DRHX*TETA*DAH1/2.0-AVAR*2.0*DR
     1HH1-AVAR*DRHX*0.3333*DRHH1/CAUX+DRHH1*DAX)-CAUX*TETA*DAH1)+DEXDET*
     1DAH1
      D(NND,2)=DIVI/CAUX**0.3333*(0.6667*(DRHX*TETA*DAH2/2.0+AVAR*2.0*DR
     1HH2-AVAR*DRHX*0.3333*DRHH2/CAUX+DRHH2*DAX)+CAUX*TETA*DAH2)+DEXDET*
     1DAH2
 3198 CONTINUE
      NND=NND+1
   81 CONTINUE
C
C     CALCULO DE LOS DIFERENCIALES DE ALTURA
C
      DIFYY(1)=0.0
      DO 181 I=2,N
  181 DIFYY(I)=(-BB(I)-D(I,1)*DIFYY(I-1))/D(I,2)
C
C     COMPARACION ENTRE VALOR ANTERIOR Y VALOR ACTUAL DEL AREA
C
      IF(INDEX.EQ.0) GO TO 3229
      DO 220 I=1,N
      YYY(I,J+1)=ABS(DIFYY(I)+YYY(I,J+1))
           CALL INTERP(A,P,OPERA,I,LIND,J-AM,PM,YM,DATH,RH,YYY)
      ISIM(I)=LIND
      Q(I,J+1)=SQRT(SO)/RM(I)*A(I, 2 )**1.6667/P(I, 2 )**0.6667
      V(I    )=Q(I,J+1)/A(I, 2 )
  220 CONTINUE
      GO TO 3230
 3229 DO 222 I=1,N
      YYY(I,J+1)=ABS(DIFYY(I)+YYY(I,J+1))
      A(I, 2 )=B(I)*YYY(I,J+1)+TALUD(I)*YYY(I,J+1)*YYY(I,J+1)
      RH(I, 2 )=A(I, 2 )/(B(I)+2.0*YYY(I,J+1)*RAIZ(I))
      BS(I    )=B(I)+2.0*YYY(I,J+1)*TALUD(I)
      Q(I,J+1)=SQRT(SO)/RM(I)*RH(I,2)**0.6667*A(I,2)
      V(I    )=Q(I,J+1)/A(I, 2 )
  222 CONTINUE
 3230 CONTINUE
C
C     SE OBSERVA SI DIFAR ESTA DENTRO DEL RANGO DE ERROR ACEPTABLE
C
      IF(ITER.EQ.8) GO TO 613
      DO 240 I=2,N
      IF(DIFYY(I).LE.0.01.AND.DIFYY(I).GE.-0.01) GO TO 240
      ITER=ITER+1
      GO TO 231
  240 CONTINUE
  613 CONTINUE
      IF(INDEX.EQ.0) GO TO 2888
      DO 288 L=2,N
      K=ISIM(L)
      BS(L    )=(YYY(L,J+1)-YM(L,K-1))*(BM(L,K)-BM(L,K-1))/(YM(L,K)-
     1YM(L,K-1))+BM(L,K-1)
  288 CONTINUE
 2888 CONTINUE
      WRITE(6,383) DETA(J+1),(Q(I,J+1),I=1,N)
      WRITE(6,385)(BS(I    ),I=1,N)
      WRITE(6,384)(YYY(I,J+1),I=1,N)
  657 DO 756 I=1,N
      A(I,1)=A(I,2)
      RH(I,1)=RH(I,2)
  756 CONTINUE
      IF(INDEX.EQ.0) GO TO 251
      DO 758 I=1,N
      P(I,1)=P(I,2)
  758 CONTINUE
  251 CONTINUE
  241 CONTINUE
  381 FORMAT(///,3X,'TIEMPO',4X,'I=',I3,4X,9(5X,I2,3X),//)
  383 FORMAT (1X,F8.3,4X,'Q=',F7.2,9(3X,F7.2))
```

MAIN

```
384 FORMAT(13X,'Y=',F7.2,2(3X,F7.2)/)
385 FORMAT(13X,'B=',F7.2,2(3X,F7.2))
    STOP
    END
```

GENER

```
      SUBROUTINE GENER (Q,SO,RM,B,YYY,I,J,TALUD)
      DIMENSION Q(10,20),RM(10),B(10   ),YYY(10,20),TALUD(10)
      W=(Q(I,J)*RM(I)/SQRT(SO) )**1.5
      H=2.0*W*SQRT(TALUD(I)*TALUD(I)+1.0)
      YYYI=5.0
      K=30
      N=1
1551  COAY=B(I)*YYYI+TALUD(I)*YYYI*YYYI
      F=COAY**2.5-H*YYYI-W*B(I)
      DF=2.5*COAY**1.5*(B(I)+2.0*TALUD(I)*YYYI)-H
      U=F/DF
      YYYI=YYYI-U
      IF(ABS(F).LT.0.001.OR.N.GT.K) GO TO 1552
      N=N+1
      GO TO 1551
1552  YYY(I,J)=YYYI
      RETURN
      END
```

INTI

```
      SUBROUTINE INTI(Q,SO,RM,A,BS,P,I,J,AM,PM,BM,YM,RH,YYY)
      DIMENSION Q(10,20),RM(10),A(10,2 ),BS(10    ),P(10,2 ),QN(10,50),
     1AM(10,50),BM(10,50),PM(10,50)    ,YYY(10,20),YM(10,50)
      DIMENSION RH(10,2 )
      QN(I,1)=0.0
      AM(I,1)=0.0
      YM(I,1)=0.0
      BM(I,1)=0.0
      PM(I,1)=0.0
      DO 211 K=2,50
      QN(I,K)=SQRT(SO)/RM(I)*AM(I,K)**1.6667/PM(I,K)**0.6667
      IF(Q(I,J)-QN(I,K)) 82,83,211
  211 CONTINUE
      PRINT 4
    4 FORMAT(1H1,30X,19HSOLUCION INDEFINIDA)
      GO TO 94
   83 A(I,1)=AM(I,K)
      BS(I   )=BM(I,K)
      YYY(I,J)=YM(I,K)
      P(I,1)=PM(I,K)
      RH(I,1)=A(I,1)/P(I,1)
      GO TO 94
   82 F=(Q(I,J)-QN(I,K-1))/(QN(I,K)-QN(I,K-1))
      A(I,1)=F*(AM(I,K)-AM(I,K-1))+AM(I,K-1)
      BS(I   )=F*(BM(I,K)-BM(I,K-1))+BM(I,K-1)
      P(I,1)=F*(PM(I,K)-PM(I,K-1))+PM(I,K-1)
      YYY(I,J)=F*(YM(I,K)-YM(I,K-1))+YM(I,K-1)
      RH(I,1)=A(I,1)/P(I,1)
   94 RETURN
      END
```

INTERP

```
      SUBROUTINE INTERP(A,P,DPERA,I,LIND,J,AM,PM,YM,DATH,RH,YYY)
      DIMENSION A(10,2 ),P(10,2 ),DPERA(10),AM(10,50),PM(10,50),YM(10,50
     1),YYY(10,20)
      DIMENSION DATH(10),RH(10,2 )
      AM(I,1)=0.0
      YM(I,1)=0.0
      PM(I,1)=0.0
      DO 43 K=2,50
      IF(YYY(I,J+1)-YM(I,K)) 41,42,43
   43 CONTINUE
      PRINT 7
    7 FORMAT(1H1,30X,18HSOLUCION IMPOSIBLE)
      GO TO 50
   42 P(I, 2 )=PM(I,K)
      A(I, 2 )=A(I,K)
      DPERA(I)=(PM(I,K+1)-PM(I,K-1))/(YM(I,K+1)-YM(I,K-1))
      DATH(I)=(AM(I,K+1)-AM(I,K-1))/(YM(I,K+1)-YM(I,K-1))
      RH(I, 2 )=A(I, 2 )/P(I, 2 )
      LIND=K
      GO TO 50
   41 DPERA(I)=(PM(I,K)-PM(I,K-1))/(YM(I,K)-YM(I,K-1))
      DATH(I)=(AM(I,K)-AM(I,K-1))/(YM(I,K)-YM(I,K-1))
      P(I, 2 )=DPERA(I)*(YYY(I,J+1)-YM(I,K-1))+PM(I,K-1)
      A(I, 2 )=(AM(I,K)-AM(I,K-1))/(YM(I,K)-YM(I,K-1))*(YYY(I,J+1)-
     1YM(I,K-1))+AM(I,K-1)
      RH(I, 2 )=A(I, 2 )/P(I, 2 )
      LIND=K
   50 RETURN
      END
```

SIMULACION DEL TRANSITO EN UN CAUCE UTILIZANDO
EL METODO CINEMATICO

INTERVALO DE DISTANCIA ENTRE SECCIONES = 300.00MTS.
TIEMPO EN MINUTOS
CAUDALES EN METROS CUBICOS POR SEGUNDO
ALTURAS DE AGUA EN METROS
RUGOSIDAD DE MANNING=0.0185
PENDIENTE DEL FONDO DEL CANAL=0.01000

TIEMPO	I=	1	2	3	4	5	6	7	8	9	10
0.0	Q=	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
16.667	Q=	24.18	23.75	23.36	23.00	22.67	22.37	22.10	21.84	21.60	21.38
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	0.93	0.92	0.91	0.90	0.90	0.89	0.88	0.87	0.87	0.86
33.333	Q=	29.44	29.36	29.22	29.04	28.81	28.55	28.26	27.95	27.63	27.29
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	1.07	1.06	1.06	1.06	1.05	1.04	1.04	1.03	1.02	1.01
50.000	Q=	34.98	34.62	34.33	34.09	33.88	33.70	33.53	33.36	33.20	33.03
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	1.20	1.19	1.18	1.18	1.17	1.17	1.16	1.16	1.16	1.15
66.667	Q=	39.71	39.64	39.51	39.32	39.10	38.86	38.61	38.37	38.13	37.90
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	1.30	1.30	1.30	1.30	1.29	1.29	1.28	1.27	1.27	1.26
83.333	Q=	44.55	44.25	44.03	43.86	43.71	43.56	43.41	43.25	43.07	42.88
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	1.41	1.41	1.40	1.40	1.39	1.39	1.39	1.38	1.38	1.37
100.000	Q=	49.52	49.41	49.22	49.00	48.76	48.52	48.29	48.06	47.86	47.66
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	1.52	1.52	1.51	1.51	1.50	1.50	1.49	1.49	1.48	1.48
116.667	Q=	49.52	49.60	49.73	49.87	49.99	50.09	50.16	50.20	50.21	50.20
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	1.52	1.52	1.52	1.53	1.53	1.53	1.53	1.53	1.53	1.53
133.333	Q=	54.61	54.20	53.79	53.41	53.08	52.79	52.55	52.35	52.19	52.06
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	1.63	1.62	1.61	1.60	1.59	1.59	1.58	1.58	1.57	1.57
150.000	Q=	59.82	59.80	59.75	59.65	59.50	59.30	59.06	58.78	58.47	58.15
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	1.73	1.73	1.73	1.73	1.73	1.72	1.72	1.71	1.71	1.70
166.667	Q=	64.93	64.61	64.34	64.11	63.94	63.81	63.71	63.62	63.54	63.45
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	1.84	1.83	1.82	1.82	1.82	1.81	1.81	1.81	1.81	1.81
183.333	Q=	69.78	69.72	69.61	69.44	69.24	69.00	68.75	66.49	68.23	67.98
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	1.93	1.93	1.93	1.93	1.92	1.92	1.91	1.91	1.90	1.90
200.000	Q=	74.70	74.44	74.23	74.07	73.94	73.83	73.72	73.61	73.48	73.33
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	2.03	2.02	2.02	2.02	2.01	2.01	2.01	2.01	2.00	2.00
216.667	Q=	79.69	79.59	79.43	79.24	79.02	78.79	79.56	78.35	78.15	77.96
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	2.12	2.12	2.12	2.12	2.11	2.11	2.10	2.10	2.09	2.09
233.333	Q=	69.78	70.45	71.12	71.76	72.37	72.94	73.48	73.93	74.33	74.69
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	1.93	1.95	1.96	1.97	1.98	1.99	2.00	2.01	2.02	2.03
250.000	Q=	59.82	59.95	60.12	60.34	60.60	60.72	61.28	61.70	62.16	62.64
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	1.73	1.74	1.74	1.74	1.75	1.75	1.76	1.77	1.78	1.79
266.667	Q=	49.52	50.08	50.59	51.04	51.45	51.80	52.12	52.41	52.68	52.94
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	1.52	1.53	1.54	1.55	1.56	1.57	1.57	1.58	1.59	1.59
283.333	Q=	39.71	39.97	40.28	40.65	41.05	41.49	41.94	42.41	42.88	43.35
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	1.30	1.31	1.32	1.33	1.33	1.34	1.35	1.36	1.38	1.39
300.000	Q=	29.44	29.98	30.46	30.90	31.30	31.68	32.05	32.41	32.78	33.16
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	1.07	1.08	1.09	1.10	1.11	1.12	1.13	1.14	1.15	1.16
316.666	Q=	19.22	19.64	20.10	20.59	21.09	21.60	22.10	22.59	23.07	23.53
	B=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Y=	0.80	0.81	0.83	0.84	0.85	0.87	0.88	0.89	0.91	0.92

ANEXO IV

INSTRUCTIVO DEL USO DEL PROGRAMA

CINEMAT

Programa CINEMAT

Propósito.

Simular el tránsito de la escorrentía en ríos de pendiente alta, utilizando un hidrograma de entrada, las condiciones iniciales de flujo en la longitud estudiada, la topografía real de cada una de las secciones y las características físicas del cauce del río.

Capacidad.

La versión presentada tiene capacidad para veinte secciones y cien intervalos de tiempo cuyos valores dependen de la duración de la crecida o el período en que se desea simular la escorrentía.

Forma de salida.

Las salidas del programa CINEMAT incluyen el caudal, altura y ancho superficial alcanzados por el agua en cada una de las secciones estudiadas.

Datos de entrada.

La manera de leer los datos de entrada se muestran en el formato que se presenta a continuación:

TARJETA Nº

CIDIAT — CENTRO INTERAMERICANO DE DESARROLLO INTEGRAL DE AGUAS Y TIERRAS

BANCO DE PROGRAMAS

PROGRAMA: CINEMAT

CODIGO. FECHA.

VARIABLE	INDEX	NM	N	NT	SO	TETA	CRM			
Formato	I8	I8	I8	I8	F8.4	F8.4	F8.4			
Valor	1	8	10	20	0.0100	0.55	0.20			
VARIABLE	DEX(1)	DEX(2)	DEX(3)	DEX(4)	DEX(5)	DEX(6)	DEX(7)	DEX(8)	DEX(9)	
Formato	9F8.2									
Valor	500.0	500.0	400.0	450.0	200.0	700.0	450.0	300.0	350.	
VARIABLE	DET(1)	DET(2)	DET(3)	DET(4)	DET(5)	DET(6)	DET(7)	DET(8)	DET(9)	DET(10)
Formato	19F8.3									
Valor	100.0	150.0	160.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0
VARIABLE	DET(11)	DET(12)	DET(13)	DET(14)	DET(15)	DET(16)	DET(17)	DET(18)	DET(19)	
Formato										
Valor	170.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0	
VARIABLE	Q(1,1)	Q(2,1)	Q(3,1)	Q(4,1)	Q(5,1)	Q(6,1)	Q(7,1)	Q(8,1)	Q(9,1)	Q(10,1)
Formato	10F8.3									
Valor	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
VARIABLE	Q(1,1)	Q(1,2)	Q(1,3)	Q(1,4)	Q(1,5)	Q(1,6)	Q(1,7)	Q(1,8)	Q(1,9)	Q(1,10)
Formato	20F8.2									
Valor	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	100.0
VARIABLE	Q(1,11)	Q(1,12)	Q(1,13)	Q(1,14)	Q(1,15)	Q(1,16)	Q(1,17)	Q(1,18)	Q(1,19)	Q(1,20)
Formato										
Valor	90.0	80.0	70.0	60.0	50.0	40.0	30.0	20.0	20.0	20.0
VARIABLE	AM(1,1)	AM(1,2)	AM(1,3)	AM(1,4)	AM(1,5)	AM(1,6)	AM(1,7)	AM(1,8)	Sólo si INDEX = 1 (Area irregular)	
Formato	8F8.3									
Valor	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0		

TARJETA Nº

CIDIAT CENTRO INTERAMERICANO DE DESARROLLO INTEGRAL DE AGUAS Y TIERRAS

BANCO DE PROGRAMAS

PROGRAMA: CINEMAT

CODIGO: FECHA:

VARIABLE	PM(1,1)	PM(1,2) PM(1,3) PM(1,4) PM(1,5) PM(1,6) PM(1,7) PM(1,8) (Sección irregular) — Sólo si INDEX = 1
Formato	8F8.3	
Valor	0.0	5.0 10.0 15.0 20.0 25.0 30.0 35.0
VARIABLE	BM(1,1)	BM(1,2) BM(1,3) BM(1,4) BM(1,5 BM(1,6) BM(1,7) BM(1,8)
Formato	8F8.3	
Valor	0.0	4.5 9.0 13.0 16.0 20.5 27.0 31.0
VARIABLE	YM(1,1)	YM(1,2) YM(1,3) YM(1,4) YM(1,5) YM(1,6) YM(1,7) YM(1,8)
Formato	8F8.3	
Valor	0.0	0.5 1.0 1.5 2.0 2.5 3.0 3.5
VARIABLE	Repetir hasta completar los valores tabulares de AM, PM, BM y YM para todas las secciones	
Formato		
Valor		
VARIABLE	B(1)	B(2) B(3) B(4) B(5) B(6) B(7) B(8) B(9) B(10) — Sólo si INDEX = 0 (sección prismática)
Formato	10F8.3	
Valor	10.0	12.0 8.0 5.0 9.0 13.0 13.0 10.0 10.0 12.0
VARIABLE	TALUD(1)	TALUD(2) TALUD(3) TALUD(4) TALUD(5) TALUD(6) TALUD(7) TALUD(8) TALUD(9) TALUD(10) — sólo si INDEX = 0 (Sección prismática)
Formato	10F8.3	
Valor	2.0	1.5 2.0 1.0 0.0 2.0 3.0 2.0 1.5 1.0
VARIABLE		
Formato		
Valor		
VARIABLE		
Formato		
Valor		

Equivalencia de las variables de entrada, utilizadas en el Programa CINEMAT

AM(I,K)	Datos tabulares del área mojada para diferentes niveles de las secciones irregulares en estudio; sólo se leen si INDEX=1
B(I)	Ancho en la base de la sección prismática representativa de cada sección en estudio; sólo se lee si INDEX=0
BM(I,K)	Datos tabulares del ancho superficial para diferentes niveles de las secciones irregulares en estudio; sólo se leen si INDEX=1
CRM	Coeficiente de rugosidad de Manning del cauce del río
DET(J)	Intervalo de tiempo utilizado para el tránsito
DEX(L)	Intervalo de distancia entre secciones a lo largo del cauce, el cual debe ser menor de 5000 metros
I	Indice que va del 1 al número total de secciones estudiadas, N
INDEX	Parámetro que indica si se usará sección prismática o sección irregular. Para sección prismática INDEX=0; para sección irregular, INDEX=1
J	Indice que va del 1 al número total de intervalos de tiempo tomados, NT
K	Indice que va del 1 al número total de medidas tabulares tomadas en cada sección, NM
L	Indice que va del 1 al número total de subtramos estudiados, N-1
N	Número total de secciones estudiadas, el programa acepta un máximo de 20 secciones
NM	Número total de medidas tabulares hechas en cada sección, el programa acepta un máximo de 50 medidas tabulares en cada sección.

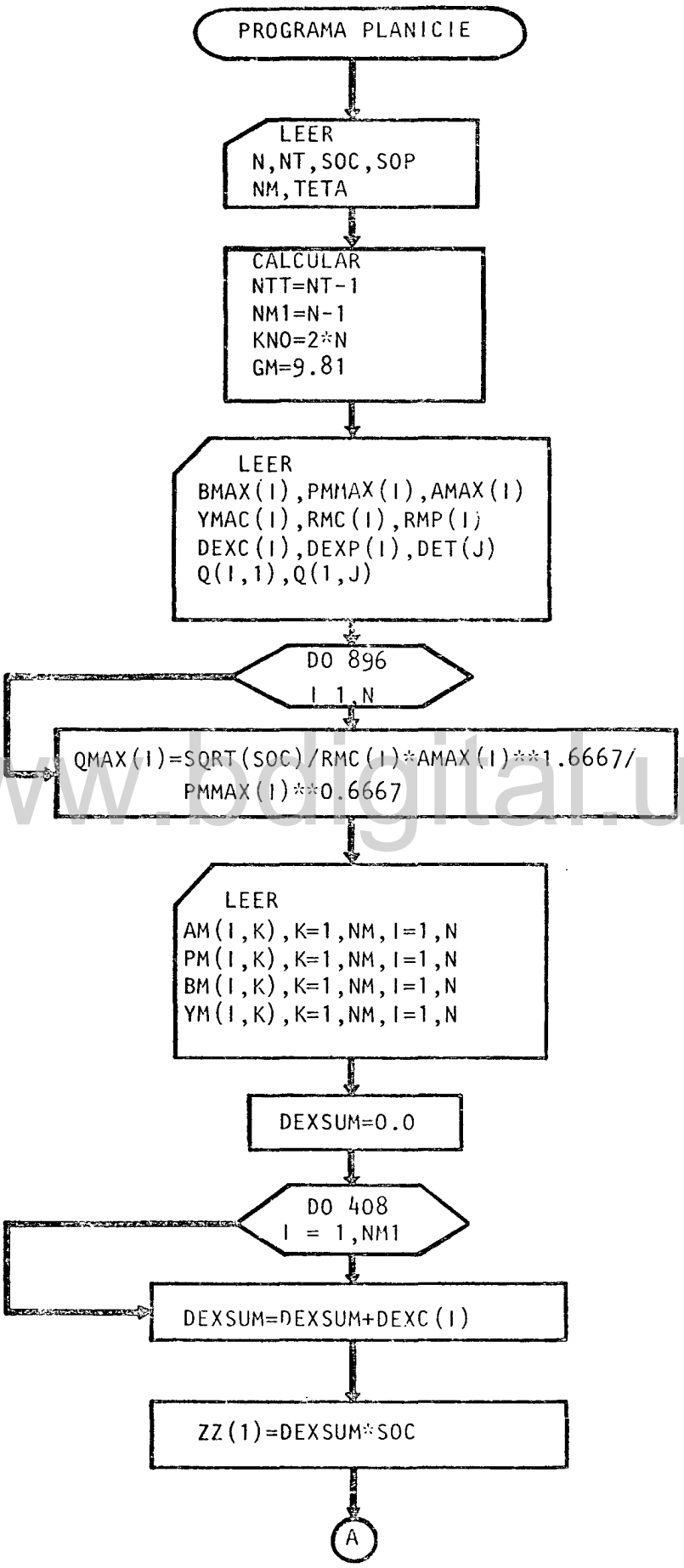
NT	Número total de intervalos de tiempo para el tránsito, el programa acepta un máximo de 100 intervalos de tiempo
PM(I,K)	Datos tabulares del perímetro mojado para diferentes niveles en cada sección irregular en estudio, sólo se leen si INDEX=1
Q(I,1)	Caudal en cada sección en estudio, al inicio del tránsito
Q(1,J)	Hidrograma de entrada
SO	Pendiente promedio a lo largo del cauce del río
TALUD(I)	Pendiente del talud lateral de cada sección regular en estudio; sólo se lee si INDEX = 0
TETA	Factor de ponderación propio del método numérico utilizado, para este caso vale 0.55
YM(I,K)	Datos tabulares de la profundidad para diferentes niveles en cada sección irregular en estudio; sólo se leen si INDEX = 1

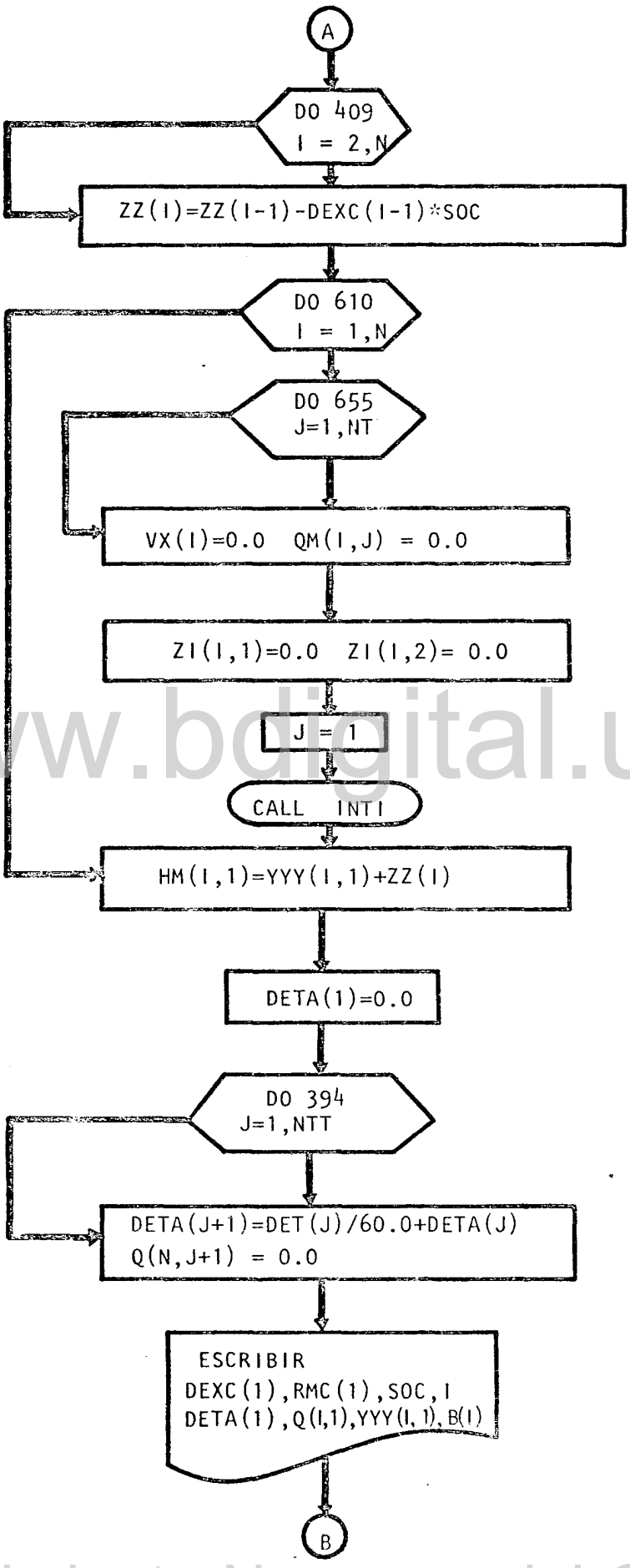
Equivalencia de las variables de salida, dadas por el programa CINEMAT

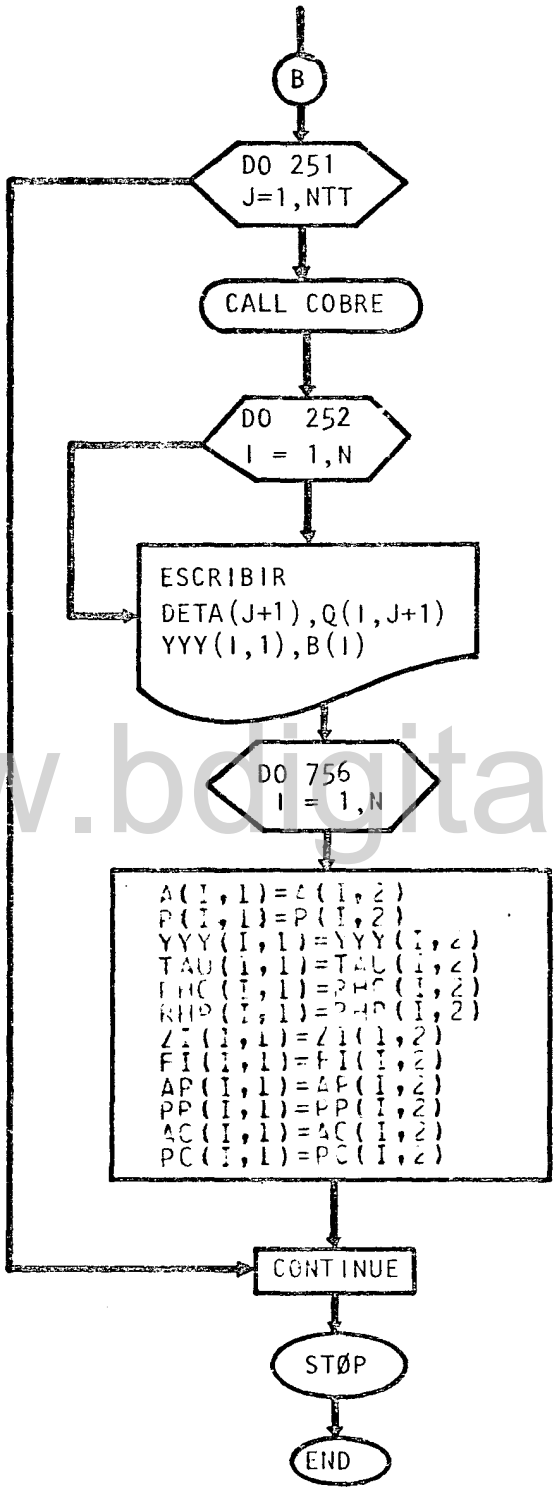
B(I)	Ancho superficial alcanzado por el flujo en cada sección en estudio, para cualquier intervalo de tiempo
I	Parámetro que indica la sección en estudio considerada
Q(I)	Caudal que pasa por cada sección en estudio, para cualquier intervalo de tiempo
Y(I)	Tirante del flujo en cada sección en estudio, para cualquier intervalo de tiempo.

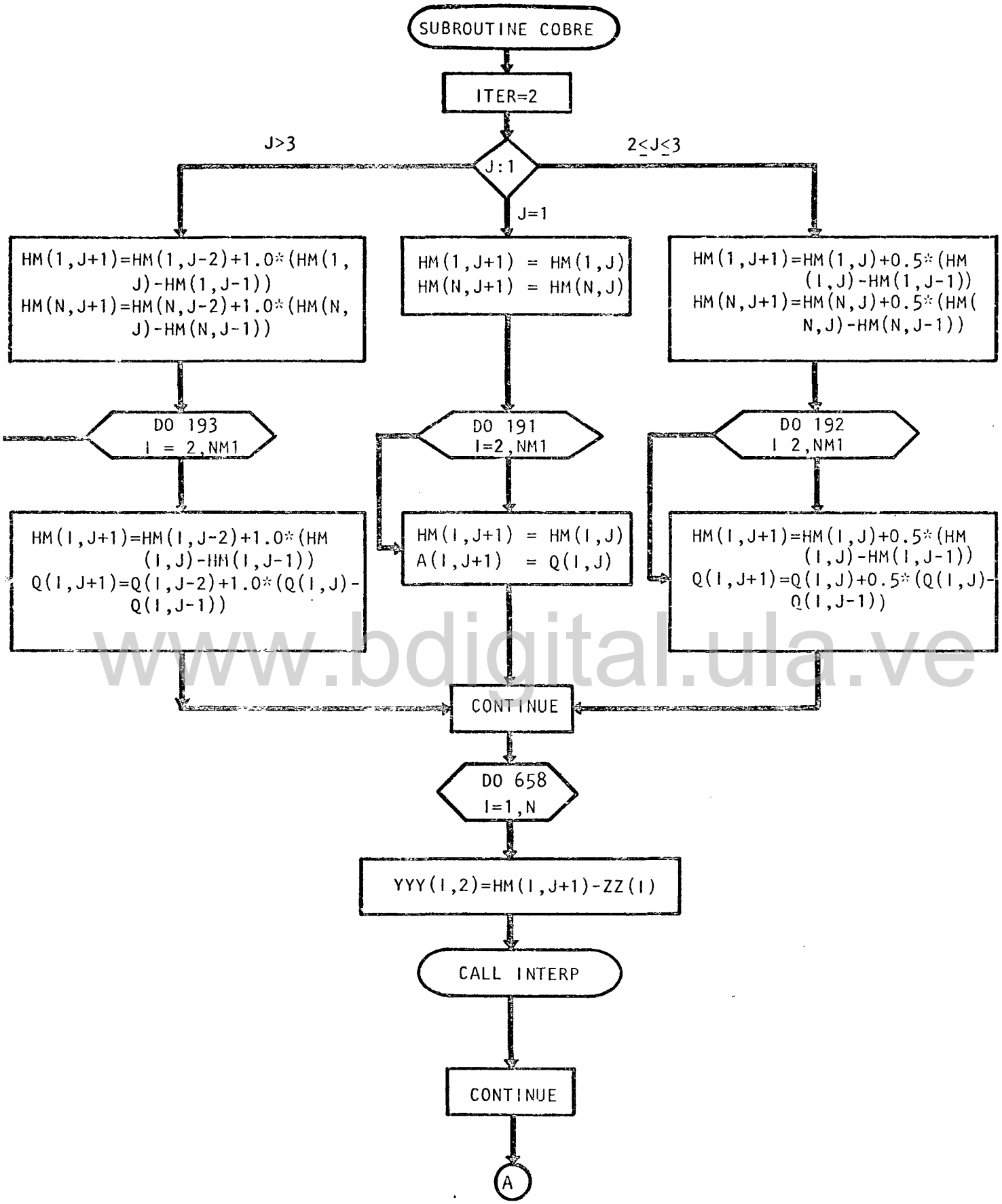
ANEXO V

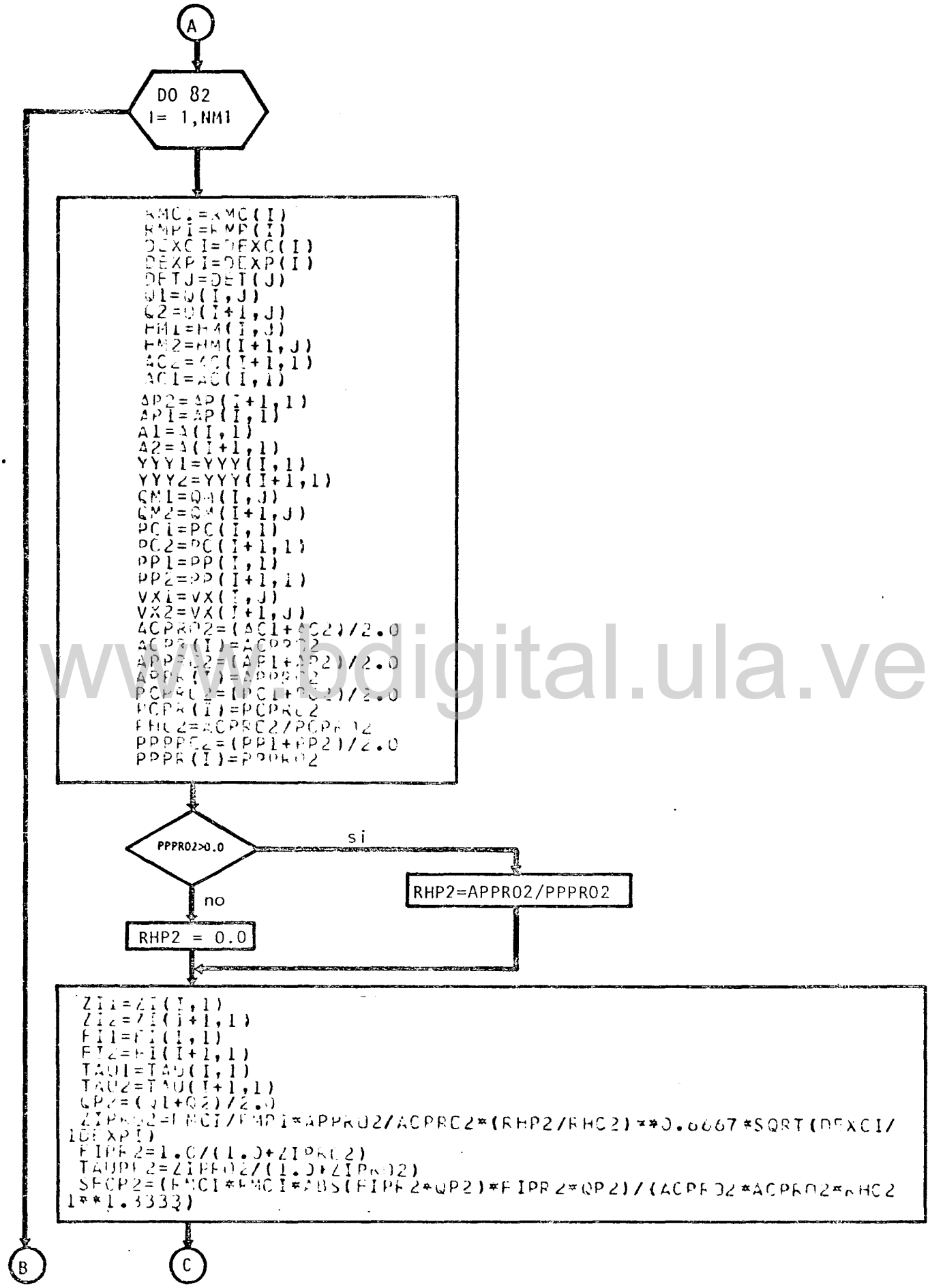
FLUJOGRAMA DETALLADO DEL PROGRAMA PLANICIE

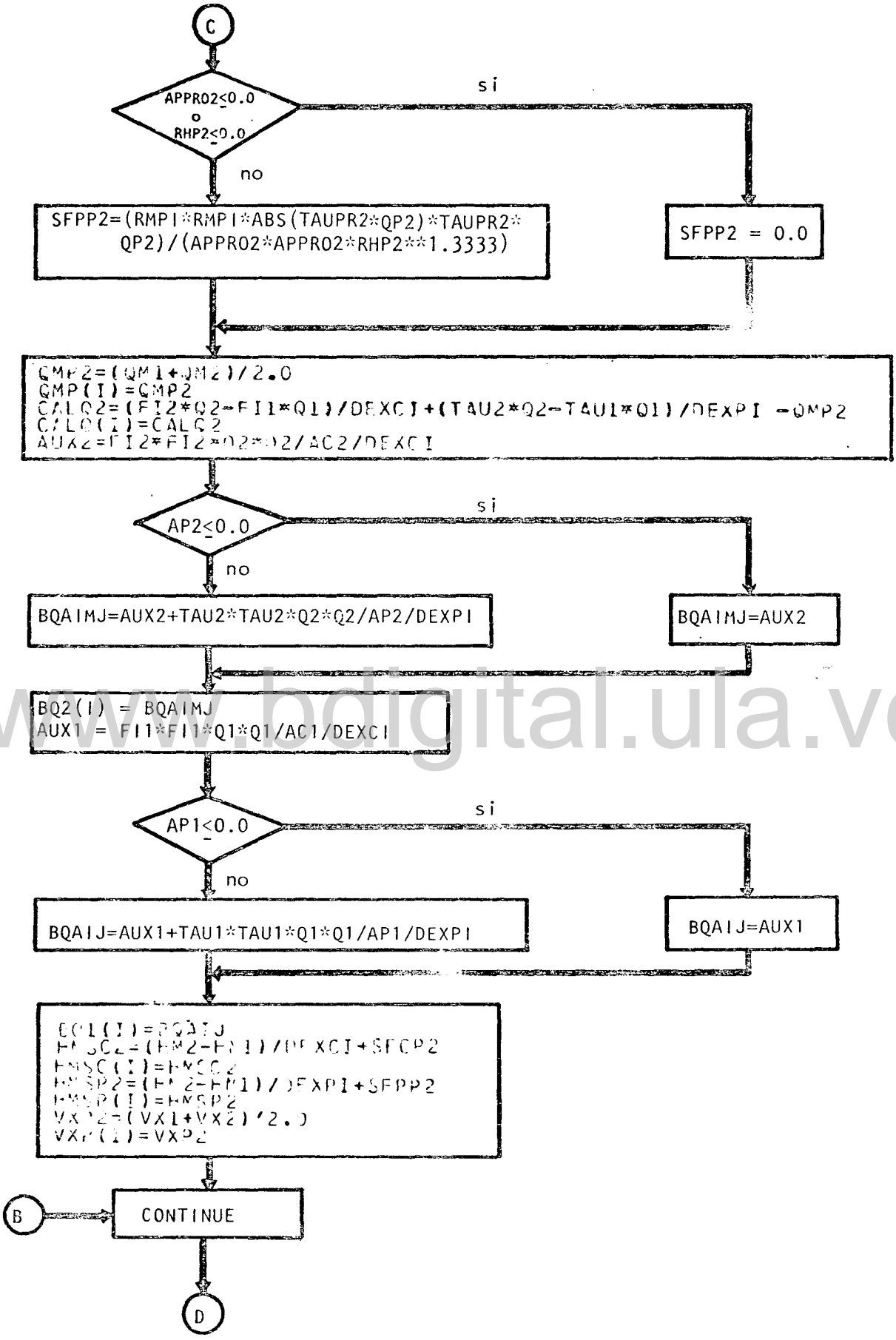


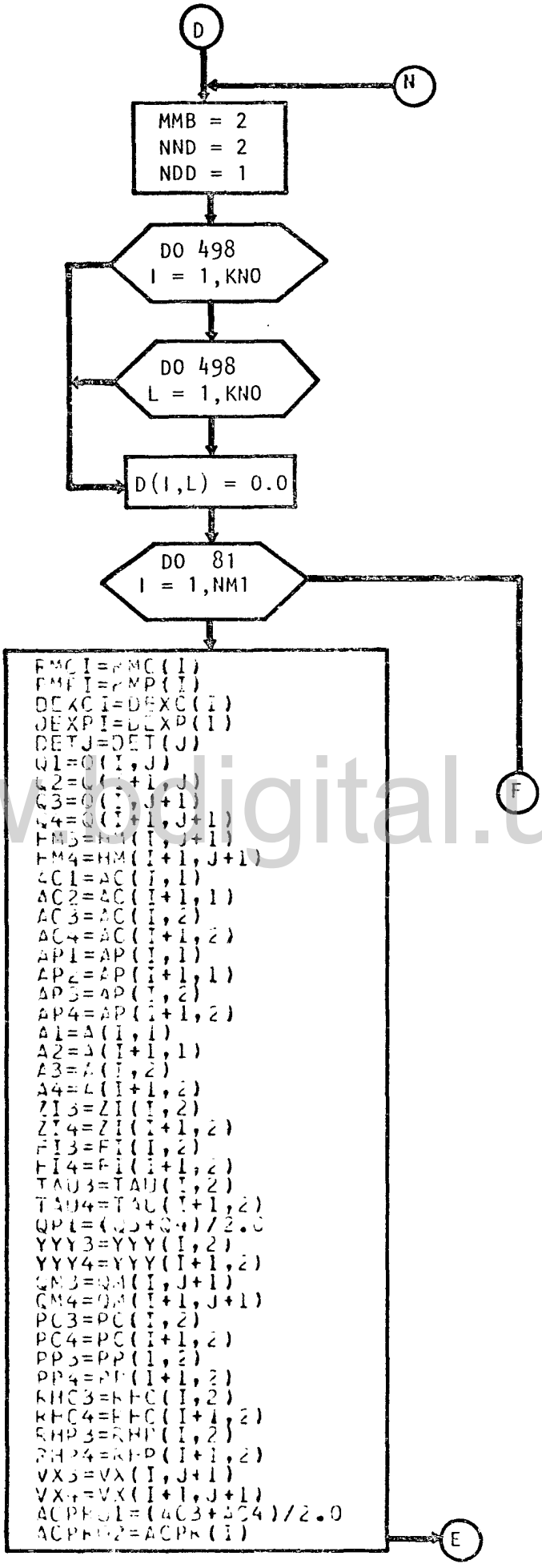


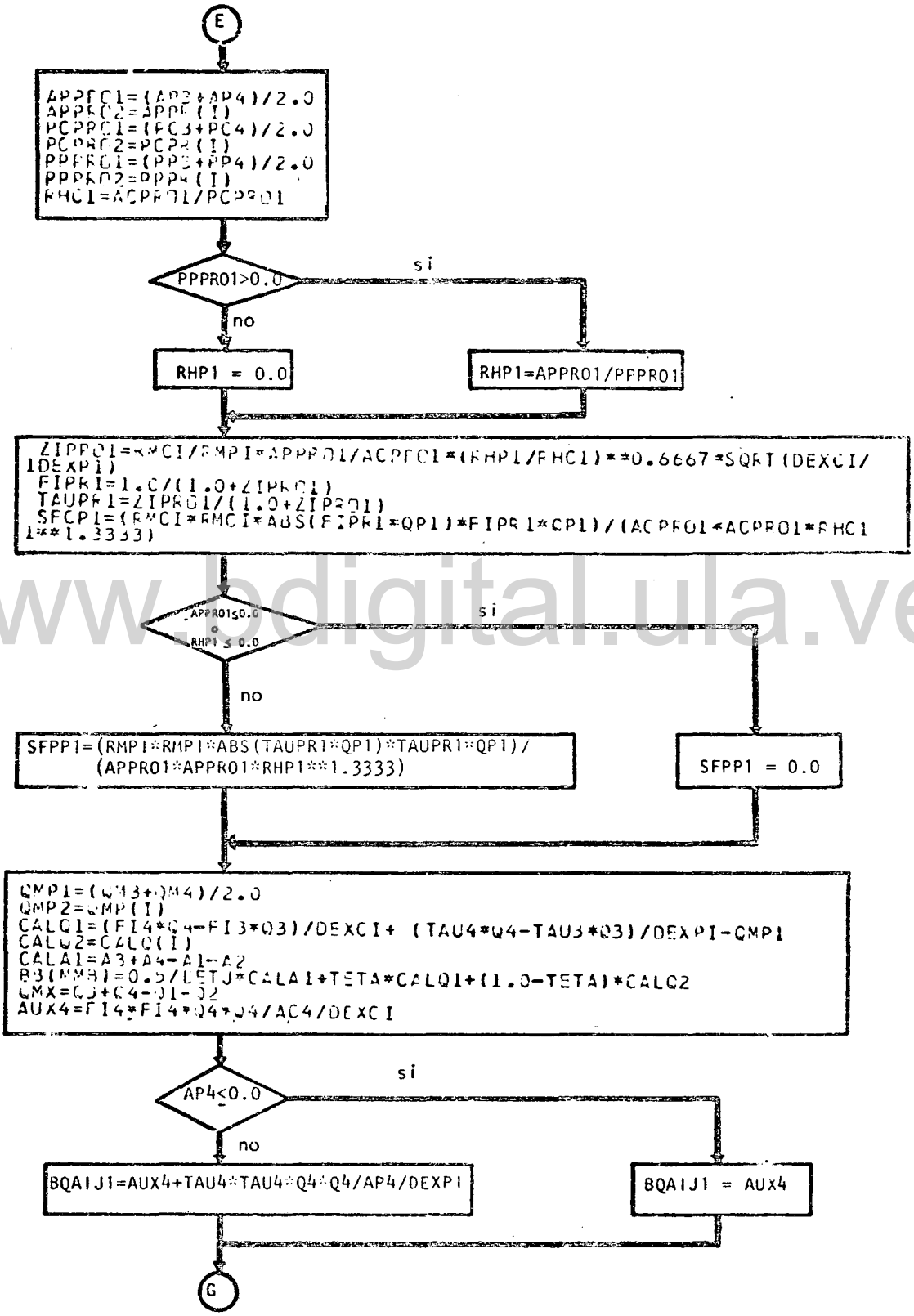


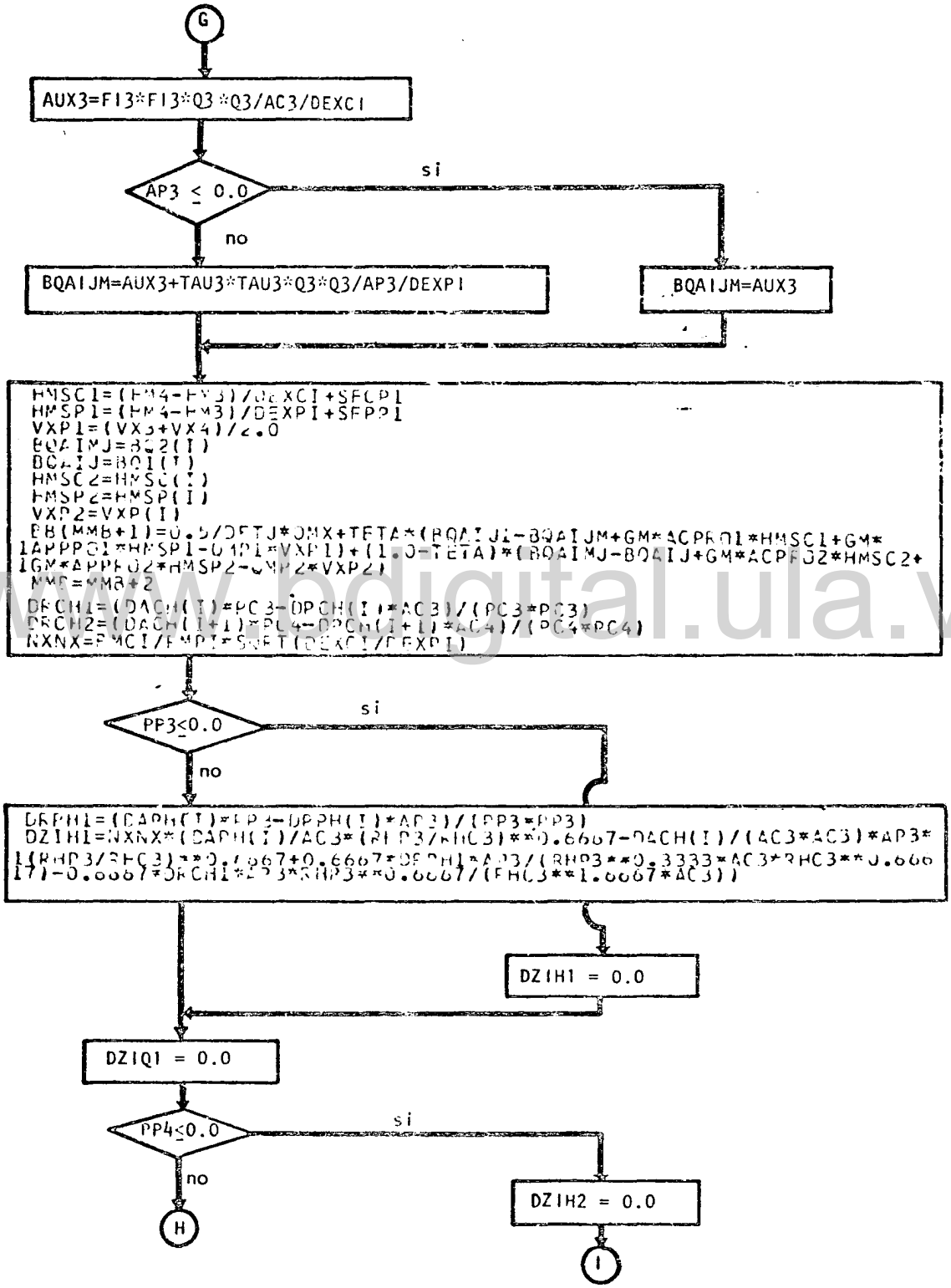


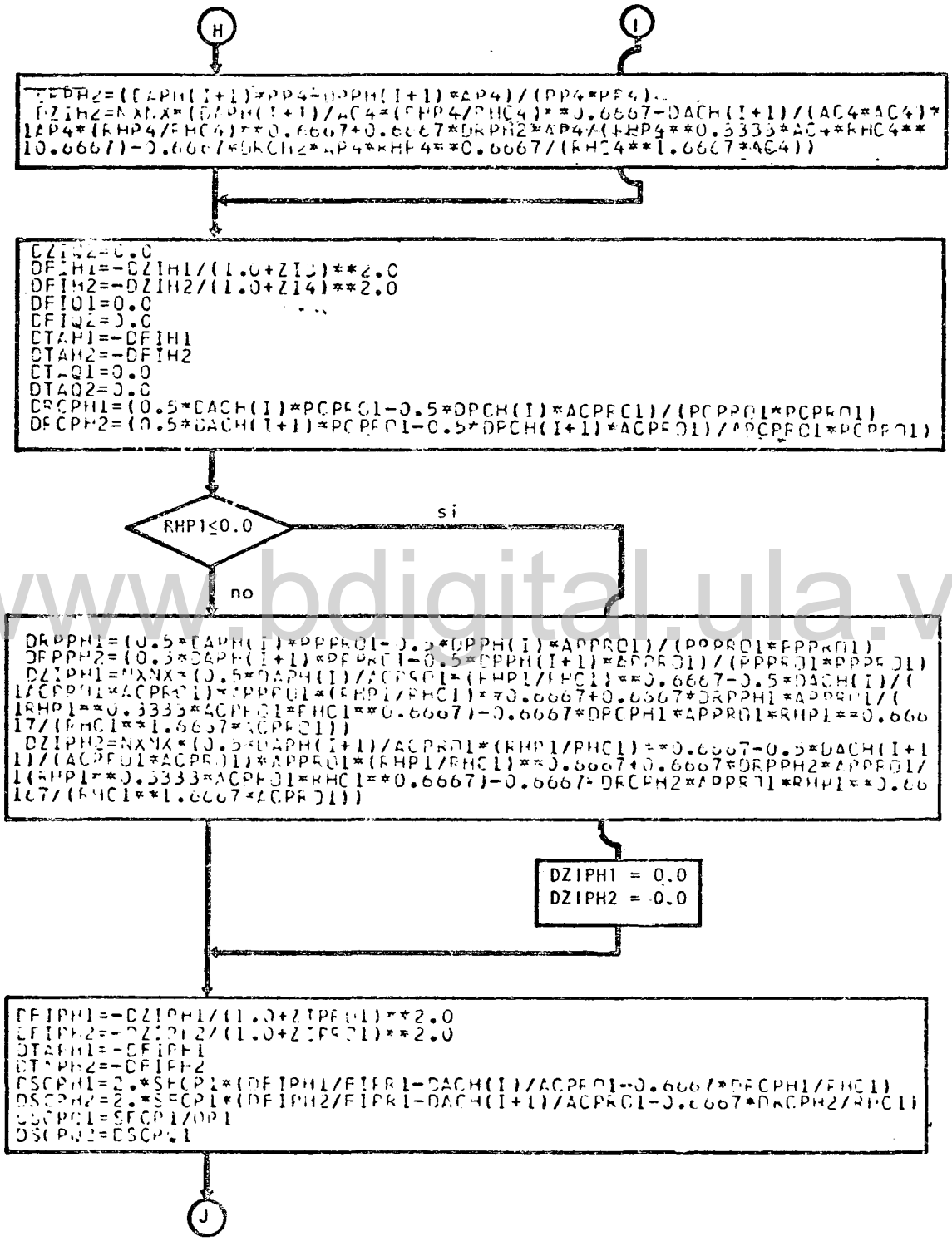


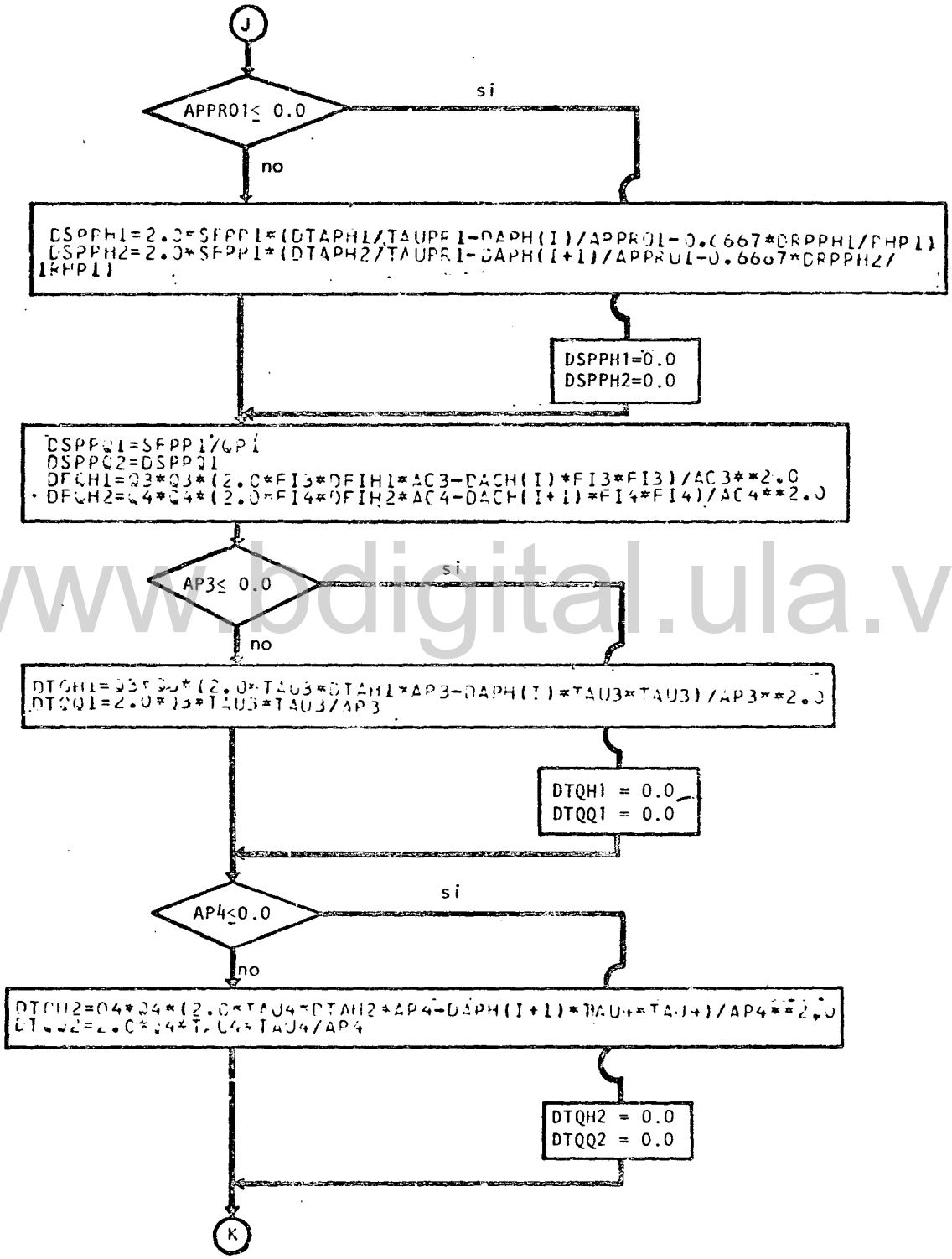


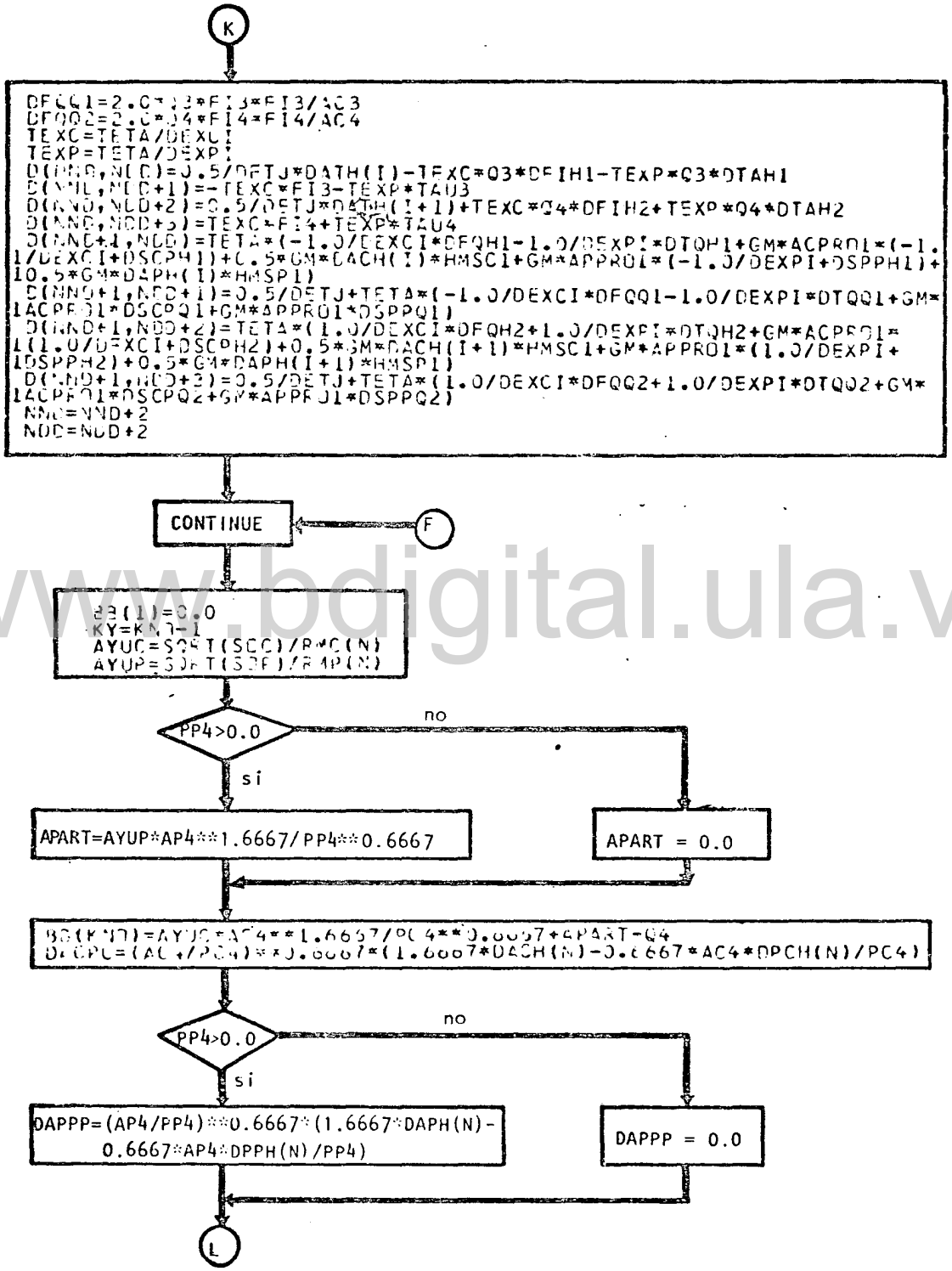


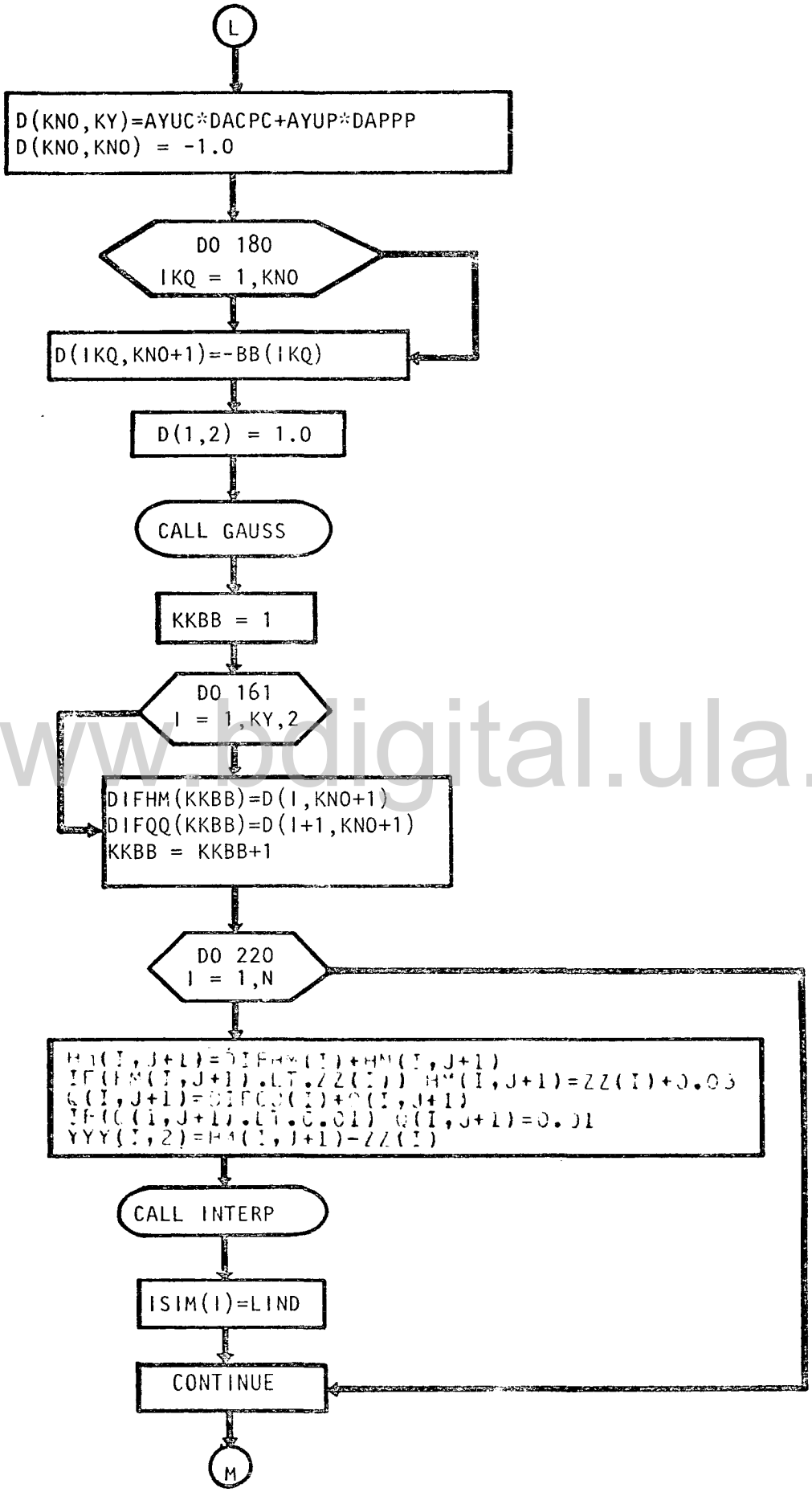


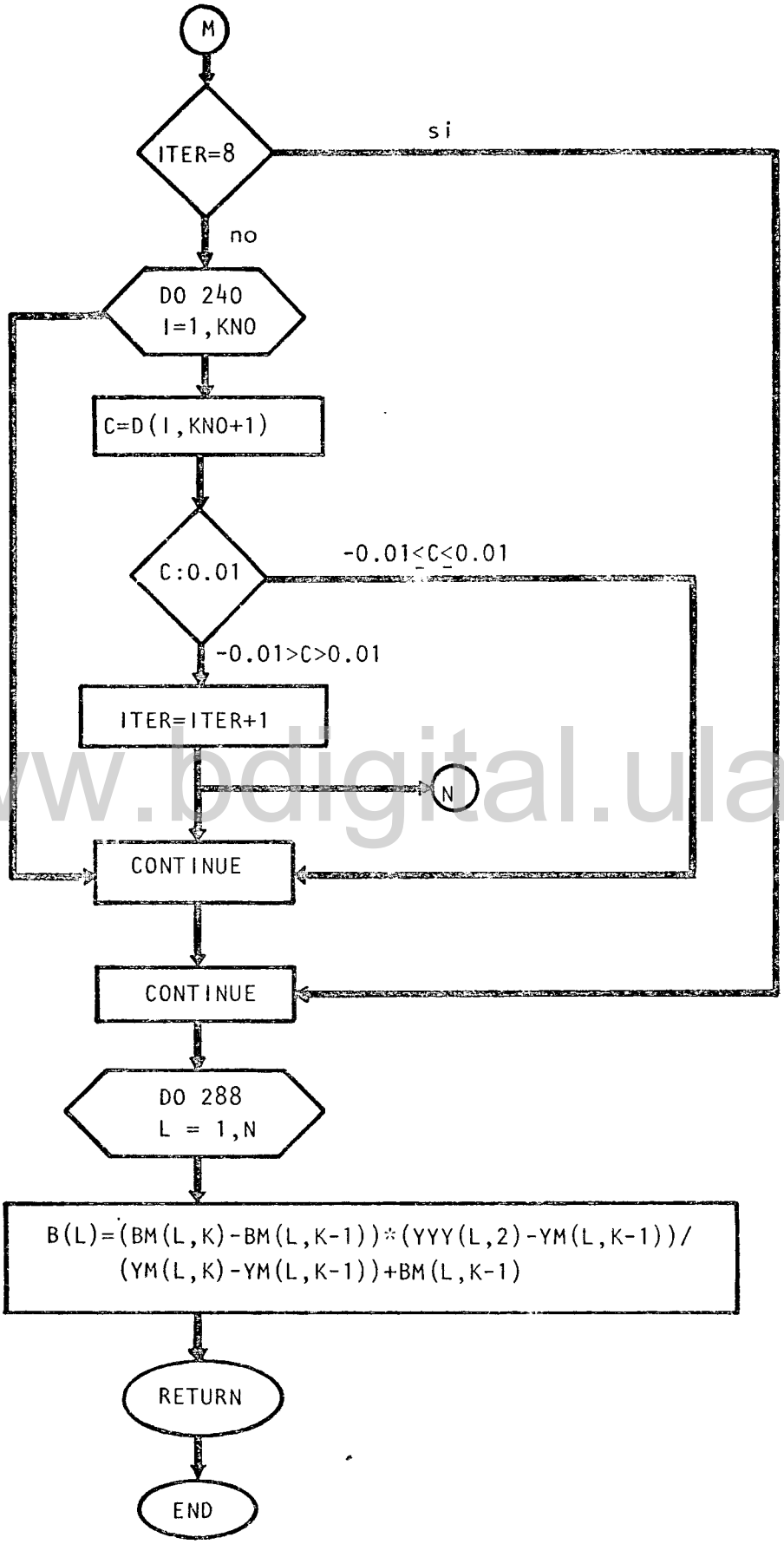


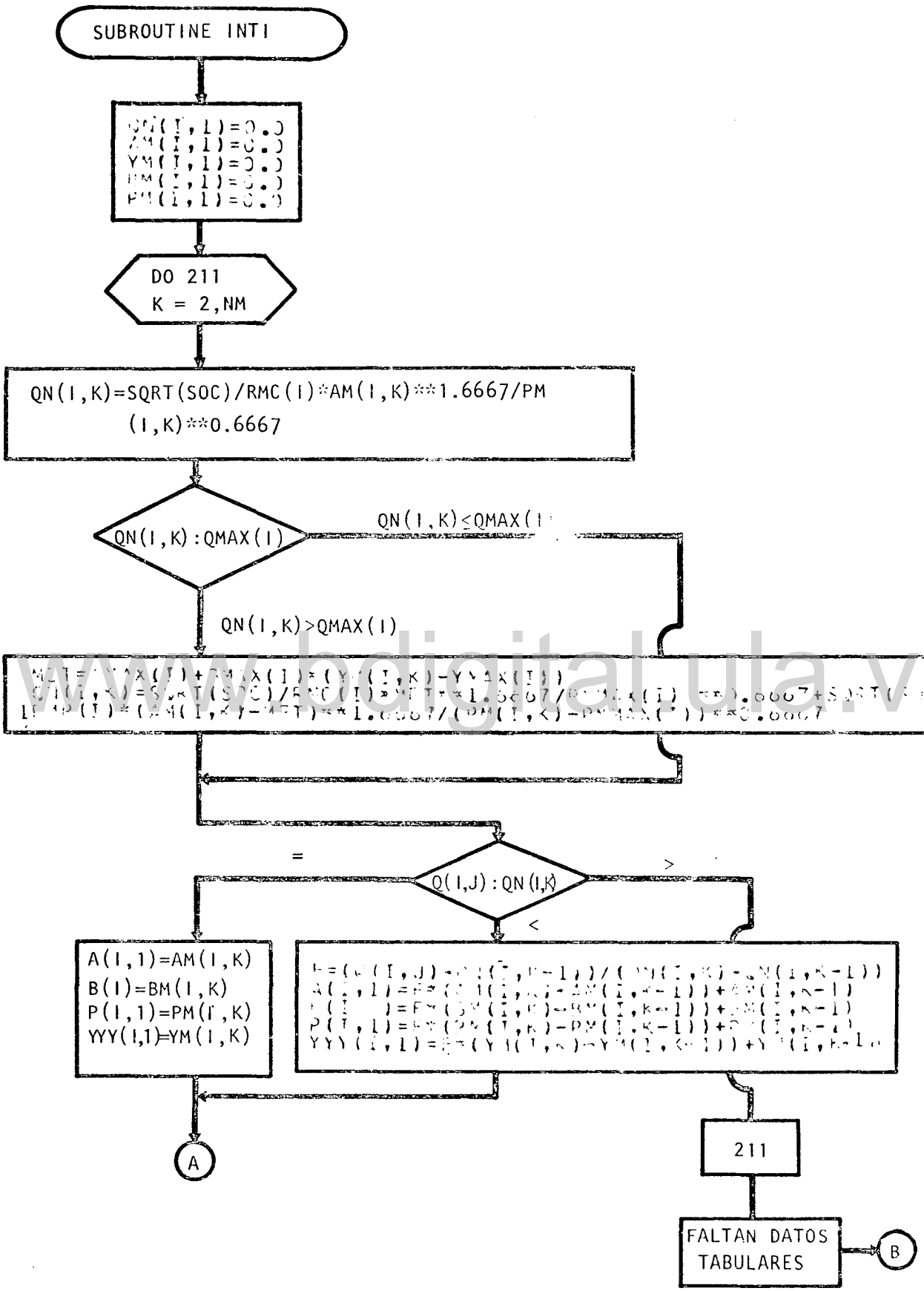


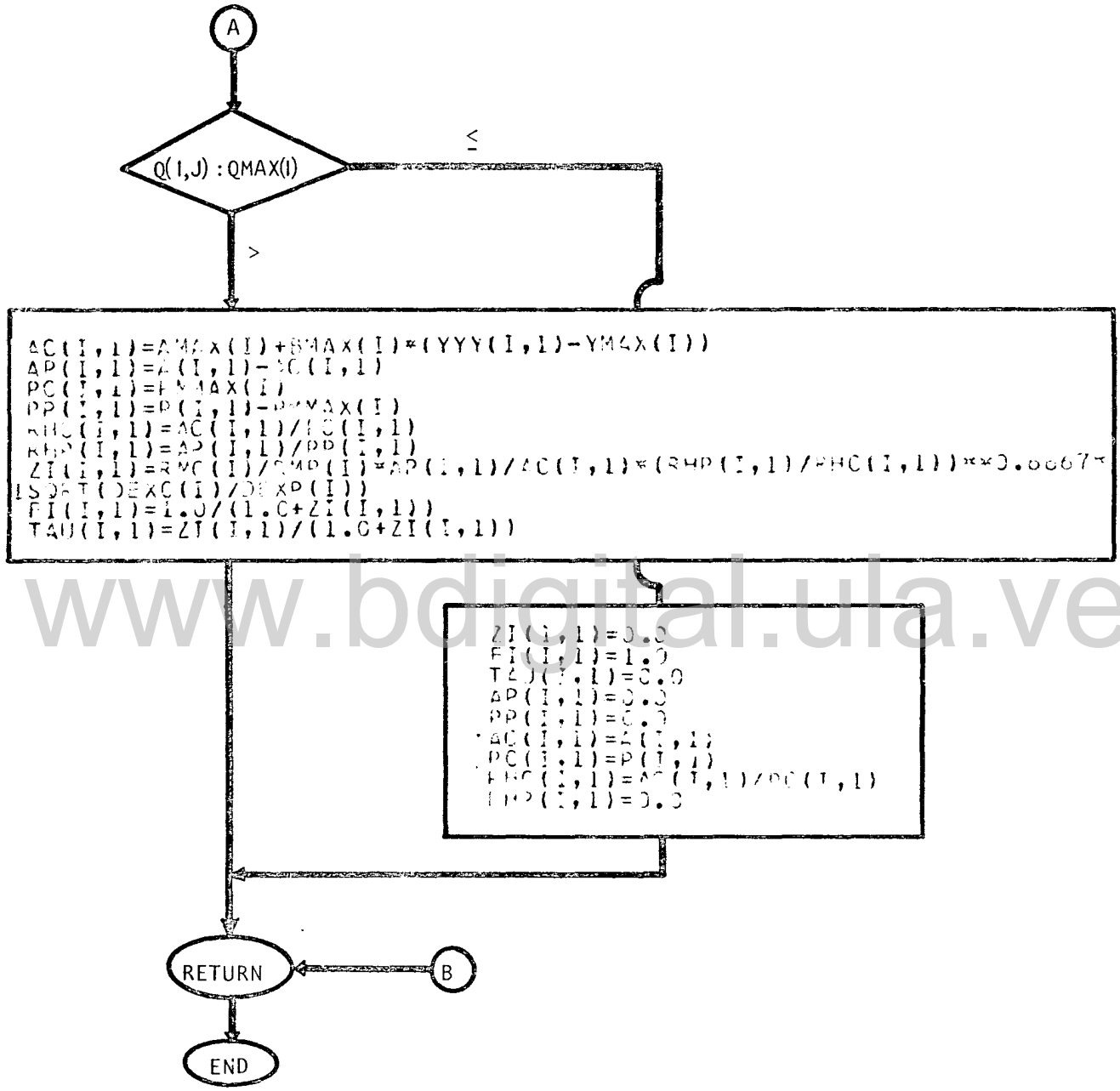


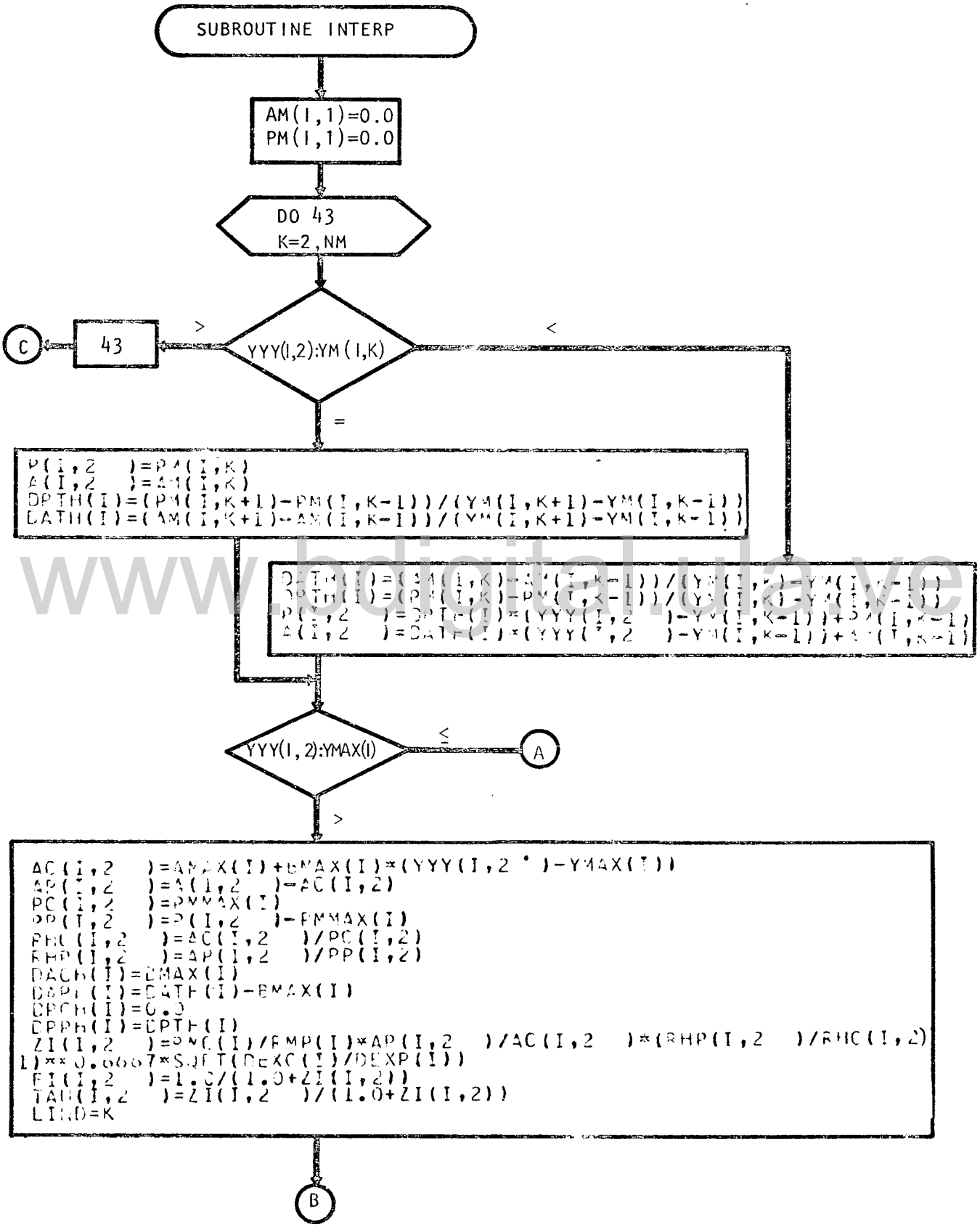


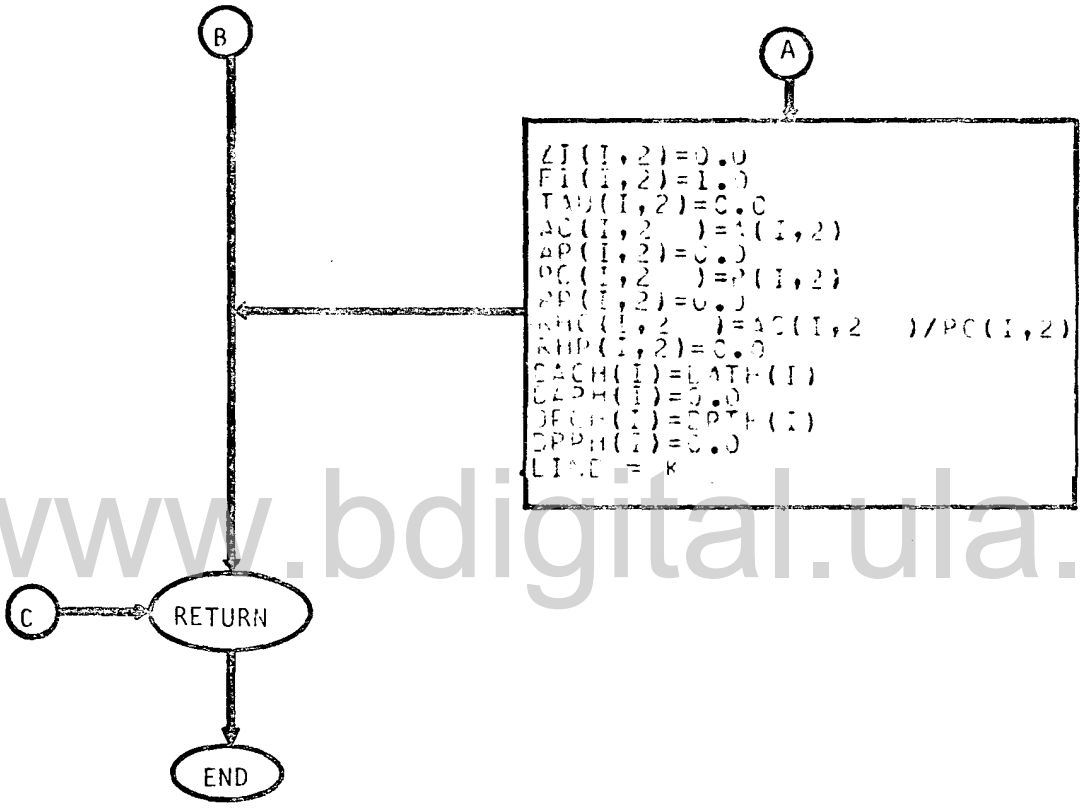


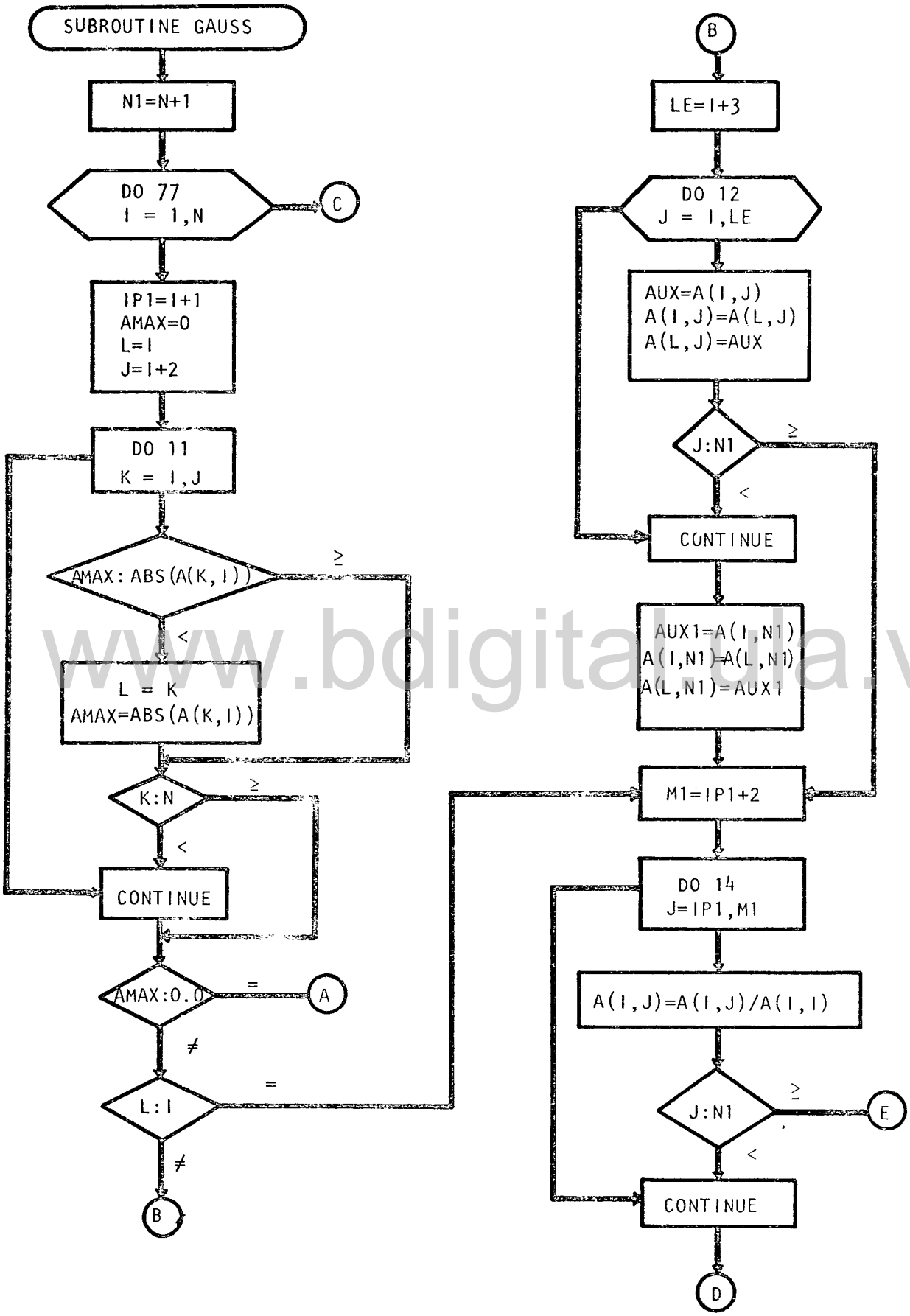


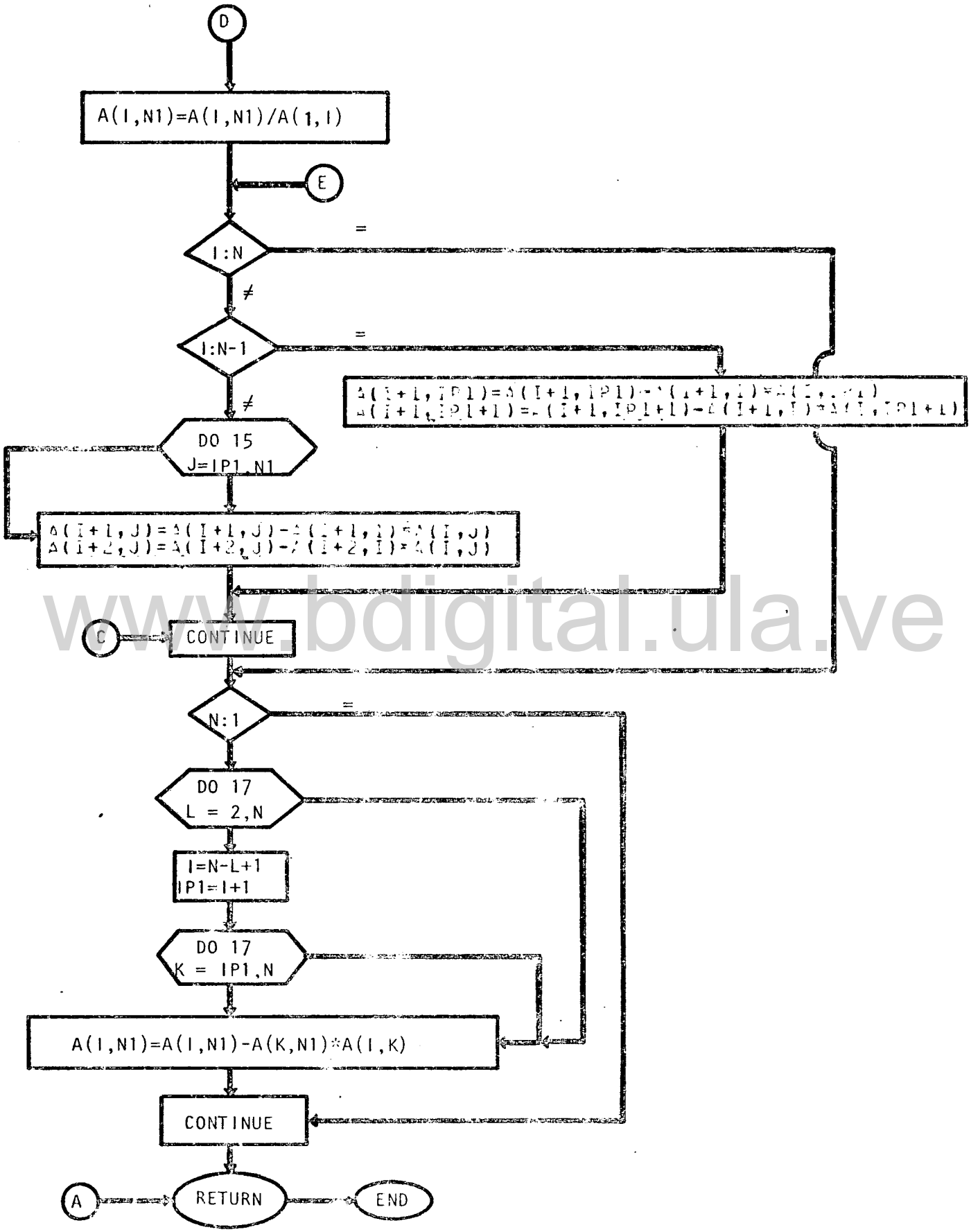












ANEXO VI

LISTADO Y RESULTADOS DEL PROGRAMA

PLANICIE

MAIN

```
C       METODO IMPLICITO PARA PLANICIES INUNDABLES CON AREA IRREGULAR
        DIMENSION DEXC(10),DEXP(10),DET(20),RMC(10),RMP(10),VX(10   ),QM(
       110,20),Q(10,20),HM(10,20),B(10),AC(10,2),AP(10,2),BB(20),D(20,21),
       1ZZ(10),DIFHM(20),DIFQQ(20),YYY(10  ),DETA(20),ZI(10  ),FI(10,2),
       1TAU(10,2),RHC(10  ),RHP(10  ),PC(10,2),PP(10,2)
        DIMENSION AM(10,50),PM(10,50),YM(10,50),BM(10,50)
        DIMENSION YMAX(10),BMAX(10),AMAX(10),PMMAX(10),QMAX(10),A(10,2)
        READ(5,113) N,NT,NM,SOC,SOP,TETA,CRC,CRP
        NTT=NT-1
        NM1=N-1
        KNO=2*N
        GM=9.81
        READ(5,111) (BMAX(I),I=1,N)
        READ(5,111) (PMMAX(I),I=1,N)
        READ(5,111) (AMAX(I),I=1,N)
        READ(5,111) (YMAX(I),I=1,N)
        READ(5,111) (DEXC(I),I=1,N  )
        READ(5,111) (DEXP(I),I=1,N  )
        DO 896 I=1,N
        QMAX(I)=SQRT(SOC)/CRC    *AMAX(I)**1.6667/PMMAX(I)**0.6667
  896 CONTINUE
        READ(5,111) (DET(J),J=1,NTT)
        READ(5,111) (Q(I,1),I=1,N)
        READ(5,111) (Q(1,J),J=1,NTT)
        READ(5,111) ((AM(I,K),K=1,NM),I=1,N)
        READ(5,111) ((PM(I,K),K=1,NM),I=1,N)
        READ(5,111) ((BM(I,K),K=1,NM),I=1,N)
        READ(5,111) ((YM(I,K),K=1,NM),I=1,N)
  111 FORMAT(10F8.3)
        DEXSUM=0.0
        DO 408 I=1,NM1
  408 DEXSUM=DEXSUM+DEXC(I)
        ZZ(1)=DEXSUM*SOC*0.57
        DO 409 I=2,N
  409 ZZ(I)=ZZ(I-1)-DEXC(I-1)*SOC
        DO 610 I=1,N
        DO 655 J=1,NT
  655 QM(I,J)=0.0
        RMC(I)=CRC
        RMP(I)=CRP
        ZI(I)=0.0
        VX(I  )=0.0
        J=1
        CALL INTI(Q,SOC,SOP,RMC,RMP,A,AC,AP,AM,B,BM,P,PC,PP,PM,I,J,
       1RHC,RHP,YYY,YM,QMAX,YMAX,BMAX,PMMAX,AMAX,ZI,FI,TAU,DEXC,DEXP,N)
  610 HM(I,1)=YYY(I  )+ZZ(I)
        DETA(1)=0.0
        DO 394 J=1,NTT
        DETA(J+1)=DET(J)/60.0+DETA(J)
  394 Q(N,J+1)=0.0
        WRITE(6,1004)
        WRITE(6,1000)  DEXC(1)
        WRITE(6,1001)
        WRITE(6,1002)
        WRITE(6,1003)
        WRITE(6,1008) RMC(1)
        WRITE(6,1009) SOC
        WRITE(6,381) (I,I=1,N)
        WRITE(6,383) DETA(1), (Q(I,1),I=1,N)
        WRITE(6,386) (YYY(I  ),I=1,N)
        WRITE(6,385) (  B(I  ),I=1,N)
        DO 251 J=1,NTT
        CALL COORE (DEXC,DEXP,DET,RMC,RMP,VX,QM,Q,HM,B,A,AC,AP,BM,AM,ZZ,
       1YYY,YM,N,NT,SOC,SOP,TETA,NTT,NM1,KNO,J,GM,FI,TAU,YMAX,INDI,ZI,
       1P,PC,PP,AMAX,BMAX,PMMAX,QMAX,PM,RHC,RHP)
        IF(INDI.EQ.0) GO TO 437
        WRITE(6,3383) DETA (J+1), (Q(I,J+1),I=1,N)
        WRITE(6,386) (YYY(I  ),I=1,N)
        WRITE(6,385) (B(I),I=1,N)
  657 DO 756 I=1,N
        A(I,1)=A(I,2)
        TAU(I,1)=TAU(I,2)
        FI(I,1)=FI(I,2)
        AP(I,1)=AP(I,2)
        PP(I,1)=PP(I,2)
        AC(I,1)=AC(I,2)
        PC(I,1)=PC(I,2)
  756 CONTINUE
```

MAIN

```
      GO TO 251
  437 WRITE(6,383) DETA(J+1) ,(Q(I,J+1),I=1,N)
      WRITE(6,386) (YYY(I   ),I=1,N)
      WRITE(6,385) (B(I),I=1,N)
      GO TO 657
  251 CONTINUE
  113 FORMAT(3I8,5F8.4)
 1004 FORMAT(1H1,//,35X,'SIMULACION DEL TRANSITO EN UNA PLANICIE DE INUN
     1DACION POR',//,53X,'EL METODO IMPLICITO',///)
 1000 FORMAT(13X,'INTERVALO DE DISTANCIA ENTRE SECCIONES=',F8.2,'MTS.')
 1001 FORMAT(13X,'TIEMPO EN MINUTOS')
 1002 FORMAT(13X,'CAUDALES EN METROS CUBICOS POR SEGUNDO')
 1003 FORMAT(13X,'ALTURAS DE AGUA EN METROS')
 1008 FORMAT(13X,'RUGOSIDAD DE MANNING DEL CANAL=',F6.4)
 1009 FORMAT(13X,'PENDIENTE DE FONDO DEL CANAL=',F7.5)
  381 FORMAT(///,3X,'TIEMPO',4X,'I=',I3,4X,9(5X,I2,3X),3X,'SOLUCION',//)
  383 FORMAT(1X,F8.3,4X,'Q=',F7.2,9(3X,F7.2),3X,'ESTABLE')
  385 FORMAT(12X,'BS=',F7.2,9(3X,F7.2),/)
  386 FORMAT(12X,'YY=',F7.2,9(3X,F7.2))
 3383 FORMAT(1X,F8.3,4X,'Q=',F7.2,9(3X,F7.2),3X,'INESTABLE')
      STOP
      END
```

COBRE

```
      SUBROUTINE COBRE(DEXC,DEXP,DET,RMC,RMP,VX,QM,Q,HM,B,A,AC,AP,BM,AM,
     1ZZ,YYY,YM,N,NT,SUC,SOP,TETA,NTT,NM1,KNU,J,GM,FI,TAU,YMAX,INDI,ZI,
     1P,PC,PP,AMAX,BMAX,PMMAX,QMAX,PM,RHC,RHP)
      DIMENSION DEXC(10),DEXP(10),DET(20),RMC(10),RMP(10),VX(10),
     1QM(10,20),Q(10,20),HM(10,20),B(10),A(10,2),AC(10,2),AP(10,2),
     1BM(10,50),AM(10,50),ZZ(10),YYY(10  ),YM(10,50)
     1,DIFHM(20),DIFQQ(20),DETA(20),BB(20),D(20,21)
      DIMENSION ACPR(10),APPR(10),BQ1(10),BQ2(10),HMSC(10),HMSP(10),
     1QMP(10),RHC(10  ),RHP(10),          PM(10,50),PC(10,2),PP(10,2)
      DIMENSION          CALQ(10),ZI(10  ),FI(10,2),TAU(10,2),YMAX(10),
     1PCPR(10),PPPR(10)
      DIMENSION DATH(10),DACH(10),DAPH(10),DPTH(10),DPCH(10),DPPH(10),
     1ISIM(10),AMAX(10),BMAX(10),PMMAX(10),QMAX(10)
      ITER=2
C
C     PREDICCION PARA ITERACION INICIAL EN UNA LINEA DE TIEMPO
C
      IF(J.NE.1) GO TO 550
      HM(1,J+1)=HM(1,J)
      HM(N,J+1)=HM(N,J)
      Q(N,J+1)=Q(N,J)
      DO 191 I=2,NM1
      HM(I,J+1)=HM(I,J)
  191 Q(I,J+1)=Q(I,J)
      GO TO 553
  550 IF(J.NE.2.AND.J.NE.3) GO TO 552
      HM(1,J+1)=ABS(HM(1,J)+0.5*(HM(1,J)-HM(1,J-1)))
      HM(N,J+1)=ABS(HM(N,J)+0.5*(HM(N,J)-HM(N,J-1)))
      Q(N,J+1)=ABS(Q(N,J)+0.5*(Q(N,J)-Q(N,J-1)))
      DO 192 I=2,NM1
      HM(I,J+1)=ABS(HM(I,J)+0.5*(HM(I,J)-HM(I,J-1)))
  192 Q(I,J+1)=ABS(Q(I,J)+0.5*(Q(I,J)-Q(I,J-1)))
      GO TO 553
  552 HM(1,J+1)=ABS(HM(1,J-2)+1.0*(HM(1,J)-HM(1,J-1)))
      HM(N,J+1)=ABS(HM(N,J-2)+1.0*(HM(N,J)-HM(N,J-1)))
      Q(N,J+1)=ABS(Q(N,J-2)+1.0*(Q(N,J)-Q(N,J-1)))
      DO 193 I=2,NM1
      HM(I,J+1)=ABS(HM(I,J-2)+1.0*(HM(I,J)-HM(I,J-1)))
  193 Q(I,J+1)=ABS(Q(I,J-2)+1.0*(Q(I,J)-Q(I,J-1)))
  553 CONTINUE
C
C     CALCULO DE LAS CARACTERISTICAS HIDRAULICAS EN EL CANAL
      DO 658 I=1,N
      YYY(I  )=HM(I,J+1)-ZZ(I)
      CALL INTERP(A,AM,AC,AP,P,PM,PC,PP,DATH,DPTH,DACH,DAPH,DPCH,
     1DPPH,I,LIND,J,YYY,YM,RMC,RMP,DEXC,DEXP,RHC,RHP,ZI,FI,TAU,YMAX,AMAX
     1,BMAX,PMMAX,N)
  658 CONTINUE
      DO 82 I=1,NM1
      RMCI=RMC(I)
      RMPI=RMP(I)
      DEXCI=DEXC(I)
      DEXPI=DEXP(I)
      DETJ=DET(J)
      Q1=Q(I,J)
      Q2=Q(I+1,J)
      HM1=HM(I,J)
      HM2=HM(I+1,J)
      AC2=AC(I+1,1)
      AC1=AC(I,1)
      AP2=AP(I+1,1)
      AP1=AP(I,1)
      A1=A(I,1)
      A2=A(I+1,1)
      QM1=QM(I,J)
      QM2=QM(I+1,J)
      PC1=PC(I,1)
      PC2=PC(I+1,1)
      PP1=PP(I,1)
      PP2=PP(I+1,1)
      ACPRO2=(AC1+AC2)/2.0
      ACPR(I)=ACPRO2
      APPRO2=(AP1+AP2)/2.0
      APPR(I)=APPRO2
      PCPRO2=(PC1+PC2)/2.0
      PCPR(I)=PCPRO2
      RHC2=ACPRO2/PCPRO2
      PPPRO2=(PP1+PP2)/2.0
```

COBRE

```
      PPPR(I)=PPPRO2
      IF(PPPRO2.GT.0.0) GO TO 7123
      RHP2=0.0
      GO TO 7124
.7123 RHP2=APPRO2/PPPRO2
 7124 CONTINUE
      FI1=FI(I,1)
      FI2=FI(I+1,1)
      TAU1=TAU(I,1)
      TAU2=TAU(I+1,1)
      QP2=(Q1+Q2)/2.0
      ZIPRO2=RMCI/RMPI*APPRO2/ACPRO2*(RHP2/RHC2)**0.6667*SQRT(DEXCI/
     1DEXPI)
      FIPR2=1.0/(1.0+ZIPRO2)
      TAUPR2=ZIPRO2/(1.0+ZIPRO2)
      SFCP2=(RMCI*RMCI*ABS(FIPR2*QP2)*FIPR2*QP2)/(ACPRO2*ACPRO2*RHC2
     1**1.3333)
      IF(APPRO2.LE.0.0.OR.RHP2.LE.0.0) GO TO 20
      SFPP2=(RMPI*RMPI*ABS(TAUPR2*QP2)*TAUPR2*QP2)/(APPRO2*APPRO2*RHP2
     1**1.3333)
      GO TO 21
   20 SFPP2=0.0
   21 QMP2=(QM1+QM2)/2.0
      QMP(I)=QMP2
      CALQ2=(FI2*Q2-FI1*Q1)/DEXCI+(TAU2*Q2-TAU1*Q1)/DEXPI -QMP2
      CALQ(I)=CALQ2
      AUX2=FI2*FI2*Q2*Q2/AC2/DEXCI
      IF(AP2.LE.0.0) GO TO 22
      BQAIMJ=AUX2+TAU2*TAU2*Q2*Q2/AP2/DEXPI
      GO TO 23
   22 BQAIMJ=AUX2
   23 BQ2(I)=BQAIMJ
      AUX1=FI1*FI1*Q1*Q1/AC1/DEXCI
      IF(AP1.LE.0.0) GO TO 24
      BQAIJ=AUX1+TAU1*TAU1*Q1*Q1/AP1/DEXPI
      GO TO 25
   24 BQAIJ=AUX1
   25 BQ1(I)=BQAIJ
      HMSC2=(HM2-HM1)/DEXCI+SFCP2
      HMSC(I)=HMSC2
      HMSP2=(HM2-HM1)/DEXPI+SFPP2
      HMSP(I)=HMSP2
   82 CONTINUE
  231 CONTINUE
      MMB=2
      NND=2
      NDD=1
C
C     CALCULO DE VALORES RESIDUALES UTILIZANDO DATOS DE PRUEBA
C
      DO 498 I=1,KNO
      DO 498 L=1,KNO
  498 D(I,L)=0.0
      DO 81 I=1,NM1
      RMCI=RMC(I)
      RMPI=RMP(I)
      DEXCI=DEXC(I)
      DEXPI=DEXP(I)
      DETJ=DET(J)
      Q1=Q(I,J)
      Q2=Q(I+1,J)
      Q3=Q(I,J+1)
      Q4=Q(I+1,J+1)
      HM3=HM(I,J+1)
      HM4=HM(I+1,J+1)
      AC1=AC(I,1)
      AC2=AC(I+1,1)
      AC3=AC(I,2)
      AC4=AC(I+1,2)
      AP1=AP(I,1)
      AP2=AP(I+1,1)
      AP3=AP(I,2)
      AP4=AP(I+1,2)
      A1=A(I,1)
      A2=A(I+1,1)
      A3=A(I,2)
      A4=A(I+1,2)
      ZI3=ZI(I)
```

COBRE

```
      ZI4=ZI(I+1)
      FI3=FI(I,2)
      FI4=FI(I+1,2)
      TAU3=TAU(I,2)
      TAU4=TAU(I+1,2)
      QP1=(Q3+Q4)/2.0
      YYY3=YYY(I)
      YYY4=YYY(I+1)
      QM3=QM(I,J+1)
      QM4=QM(I+1,J+1)
      PC3=PC(I,2)
      PC4=PC(I+1,2)
      PP3=PP(I,2)
      PP4=PP(I+1,2)
      RHC3=RHC(I)
      RHC4=RHC(I+1)
      RHP3=RHP(I)
      RHP4=RHP(I+1)
      VX3=VX(I)
      VX4=VX(I+1)
      ACPRO1=(AC3+AC4)/2.0
      ACPRO2=ACPR(I)
      APPRO1=(AP3+AP4)/2.0
      APPRO2=APPR(I)
      PCPRO1=(PC3+PC4)/2.0
      PCPRO2=PCPR(I)
      PPPRO1=(PP3+PP4)/2.0
      PPPRO2=PPPR(I)
      RHC1=ACPRO1/PCPRO1
      IF(PPPRO1.GT.0.0) GO TO  3123
      RHP1=0.0
      GO TO 3124
 3123 RHP1=APPRO1/PPPRO1
 3124 CONTINUE
      ZIPRO1=RMC1/RMP1*APPRO1/ACPRO1*(RHP1/RHC1)**0.6667*SQRT(DEXCI/
     1DEXPI)
      FIPR1=1.0/(1.0+ZIPRO1)
      TAUPR1=ZIPRO1/(1.0+ZIPRO1)
      SFCP1=(RMC1*RMC1*ABS(FIPR1*QP1)*FIPR1*QP1)/(ACPRO1*ACPRO1*RHC1
     1**1.3333)
      IF(APPRO1.LE.0.0.OR.RHP1.LE.0.0) GO TO 26
      SFPP1=(RMP1*RMP1*ABS(TAUPR1*QP1)*TAUPR1*QP1)/(APPRO1*APPRO1*RHP1
     1**1.3333 )
      GO TO 27
   26 SFPP1=0.0
   27 QMP1=(QM3+QM4)/2.0
      QMP2=QMP(I)
      CALQ1=(FI4*Q4-FI3*Q3)/DEXCI+ (TAU4*Q4-TAU3*Q3)/DEXPI-QMP1
      CALQ2=CALQ(I)
      CALA1=A3+A4-A1-A2
      BB(MMB)=0.5/DETJ*CALA1+TETA*CALQ1+(1.0-TETA)*CALQ2
      QMX=Q3+Q4-Q1-Q2
      AUX4=FI4*FI4*Q4*Q4/AC4/DEXCI
      IF(AP4.LE.0.0) GO TO 28
      BQAIJ1=AUX4+TAU4*TAU4*Q4*Q4/AP4/DEXPI
      GO TO 29
   28 BQAIJ1=AUX4
   29 AUX3=FI3*FI3*Q3*Q3/AC3/DEXCI
      IF(AP3.LE.0.0) GO TO 30
      BQAIJM=AUX3+TAU3*TAU3*Q3*Q3/AP3/DEXPI
      GO TO 31
   30 BQAIJM=AUX3
   31 HMSC1=(HM4-HM3)/DEXCI+SFCP1
      HMSP1=(HM4-HM3)/DEXPI+SFPP1
      VXP1=(VX3+VX4)/2.0
      BQAIMJ=BQ2(I)
      BQAIJ=BQ1(I)
      HMSC2=HMSC(I)
      HMSP2=HMSP(I)
      BB(MMB+1)=0.5/DETJ*QMX+TETA*(BQAIJ1-BQAIJM+GM*ACPRO1*HMSC1+GM*
     1APPRO1*HMSP1-QMP1*VXP1)+(1.0-TETA)*(BQAIMJ-BQAIJ+GM*ACPRO2*HMSC2+
     1GM*APPRO2*HMSP2-QMP2*VXP1)
      MMB=MMB+2
C
C     CALCULO DE COEFICIENTES DE SISTEMA DE ECUACIONES SIMULTANEAS
C
C     CALCULO DE LAS DERIVADAS PARCIALES RESPECTO A H Y Q
C
```

COBRE

```
      DRCH1=(DACH(I)*PC3-DPCH(I)*AC3)/(PC3*PC3)
      DRCH2=(DACH(I+1)*PC4-DPCH(I+1)*AC4)/(PC4*PC4)
      NXNX=RMCI/RMPI*SQRT(DEXCI/DEXPI)
      IF(PP3.LE.0.0) GO TO 765
      DRPH1=(DAPH(I)*PP3-DPPH(I)*AP3)/(PP3*PP3)
      DZIH1=NXNX*(DAPH(I)/AC3*(RHP3/RHC3)**0.6667-DACH(I)/(AC3*AC3)*AP3*
     1(RHP3/RHC3)**0.6667+0.6667*DRPH1*AP3/(RHP3**0.3333*AC3*RHC3**0.666
     17)-0.6667*DRCH1*AP3*RHP3**0.6667/(RHC3**1.6667*AC3))
      GO TO 766
  765 DZIH1=0.0
  766 DZIQ1=0.0
      IF(PP4.LE.0.0) GO TO 767
      DRPH2=(DAPH(I+1)*PP4-DPPH(I+1)*AP4)/(PP4*PP4)
      DZIH2=NXNX*(DAPH(I+1)/AC4*(RHP4/RHC4)**0.6667-DACH(I+1)/(AC4*AC4)*
     1AP4*(RHP4/RHC4)**0.6667+0.6667*DRPH2*AP4/(RHP4**0.3333*AC4*RHC4**
     10.6667)-0.6667*DRCH2*AP4*RHP4**0.6667/(RHC4**1.6667*AC4))
      GO TO 768
  767 DZIH2=0.0
  768 DZIQ2=0.0
      DFIH1=-DZIH1/(1.0+ZI3)**2.0
      DFIH2=-DZIH2/(1.0+ZI4)**2.0
      DFIQ1=0.0
      DFIQ2=0.0
      DTAH1=-DFIH1
      DTAH2=-DFIH2
      DTAQ1=0.0
      DTAQ2=0.0
      DRCPH1=(0.5*DACH(I)*PCPRO1-0.5*DPCH(I)*ACPRO1)/(PCPRO1*PCPRO1)
      DRCPH2=(0.5*DACH(I+1)*PCPRO1-0.5*DPCH(I+1)*ACPRO1)/(PCPRO1*PCPRO1)
      IF(RHP1.LE.0.0) GO TO 769
      DRPPH1=(0.5*DAPH(I)*PPPRO1-0.5*DPPH(I)*APPRO1)/(PPPRO1*PPPRO1)
      DRPPH2=(0.5*DAPH(I+1)*PPPRO1-0.5*DPPH(I+1)*APPRO1)/(PPPRO1*PPPRO1)
      DZIPH1=NXNX*(0.5*DAPH(I)/ACPRO1*(RHP1/RHC1)**0.6667-0.5*DACH(I)/(
     1ACPRO1*ACPRO1)*APPRO1*(RHP1/RHC1)**0.6667+0.6667*DRPPH1*APPRO1/(
     1RHP1**0.3333*ACPRO1*RHC1**0.6667)-0.6667*DRCPH1*APPRO1*RHP1**0.666
     17/(RHC1**1.6667*ACPRO1))
      DZIPH2=NXNX*(0.5*DAPH(I+1)/ACPRO1*(RHP1/RHC1)**0.6667-0.5*DACH(I+1
     1)/(ACPRO1*ACPRO1)*APPRO1*(RHP1/RHC1)**0.6667+0.6667*DRPPH2*APPRO1/
     1(RHP1**0.3333*ACPRO1*RHC1**0.6667)-0.6667*DRCPH2*APPRO1*RHP1**0.66
     167/(RHC1**1.6667*ACPRO1))
      GO TO 770
  769 DZIPH1=0.0
      DZIPH2=0.0
  770 CONTINUE
      DFIPH1=-DZIPH1/(1.0+ZIPRO1)**2.0
      DFIPH2=-DZIPH2/(1.0+ZIPRO1)**2.0
      DTAPH1=-DFIPH1
      DTAPH2=-DFIPH2
      DSCPH1=2.*SFCP1*(DFIPH1/FIPR1-DACH(I)/ACPRO1-0.6667*DRCPH1/RHC1)
      DSCPH2=2.*SFCP1*(DFIPH2/FIPR1-DACH(I+1)/ACPRO1-0.6667*DRCPH2/RHC1)
      DSCPQ1=SFCP1/QP1
      DSCPQ2=DSCPQ1
      IF(APPRO1.LE.0.0) GO TO 1522
      DSPPH1=2.0*SFPP1*(DTAPH1/TAUPR1-DAPH(I)/APPRO1-0.6667*DRPPH1/RHP1)
      DSPPH2=2.0*SFPP1*(DTAPH2/TAUPR1-DAPH(I+1)/APPRO1-0.6667*DRPPH2/
     1RHP1)
      GO TO 1566
 1522 DSPPH1=0.0
      DSPPH2=0.0
 1566 CONTINUE
      DSPPQ1=SFPP1/QP1
      DSPPQ2=DSPPQ1
      DFQH1=Q3*Q3*(2.0*FI3*DFIH1*AC3-DACH(I)*FI3*FI3)/AC3**2.0
      DFQH2=Q4*Q4*(2.0*FI4*DFIH2*AC4-DACH(I+1)*FI4*FI4)/AC4**2.0
      IF(AP3.LE.0.0) GO TO 1800
      DTQH1=Q3*Q3*(2.0*TAU3*DTAH1*AP3-DAPH(I)*TAU3*TAU3)/AP3**2.0
      DTQQ1=2.0*Q3*TAU3*TAU3/AP3
      GO TO 1810
 1800 DTQH1=0.0
      DTQQ1=0.0
 1810 CONTINUE
      IF(AP4.LE.0.0) GO TO 1802
      DTQH2=Q4*Q4*(2.0*TAU4*DTAH2*AP4-DAPH(I+1)*TAU4*TAU4)/AP4**2.0
      DTQQ2=2.0*Q4*TAU4*TAU4/AP4
      GO TO 1820
 1802 DTQH2=0.0
      DTQQ2=0.0
 1820 CONTINUE
```

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```
      DFQQ1=2.0*Q3*FI3*FI3/AC3
      DFQQ2=2.0*Q4*FI4*FI4/AC4
      TEXC=TETA/DEXCI
      TEXP=TETA/DEXPI
      D(NND,NDD)=0.5/DETJ*DATH(I)-TEXC*Q3*DFIH1-TEXP*Q3*DTAH1
      D(NND,NDD+1)=-TEXC*FI3-TEXP*TAU3
      D(NND,NDD+2)=0.5/DETJ*DATH(I+1)+TEXC*Q4*DFIH2+TEXP*Q4*DTAH2
      D(NND,NDD+3)=TEXC*FI4+TEXP*TAU4
      D(NND+1,NDD)=TETA*(-1.0/DEXCI*DFQH1-1.0/DEXPI*DTQH1+GM*ACPRO1*(-1.
     1/DEXCI+DSCPH1)+0.5*GM*DACH(I)*HMSC1+GM*APPRO1*(-1.0/DEXPI+DSPPH1)+
     10.5*GM*DAPH(I)*HMSP1)
      D(NND+1,NDD+1)=0.5/DETJ+TETA*(-1.0/DEXCI*DFQQ1-1.0/DEXPI*DTQQ1+GM*
     1ACPRO1*DSCPQ1+GM*APPRO1*DSPPQ1)
      D(NND+1,NDD+2)=TETA*(1.0/DEXCI*DFQH2+1.0/DEXPI*DTQH2+GM*ACPRO1*
     1(1.0/DEXCI+DSCPH2)+0.5*GM*DACH(I+1)*HMSC1+GM*APPRO1*(1.0/DEXPI+
     1DSPPH2)+0.5*GM*DAPH(I+1)*HMSP1)
      D(NND+1,NDD+3)=0.5/DETJ+TETA*(1.0/DEXCI*DFQQ2+1.0/DEXPI*DTQQ2+GM*
     1ACPRO1*DSCPQ2+GM*APPRO1*DSPPQ2)
      NND=NND+2
      NDD=NDD+2
   81 CONTINUE
C
C     CONDICIONES DE BORDE
C
      BB(1)=0.0
      KY=KNO-1
      AYUC=SQRT(SOC)/RMC(N)
      AYUP=SQRT(SOP)/RMP(N)
      IF(PP4.GT.0.0) GO TO 36
      APART=0.0
      GO TO 37
   36 APART=AYUP*AP4**1.6667/PP4**0.6667
   37 BB(KNO)=AYUC*AC4**1.6667/PC4**0.6667+APART-Q4
      DACPC=(AC4/PC4)**0.6667*(1.6667*DACH(N)-0.6667*AC4*DPCH(N)/PC4)
      IF(PP4.GT.0.0) GO TO 38
      DAPPP=0.0
      GO TO 39
   38 DAPPP=(AP4/PP4)**0.6667*(1.6667*DAPH(N)-0.6667*AP4*DPPH(N)/PP4)
   39 D(KNO,KY)=AYUC*DACPC+AYUP*DAPPP
      D(KNO,KNO)=-1.0
      DO 180 IKQ=1,KNO
  180 D(IKQ,KNO+1)=-BB(IKQ)
      D(1,2)=1.0
C
C     LLAMADA AL SUBPROGRAMA QUE RESUELVE LA MATRIZ FORMADA
C
      CALL GAUSS(D,KNO)
C
C     COMPARACION ENTRE VALORES ACTUALES Y VALORES ANTERIORES
C
      KKBB=1
      DO 161 I=1,KY,2
      DIFHM(KKBB)=D(I,KNO+1)
      DIFQQ(KKBB)=D(I+1,KNO+1)
  161 KKBB=KKBB+1
      DO 220 I=1,N
      HM(I,J+1)=DIFHM(I)+HM(I,J+1)
      IF(HM(I,J+1).LT.ZZ(I)) HM(I,J+1)=ZZ(I)+0.03
      Q(I,J+1)=DIFQQ(I)+Q(I,J+1)
      IF(Q(I,J+1).LT.0.01) Q(I,J+1)=0.01
      YYY(I   )=HM(I,J+1)-ZZ(I)
      CALL INTERP(A,AM,AC,AP,P,PM,PC,PP,DATH,DPTH,DACH,DAPH,DPCH,
     1DPPH,I,LIND,J,YYY,YM,RMC,RMP,DEXC,DEXP,RHC,RHP,ZI,FI,TAU,YMAX,AMAX
     1,BMAX,PMMAX,N)
      ISIM(I)=LIND
  220 CONTINUE
C     SE OBSERVA SI DIFHM Y DIFQQ SE ENCUENTRAN DENTRO DEL RANGO DE
C     ERROR ACEPTABLE
      IF(ITER.EQ.16) GO TO 241
      DO 240 I=1,KNO
      C=D(I,KNO+1)
      IF(C.LE.0.01.AND.C.GE.-0.01)GO TO 240
      ITER=ITER+1
      GO TO 231
  240 CONTINUE
      DO 288 L=1,N
      K=ISIM(L)
      B(L     )=(BM(L,K)-BM(L,K-1))*(YYY(L     )-YM(L,K-1))/(YM(L,K)-
```

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     1YM(L,K-1))*BM(L,K-1)
0330          INDI=0
0331      288 CONTINUE
0332          GO TO 242
0333      241 CONTINUE
0334          DO 204 L=1,N
0335          K=ISIM(L)
0336          B(L     )=(BM(L,K)-BM(L,K-1))*(YYY(L     )-YM(L,K-1))/(YM(L,K)-
     1YM(L,K-1))*BM(L,K-1)
0337          INDI=1
0338      204 CONTINUE
0339      242 RETURN
0340          END
```

INTI

```
      SUBROUTINE INTI(Q,SOC,SOP,RMC,RMP,A,AC,AP,AM,B,BM,P,PC,PP,PM,I,J,
     1RHC,RHP,YYY,YM,QMAX,YMAX,BMAX,PMMAX,AMAX,ZI,FI,TAU,DEXC,DEXP,N)
      DIMENSION Q(10,20),RMC(10),RMP(10),A(10,2),AC(10,2),AP(10,2),
     1AM(10,50),B(10),BM(10,50),          PC(10,2),PP(10,2),PM(10,50),
     1RHC(10  ),RHP(10  ),YYY(10  ),YM(10,50)
      DIMENSION FI(10,2),TAU(10,2),ZI(10  ),QMAX(10),YMAX(10),BMAX(10
     1),PMMAX(10),AMAX(10),QN(10,50),DEXC(10),DEXP(10)
      QN(I,1)=0.0
      AM(I,1)=0.0
      YM(I,1)=0.0
      BM(I,1)=0.0
      PM(I,1)=0.0
      DO 211 K=2,50
      QN(I,K)=SQRT(SOC)/RMC(I)*AM(I,K)**1.6667/PM(I,K)**0.6667
      IF(QN(I,K).LE.QMAX(I)) GO TO 48
      MET=AMAX(I)+BMAX(I)*(YM(I,K)-YMAX(I))
      QN(I,K)=SQRT(SOC)/RMC(I)*MET**1.6667/PMMAX(I) **0.6667+SQRT(SOP)/
     1RMP(I)*(AM(I,K)-MET)**1.6667/(PM(I,K)-PMMAX(I))**0.6667
   48 IF(Q(I,J)-QN(I,K)) 82,83,211
  211 CONTINUE
      PRINT 4
    4 FORMAT(1H1,30X,19HSOLUCION INDEFINIDA)
      GO TO 94
   83 A(I,1)=AM(I,K)
      B(I  )=BM(I,K)
      P=PM(I,K)
      YYY(I  )=YM(I,K)
      IF(Q(I,J).GT.QMAX(I)) GO TO 97
   98 ZI(I  )=0.0
      FI(I,1)=1.0
      TAU(I,1)=0.0
      AP(I,1)=0.0
      PP(I,1)=0.0
      AC(I,1)=A(I,1)
      PC(I,1)=P
      RHC(I  )=AC(I,1)/PC(I,1)
      RHP(I  )=0.0
      GO TO 94
   82 F=(Q(I,J)-QN(I,K-1))/(QN(I,K)-QN(I,K-1))
      A(I,1)=F*(AM(I,K)-AM(I,K-1))+AM(I,K-1)
      B(I  )=F*(BM(I,K)-BM(I,K-1))+BM(I,K-1)
      P     =F*(PM(I,K)-PM(I,K-1))+PM(I,K-1)
      YYY(I  )=F*(YM(I,K)-YM(I,K-1))+YM(I,K-1)
      IF(Q(I,J).GT.QMAX(I)) GO TO 97
      GO TO 98
   97 AC(I,1)=AMAX(I)+BMAX(I)*(YYY(I  )-YMAX(I))
      AP(I,1)=A(I,1)-AC(I,1)
      PC(I,1)=PMMAX(I)
      PP(I,1)=P     -PMMAX(I)
      RHC(I  )=AC(I,1)/PC(I,1)
      RHP(I  )=AP(I,1)/PP(I,1)
      IF(I.GT.1) GO TO 2
      DEXAC=DEXC(1)
      DEXAP=DEXP(1)
      GO TO 6
    2 IF(I.EQ.N) GO TO 7
      DEXAC=DEXC(I-1)/2.0+DEXC(I)/2.0
      DEXAP=DEXP(I-1)/2.0+DEXP(I)/2.0
      GO TO 6
    7 DEXAC=DEXC(I-1)
      DEXAP=DEXP(I-1)
    6 CONTINUE
      ZI(I  )=RMC(I)/RMP(I)*AP(I,1)/AC(I,1)*(RHP(I  )/RHC(I  ))**0.6667*
     1SQRT(DEXAC/DEXAP)
      FI(I,1)=1.0/(1.0+ZI(I  ))
      TAU(I,1)=ZI(I  )/(1.0+ZI(I  ))
   94 RETURN
      END
```

INTERP

```
      SUBROUTINE INTERP(A,AM,AC,AP,P,PM,PC,PP,DATH,DPTH,DACH,DAPH,DPCH,
     1DPPH,I,LIND,J,YYY,YM,RMC,RMP,DEXC,DEXP,RHC,RHP,ZI,FI,TAU,YMAX,AMAX
     1,BMAX,PMMAX,N)
      DIMENSION A(10,2),AM(10,50),AC(10,2),AP(10,2),        PM(10,50),
     1PC(10,2),PP(10,2),DATH(10),DPTH(10),DACH(10),DAPH(10),DPCH(10),
     1DPPH(10),YYY(10  ),YM(10,50),RMC(10),RMP(10),DEXC(10),DEXP(10),
     1RHC(10  ),RHP(10  ),ZI(10  ),FI(10,2),TAU(10,2),YMAX(10),
     1AMAX(10),BMAX(10),PMMAX(10)
      AM(I,1)=0.0
      PM(I,1)=0.0
      DO 43 K=2,50
      IF(YYY(I    )-YM(I,K)) 41,42,43
   43 CONTINUE
      PRINT 9
    9 FORMAT(1H1,30X,18HSOLUCION IMPOSIBLE)
      GO TO 50
   42 P       =PM(I,K)
      A(I,2  )=AM(I,K)
      DPTH(I)=(PM(I,K+1)-PM(I,K-1))/(YM(I,K+1)-YM(I,K-1))
      DATH(I)=(AM(I,K+1)-AM(I,K-1))/(YM(I,K+1)-YM(I,K-1))
      IF(YYY(I  ).GT.YMAX(I)) GO TO 47
   48 ZI(I  )=0.0
      FI(I,2)=1.0
      TAU(I,2)=0.0
      AC(I,2  )=A(I,2)
      AP(I,2)=0.0
      PC(I,2  )=P
      PP(I,2)=0.0
      RHC(I    )=AC(I,2  )/PC(I,2)
      RHP(I  )=0.0
      DACH(I)=DATH(I)
      DAPH(I)=0.0
      DPCH(I)=DPTH(I)
      DPPH(I)=0.0
      LIND = K
      GO TO 50
   41 DATH(I)=(AM(I,K)-AM(I,K-1))/(YM(I,K)-YM(I,K-1))
      DPTH(I)=(PM(I,K)-PM(I,K-1))/(YM(I,K)-YM(I,K-1))
      P       =DPTH(I)*(YYY(I    )-YM(I,K-1))+PM(I,K-1)
      A(I,2  )=DATH(I)*(YYY(I    )-YM(I,K-1))+AM(I,K-1)
      IF(YYY(I    ).GT.YMAX(I)) GO TO 47
      GO TO 48
   47 AC(I,2  )=AMAX(I)+BMAX(I)*(YYY(I    )-YMAX(I))
      AP(I,2  )=A(I,2  )-AC(I,2)
      PC(I,2  )=PMMAX(I)
      PP(I,2  )=P       -PMMAX(I)
      RHC(I    )=AC(I,2  )/PC(I,2)
      RHP(I    )=AP(I,2  )/PP(I,2)
      DACH(I)=BMAX(I)
      DAPH(I)=DATH(I)-BMAX(I)
      DPCH(I)=0.0
      DPPH(I)=DPTH(I)
      IF(I.GT.1) GO TO 2
      DEXAC=DEXC(1)
      DEXAP=DEXP(1)
      GO TO 6
    2 IF(I.EQ.N) GO TO 7
      DEXAC=DEXC(I-1)/2.0+DEXC(I)/2.0
      DEXAP=DEXP(I-1)/2.0+DEXP(I)/2.0
      GO TO 6
    7 DEXAC=DEXC(I-1)
      DEXAP=DEXP(I-1)
    6 CONTINUE
      ZI(I    )=RMC(I)/RMP(I)*AP(I,2  )/AC(I,2  )*(RHP(I    )/RHC(I    )
     1)**0.6667*SQRT(DEXAC/DEXAP)
      FI(I,2  )=1.0/(1.0+ZI(I  ))
      TAU(I,2  )=ZI(I    )/(1.0+ZI(I  ))
      LIND=K
   50 RETURN
      END
```

GAUSS

```
      SUBROUTINE GAUSS(A,N)
      DIMENSION A(20,21)
      N1=N+1
      DO 77 I=1,N
      IP1=I+1
      AMAX=0.
      L=I
      J=I+2
      DO 11 K=I,J
      IF(AMAX.GE.ABS(A(K,I))) GO TO 61
      L=K
      AMAX=ABS(A(K,I))
   61 IF(K.GE.N) GO TO 7
   11 CONTINUE
    7 IF(AMAX.EQ.0.) GO TO 19
      IF(L.EQ.I) GO TO 13
      LE=I+3
      DO 12 J=I,LE
      AUX=A(I,J)
      A(I,J)=A(L,J)
      A(L,J)=AUX
      IF(J.GE.N1) GO TO 13
   12 CONTINUE
      AUX1=A(I,N1)
      A(I,N1)=A(L,N1)
      A(L,N1)=AUX1
   13 M1=IP1+2
      DO 14 J=IP1,M1
      A(I,J)=A(I,J)/A(I,I)
      IF(J.GE.N1) GO TO 49
   14 CONTINUE
      A(I,N1)=A(I,N1)/A(I,I)
   49 IF(I.EQ.N) GO TO 16
      IF (I.EQ.(N-1)) GO TO 25
      DO 15 J=IP1,N1
      A(I+1,J)=A(I+1,J)-A(I+1,I)*A(I,J)
   15 A(I+2,J)=A(I+2,J)-A(I+2,I)*A(I,J)
      GO TO 77
   25 A(I+1,IP1)=A(I+1,IP1)-A(I+1,I)*A(I,IP1)
      A(I+1,IP1+1)=A(I+1,IP1+1)-A(I+1,I)*A(I,IP1+1)
   77 CONTINUE
   16 IF(N.EQ.1) GO TO 18
      DO 17 L=2,N
      I=N-L+1
      IP1=I+1
      DO 17 K=IP1,N
   17 A(I,N1)=A(I,N1)-A(K,N1)*A(I,K)
   18 CONTINUE
    4 FORMAT(1H1,30X,18HSOLUCION IMPOSIBLE)
      GO TO 20
   19 PRINT 4
   20 RETURN
      END
```

SIMULACION DEL TRANSITO EN UNA PLANICIE DE INUNDACION POR
EL METODO IMPLICITO

INTERVALO DE DISTANCIA ENTRE SECCIONES= 300.00MTS.
TIEMPO EN MINUTOS
CAUDALES EN METROS CUBICOS POR SEGUNDO
ALTURAS DE AGUA EN METROS
RUGOSIDAD DE MANNING DEL CANAL=0.0350
PENDIENTE DE FONDO DEL CANAL=0.00100

TIEMPO	I=	1	2	3	4	5	6	7	8	9	10	SOLUCION
0.0	Q=	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	ESTABLE
	YY=	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	
	BS=	58.73	58.73	58.73	58.73	58.73	58.73	58.73	58.73	58.73	58.73	
3.333	Q=	90.00	59.58	62.81	60.57	59.84	59.61	59.53	59.51	59.49	59.54	ESTABLE
	YY=	2.08	1.96	1.92	1.90	1.90	1.90	1.90	1.90	1.90	1.90	
	BS=	62.52	60.21	59.22	58.89	58.78	58.75	58.74	58.73	58.73	58.72	
6.667	Q=	120.00	99.70	79.25	68.13	63.08	60.96	60.13	59.81	59.72	59.61	ESTABLE
	YY=	2.31	2.16	2.03	1.96	1.92	1.91	1.90	1.90	1.90	1.90	
	BS=	66.55	63.88	61.58	60.05	59.27	58.94	58.81	58.76	58.73	58.74	
10.000	Q=	150.00	127.04	107.60	87.75	73.97	66.45	62.64	60.90	60.10	59.76	ESTABLE
	YY=	2.53	2.37	2.22	2.09	2.00	1.95	1.92	1.91	1.90	1.90	
	BS=	70.93	67.70	65.05	62.71	61.04	59.83	59.22	58.93	58.82	58.78	
13.333	Q=	180.00	156.70	133.87	114.71	95.64	80.15	70.44	64.99	62.14	60.51	ESTABLE
	YY=	2.74	2.59	2.43	2.29	2.15	2.05	1.98	1.94	1.92	1.91	
	BS=	76.73	72.38	68.75	66.14	63.73	61.87	60.53	59.62	59.15	59.01	
16.667	Q=	210.00	186.33	163.25	140.65	121.44	102.91	86.51	74.86	67.78	63.85	ESTABLE
	YY=	2.94	2.79	2.64	2.48	2.34	2.21	2.10	2.01	1.96	1.94	
	BS=	82.45	78.06	73.80	69.73	67.16	64.73	62.72	61.25	60.15	59.77	
20.000	Q=	240.00	215.28	192.60	169.78	147.16	127.79	109.69	92.96	79.56	69.38	ESTABLE
	YY=	3.12	2.99	2.83	2.68	2.54	2.39	2.26	2.14	2.05	2.02	
	BS=	94.03	89.61	79.34	75.12	70.98	68.10	65.70	63.56	61.96	61.43	
23.333	Q=	270.00	245.86	220.60	198.25	176.13	153.56	133.87	116.01	98.86	82.27	ESTABLE
	YY=	3.27	3.15	3.02	2.88	2.73	2.58	2.44	2.31	2.20	2.16	
	BS=	105.24	98.49	85.82	80.55	76.39	72.33	68.99	66.62	64.57	63.84	
26.667	Q=	300.00	277.72	253.38	227.05	203.84	182.37	159.93	139.61	120.96	101.25	ESTABLE
	YY=	3.41	3.31	3.19	3.06	2.92	2.77	2.63	2.49	2.38	2.35	
	BS=	117.74	109.07	99.26	88.78	81.73	77.64	73.64	69.90	67.88	67.24	
30.000	Q=	330.00	307.15	285.71	261.72	234.71	209.90	188.62	166.17	143.60	122.69	ESTABLE
	YY=	3.54	3.44	3.34	3.22	3.10	2.96	2.82	2.68	2.58	2.55	
	BS=	132.09	120.30	111.92	102.33	92.03	82.95	78.90	75.03	72.12	71.30	
33.333	Q=	360.00	333.51	311.46	291.74	269.51	242.93	216.47	193.89	170.84	146.34	ESTABLE
	YY=	3.64	3.56	3.47	3.37	3.26	3.14	3.01	2.88	2.77	2.74	
	BS=	151.31	135.68	122.39	114.50	105.37	95.36	84.62	80.56	77.65	76.85	
36.667	Q=	390.00	364.13	337.18	314.67	296.28	275.94	250.90	222.70	197.30	172.71	ESTABLE
	YY=	3.74	3.65	3.57	3.49	3.40	3.30	3.18	3.07	2.98	2.96	
	BS=	170.99	154.40	138.95	124.18	116.73	108.22	98.62	89.44	83.50	82.92	
40.000	Q=	420.00	394.24	368.96	341.85	317.94	299.90	280.34	257.38	229.88	202.78	ESTABLE
	YY=	3.84	3.76	3.67	3.59	3.51	3.42	3.33	3.24	3.16	3.13	
	BS=	189.35	173.93	157.63	141.95	126.75	118.67	111.21	103.34	96.80	94.95	
43.333	Q=	450.00	424.89	398.93	373.74	347.22	321.51	302.45	283.85	262.80	237.17	ESTABLE
	YY=	3.94	3.85	3.77	3.69	3.61	3.53	3.45	3.38	3.32	3.31	
	BS=	208.23	192.39	176.87	160.98	144.95	130.59	121.08	114.99	110.21	109.05	
46.667	Q=	360.00	399.40	404.09	392.25	372.94	350.20	324.88	304.14	285.49	267.02	ESTABLE
	YY=	3.45	3.87	3.83	3.77	3.70	3.62	3.55	3.49	3.45	3.45	
	BS=	190.65	194.74	187.87	176.19	162.86	148.04	135.10	124.56	121.28	120.67	
50.000	Q=	270.00	310.27	350.16	370.39	373.48	364.00	348.03	326.50	305.93	288.10	ESTABLE
	YY=	3.67	3.73	3.78	3.78	3.74	3.70	3.63	3.58	3.54	3.54	
	BS=	157.21	169.62	177.67	177.87	171.44	162.15	150.61	139.96	133.15	132.17	
53.333	Q=	180.00	239.48	278.74	313.57	337.62	349.35	349.06	340.43	325.31	306.73	ESTABLE
	YY=	3.41	3.56	3.64	3.69	3.72	3.71	3.68	3.65	3.61	3.61	
	BS=	118.01	136.98	152.24	161.80	166.05	164.33	159.22	152.55	146.36	145.75	
56.667	Q=	120.00	158.98	210.83	253.22	286.85	311.16	325.99	331.57	328.79	320.72	ESTABLE
	YY=	3.11	3.29	3.44	3.56	3.62	3.66	3.67	3.66	3.66	3.66	
	BS=	93.05	106.05	121.57	136.61	148.19	154.80	156.77	156.00	155.15	155.75	
60.000	Q=	60.00	108.71	145.26	185.83	226.69	262.73	289.08	305.52	314.31	321.00	ESTABLE
	YY=	2.76	3.01	3.13	3.35	3.47	3.56	3.61	3.64	3.66	3.66	
	BS=	77.32	85.14	95.04	112.49	122.95	135.68	145.00	151.00	154.80	155.94	
63.333	Q=	60.00	74.09	100.45	130.53	170.42	203.41	237.45	267.51	289.76	307.89	ESTABLE
	YY=	2.64	2.73	2.95	3.11	3.25	3.38	3.49	3.55	3.61	3.61	
	BS=	71.14	76.32	82.57	93.06	104.51	115.50	124.75	136.92	145.19	146.58	

ANEXO VII

INSTRUCTIVO DEL USO DEL PROGRAMA

PLANICIE

Programa PLANICIE

Propósito.

Simular el tránsito de la escorrentía en ríos con planicie inundable, es decir, aquellos ríos cuyas aguas en caso de avenidas, rebasan el cauce natural. Se utiliza un hidrograma de entrada, las condiciones iniciales de flujo en la longitud estudiada, la topografía real de cada una de las secciones y las características físicas tanto del cauce como de la planicie del río.

Capacidad.

La versión presentada tiene capacidad para veinte secciones y cien intervalos de tiempo cuyos valores dependen de la duración de la crecida o el período en que se desea simular la escorrentía. Este programa también toma en cuenta el efecto de meandreo del río dentro de la planicie.

Forma de salida.

Las salidas del programa PLANICIE incluyen el caudal, altura y ancho superficial alcanzados por el agua, ya sea dentro del cauce o al desbordarse, en cada una de las secciones estudiadas. Además de los valores de profundidad y ancho superficial máximos, alcanzados en cada una de las secciones durante todo el período de tránsito.

Datos de entrada.

La manera de leer los datos de entrada se muestran en el formato que se presenta a continuación:

TARJETA Nº

CIDIAT CENTRO INTERAMERICANO DE DESARROLLO INTEGRAL DE AGUAS Y TIERRAS

BANCO DE PROGRAMAS

PROGRAMA: PLANICIE

CODIGO:

FECHA: 1

VARIABLE	N	NT	NM	SOC	SOP	TETA	CRC	CRP			
Formato	I8	I8	I8	F8.4	F8.4	F8.4					
Valor	10	20	8	0.0010	0.0010	0.55	0.035	0.1035			
VARIABLE	BMAX(1)	BMAX(2)	BMAX(3)	BMAX(4)	BMAX(5)	BMAX(6)	BMAX(7)	BMAX(8)	BMAX(9)	BMAX(10)	
Formato	10F8.3										
Valor	40.0	45.0	38.0	40.0	32.0	60.0	50.0	47.0	62.0	30.5	
VARIABLE	PMMAX(1)	PMMAX(2)	PMMAX(3)	PMMAX(4)	PMMAX(5)	PMMAX(6)	PMMAX(7)	PMMAX(8)	PMMAX(9)	PMMAX(10)	
Formato	10F8.3										
Valor	50.0	65.0	50.0	52.0	40.0	30.0	55.0	42.0	44.0	20.5	
VARIABLE	AMAX(1)	AMAX(2)	AMAX(3)	AMAX(4)	AMAX(5)	AMAX(6)	AMAX(7)	AMAX(8)	AMAX(9)	AMAX(10)	
Formato	10F8.3										
Valor	150.0	130.0	155.0	120.0	110.0	140.0	120.0	150.0	140.0	120.0	
VARIABLE	YMAX(1)	YMAX(2)	YMAX(3)	YMAX(4)	YMAX(5)	YMAX(6)	YMAX(7)	YMAX(8)	YMAX(9)	YMAX(10)	
Formato	10F8.3										
Valor	10.0	11.0	10.0	13.0	9.0	14.0	12.0	11.0	13.0	14.0	
VARIABLE	DEXC(1)	DEXC(2)	DEXC(3)	DEXC(4)	DEXC(5)	DEXC(6)	DEXC(7)	DEXC(8)	DEXC(9)	DEXC(10)	
Formato	10F8.3										
Valor	300.	300.	300.0	400.0	350.0	250.0	550.0	400.0	300.0	250.0	
VARIABLE	DEXP(1)	DEXP(2)	DEXP(3)	DEXP(4)	DEXP(5)	DEXP(6)	DEXP(7)	DEXP(8)	DEXP(9)	DEXP(10)	
Formato	10F8.3										
Valor	300.0	300.0	300.0	400.0	350.0	250.0	550.0	400.0	300.0	250.0	
VARIABLE	DET(1)	DET(2)	DET(3)	DET(4)	DET(5)	DET(6)	DET(7)	DET(8)	DET(9)	DET(10)	
Formato	19F8.3										
Valor	150.0	150.0	160.0	170.0	160.0	160.0	150.0	150.0	150.0	140.0	

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TARJETA Nº

CIDIAT CENTRO INTERAMERICANO DE DESARROLLO INTEGRAL DE AGUAS Y TIERRAS

BANCO DE PROGRAMAS

PROGRAMA: PLANICIE

CODIGO.

FECHA: 2

VARIABLE	DET(11)	DET(12)	DET(13)	DET(14)	DET(15)	DET(16)	DET(17)	DET(18)	DET(19)	
Formato										
Valor	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	
VARIABLE	Q(1,1)	Q(2,1)	Q(3,1)	Q(4,1)	Q(5,1)	Q(6,1)	Q(7,1)	Q(8,1)	Q(9,1)	Q(10,1)
Formato	10F8.3									
Valor	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
VARIABLE	Q(1,1)	Q(1,2)	Q(1,3)	Q(1,4)	Q(1,5)	Q(1,6)	Q(1,7)	Q(1,8)	Q(1,9)	Q(1,10)
Formato	20F8.3									
Valor	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	100.0
VARIABLE	Q(1,11)	Q(1,12)	Q(1,13)	Q(1,14)	Q(1,15)	Q(1,16)	Q(1,17)	Q(1,18)	Q(1,19)	Q(1,20)
Formato										
Valor	90.0	80.0	70.0	60.0	50.0	40.0	30.0	20.0	20.0	20.0
VARIABLE	AM(1,1)	AM(1,2)	AM(1,3)	AM(1,4)	AM(1,5)	AM(1,6)	AM(1,7)	AM(1,8)	Repetir los valores tabulares para todas	
Formato	8F8.3									
Valor	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0		
VARIABLE	PM(1,1)	PM(1,2)	PM(1,3)	PM(1,4)	PM(1,5)	PM(1,6)	PM(1,7)	PM(1,8)	las secciones	
Formato	8F8.3									
Valor	0.0	5.5	10.5	15.5	20.8	25.8	30.9	35.9		
VARIABLE	BM(1,1)	BM(1,2)	BM(1,3)	BM(1,4)	BM(1,5)	BM(1,6)	BM(1,7)	BM(1,8)		
Formato	8F8.3									
Valor	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0		
VARIABLE	YM(1,1)	YM(1,2)	YM(1,3)	YM(1,4)	YM(1,5)	YM(1,6)	YM(1,7)	YM(1,8)		
Formato	8F8.3									
Valor	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0		

Equivalencia de las variables de entrada, utilizadas en el programa PLANICIE

AM(I,K)	Datos tabulares del área mojada para diferentes niveles en cada sección en estudio
AMAX(I)	Area máxima de flujo en el cauce del río, antes del desborde
BM(I,K)	Datos tabulares del ancho superficial para diferentes niveles en cada sección en estudio
BMAX(I)	Ancho máximo de flujo en el cauce del río, antes del desborde
CRC	Coeficiente de rugosidad de Manning para el cauce del río
CRP	Coeficiente de rugosidad de Manning en la planicie
DET(J)	Intervalo de tiempo utilizado para el tránsito
DEXC(L)	Intervalo de distancia entre secciones a lo largo del cauce, el cual debe ser menor de 5.000 metros
DEXP(L)	Intervalo de distancia entre secciones a lo largo de la planicie, el cual debe ser menor de 5.000 metros
I	Indice que va del 1 al número total de secciones estudiadas, N
J	Indice que va del 1 al número total de intervalos de tiempo tomados, NT
K	Indice que va del 1 al número total de medidas tabulares tomadas en cada sección, NM
L	Indice que va del 1 al número total de subtramos estudiados, N-1
N	Número total de secciones estudiadas, el programa acepta un máximo de 20 secciones.
NM	Número total de medidas tabulares hechas en cada sección, el programa acepta un máximo de 50 medidas tabulares en cada sección.

NT	Número total de intervalos de tiempo para el tránsito, el programa acepta un máximo de 100 intervalos de tiempo
PM(I,K)	Datos tabulares del perímetro mojado para diferentes niveles en cada sección en estudio
PMMAX(I)	Perímetro mojado máximo del flujo en el cauce del río, antes del desborde
Q(I,1)	Caudal en cada sección en estudio, al inicio del tránsito
Q(1,J)	Hidrograma de entrada
SOC	Pendiente promedio a lo largo del cauce del río
SOP	Pendiente promedio a lo largo de la planicie
TETA	Factor de ponderación propio del método numérico utilizado, para este caso vale 0.55
YM(I,K)	Datos tabulares de la profundidad para diferentes niveles en cada sección en estudio.

Equivalencia de las variables de salida, dadas por el programa PLANICIE

ALMAX(I)	Tirante máximo alcanzado en cada sección en estudio durante todo el período de tránsito
BS(I)	Ancho superficial alcanzado por el flujo en cada sección en estudio, para cualquier intervalo de tiempo
I	Parámetro que indica la sección en estudio considerada
Q(I)	Caudal que pasa por cada sección en estudio, para cualquier intervalo de tiempo.

TMAX(I) Ancho superficial máximo alcanzado por el flujo en cada una de las secciones

YY(I) Tirante del flujo en cada sección en estudio, para cualquier intervalo de tiempo

En la Figura A.VII.1 se presenta el esquema ilustrativo para la obtención de los datos tabulares del área, profundidad, perímetro mojado y ancho superficial en cada sección en estudio.

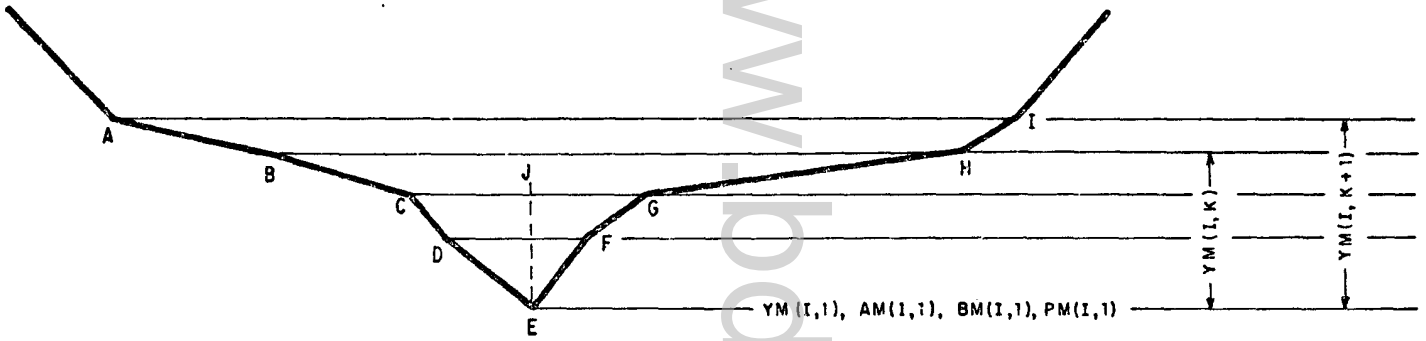


Figura A.VII.1 Esquema ilustrativo para la obtención de los datos tabulares del área, profundidad, perímetro mojado y ancho superficial en cada sección en estudio.

En donde:

AM(I,K) está representada por el área encerrada entre los puntos BCDEFGH
PM(I,K) está representado por la suma de los segmentos $\overline{BC}$,$\overline{CD}$,$\overline{DE}$,$\overline{EF}$,$\overline{FG}$ y $\overline{GH}$
BM(I,K) está representado por el segmento $\overline{BH}$

AMAX(I) está representada por el área encerrada entre los puntos CDEFG
PMMAX(I) está representado por la suma de los segmentos $\overline{CD}$,$\overline{DE}$,$\overline{EF}$ y $\overline{FG}$
BMAX(I) está representado por el segmento $\overline{CG}$
YMAX(I) está representado por la altura $\overline{EJ}$

ANEXO VIII

INSTRUCTIVO DE USO DEL MODELO STANFORD IV ORIGINAL

Entradas del modelo hidrológico STANFORD IV, versión NWS

Variable	Formato	Significado
INFRO ( )	20A4	Información general sobre la corrida
**********		
BASIN	20A4	Nombre de la cuenca
**********		
MO1	I5	Primer mes, y
YR1	I5	Ultimos dos dígitos del primer año de la corrida
MO2	I5	Ultimo mes, y
YR2	I5	Ultimos dos dígitos del último año de la corrida
NPTS	I5	Número de puntos de cálculo del caudal
PXIN	I5	Número de medidores de precipitación que aportan hacia el cauce
NGAGES	I5	Número de medidores de precipitación utilizados en la simulación
RGIN ( )	5I3	Medidores que aportan al caudal y orden en que van a ser asignados

NOTA: Por ejemplo, supongamos PXIN=10,NGAGES=3, RGIN ( ) 8, 2, 6. En este caso, el 8° medidor de precipitación que aporta al cauce será el medidor 1 para la simulación; el 2°medidor que aporta al cauce será el medidor 2 para la simulación; etc.

OUTHR	I5	Si 1, se dan como salida los caudales horarios simulados
LINEP	I5	Promedio diario de QS en ploteado si = 1
NOFLW	I5	Si 1, suprime impresión del sumario mensual de caudales observados y simulados
AVEPE	I5	Si 1, usa evaporación media mensual
POWER	F5.1	Exponente de la ecuación de la curva de infiltración
SIXHR	I5	Si 1, se utiliza lluvia promedio de cada 6 horas
GN HR	I5	Si 1, se utiliza precipitación acumulada cada 6 horas
STORE	I5	Si 1, almacena entradas del canal sobre el conjunto de datos, DSRO
ROUTE	I5	Sólo igual a 1 si STORE = 1
DSRO	I5	Si = 0, los dos anteriores = 0
SNOW	I5	Si 1, se considera nieve
POINT	I5	Puntos de computación de nieve si = 1
INOUT	I5	Salidas de variables de nieve, si = 1
VAREP	I5	Si 1, varía el valor de la evaporación
UZSNWF	F5.2	Factor de ponderación en la ecuación UZSNT=UZSN+ UZSNWF*AEPI

****

PEADJ ( )	12F5.3	Factor de ajuste mensual de ETP; POINT = 0

****

GAGEPE ( )	5F5.3	Factor de ajuste de ETP; POINT = 0

****

EVAPM ( )	12F5.3	Promedio de evaporación mensual. Sólo si AVEPE=1, POINT = 0

****

SDEP	F5.2	Desviación standard de ETP, en %	SOLO
EPBIAS	F5.2	Sesgo de ETP, en %	SI
IXEP	I10	Código entero para el inicio de la generación de números aleatorios	VAREP=1

****

RGN	5A4	Nombre de estación pluviométrica
K1 (IRG)	F5.2	Relación entre el promedio de precipitación del segmento con respecto al promedio de la precipitación puntual
IMPV (IRG)	F5.2	Fracción del área del segmento ocupada por superficies impermeables, lagos y cauces
EPXM (IRG)	F5.2	Capacidad máxima de intercepción
UZSN (IRG)	F5.1	Almacenamiento nominal del almacenamiento de la zona alta
LZSN (IRG)	F5.1	Almacenamiento nominal del almacenamiento de la zona baja
CB (IRG)	F5.2	Indice de infiltración
CC (IRG)	F5.2	Indice de flujo subsuperficial
K3 (IRG)	F5.2	Indice de pérdida por evaporación real
K24L (IRG)	F5.2	Porción de la recarga de agua subterránea asignada a percolación profunda
K24EL (IRG)	F5.2	Evapotranspiración desde el almacenamiento del agua subterránea

****

L	20X,F5.0	Distancia media recorrida por el escurrimiento superficial en la vertiente, en metros

SS	F5.2	Pendiente media de la vertiente
NN	F5.2	Coeficiente de Manning para el escurrimiento superficial en la vertiente
IRC	F5.2	Coeficiente de recesión del flujo subsuperficial
KK24	F5.3	Tasa básica de la recesión del agua subterránea
KV (IRG)	F5.2	Componente variable de la recesión del agua subterránea

****

UZSI (IRG)	20X,F5.2	Almacenamiento inicial en la zona alta
LZSI (IRG)	F5.2	Almacenamiento inicial en la zona baja
SGWI (IRG)	F5.2	Almacenamiento inicial de agua subterránea
GWSI (IRG)	F5.2	Parámetro inicial de agua subterránea
RESI (IRG)	F5.2	Almacenamiento inicial de detención superficial
SRGXI (IRG)	F5.2	Almacenamiento residual inicial del escurrimiento sobre la superficie impermeable
SCEPI (IRG)	F5.2	Almacenamiento inicial en depresiones del suelo
AEPI (IRG)	F5.2	Indice de ETP antecedente

****

FPN ( )	7A4	Nombre de estación de cálculo de Q
AREA	2X, F10.2	Area en Km^2
KS1	F5.2	Parámetro constante de atenuación en el canal K
VARK	I5	K variable, si = 1
VARL	I5	LAG variable, si = 1
RTEINT	I5	Intervalo de tránsito, en horas
ELEMTS	I5	Número de elementos en el histograma tiempo-área

****

BASEK	F10.0	Intervalo para K variable - CFS VARK = 1
KSIV ( )	10F5.2	Curva de K variable
**********		
KSIV ( )	10X,10F5.2	Remanente de curva
**********		
BASFL	F10.0	Intervalo para LAG variable - CFS VARL = 1
LAG ( )	1015	Curva de LAG variable
**********		
CHECK ( )	30X,15	= 1 si el caudal observado es en intervalos de 6 hr = 2 si el caudal observado es horario = 0 si no es ninguno de los dos
COMPAR	15	Flujo medio mensual observado si = 1
PLOT	15	Plotea QMD si = 1
PLOTHR	15	Plotea QS horario o cada 6 horas si = 1
MINFW	F10.0	Cuando QMD<MINFW no se escribe el resumen horario del caudal para el día a que corresponde QMD
PLOTMX	F10.0	Máxima ordenada de QMD que se plotea
PHRMX	F10.0	Máxima ordenada horaria o de cada 6 horas
**********		
TIMEAR ( )	30X,10F5.2	Tiempo de retardo del histograma en CHANNEL
**********		
GAGEAR ( )	30X,1015	Número de los medidores de precipitación a ser utilizados en cada segmento de TIMEAR ( )
**********		
ADDFW1 ( )	30X,1015	FLOW cada punto de entrada
**********		

ADDFW2 ( )	30X,1015	Segmentos de TIMEAR ( ). Máx. = 2 por segmento
**********		
**********		
SNOWA ( )	1215	Meses cuando se considera nieve. SNOW =1 si se considera; = 0 si no.
**********		
EVAP ( )	Entrada diaria	PE diario, sólo si AVEPE = 1
ACTFLW	Entrada diaria 36 tarjetas	Caudal diario observado para cada punto de cálculo del caudal. COMPAR = 0; POINT = 0
**********		
DISP	I5	Sólo si ROUTE = 1
DSN	I5	Número de la unidad donde se van a almacenar los datos de precipitación
SKIP	I5	Número de registros que deben ser soltados sobre la cinta o disco para llegar a la posición correcta. Es = 0 si se usan tarjetas
**********		
PX( )	Formato SWM	Datos de precipitación horaria. 99 en cols. 1-2 después de cada medidor
**********		
FLOW1	Formato de caudal horario	Caudal horario observado para días seleccionados; si CHECK = 2 y POINT=0. Tarjeta 99 indica el fin de los datos para cada punto de medición del caudal
**********		
FLOW1	Formato p/caudal de 6 horas	Caudal de cada seis horas para días seleccionados pies^3/seg - POINT = 0

TARJETA Nº

CIDIAT — CENTRO INTERAMERICANO DE DESARROLLO INTEGRAL DE AGUAS Y TIERRAS

BANCO DE PROGRAMAS

PROGRAMA:

CODIGO: | FECHA:

VARIABLE	INFRO (Información general de la corrida)
Formato	20A4
Valor	SIMULACION PARAMETRICA
VARIABLE	BASIN (nombre de la cuenca)
Formato	20A4
Valor	RIO BOCONO
VARIABLE	MO1 | YR1 | MO2 | YR2 | NPTS | PXIN | NGAGES | RGIN
Formato	15 | 15 | 15 | 15 | 15 | 15 | 15 | 513
Valor	1 | 71 | 12 | 71 | 1 | 2 | 2 | 1 | 2
VARIABLE	OUTHR | LINEP | NOFLW | AVEPE | POWER | SIXHR | CNGHR | STORE | ROUTE | DSRO | SNOW | POINT | INOUT | VAREP | UZSNWF
Formato	15 | 15 | 15 | 15 | F5.1 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | F5.2
Valor	0 | 1 | 1 | 0 | 2.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0
VARIABLE	PEADJ (Sólo si POINT = 0)
Formato	12F5.3
Valor	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75
VARIABLE	GAGEPE (Sólo si POINT = 0)
Formato	5F5.3
Valor	1.0 1.0
VARIABLE	EVAPM (Sólo si POINT = 0 y AVEPE = 1)
Formato	12F5.3
Valor	
VARIABLE	SDEP | EPBIAS | IXEP (Sólo si VAREP = 1)
Formato	F5.2 | F5.2 | I10
Valor	

TARJETA Nº

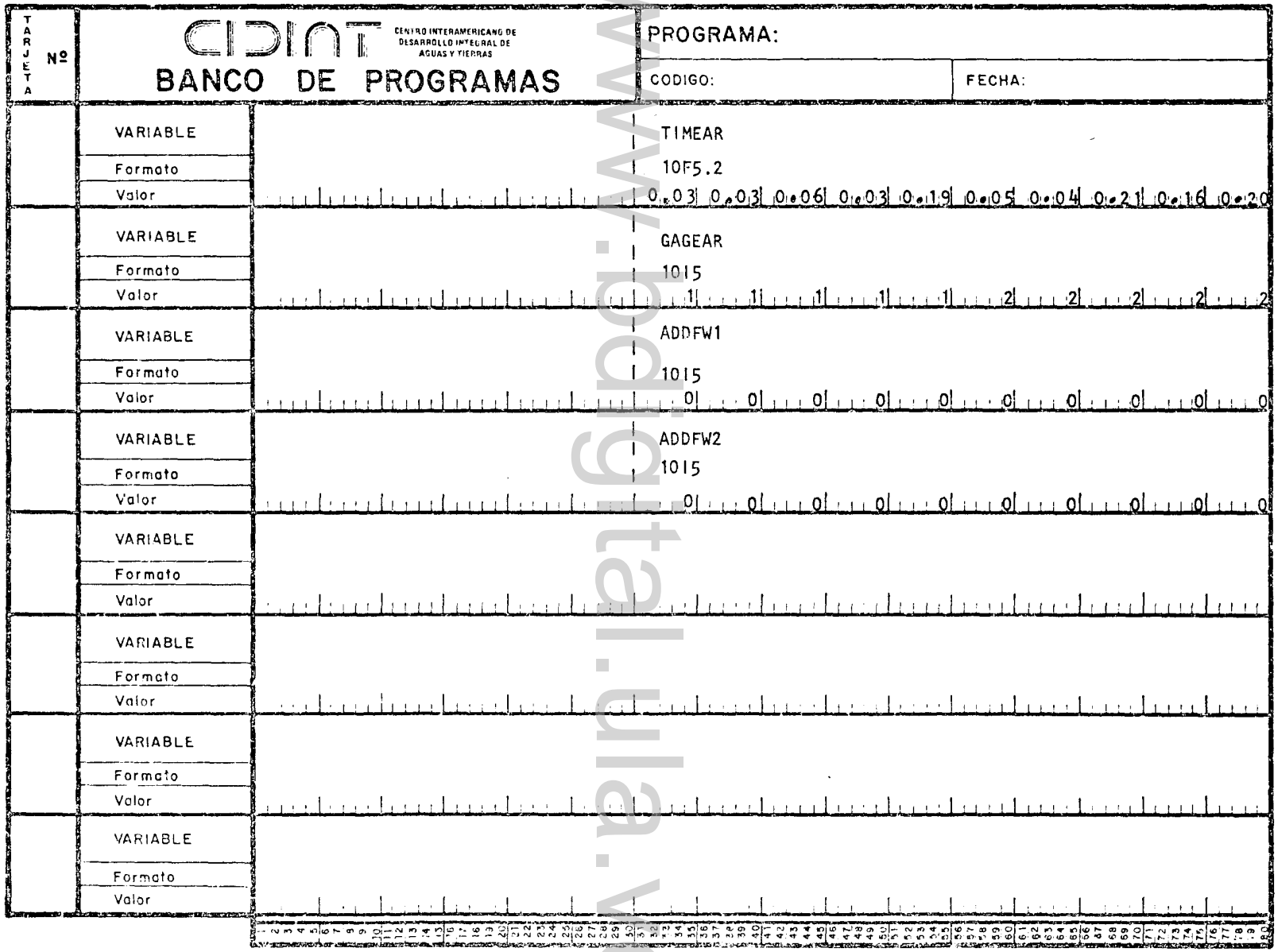
CIDIAT CENTRO INTERAMERICANO DE DESARROLLO INTEGRAL DE AGUAS Y TIERRAS

BANCO DE PROGRAMAS

PROGRAMA:

CODIGO: FECHA:

VARIABLE	RGN	K1	IMPV	EPXM	UZSN	LZSN	CB	CC	K3	K24L	K24EL		Repetir
Formato	5A4	F5.2	F5.2	F5.2	F5.2	F5.2	F5.2	F5.2	F5.2	F5.2	F5.2		para
Valor	SAN RAFAEL DE BOCONO	1.95	0.05	0.10	0.32	4.02	1.25	60.0	0.30	0.0	0.0		cada
VARIABLE	RGN	L	SS	NN	IRC	KK24	KV						Estación
Formato	5A4	F5.0	F5.2	F5.2	F5.2	F5.3	F5.2						de
Valor	SAN RAFAEL DE BOCONO	100.	0.10	0.35	0.55	0.95	0.0						Precipita-
VARIABLE	RGN	UZSI	LZSI	SGWI	GWSI	RESI	SRGXI	SCEPI	AEPI				ción.
Formato	5A4	F5.2	F5.2	F5.2	F5.2	F5.2	F5.2	F5.2	F5.2				
Valor	SAN RAFAEL DE BOCONO	0.30	3.91	2.00	0.0	1.0	1.0	1.50	0.0				
VARIABLE	FPN			AREA	KS1	VARK	VARL	RTEIN	ELEMTS				Repetir
Formato	7A4			F10.2	F5.2	15	15	15	15				para
Valor	BOCONO EN BOCONO			513.0	0.85	0	0	1	10				cada
VARIABLE	BASEK	KSIV											punto
Formato	F10.0	10F5.2		(Sólo si VARK = 1)									de
Valor													Caudal
VARIABLE		KSIV											
Formato		10F5.2		(Sólo si VARK=1)									
Valor													
VARIABLE	BASEL	LAG											
Formato	F10.0	10I5		(Sólo si VARL = 1)									
Valor													
VARIABLE				CHECK	COMPAR	PLOT	PLOTHR	MINFW		PLOTMX		PHRMX	
Formato				15	15	15	15	F10.0		F10.0		F10.0	
Valor				0	1	1	0	10.		100.		0.	



ANEXO IX

LISTADO Y RESULTADOS DEL MODELO STANFORD IV ORIGINAL

```
                    MAIN
      INTEGER YR2,COMPAR(10),YR,HR,WY,BASE,CTEST,CUTHR,PXIN,PGIN(5),
     1PTEST,PLOT(10),PLOTHR(10),CKTEST,HRTEST,COUNT,DISP,DSN,
     2T1,T2,DSRO,CN6HR,STORE,ROUTE,SKIP,SNOWA(12),
     3TITLE,TITLE1
      REAL LZSI(5), MINEW(10),INCHES(12),KEPTRO(744),MOCHAR(12),
     1KEPTPX(31,24),L,NN,IRC,KK24,INAREA,MINEWT
      DIMENSION UZSI(5),SGWI(5),RESI(5),SRGXI(5),SCEPI(5),RECDBS(11),
     1RECPX(12),RGN(5),SSF(10,12),SAF(10,12),AREA(10),RECFW(4),PXSIX(4),
     2NUM(12),LASTDA(2,12),HREN(6)
C MAIN,HOURLY AND DAILY VARIABLES
      INTEGER FIRST,CHECK(10)
      COMMON/MHD/FLOW1(10,744),PHRMX(10),EPN(7),EPNAME(10,7),PLOTMX(10),
     1ACTFLW(10,12,31),SIMFLW(10,12,31),FIRST,CHECK
C MAIN,LAND AND CHANEL VARIABLES
      INTEGER ELE,ELEMTS(10),GAGEAR(10,10),ADDFW1(10,10),
     1ADDFW2(10,10),TEST1(10),TEST2(10),RTEINT(10),AVEPE,VARK(10),
     2VAEL(10),SNOW,VAREP
      REAL IMPV(5),LZSN(5),K3(5),K24L(5),K24EL(5),KV(5),LKK4(5),
     1LIFC4(5),LZSI(5),KS1(10),KS1V(10,20)
      COMMON/MCL/EPDIST(24),EPXM(5),UZSN(5),CB(5),CC(5),SRC(5),DEC(5),
     1UZSI(5),SGWI(5),GWSI(5),RESI(5),SRGXI(5),SCEPI(5),REPI(5),
     2CFSM(10),PREVEP(10),TRANSI(10,48),EVAP(12,31),
     3FLOW(10,744),RO(5,744),EVAP1(12),SRO(5),SROS(5),SIMPV(5),SINTF(5),
     4SGWE(5),SRECH(5),SPR(5),SPE(5),SET(5),TIMEAR(10,10),PEADJ(12),
     5GAGEPE(5),POWER,BASEK(10),BASEL(10),IMPV,LZSN,K3,K24L,K24EL,KV,
     6LKK4,LIFC4,LZSI,KS1,KS1V,MAXL(10),MINL(10),LAG(10,10),
     7IE,MHR,MOHR1,MOHR2,ELE,ELEMTS,GAGEAR,VAREP,SDEP,EPBIAS,IXEP,
     8ADDFW1,ADDFW2,TEST1,TEST2,RTEINT,AVEPE,VARK,VARL,SNOW,UZSNWE,
     9AEPI(5)
C MAIN,LAND,CHANEL AND SNOW VARIABLES
      INTEGER SIXHR
      REAL K1(5)
      COMMON/MLCS/FCOVER(5),FDEN(5),KOHLER,PE(5,31),COVER(5,31),
     1PX(5,31,24),K1,LAST,IRG,IPT,IDA,IHR,MONTH,I,SIXHR
C MAIN,HOURLY,DAILY AND SNOW VARIABLES
      INTEGER YEAR,DA,FINAL
      REAL INFRO(20)
      COMMON/MHDS/X(368),INFRO,LEAPYR,N,YEAR,DA,FINAL
C
      INTEGER POINT,CN,STATE,YR1
      REAL LAGROI(5,30),LIQWI(5),NEGHSI(5)
      DIMENSION SIMSC(10,31),WATERI(5,12),WEI(5),EXWATI(5),AESCI(5),
     1SBI(5),SBAGI(5),SBWSI(5),AIXI(5),TSI(5),BASIN(20),RGNAME(5,5),
     2TANT(5),TONT(5)
C  INITIALIZATION OF DATA
      INIT=0
      FIRST=0
      NEWWY=0
      CTEST=0
      PTEST=0
      CKTEST=0
      HRTEST=0
      DO 100 I=1,24
100   EPDIST(I)=0.0
      EPDIST(7)=0.019
      EPDIST(8)=0.041
      EPDIST(9)=0.067
      EPDIST(10)=0.088
      EPDIST(11)=0.102
      EPDIST(12)=0.11
      EPDIST(13)=0.11
      EPDIST(14)=0.11
      EPDIST(15)=0.105
      EPDIST(16)=0.095
      EPDIST(17)=0.081
      EPDIST(18)=0.055
      EPDIST(19)=0.017
      DIST=0.0
      DO 1001 I=1,365
      X(I)=DIST
1001  DIST=DIST+0.1
      DATA MOCHAR/3HENE,3HFEB,3HMAR,3HABR,3HMAY,3HJUN,3HJUL,3HAGO,3HSEP,
     13HOCT,3HNOV,3HDIC/
      DATA LASTDA/31,31,28,29,31,31,30,30,31,31,30,30,31,31,31,31,30,30,
     131,31,30,30,31,31/
      DATA NUM/1,2,3,4,5,6,7,8,9,10,11,12/
C RUN,RAINGAGE AND FLOW-POINT INPUT DATA
C BASIC RUN INFORMATION
```

```
                        MAIN
      READ 901, INFRO
      READ 901, BASIN
      PRINT 900
      PRINT 903, BASIN
      PRINT 902, INFRO
      PRINT 904
      READ 905, MO1,YR1,MO2,YR2,NPTS,PXIN,NGAGES,(PGIN(I),I=1,NGAGES)
      READ 950,OUTHR,LINER,NCFLW,AVEPE,POWER,SIXHR,CN6HR,
     1STOPE,ROUTE,DSPE,SNOW,POINT,INOUT,VAREP,UZSNWF
      IF (DSRO.GT.0) REWIND DSRO
      IF (STOPE.EQ.1) ROUTE=0
      IF (SNOW.EQ.0) POINT=0
      IF (CN6HR.EQ.1) SIXHR=1
      IF (POINT.EQ.1) GO TO 1003
      READ 965, PEADJ
      READ 965, (GAGEPE(IRG),IRG=1,NGAGES)
      IF (AVEPE.EQ.0) GO TO 1003
      READ 965, EVAPM
      DO 1004 I=1,12
1004  EVAPM(I)=EVAPM(I)*PEADJ(I)/0.254
1003  LEAPYR=0
      IF (VAREP.EQ.1) READ 991,SDEP,EPBIAS,IXEP
      IF ((YR2-4*(YR2/4)).EQ.0) LEAPYR=1
      LAST=LASTDA((LEAPYR+1),MO2)
      PRINT 906, MOCHAR(MO1),YR1,MOCHAR(MO2),LAST,YR2
      PRINT 907, NPTS,NGAGES
      PRINT 936
      IF (PCINT.EQ.0) GO TO 1005
C BASIC RAINGAGE INFORMATION -- POINT#1
      READ 909,RGN,K1(1)
      PRINT 916
      IRG=1
      PRINT 966,IRG,RGN,K1(1)
      DO 1006 I=1,5
1006  RGNAME(1,I)=RGN(I)
      GO TO 1025
1005  PRINT 908
C BASIC RAINGAGE INFORMATION
      DO 101 IRG=1,NGAGES
      READ 909, RGN,K1(IRG),IMPV(IRG),EPXM(IRG),UZSN(IRG),LZSN(IRG),
     1CP(IRG),CC(IRG),K3(IRG),K24L(IRG),K24EL(IRG)
      READ 939, L,SS,NN,IFC,KK24,KV(IRG)
      L=L*3.28
      SFC(IRG)=1020.0*SQRT(SS)/(NN*L)
      DEC(IRG)=0.00282*((NN*L/SQRT(SS))**0.6)
      LKK4(IRG)=1.0-(KK24**(1.0/24.0))
      LIFC4(IRG)=1.0-(IFC**(1.0/24.0))
      READ 910, UZSI(IRG),LZSI(IRG),SGWI(IRG),GWSI(IRG),RESI(IRG),
     1SRGXI(IRG),SCEPI(IRG),AEPI(IRG)
      REPI(IRG)=0.0
      L=L/3.28
      PRINT 911, IRG,RGN,K1(IRG),IMPV(IRG),EPXM(IRG),UZSN(IRG),
     1LZSN(IRG),CP(IRG),CC(IRG),K3(IRG),K24L(IRG),K24EL(IRG),L,SS,NN,
     2IFC,KK24,KV(IRG)
      DO 1011 I=1,5
1011  RGNAME(IRG,I)=RGN(I)
101   CONTINUE
      PRINT 979,POWER,UZSNWF
      PRINT 937
      PRINT 912
      DO 102 IRG=1,NGAGES
      DO 1021 I=1,5
1021  RGN(I)=RGNAME(IRG,I)
      PRINT 913, RGN,UZSI(IRG),LZSI(IRG),SGWI(IRG),GWSI(IRG),
     1RESI(IRG),SRGXI(IRG),SCEPI(IRG),AEPI(IRG)
102   CONTINUE
      IF (SNOW.EQ.0) GO TO 1024
1025  CONTINUE
      IF (PCINT.EQ.1) GO TO 1051
      GO TO 1023
1024  IF (NGAGES.LE.3) GO TO 1022
1023  PRINT 900
      PRINT 903, BASIN
      PRINT 902, INFRO
1022  PRINT 938
      PRINT 914
C BASIC FLOW-POINT INFORMATION
      DO 103 IPT=1,NPTS
```

```
                        MAIN
      READ 915, FPN,AREA(IPT),KS1(IPT),VARK(IPT),VARL(IPT),
     1RTEINT(IPT),ELEMTS(IPT)
      AREA(IPT)=AREA(IPT)*0.3861
      IF (VARK(IPT).EQ.0) GO TO 150
      READ 944, BASEK(IPT),(KS1V(IPT,I),I=1,10)
      READ 986, (KS1V(IPT,I),I=11,20)
      KS1(IPT)=1.0
150   IF (VARL(IPT).EQ.0) GO TO 1249
      READ 988, BASEL(IPT),(LAG(IPT,I),I=1,10)
1249  READ 976, CHECK(IPT),COMPAR(IPT),PLOT(IPT),
     1PLOTHR(IPT),MINFW(IPT),PLOTMX(IPT),PHRMX(IPT)
      ELE=ELEMTS(IPT)
      IF (COMPAR(IPT).EQ.1) GO TO 1241
      PLOT(IPT)=0
      GO TO 1245
1241  CTEST=1
1245  IF (PLOT(IPT).EQ.0) GO TO 124
      PTEST=1
124   IF (CHECK(IPT).EQ.1) GO TO 1246
      IF (CHECK(IPT).EQ.2) GO TO 1247
      PLOTHR(IPT)=0
      GO TO 1248
1246  CKTEST=1
      GO TO 1248
1247  HRTEST=1
1248  READ 917, (TIMEAR(IPT,IE),IE=1,ELE)
      READ 934, (GAGEAR(IPT,IE),IE=1,ELE)
      READ 934, (ADDFW1(IPT,IE),IE=1,ELE)
      READ 934, (ADDFW2(IPT,IE),IE=1,ELE)
      TEST1(IPT)=0
      TEST2(IPT)=0
      INAREA=0.0
      DO 1243 IE=1,ELE
      IF (ADDFW1(IPT,IE).EQ.0) GO TO 1244
      TEST1(IPT)=1
      I=ADDFW1(IPT,IE)
      INAREA=INAREA+AREA(I)
1244  IF (ADDFW2(IPT,IE).EQ.0) GO TO 1243
      TEST2(IPT)=1
      I=ADDFW2(IPT,IE)
      INAREA=INAREA+AREA(I)
1243  CONTINUE
      CFSM(IPT)=26.9*24.0*(AREA(IPT)-INAREA)
      UMAREA=AREA(IPT)*2.59                                              PL
      PRINT 918,IPT,FPN,UMAREA,KS1(IPT),RTEINT(IPT),COMPAR(IPT),CHECK(IP
     1T),(TIMEAR(IPT,IE),IE=1,ELE)
      PRINT 919, (GAGEAR(IPT,IE),IE=1,ELE)
      PRINT 920, (ADDFW1(IPT,IE),IE=1,ELE)
      PRINT 921, (ADDFW2(IPT,IE),IE=1,ELE)
      IF (VARK(IPT).EQ.0) GO TO 1042
      PRINT 985, BASEK(IPT),(KS1V(IPT,I),I=1,20)
1042  IF (VARL(IPT).EQ.0) GO TO 1041
      PRINT 987, BASEL(IPT),(LAG(IPT,I),I=1,10)
1041  PREVEI(IPT)=0.0
      ELE=ELE*RTEINT(IPT)
      MLAG=0
      IF (VARL(IPT).EQ.0) GO TO 1043
      DO 1044 I=1,10
      IF (LAG(IPT,I).GT.MLAG) MLAG=LAG(IPT,I)
1044  CONTINUE
      DO 1045 I=2,10
      IF (LAG(IPT,I).EQ.0) GO TO 1045
      MINL(IPT)=I
      GO TO 1043
1045  CONTINUE
1043  MAXL(IPT)=ELE+MLAG
      ELE=ELE+MLAG
      DO 104 IE=1,ELE
104   TRANSI(IPT,IE)=0.0
      DO 1031 I=1,7
1031  FPNAME(IPT,I)=FPN(I)
103   CONTINUE
      IF (NPTS.LE.5) GO TO 1032
      PRINT 900
      PRINT 903, BASIN
      PRINT 902, INFRO
1032  PRINT 972
      PRINT 973, (NUM(I),I=1,12)
```

```
                        MAIN
      PRINT 974, (PEADJ(I),I=1,12)
      PRINT 975, (NUM(IRG),IRG=1,NGAGES)
      PRINT 974, (GAGEPE(IRG),IRG=1,NGAGES)
C END OF RUN,RAINGAGE AND FLOW-POINT INPUT DATA
1051  MONTH=MO1
      YEAR=YR1
C START OF MONTHLY LOOP
C INITIAL MONTHLY VALUES
105   LEAPYR=0
      IF ((YEAR-4*(YEAR/4)).EQ.0) LEAPYR=1
      LAST=LASTDA((LEAPYR+1),MONTH)
      KOUNT=0
      DO 106 IRG=1,NGAGES
      UZS1(IRG)=UZSI(IRG)
      LZS1(IRG)=LZSI(IRG)
      SGW1(IRG)=SGWI(IRG)
      RES1(IRG)=RESI(IRG)
      SRGX1(IRG)=SRGXI(IRG)
      SCEP1(IRG)=SCEPI(IRG)
      SRC(IRG)=0.0
      SROS(IRG)=0.0
      SIMPV(IRG)=0.0
      SINTF(IRG)=0.0
      SGWF(IRG)=0.0
      SRECH(IRG)=0.0
      SPE(IRG)=0.0
      SPE(IRG)=0.0
106   SET(IRG)=0.0
C INPUT OF MONTHLY DATA
      IF (MONTH.EQ.1) GO TO 131
      IF ((YEAR.EQ.YR1).AND.(MONTH.EQ.MO1)) GO TO 1311
      GO TO 132
1311  DO 1312 IPT=1,NPTS
      DO 1312 MO=1,12
      SSF(IPT,MO)=0.0
      DO 1312 IDA=1,31
1312  SIMFLW(IPT,MO,IDA)=0.0
131   WY=YEAR
      NEWWY=1
      IF (MONTH.GT.12) WY=WY+1
      LEAPYR=0
      IF ((WY-4*(WY/4)).EQ.0) LEAPYR=1
C MONTHS DURING WHICH SNOW IS CONSIDERED
      IF (SNOW.EQ.0) GO TO 1313
      READ 999,SNOWA
1313  IF (POINT.EQ.1) GO TO 1320
C DAILY POTENTIAL EVAPOTRANSPIRATION - BY WATER YEAR
      IF (AVEPE.EQ.1) GO TO 1331
      DO 133 I=1,36
      READ 931, MO,CN,RECOBS
      FINAL=CN*10
      BASE=FINAL-9
      IF (CN.EQ.3) FINAL=LASTDA((LEAPYR+1),MO)
      N=BASE-1
      DO 133 IDA=BASE,FINAL
133   EVAP(MO,IDA)=RECOBS(IDA-N)/0.254
C ACTUAL MEAN DAILY FLOWS - BY WATER YEAR
1331  IF (OTEST.EQ.0) GO TO 132
      DO 134 IPT=1,NPTS
      IF (COMPAR(IPT).EQ.1) GO TO 1342
      DO 1341 MO=1,12
      SAF(IPT,MO)=0.0
      DO 1341 IDA=1,31
1341  ACTFLW(IPT,MO,IDA)=0.0
      GO TO 134
1342  DO 1343 MO=1,12
1343  SAF(IPT,MO)=0.0
      DO 135 I=1,36
      READ 932, MO,CN,RECOBS
      FINAL=CN*10
      BASE=FINAL-9
      IF (CN.EQ.3) FINAL=LASTDA((LEAPYR+1),MO)
      N=BASE-1
      DO 135 IDA=BASE,FINAL
      OBS=RECOBS(IDA-N)
      SAF(IPT,MO)=SAF(IPT,MO)+OBS
135   ACTFLW(IPT,MO,IDA)=OBS
134   CONTINUE
```

MAIN

```
C MONTHLY INPUT DATA
132   IF (SNOW.EQ.0) GO TO 28
      IF (SNOWA(MONTH).EQ.1) GO TO 25
28    DO   26 IRG=1,NGAGES
      DO   27 I=1,30
      LAGRCI(IRG,I)=0.0
      IF (I.GT.12) GO TO 27
      WATEI(IRG,I)=0.0
27    CONTINUE
      WEI(IRG)=0.0
      LICWI(IRG)=0.0
      EXWATI(IRG)=0.0
      NEGWSI(IRG)=0.0
      ABSCI(IRG)=0.0
      SBI(IRG)=0.0
      SPAEI(IRG)=0.0
      SBWSI(IRG)=0.0
      AIXI(IRG)=0.0
      TSI(IRG)=32.0
      TAMT(IRG)=50.0
      TDMT(IRG)=40.0
      DO   26 IDA=1,LAST
26    COVER(IRG,IDA)=0.0
      IF (SNOW.EQ.1) GO TO 25
      DO   29 IRG=1,NGAGES
      ECOVER(IRG)=1.0
29    EOEN(IRG)=1.0
25    IF (ROUTE.EQ.0) GO TO 1320
      DO 20 IRG=1,NGAGES
      READ (DSRO) KEPTRO
      DO 21 MHR=1,744
21    EC(IRG,MHR)=KEPTRO(MHR)
20    CONTINUE
      GO TO 400
1320  IF (NEWWY.EQ.0) GO TO 1321
      READ 978,DISP,DSN,SKIP
      IF ((DSN.GT.0).AND.(INIT.EQ.0)) REWIND DSN
      INIT=1
      NEWWY=0
      IF (SKIP.EQ.0) GO TO 1321
      DO 1329 I=1,SKIP
1329  READ (DSN)
1321  IF (DISP.EQ.1) GO TO 1330
      IF (DSN.GT.0) GO TO 1322
C PRECIPITATION -- BY MONTH
1330  DO 109 IRG=1,NGAGES
      DO 109 IDA=1,31
      DO 109 IHR=1,24
109   PX(IRG,IDA,IHR)=0.0
      DO 107 IG=1,PXIN
      DO 1071 I=1,NGAGES
      IF (RGIN(I).NE.IG) GO TO 1071
      IRG=I
      GO TO 110
1071  CONTINUE
1072  READ 951,STATE
      IF (STATE.EQ.99) GO TO 107
      GO TO 1072
110   READ 922,STATE,YR,MO,DA,CN,RECPX
      IF (STATE.EQ.99) GO TO 107
      IF (SIXHR.EQ.1) GO TO 1081
      BASE=(CN-1)*12
      DO 108 IHR=1,12
      HR=BASE+IHR
108   PX(IRG,DA,HR)=RECPX(IHR)/2.54
      GO TO 110
1081  IF (CN6HR.EQ.1) GO TO 1085
      BASE=(CN-1)*2
      PXSIX(1)=0.0
      PXSIX(2)=0.0
      DO 1082 I=1,6
1082  PXSIX(1)=PXSIX(1)+RECPX(I)
      DO 1083 I=7,12
1083  PXSIX(2)=PXSIX(2)+RECPX(I)
      DO 1084 IHR=1,2
      HR=BASE+IHR
1084  PX(IRG,DA,HR)=PXSIX(IHR)
      GO TO 110
```

MAIN

```
1085  DO 1086 IHR=1,4
      PX(IPC,DA,IHR)=RECPX(IHR)
1086  CONTINUE
      GO TO 110
107   CONTINUE
      IF (ODISP.EQ.0) GO TO 400
      DO 1327 IRG=1,NGAGES
      DO 1328 IDA=1,31
      DO 1328 IHR=1,24
1328  KEPTPX(IDA,IHR)=PX(IRG,IDA,IHR)
1327  WRITE (LSN) KEPTPX
      GO TO 400
1322  DO 1323 IG=1,PXIN
      DO 1324 I=1,NGAGES
      IF (PGIN(I).NE.IG) GO TO 1324
      IRG=I
      GO TO 1325
1324  CONTINUE
      READ (DSN)
      GO TO 1323
1325  READ (DSN) KEPTPX
      DO 1326 IDA=1,31
      DO 1326 IHR=1,24
1326  PX(IRG,IDA,IHR)=KEPTPX(IDA,IHR)/2.54
1323  CONTINUE
C INSTANTANEOUS ACTUAL FLOWS--BY MONTH
C HOURLY FLOW -- ONE STATION
400   IF (PCINT.EQ.1) GO TO 122
      IF (HRTEST.EQ.0) GO TO 401
      DO 405 IPT=1,NPTS
      IF (CHECK(IPT).NE.2) GO TO 405
      DO 402 I=1,744
402   FLOW1(IPT,I)=0.0
403   READ 971,STATE,MO,DA,YR,CN,HRFW
      IF (STATE.EQ.99) GO TO 405
      BASE=(DA-1)*24+(CN-1)*6
      DO 404 I=1,6
      MHR=BASE+I
404   FLOW1(IPT,MHR)=HRFW(I)
      GO TO 403
405   CONTINUE
401   IF (CKTEST.EQ.0) GO TO 122
C SIX HOUR FLOWS
      DO 406 IPT=1,NPTS
      IF (CHECK(IPT).NE.1) GO TO 406
      DO 407 I=1,744
407   FLOW1(IPT,I)=0.0
408   READ 970,STATE,MO,DA,YR,RECFW,T1,P1,T2,P2
      IF (STATE.EQ.99) GO TO 406
      BASE=(DA-1)*24
      DO 409 I=1,4
      MHR=BASE+(I*6)
409   FLOW1(IPT,MHR)=RECFW(I)
      IF (T1.EQ.0) GO TO 408
      MHR=BASE+T1
      FLOW1(IPT,MHR)=P1
      IF (T2.EQ.0) GO TO 408
      MHR=BASE+T2
      FLOW1(IPT,MHR)=P2
      GO TO 403
406   CONTINUE
C SNOW VARIABLES
  122 IF (SNOW.EQ.0) GO TO 123
      IF (SNOWA(MONTH).EQ.0) GO TO 123
C
123   IF (PCINT.EQ.1) GO TO 115
      IF (ROUTE.EQ.0) GO TO 115
      GO TO 114
C COMPUTATION OF SNOWPACK CONDITIONS
115   IF (SNOW.EQ.0) GO TO 113
      IF (SNOWA(MONTH).EQ.0) GO TO 113
      DO 116 IRG=1,NGAGES
C
116   CONTINUE
      IF (PCINT.EQ.1) GO TO 1259
C COMPUTATION OF SIMULATED CHANNEL INFLOW AND STREAMFLOW
113   DO 112 IRG=1,NGAGES
      CALL LAND
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                    MAIN

112   CONTINUE
114   DO 117 IPT=1,NPTS
      CALL CHANEL
117   CONTINUE
C MONTHLY SUMMARY
      IF (STORE.EQ.0) GO TO 1211
      DO 22 IRG=1,NGAGES
      DO 23 MHR=1,744
23    KEPTRO(MHR)=RO(IRG,MHR)
      WRITE (DSRO) KEPTRO
22    CONTINUE
      GO TO 1210
1211  IF (ROUTE.EQ.0) GO TO 1210
      GO TO 1257
1210  PRINT 923,BASIN
      PRINT 924, MOCHAR(MONTH),YEAR
      PRINT 925
      PRINT 940
      PRINT 926
C OUTPUT LAND STORAGES AND FLOW COMPONENTS
      DO 125 IRG=1,NGAGES
      DO 1251 I=1,5
1251  RGN(I)=RGNAME(IRG,I)
      PRINT 927, IRG,RGN,SRO(IRG),SROS(IRG),SIMPV(IRG),
     1SINTE(IRG),SGWI(IRG),SPECH(IRG),SPR(IRG),SPE(IRG),
     2SET(IRG)
125   CONTINUE
      PRINT 941
      PRINT 942
      DO 1252 IRG=1,NGAGES
      BAL=(LZSI(IRG)+UZSI(IRG)+RESI(IRG)+SRGXI(IRG)-LZS1(IRG)-UZS1(IRG)
     1-RESI(IRG)-SRGXI(IRG))*(1.0-IMPV(IRG))+SGWI(IRG)+SCEPI(IRG)
     2-SGW1(IRG)-SCEP1(IRG)+SRO(IRG)+SET(IRG)+SPECH(IRG)-SPR(IRG)
      DO 1253 I=1,5
1253  RGN(I)=RGNAME(IRG,I)
      PRINT 943, RGN,UZSI(IRG),LZSI(IRG),SGWI(IRG),GWSI(IRG),
     1RESI(IRG),SRGXI(IRG),SCEPI(IRG),AEPI(IRG),BAL
1252  CONTINUE
C OUTPUT OF MONTHLY SNOW SUMMARY
      IF (SNOW.EQ.0) GO TO 1257
      IF (SNOWA(MONTH).EQ.0) GO TO 1257
1259  CONTINUE
      IF (POINT.EQ.1) GO TO 1361
C SNOW COVER ABOVE EACH FLOW-POINT
      IF (NPTS.EQ.1) GO TO 1257
      DO 300 IPT=1,NPTS
      ELE=ELEMTS(IPT)
      DO 301 IDA=1,LAST
      SIMSC(IPT,IDA)=0.0
      DO 301 IE=1,ELE
      IRG=GAGEAR(IPT,IE)
      SIMSC(IPT,IDA)=SIMSC(IPT,IDA)+COVER(IRG,IDA)*TIMEAR(IPT,IE)
301   CONTINUE
      ALOCAL=CFSM(IPT)/(26.9*24.0)
      P1=ALOCAL/AREA(IPT)
      IF (P1.EQ.1.0) GO TO 300
      DO 305 IDA=1,LAST
305   SIMSC(IPT,IDA)=SIMSC(IPT,IDA)*P1
      DO 302 IE=1,ELE
      I=ADDFW1(IPT,IE)
      IF (I.EQ.0) GO TO 302
      P2=(AREA(I)/AREA(IPT))
      DO 303 IDA=1,LAST
303   SIMSC(IPT,IDA)=SIMSC(IPT,IDA)+SIMSC(I,IDA)*P2
      I=ADDFW2(IPT,IE)
      IF (I.EQ.0) GO TO 302
      P2=(AREA(I)/AREA(IPT))
      DO 304 IDA=1,LAST
304   SIMSC(IPT,IDA)=SIMSC(IPT,IDA)+SIMSC(I,IDA)*P2
302   CONTINUE
300   CONTINUE
C OUTPUT SIMULATED SNOW COVER
      PRINT 900
      PRINT 903,BASIN
      PRINT 924,MOCHAR(MONTH),YEAR
      PRINT 902
      PRINT 929
      PRINT 944,(NUM(IPT),IPT=1,NPTS)
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                        MAIN

      DO 306 IDA=1,LAST
306   PRINT 993,IDA,(SIMSC(IPT,IDA),IPT=1,NPTS)
C COMPUTE MEAN DAILY SIMULATED FLOW
1257  DO 126 IPT=1,NPTS
      SSF(IPT,MONTH)=0.0
      DO 123 IDA=1,LAST
      I=(IDA-1)*24
      TEMPFL=0.0
      DO 127 IHR=1,24
      MHR=I+IHR
127   TEMPFL=TEMPFL+FLOW(IPT,MHR)
      TEMPFL=TEMPFL/24.0
      SIMFLW(IPT,MONTH,IDA)=TEMPFL                                    PL
  128 SSF(IPT,MONTH)=SSF(IPT,MONTH)+TEMPFL                            PL
126   CONTINUE
C OUTPUT HOURLY SIMULATED FLOWS ABOVE PRESET VALUE
      IF (OUTHR.EQ.0) GO TO 137
      TITLE=0
      DO 138 IPT=1,NPTS
      MINFWT=MINFW(IPT)
      DO 139 I=1,7
139   FPN(I)=FPNAME(IPT,I)
      TITLE1=0
      DO 140 IDA=1,LAST
      IF (SIMFLW(IPT,MONTH,IDA).LT.MINFWT) GO TO 140
      IF (TITLE.EQ.1) GO TO 1391
      TITLE=1
      PRINT 900
      PRINT 903, BASIN
      PRINT 924, MOCHAR(MONTH),YEAR
      PRINT 945
1391  IF (TITLE1.EQ.1) GO TO 1392
      TITLE1=1
      PRINT 946, FPN,MINFWT
1392  MOHR2=IDA*24-12
      MOHR1=MOHR2-11
      PRINT 947, IDA,(FLOW(IPT,MHR),MHR=MOHR1,MOHR2)
      MOHR1=MOHR1+12
      MOHR2=MOHR2+12
      PRINT 948, (FLOW(IPT,MHR),MHR=MOHR1,MOHR2),
     1SIMFLW(IPT,MONTH,IDA)
140   CONTINUE
138   CONTINUE
C OUTPUT MEAN DAILY SIMULATED FLOW
137   IF (NOFLW.EQ.1) GO TO 1362
      PRINT 900
      PRINT 903, BASIN
      PRINT 924, MOCHAR(MONTH),YEAR
      PRINT 928
      PRINT 929
      PRINT 944, (NUM(IPT),IPT=1,NPTS)
      DO 129 IDA=1,LAST
129   PRINT 930, IDA,(SIMFLW(IPT,MONTH,IDA),IPT=1,NPTS)
      PRINT 935, (SSF(IPT,MONTH),IPT=1,NPTS)
C OUTPUT MEAN DAILY ACTUAL FLOW
      IF (QTEST.EQ.0) GO TO 1362
      PRINT 900
      PRINT 903, BASIN
      PRINT 924, MOCHAR(MONTH),YEAR
      PRINT 933
      PRINT 929
      PRINT 944, (NUM(IPT),IPT=1,NPTS)
      DO 136 IDA=1,LAST
136   PRINT 930, IDA,(ACTFLW(IPT,MONTH,IDA),IPT=1,NPTS)
      PRINT 935, (SAF(IPT,MONTH),IPT=1,NPTS)
C PLOTTING OF HOURLY FLOW
1362  IF ((HRTEST.EQ.0).AND.(CKTEST.EQ.0)) GO TO 1363
      DO 820 IPT=1,NPTS
      IF (PLOTHR(IPT).EQ.0) GO TO 820
      CALL HOURLY(INERC,MONTH,YEAR,IPT,FLOW)
820   CONTINUE
C WATER YEAR SUMMARY SECTION
 1363 IF(MONTH.NE.12) GO TO 1361
C    WATER YEAR SIMULATED FLOW SUMMARY TABLES
      DO 810 IPT=1,NPTS
      DO 811 I=1,7
811   FPN(I)=FPNAME(IPT,I)
      PRINT 952, FPN
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MAIN

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      PRINT 953, YEAR
      PRINT 954
      PRINT 955
      PRINT 956
      N=29
      IF (LEAPYR.EQ.1) N=29
      DO 812 IDA=1,N
      PRINT 957, IDA,(SIMFLW(IPT,MO,IDA),MO=1,12)
      IF ((IDA-5*(IDA/5)).EQ.0) PRINT 956
812   CONTINUE
      N=N+1
      DO 813 IDA=N,30
      PRINT 958, IDA,SIMFLW(IPT,1,IDA),(SIMFLW(IPT,MO,IDA),MO=3,12)
813   CONTINUE
      IDA=31
      PRINT 959, IDA,SIMFLW(IPT,1,31),SIMFLW(IPT,3,31),SIMFLW(IPT,5,31),
     1SIMFLW(IPT,7,31),SIMFLW(IPT,8,31),SIMFLW(IPT,10,31),SIMFLW(IPT,12,
     231)
      CONV=26.9*AREA(IPT)
      WYFLOW=0.0
      DO 814 MO=1,12
      TEMPFL=SSF(IPT,MO)*35.31
      INCHES(MO)=(TEMPFL/CONV)*25.4
  814 WYFLOW=WYFLOW+TEMPFL*0.02332
      PRINT 960, (SSF(IPT,MO),MO=1,12),WYFLOW                          PL
      WYFLOW=((WYFLOW*35.31)/CONV)*25.4
      PRINT 961, (INCHES(MO),MO=1,12),WYFLOW                           PL
      WYFLOW=WYFLOW*AREA(IPT)*2.59
      PRINT 962, WYFLOW
      IF (COMPAR(IPT).EQ.0) GO TO 810
      WYFLOW=0.0
      DO 815 MO=1,12
      TEMPFL=SAF(IPT,MO)
      INCHES(MO)=(TEMPFL*86.4)/UMAREA
815   WYFLOW=WYFLOW+TEMPFL
      PRINT 963, (SAF(IPT,MO),MO=1,12),WYFLOW                          PL
      WYFLOW=(WYFLOW*86.4)/UMAREA
      PRINT 961, (INCHES(MO),MO=1,12),WYFLOW                           PL
      WYFLOW=WYFLOW*UMAREA
      PRINT 962, WYFLOW
810   CONTINUE
C PLOTTING OF SIMULATED VERSUS OBSERVED MEAN DAILY FLOW--BY WATER YEAR
      IF (PTEST.EQ.0) GO TO 1361
      LP1=0
      IF (LINEP.EQ.1) GO TO 800
      IF (FIRST.EQ.1) GO TO 800
      FIRST=1
800   DO 801 IPT=1,NPTS
      IF (PLOT(IPT).EQ.0) GO TO 801
      IF (LINEP.EQ.1) GO TO 802
      CALL DAILY(INFPO,MONTH,YEAR,IPT)
      GO TO 801
802   IF(LP1.EQ.1) GO TO 803
      LN=3
      IF (COMPAR(NPTS).EQ.0) LN=LN+4
      DO 804 I=1,LN
804   PRINT 949
      LP1=1
803   DO 805 I=1,4
805   PRINT 949
      CALL LPLOT(YEAR,IPT)
801   CONTINUE
C INCREMENT TO THE NEXT MONTH
1361  IF ((YEAR.EQ.YF2).AND.(MONTH.EQ.MO2)) GO TO 130
      MONTH=MONTH+1
      IF (MONTH.LE.12) GO TO 105
      MONTH=1
      YEAR=YEAR+1
      GO TO 105
130   CONTINUE
      IF (FIRST.EQ.1) PUNCH 990
C PROGRAM FORMAT STATEMENTS
900   FORMAT (1H1)
901   FORMAT (20A4)
902   FORMAT (1HO,20A4)
903   FORMAT (1H ,20X,20A4)
  904 FORMAT(1HO,47X,32HINFORMACION BASICA DE LA CORRIDA)
905   FORMAT (7I5,5I3)
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                    MAIN
  906 FORMAT(1HO,27HINICIO DE LA CORRIDA   1 DE,1X,A4,1X,5HDE 19,I2,6X,1
     19HFINAL DE LA CORRIDA,3X,I2,4H DE ,A4,6H DE 19,I2)
  907 FORMAT(1HO,28HNUMERO DE PUNTOS DE FLUJO = ,I2,12X,42HNUMERO DE EST
     1. DE MED. DE PRECIPITACION = ,I3)
  908 FORMAT(1HO,4H EST,2X,16HNOMBRE DE LA EST,7X,2HK1,3X,4HIMPV,2X,
     14HEPXM,3X,4HUZSN,3X,4HLZSN,4X,2HCB,4X,2HCC,4X,2HK3,4X,4HK24L,2X,
     25HK24EL,4X,1HI,5X,2HSS,5X,2HUN,4X,3HIRC,4X,4HKK24,4X,2HKV)
  909 FORMAT (6A4,3F5.2,2F5.1,5F5.2)
  910 FORMAT(20X,9F5.1)
  911 FORMAT (1H ,I3,3X,5A4,3F6.2,2F7.2,F7.3,2F6.2,2F7.2,F7.0,F6.2,
     1F7.2,F6.2,F7.3,F7.2)
  912 FORMAT(1HO,17HNOMBRE DE LA EST.,12X,3HUZS,4X,3HLZS,4X,3HSGW,4X,
     13HGWS,4X,3HRFS,3X,4HSFGX,3X,4HSCEP,3X,4HAEPI)
  913 FORMAT (1H ,5A4,6X,3F7.2)
  914 FORMAT(1HO,3H PE,1X,25HNOMBRE DEL PUNTO DE FLUJO,9X,4HAREA,3X,3HKS
     11,2X,4HPTIN,2X,7HCOMPARE,2X,4HCHEK,2X,10HHISTOGRAMS)
  915 FORMAT (7A4,2X,F10.2,F5.2,4I5)
  916 FORMAT (1HO,3H RG,3X,13HRAINGAGE NAME,10X,2HK1)
  917 FORMAT (30X,10F5.2)
  918 FORMAT (1H ,I3,3X,7A4,F8.2,F6.2,I5,2I7,5X,9HTIMEDELAY,10F5.2)
  919 FORMAT (1H ,72X,8HGAGEAREA,1X,10I5)
  920 FORMAT (1H ,72X,8HADDFLOW1,1X,10I5)
  921 FORMAT (1H ,72X,8HADDFLOW2,1X,10I5)
  922 FORMAT (I2,7X,3I3,I2,12F5.2)
  923 FORMAT (1H1,20HSUMARIO MENSUAL PARA,1X,2044)
  924 FORMAT (1HO,A4,3H 19,I2)
  925 FORMAT(1HO,31X,42HSUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS)
  926 FORMAT(1HO,4H EST,2X,17HNOMBRE DE LA EST.,6X,8HTOTAL RO,3X,
     110HSURFACE RO,3X,7HIMPV RO,3X,9HINTERFLOW,3X,7HGW FLOW,3X,
     28HRECHARGE,3X,6HPRECIP,3X,12HPOTENTIAL-ET,3X,9HACTUAL-ET)
  927 FORMAT (1H ,I3,3X,5A4,F10.3,F12.3,4F11.3,F9.2,2F13.3)
  928 FORMAT (1HO,43X,44HSUMARIO DE LA DESCARGA MEDIA DIARIA SIMULADA)
  929 FORMAT (1HO,5HDIA  ,19X,14HPUNTO DE FLUJO)
  930 FORMAT (1H ,I5,5X,10F10.1)
  931 FORMAT (9X,I2,11,11F6.3)
  932 FORMAT (9X,I2,11,11F6.0)
  933 FORMAT (1HO,43X,45HSUMARIO DE LA DESCARGA MEDIA DIARIA OBSERVADA)
  934 FORMAT (30X,10I5)
  935 FORMAT(1HO,5HTOTAL,5X,10F10.1)
  936 FORMAT(1HO,48X,28HPARAMETROS PARA LA VERTIENTE)
  937 FORMAT(1HO,41X,25HALMACENAMIENTOS INICIALES)
  938 FORMAT(1HO,45X,29HPARAMETROS DE PUNTOS DE FLUJO)
  939 FORMAT (20X,F5.0,3F5.2,F5.3,F5.2)
  940 FORMAT(1HO,12X,77HCOMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PREC
     1IPITACION Y DE LA ESCORRENTIA)
  941 FORMAT(1HO,38X,32HALMACENAMIENTOS AL FINAL DEL MES)
  942 FORMAT(1HO,17HNOMBRE DE LA EST.,12X,3HUZS,4X,3HLZS,4X,3HSGW,4X,
     13HGWS,4X,3HRFS,3X,4HSFGX,3X,4HSCEP,3X,4HAEPI,4X,7HBALANCE)
  943 FORMAT (1H ,5A4,6X,8F7.2,F10.3)
  944 FORMAT (1H ,9X,10I10)
  945 FORMAT (1HO,43X,39HSUMARIO DE LA DESCARGA HORARIA SIMULADA)
  946 FORMAT (1HO,7A4,10X,44HMINIMO FLUJO MEDIO DIARIO CAUSANDO SALIDA E
     1S,F7.0,5H MCSG)
  947 FORMAT (1HO,I3,3X,2HAM,6F9.1,4X,6F9.1)
  948 FORMAT (1H ,6X,2HPM,6F9.1,4X,6F9.1,F10.1)
  949 FORMAT (1H )
  950 FORMAT (4I5,F5.1,9I5,F5.2)
  951 FORMAT (I2)
  952 FORMAT(1H1,05X,38HSIMULACION PARA EL A#O HIDROLOGICO, 19,I2,5H PAR
     1A,2X,7A4//)
  953 FORMAT (1HO,37X,13HWATER YEAR 19,I2)
  954 FORMAT(1HO,35HSUMARIO DE LA DESCARGA MEDIA DIARIA)
  955 FORMAT (1HO,3X,3HDIA,5X,3HENE,6X,3HFEB,6X,3HMAR,6X,3HAPR,6X,3HMAY,
     14X,5HJUNIO,4X,5HJULIO,6X,3HAGO,5X,4HSEPT,5X,4HOCTB,3X,6HNOVIEM,5X,
     24HDICB,7X,5HANUAL)
  956 FORMAT (1HO)
  957 FORMAT (1H ,I5,12F9.2)
  958 FORMAT (1H ,I5,F9.2,9X,10F9.2)
  959 FORMAT (1H ,I5,F9.2,9X,F9.2,9X,F9.2,9X,2F9.2,9X,F9.2,9X,F9.2)
  960 FORMAT(5HTOTAL,12F9.2,F10.0,6H MCSGD)
  961 FORMAT (1H ,5X,12F9.1,F10.1,6H MILIM)
  962 FORMAT (1H ,111X,F12.3,7H 1000MC)
  963 FORMAT(5HOBSV.,12F9.0,F10.0,6H MCXGD)
  965 FORMAT (12F5.3)
  966 FORMAT (1H ,I3,3X,5A4,F6.2)
  970 FORMAT (I2,7X,3I3,2X,4F10.0,I3,F7.0,I3,F7.0)
  971 FORMAT (I2,7X,3I3,I2,6F10.0)
  972 FORMAT(1HO,42X,34H&JUSTE DE LA EVAPORACION POTENCIAL)
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                        MAIN
  973 FORMAT(1HO,17HAJUSTE ESTACIONAL,11X,3HMES,9X,12I5)
  974 FORMAT(1H ,27X,6HAJUSTE,8X,12F5.2)
  975 FORMAT(1HO,18HAJUSTE PARA LA EST,08X,8HESTACION,6X,12I5)
976   FORMAT (30X,4I5,3F10.0)
978   FORMAT (3I5)
979   FORMAT (1HO,10X,34HINFILTRATION CURVE POWER FACTOR IS,F5.1,10X,
     116HUZSN WT. FACTOR#,F5.2)
984   FORMAT (F10.0,10F5.2)
985   FORMAT (1H ,3X,17HVARIABLE K  BASE#,F6.0,3X,2HK#,20F5.2)
986   FORMAT (10X,10F5.2)
987   FORMAT (1H ,3X,20HVARIABLE LAG   BASE#,F6.0,3X,4HLAG#,10I5)
988   FORMAT (F10.0,10I5)
989   FORMAT (12I5)
990   FORMAT (3X,2H99)
991   FORMAT (2F5.2,I10)
992   FORMAT (1HO,43X,34HSIMULATED AREAL SNOW COVER SUMMARY)
993   FORMAT (1H ,I5,5X,10F10.2)
C END OF MAIN PROGRAM
      STOP
      END
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LAND

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      SUBROUTINE LAND
C LAND SURFACE RUNOFF SUBROUTINE
C LAND VARIABLES
      REAL LZS,K1T,LZSNT,K3T,K24LT,K24ELT,KVT,LKK4T,LIRC4T,INTF,LNRAT,
     1INFIL,LZT,LDS
C MAIN,LAND AND CHANEL VARIABLES
      INTEGER ELE,ELEMTS(10),GAGEAR(10,10),ADDFW1(10,10),
     1ADDFW2(10,10),TEST1(10),TEST2(10),RTEINT(10),AVEPE,VARK(10),
     2VARL(10),SNOW,VAREP
      REAL IMPV(5),LZSN(5),K3(5),K24L(5),K24EL(5),KV(5),LKK4(5),
     1LIRC4(5),LZSI(5),KSL(10),KSLV(10,20)
      COMMON/MCL/EPOIST(24),EPXM(5),UZSN(5),CB(5),CC(5),SRC(5),DEC(5),
     1UZSI(5),SGWI(5),GWSI(5),RESI(5),SRGXI(5),SCEPI(5),REPI(5),
     2CEPM(10),PETVEI(10),TRANSI(10,48),EVAP(12,31),
     3ELOW(10,744),RO(5,744),EVAPM(12),SRO(5),SRGS(5),SIMPV(5),SINTF(5),
     4SGWF(5),SRECH(5),SPR(5),SPE(5),SET(5),TIMEAR(10,10),PEADJ(12),
     5GAGEPE(5),POWER,BASEK(10),BASEL(10),IMPV,LZSN,K3,K24L,K24EL,KV,
     6LKK4,LIRC4,LZSI,KSI,KSIV,MAXL(10),MINL(10),LAG(10,10),
     7IE,MHR,MOHR1,MOHR2,ELE,ELEMTS,GAGEAR,VAREP,SDEP,EPBIAS,IXEP,
     8ADDFW1,ADDFW2,TEST1,TEST2,RTEINT,AVEPE,VARK,VARL,SNOW,UZSNWE,
     9AEPI(5)
C MAIN,LAND,CHANEL AND SNOW VARIABLES
      INTEGER SIXHR
      REAL K1(5)
      COMMON/MLCS/FCOVER(5),FDEN(5),KOHLER,PE(5,31),COVER(5,31),
     1IPA(5,31,24),K1,LAST,IRG,IPT,IDA,IHR,MONTH,I,SIXHR
C LAND INITIAL VALUES
      SROT=0.0
      SRGST=0.0
      SINTFT=0.0
      SGWFT=0.0
      SIMPVT=0.0
      SRECHT=0.0
      SETT=0.0
      SPRT=0.0
      SPET=0.0
C INITIAL VALUES OF VARIABLES
      UZS=UZSI(IRG)
      LZS=LZSI(IRG)
      SGW=SGWI(IRG)
      GWS=GWSI(IRG)
      RES=RESI(IRG)
      SRGX=SRGXI(IRG)
      SCEP=SCEPI(IRG)
      REP=REPI(IRG)
      AEPIT=AEPI(IRG)
C INITIAL VALUES OF PARAMETERS
      K1T=K1(IRG)
      AT=IMPV(IRG)
      PA=1.0-AT
      EPXMT=EPXM(IRG)
      UZSNC=UZSN(IRG)
      LZSNT=LZSN(IRG)
      K3T=K3(IRG)
      K24LT=K24L(IRG)
      K24ELT=K24EL(IRG)
      CBT=CB(IRG)
      CCT=CC(IRG)
      KVT=KV(IRG)
      SRCT=SRC(IRG)
      DECT=DEC(IRG)
      LKK4T=LKK4(IRG)
      LIRC4T=LIRC4(IRG)
      EFC=FCOVER(IRG)*FDEN(IRG)
      IHR=1
      IDA=1
C BEGINNING OF HOUR AND DAY LOOP
C VALUES OF POTENTIAL EVAPOTRANSPIRATION AND PRECIPITATION
203   IF (IHR.NE.1) GO TO 206
      IF (KOHLER.EQ.1) GO TO 204
      IF (AVEPE.EQ.0) GO TO 205
      EP=EVAPM(MONTH)
      GO TO 2032
205   EP=EVAP(MONTH,IDA)*PEADJ(MONTH)
      GO TO 2032
204   EP=PE(IRG,IDA)*PEADJ(MONTH)
2032  IF (VAREP.EQ.0) GO TO 202
      SD=EP*SDEP
```

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                          LAND
      CALL IGAUSS(IXEP,SD,EP,TV)
      EP=TV+EPBIAS*EP
      IF (EP.LT.0.0) EP=0.0
202   EP=EP*GAGEPE(IRG)
      EPDT=EP
      SPET=SPET+EP
      EP=EFC*=P+(1.0-EFC)*(1.0-COVER(IRG,IDA))*EP
      AEPIT=(AEPIT*0.9)+EP
      UZSNT=UZSNC+UZSNWE*AEPIT
206   IF ((SIXHR.EQ.0).OR.(SNOW.EQ.1)) GO TO 208
      IS=(IHR+5)/6
      PX1=PX(IRG,IDA,IS)/6.0
      GO TO 207
208   PX1=PX(IRG,IDA,IHR)
      IF (SNOW.EQ.1) GO TO 2081
207   PX1=PX1*K1T
2081  SPET=SPET+PX1
      PR=PX1
C PX1 IS HOURLY PRECIPITATION -- PR IS HOURLY PRECIPITATION
      RU=0.0
      IF (PR.GT.0.0) GO TO 210
2121  IF (RES.EQ.0.0) GO TO 211
      P3=0.0
      GO TO 212
211   IF (SRGX.EQ.0.0) GO TO 213
      P3=0.0
      ROS=0.0
      GO TO 214
213   P3=0.0
      ROS=0.0
      INTF=0.0
      GO TO 215
C INTERCEPTION STORAGE - SCEP IS INTERCEPTION STORAGE VOLUME
C                      - EPX IS INTERCEPTION STORAGE CAPACITY
210   EPX=EPXMT-SCEP
      IF (EPX.LT.0.0) EPX=0.0
      IF (PR.GE.EPX) GO TO 216
      SCEP=SCEP+PR
      P3=0.0
      GO TO 2121
216   P3=PR-EPX
      SCEP=SCEP+EPX
C P3 IS RAIN REACHING THE GROUND
C P3*AT IS IMPERVIOUS AREA RUNOFF VOLUME
      SIMPVT=SIMPVT+P3*AT
C BEGIN 15 MINUTE LOOP
212   ROS=0.0
      GWIN=0.0
      DO 209 I15=1,4
      P4=0.25*P3+RES
      IF (P4.EQ.0.0) GO TO 209
      LNRAT=LZS/LZSNT
      D3FV=CBT/((LNRAT)**POWER)
      D4F=0.25*D3FV
C P4 IS P3 PLUS SURFACE DETENTION STORAGE
      RATIO=CCT*(2.0**LNRAT)
      IF (RATIO.LT.1.0) RATIO=1.0
      IF (P4.GE.D4F) GO TO 220
      SHRD=P4*P4/(2.0*D4F)
      GO TO 221
220   SHRD=P4-0.5*D4F
221   INFIL=P4-SHRD
C INFIL IS INFILTRATION VOLUME
      IF (P4.GE.(D4F*RATIO)) GO TO 222
      PXX=P4*P4/(2.0*D4F*RATIO)
      GO TO 223
222   PXX=P4-0.5*D4F*RATIO
C PXX IS THE POTENTIAL INCREASE TO OVERLAND FLOW AND SURFACE DETENTION
223   PGXX=SHRD-PXX
C PGXX IS THE POTENTIAL INCREASE TO INTERFLOW DETENTION
C UPPER ZONE CALCULATIONS
      IF (UZS.GE.(2.0*UZSNT)) GO TO 224
      UZI=2.0*ABS((0.5*(UZS/UZSNT)-1.0)+1.0
      PRF=(0.5*UZS/UZSNT)*(1.0/(1.0+UZI))**UZI
      GO TO 225
224   UZI=2.0*ABS(((UZS/UZSNT)-1.0)-1.0)+1.0
      PRF=1.0-(1.0/(1.0+UZI))**UZI
C PRF IS THE PERCENT OF PXX AND PGXX NOT RETAINED IN UPPER ZONE STORAGE
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LAND

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225     RGX=RGXX*PRR
C RGX IS THE VOLUME TO INTERFLOW DETENTION STORAGE
        SRGX=SRGX+RGX
C SRGX IS INTERFLOW DETENTION STORAGE
        RX=RXX*PRR
C RX IS THE VOLUME TO OVERLAND FLOW AND SURFACE DETENTION
        UZS=UZS+SMED-RGX-RX
C UZS IS UPPER ZONE STORAGE VOLUME
C OVERLAND FLOW
        IF (RX.LE.RES) GO TO 226
        DE=DECT*((RX-RES)**0.6)
C DE IS SURFACE DETENTION AT EQUILIBRIUM
        GO TO 227
226     DE=(RES+RX)*0.5
227     D=(RES+RX)*0.5
C D IS AVERAGE SURFACE DETENTION
        IF (D.GT.DE) DE=D
        IF (D.LE.0.005) GO TO 228
        ROST=0.25*SRCT*(D**1.67)*((1.0+0.6*((D/DE)**3.0))**1.67)
        GO TO 229
  228   ROST=0.0
  229   IF(ROST.GT.(0.75*RX))  ROST=0.75*RX
C ROS IS OVERLAND FLOW VOLUME
        SRCST=SRCST+ROST
        RES=RX-ROST
        ROS=ROS+ROST
C RES IS SURFACE DETENTION STORAGE VOLUME
        IF (RES.GE.0.001) GO TO 230
        LZS=LZS+RES
        RES=0.0
C LOWER ZONE AND GROUNDWATER CALCULATIONS
230     LZI=1.5*ABS((LZS/LZSNT)-1.0)+1.0
        PRI=(1.0/(1.0+LZI))**LZI
        IF (LZS.LT.LZSNT) PRR=1.0-PRR*(LZS/LZSNT)
C PRR IS THE PERCENT OF INFILTRATION RETAINED IN THE LOWER ZONE
C F3 IS HELD IN LOWER ZONE -- F1 GOES TO GROUNDWATER DETENTION
        F3=PRR*INFIL
        LZS=LZS+F3
C LZS IS LOWER ZONE STORAGE VOLUME
        GWIN=GWIN+INFIL-F3
  209   CONTINUE
C END 15 MINUTE LOOP
        F1A=GWIN
        F1=F1A*(1.0-K24LT)*PA
        RECH=F1A*K24LT*PA
C RECH IS DEEP GROUNDWATER RECHARGE
        SRECHT=SRECHT+RECH
        SGW=SGW+F1
C SGW IS GROUNDWATER STORAGE VOLUME
        GWS=GWS+F1
C GWS IS ANTECEDENT GW INFLOW INDEX
C INTERFLOW CALCULATIONS
214     INTF=LIFC4T*SRGX
C INTF IS INTERFLOW VOLUME
        SINTFT=SINTFT+INTF
        SRGX=SRGX-INTF
        IF (SRGX.GE.0.0001) GO TO 215
        LZS=LZS+SRGX
        SRGX=0.0
C GROUNDWATER FLOW CALCULATIONS
215     IF (SGW.LE.0.0001) GO TO 231
        GWF=SGW*LKK4T*(1.0+KVT*GWS)
        GO TO 232
231     GWF=0.0
        GWS=SGW
C GWF IS GROUNDWATER FLOW VOLUME
232     SGWFT=SGWFT+GWF
        SGW=SGW-GWF
C RU IS TOTAL LAND SURFACE RUNOFF VOLUME
        RU=RU+(ROS+INTF)*PA+PB*AT+GWF
C EVAP-TRANS LOSS FROM INTERCEPTION AND UPPER ZONE STORAGES
        EPHR=EPDIST(IHR)*EP
        IF (EPHR.EQ.0.0) GO TO 234
        IF (SCEP.LE.0.0) GO TO 235
        IF (SCEP.LE.EPHR) GO TO 236
        SCEP=SCEP-EPHR
        SETT=SETT+EPHR
        EPHR=0.0
```

LAND

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      GO TO 234
236   SETT=SETT+SCEP
      EPHR=EPHR-SCEP
      SCEP=0.0
235   IF (UZS.LE.0.0) GO TO 237
      IF (UZS.LE.EPHR) GO TO 238
      SETT=SETT+PA*EPHR
      UZS=UZS-EPHR
      EPHR=0.0
      GO TO 234
238   SETT=SETT+UZS*PA
      EPHR=EPHR-UZS
      UZS=0.0
237   REP=REP+EPHR
C REP IS RESIDUAL POTENTIAL EVAPOTRANSPIRATION
C SLOW PERCOLATION FROM UPPER ZONE
234   DEEPL=(UZS/UZSNT)-(LZS/LZSNT)
      IF (DEEPL.LE.0.0) GO TO 239
      LNRAT=LZS/LZSNT
      RECE=0.003*CRT*UZSNT*(DEEPL**3.0)
      UZS=UZS-RECE
      LZI=1.5*ABS(LNRAT-1.0)+1.0
      PRE=(1.0/(1.0+LZI))**LZI
      IF (LZS.LT.LZSNT) PRE=1.0-PRE*LNRAT
      E3=PRE*RECE
      E1A=(1.0-PRE)*RECE
      E1=E1A*(1.0-K24LT)*PA
      RECH=E1A*K24LT*PA
      SRECHT=SRECHT+RECH
      LZS=LZS+E3
      SGW=SGW+E1
      GWS=GWS+E1
C EVAP-TRANS FROM GROUNDWATER AND LOWER ZONE
239   IF (IHR.NE.21) GO TO 242
      IF (GWS.GT.0.0001) GWS=0.97*GWS
      LOS=K24LT*EPOT
      IF (LOS.GT.SGW) LOS=SGW
C LOS IS GROUNDWATER EVAPOTRANSPIRATION VOLUME
      SETT=SETT+LOS
      SGW=SGW-LOS
      GWS=GWS-LOS
      IF (GWS.LT.0.0) GWS=0.0
      EP=REP
      IF (EP.EQ.0.0) GO TO 242
      LNRAT=LZS/LZSNT
      IF (EP.GE.(K3T*LNRAT)) GO TO 240
      AETR=EP*(1.0-(EP/(2.0*K3T*LNRAT)))
      LZS=LZS-AETR
      GO TO 241
240   AETR=0.5*K3T*LNRAT
      LZS=LZS-AETR
241   SETT=SETT+PA*AETR
C AETR IS LOWER ZONE EVAPOTRANSPIRATION VOLUME
      REP=0.0
  242 CONTINUE
      MHR=(IDA-1)*24+IHR
      RO(IRG,MHR)=RU
      SROT=SROT+RU
      IF ((IDA.EQ.LAST).AND.(IHR.EQ.24)) GO TO 246
      IHR=IHR+1
      IF (IHR.LE.24) GO TO 203
      IHR=1
      IDA=IDA+1
      GO TO 203
C END OF HOUR AND DAY LOOP
C LAND CARRYOVER VALUES
246   UZSI(IRG)=UZS
      LZSI(IRG)=LZS
      SGWI(IRG)=SGW
      GWSI(IRG)=GWS
      RESI(IRG)=RES
      SRGXI(IRG)=SRGX
      SCEPI(IRG)=SCEP
      REPI(IRG)=REP
      AEPI(IRG)=AEPIT
      SRO(IRG)=SROT
      SROS(IRG)=SROST
      SINTF(IRG)=SINTFT
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LAND

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SIMPV(IRG)=SIMPVT
SGWF(IRG)=SGWFT
SPECH(IRG)=SPECHT
SPR(IRG)=SPRT
SPE(IRG)=SPET
SET(IRG)=SETT
RETURN
END
```

HOURLY

```
      SUBROUTINE HOURLY(INFEO,MONTH,YEAR,IPT,FLOW)
C SUBROUTINE GENERATES SCALED INPUT FOR AUXILIARY PLOT PROGRAM
      INTEGER YEAR,DA1,DA2
      REAL INFEO(20),MCCHAR(12)
      DIMENSION XA(752),YS(752),A(31),NUM(31),FLOW(10,744)
C MAIN,HOURLY AND DAILY VARIABLES
      INTEGER FIRST,CHECK(10)
      COMMON/MHF/FLOW1(10,744),PHFMX(10),FPN(7),FPNAME(10,7),PLOTMX(10),
     1ACTFLW(10,12,31),SIMFLW(10,12,31),FIRST,CHECK
      DATA MCCHAR/3HJAN,3HFEB,3HMAR,3HAPR,3HMAY,4HJUNE,4HJULY,3HAUG,
     14HSEPT,3HOCT,3HNOV,3HDEC/
      MOHR1=1
      M6=6
880   IF (CHECK(IPT).EQ.1) GO TO 855
C DETERMINE FIRST AND LAST HOUR OF PLOT AND NUMBER OF POINTS
C HOURLY FLOW
      DO 850 MHR=MOHR1,744
      IF (FLOW1(IPT,MHR).EQ.0.0) GO TO 850
      MOHR1=MHR
      GO TO 851
850   CONTINUE
      GO TO 899
851   FIRST=1
      DO 852 MHR=MOHR1,744
      IF (FLOW1(IPT,MHR).GT.0.0) GO TO 852
      MOHR2=MHR-1
      GO TO 870
852   CONTINUE
      MOHR2=744
      GO TO 870
C SIX HOUR FLOWS
855   DO 856 MHR=M6,744,6
      IF (FLOW1(IPT,MHR).EQ.0.0) GO TO 856
      M6=MHR
      GO TO 857
856   CONTINUE
      GO TO 899
857   FIRST=1
      DO 858 MHR=M6,744,6
      IF (FLOW1(IPT,MHR).GT.0.0) GO TO 858
      MOHR2=MHR-6
      GO TO 859
858   CONTINUE
      MOHR2=744
859   MOHR1=M6-5
      DO 860 MHR=MOHR1,M6
      IF (FLOW1(IPT,MHR).EQ.0.0) GO TO 860
      MOHR1=MHR
      GO TO 861
860   CONTINUE
861   F1=FLOW1(IPT,MOHR1)
      M1=MOHR1+1
864   DO 862 MHR=M1,MOHR2
      IF (FLOW1(IPT,MHR).EQ.0.0) GO TO 862
      M2=MHR
      F2=FLOW1(IPT,MHR)
      GO TO 863
862   CONTINUE
863   IF (M1.EQ.M2) GO TO 865
      FP=(F2-F1)/(M2-M1+1)
      I=M2-1
      DO 866 MHR=M1,I
      X1=MHR-M1+1
866   FLOW1(IPT,MHR)=F1+FP*X1
865   IF (M2.EQ.MOHR2) GO TO 870
      M1=M2+1
      F1=F2
      GO TO 864
870   NPT=MOHR2-MOHR1+1
      DA1=(MOHR1-1)/24+1
      DA2=(MOHR2-1)/24+1
      NDA=DA2-DA1+1
      I=MOHR1-(DA1-1)*24
      X1=I*0.1
      DO 871 I=1,NDA
      NUM(I)=DA1-1+I
871   A(I)=2.4*I
      PMAX=PHFMX(IPT)
```

HOURLY

```
      DELTA=PMAX*0.1
      PUNCH 900,NDA,DELTA,X1,NPT
      PUNCH 901,(A(I),I=1,NDA)
      PUNCH 902,(NUM(I),I=1,NDA)
      IF (CHECK(IPT).EQ.1) GO TO 872
      PUNCH 903
      GO TO 873
  872 PUNCH 904
  873 DO 874 I=1,7
  874 FPN(I)=FPNAME(IPT,I)
      PUNCH 905,FPN
      PUNCH 906,MCCHAR(MONTH),YEAR
      PUNCH 907,INFRO
      PUNCH 908
      DO 875 MHR=MOHR1,MOHR2
      I=MHR-MOHR1+1
      YA(I)=(FLOW1(IPT,MHR)/PMAX)*10.0
      YS(I)=(FLOW(IPT,MHR)/PMAX)*10.0
      IF (YA(I).GT.10.0) YA(I)=10.0
      IF (YS(I).GT.10.0) YS(I)=10.0
  875 CONTINUE
      PUNCH 909,(YA(I),I=1,NPT)
      PUNCH 909,(YS(I),I=1,NPT)
      IF (MOHR2.EQ.744) GO TO 899
      MOHR1=MOHR2+1
      M6=MOHR2+6
      GO TO 880
  899 CONTINUE
C HOURLY FORMAT STATEMENTS
  900 FORMAT (I5,F10.2,F5.1,I5)
  901 FORMAT (16F5.1)
  902 FORMAT (20I3)
  903 FORMAT (16HHOURLY FLOW--CFS)
  904 FORMAT (20HSIX HOURLY FLOW--CFS)
  905 FORMAT (7A4)
  906 FORMAT (A4,3H 19,I2)
  907 FORMAT (20A4)
  908 FORMAT (35HBLACK IS OBSERVED--RED IS SIMULATED)
  909 FORMAT (16F5.2)
      RETURN
      END
```

CHANEL

```
      SUBROUTINE CHANEL
C CHANNEL ROUTING SUBROUTINE
C CHANEL VARIABLES
      INTEGER GAGET(10),ADD1T(10),ADD2T(10),HALFR,PINT,DHR,VK,VL
      REAL KVT(20),KS1T,IN,K
      DIMENSION TRS(792),TIMET(10),LAGT(10)
C MAIN,LAND AND CHANEL VARIABLES
      INTEGER ELE,ELEMTS(10),GAGEAR(10,10),ADDFW1(10,10),
     1ADDFW2(10,10),TEST1(10),TEST2(10),RTEINT(10),AVEPE,VARK(10),
     2VARL(10),SNOW,VAREP
      REAL IMPV(5),LZSN(5),K3(5),K24L(5),K24EL(5),KV(5),LKK4(5),
     1LIFC4(5),LZSI(5),KSI(10),KSIV(10,20)
      COMMON/MCL/EPOIST(24),EPXM(5),UZSN(5),CP(5),CC(5),SRC(5),DEC(5),
     1UZSI(5),SGWI(5),GWSI(5),PESI(5),SRGXI(5),SCEPI(5),REPI(5),
     2CFSM(10),PERVEI(10),TRANSI(10,48),EVAP(12,31),
     3ELEV(10,744),RO(5,744),EVAPV(12),SRO(5),SROS(5),SIMPV(5),SINTF(5),
     4SGAGE(5),SRECH(5),SPR(5),SPE(5),SET(5),TIMEAR(10,10),PEADJ(12),
     5GAGEPE(5),POWER,BASEK(10),BASEL(10),IMPV,LZSN,K3,K24L,K24EL,KV,
     6LKK4,LIFC4,LZSI,KSI,KSIV,MAXL(10),MINL(10),LAG(10,10),
     7IE,MHR,MCHR1,MCHR2,ELE,ELEMTS,GAGEAR,VAREP,SDEP,EPBIAS,IXEP,
     8ADDFW1,ADDFW2,TEST1,TEST2,RTEINT,AVEPE,VARK,VARL,SNOW,UZSNWE,
     9AEPI(5)
C MAIN,LAND,CHANEL AND SNOW VARIABLES
      INTEGER SIXHR
      REAL K1(5)
      COMMON/MLCS/ECOVER(5),EDEN(5),KOHLEP,PE(5,31),COVER(5,31),
     1RX(5,31,24),K1,LAST,IRG,IPT,ICA,IHR,MONTH,I,SIXHR
C CHANNEL INITIAL VALUES
      MCHR1=1
      MCHR2=LAST*24
      IE=MCHR2+48
      DO 3001 I=MCHR1,IE
3001  TRS(I)=0.0
      ELE=ELEMTS(IPT)
      PINT=RTEINT(IPT)
      HALFR=(PINT-1)/2
      VK=VARK(IPT)
      VL=VARL(IPT)
      IF (VK.EQ.0) GO TO 3004
      BASEKT=BASEK(IPT)
      DO 3003 I=1,20
3003  KVT(I)=KSIV(IPT,I)
3004  IF (VL.EQ.0) GO TO 3002
      MINLT=MINL(IPT)
      BASELT=BASEL(IPT)
      DO 3005 I=1,10
3005  LAGT(I)=LAG(IPT,I)
3002  DO 300 IE=1,ELE
      GAGET(IE)=GAGEAR(IPT,IE)
      TIMET(IE)=TIMEAR(IPT,IE)
      ADD1T(IE)=ADDFW1(IPT,IE)
300   ADD2T(IE)=ADDFW2(IPT,IE)
      KS1T=KSI(IPT)
      CFS=CFSM(IPT)
      IF (TEST1(IPT).EQ.1) GO TO 303
C TRANSLATION IN TIME -- CASE OF ALL ELEMENTS OF ADDFLOW 1 & 2 EQ TO ZERO
      DO 304 MHR=MCHR1,MCHR2
      DHR=MHR+HALFR
      DO 304 IE=1,ELE
      I=DHR+PINT*(IE-1)
      J=GAGET(IE)
304   TRS(I)=TRS(I)+RO(J,MHR)*CFS*TIMET(IE)
      GO TO 305
303   IF (TEST2(IPT).EQ.1) GO TO 306
C TRANSLATION IN TIME -- CASE OF AT LEAST ONE ELEMENT OF ADDFLOW 1 GT ZERO
      DO 307 MHR=MCHR1,MCHR2
      DHR=MHR+HALFR
      DO 307 IE=1,ELE
      I=DHR+PINT*(IE-1)
      J=GAGET(IE)
      TEMPOR=RO(J,MHR)*CFS*TIMET(IE)
      J=ADD1T(IE)
      IF (ADD1T(IE).GT.0) TEMPOR=TEMPOR+FLOW(J,MHR)
      TRS(I)=TRS(I)+TEMPOR
307   CONTINUE
      GO TO 305
C TRANSLATION IN TIME -- CASE OF AT LEAST ONE ELEMENT OF ADDFLOW 1 & 2 GT ZERO
306   DO 308 MHR=MCHR1,MCHR2
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CHANEL

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      DHR=MHR+HALFR
      DO 305 IE=1,ELE
      I=DHR+PINT*(IE-1)
      J=BAGET(IE)
      TEMPOR=QQ(J,MHR)*CFS*TIMET(IE)
      IF (ADD1T(IE).EQ.0) GO TO 308
      J=ADD1T(IE)
      TEMPOR=TEMPOR+FLOW(J,MHR)
      IF (ADD2T(IE).EQ.0) GO TO 308
      J=ADD2T(IE)
      TEMPOR=TEMPOR+FLOW(J,MHR)
308   TRS(I)=TRS(I)+TEMPOR
305   IF (VL.EQ.0.0) GO TO 3051
C VARIABLE LAG
      IE=MOHR2+HALFR+PINT*(ELE-1)
      DO 51 IHR=MOHR1,IE
      MHR=IE+MOHR1-IHR
      R=(TRS(MHR)/BASELT)+1.0
      I=R
      IF (I.LT.MINLT) GO TO 51
      IF (I.LE.10) GO TO 52
C INFLOW GREATER THAN 10*BASELT
      L=LAGT(10)
      PART=TRS(MHR)-BASELT*10.0
      TRS(MHR)=TRS(MHR)-PART
      TRS(MHR+L)=TRS(MHR+L)+PART
      I=10
      GO TO 57
C INFLOW BETWEEN I*MINLT-1<*BASELT< AND I*BASELT*10.0<
 52   LTOP=LAGT(I)
      LBOT=LAGT(I-1)
      P=R-I
      IF (LTOP.LT.LBOT) GO TO 53
      IF (LBOT.LT.LTOP) LBOT=LBOT+1
      IF (LBOT.EQ.0) GO TO 55
      LTOP=LBOT+(P*(LTOP-LBOT+1))
      PART=TRS(MHR)-BASELT*(I-1)
      TRS(MHR)=TRS(MHR)-PART
      PART=PART/((LTOP-LBOT)+1.0)
      DO 54 L=LBOT,LTOP
 54   TRS(MHR+L)=TRS(MHR+L)+PART
      GO TO 55
 53   LTOP=LTOP+1
      LTOP=LBOT-(P*(LBOT-LTOP+1))
      PART=TRS(MHR)-BASELT*(I-1)
      TRS(MHR)=TRS(MHR)-PART
      PART=PART/((LBOT-LTOP)+1.0)
      DO 56 L=LTOP,LBOT
 56   TRS(MHR+L)=TRS(MHR+L)+PART
 55   IF (I.EQ.MINLT) GO TO 51
      I=I-1
 57   DO 58 I1=MINLT,I
      I2=I+MINLT-I1
      LTOP=LAGT(I2)
      LBOT=LAGT(I2-1)
      IF (LTOP.LT.LBOT) GO TO 59
      IF (LBOT.LT.LTOP) LBOT=LBOT+1
      IF (LBOT.EQ.0) GO TO 58
      TRS(MHR)=TRS(MHR)-BASELT
      PART=BASELT/((LTOP-LBOT)+1.0)
      DO 60 L=LBOT,LTOP
 60   TRS(MHR+L)=TRS(MHR+L)+PART
      GO TO 58
 59   LTOP=LTOP+1
      TRS(MHR)=TRS(MHR)-BASELT
      PART=BASELT/((LBOT-LTOP)+1.0)
      DO 61 L=LTOP,LBOT
 61   TRS(MHR+L)=TRS(MHR+L)+PART
 58   CONTINUE
 51   CONTINUE
3051  IE=MAXL(IPT)
      DO 34 I=1,IE
      MHR=MOHR1+(I-1)
34    TRS(MHR)=TRS(MHR)+TRANSI(IPT,I)
      PREV=PREVFI(IPT)
C CHANNEL ATTENUATION
      IF (VK.EQ.1) GO TO 3052
C CONSTANT K
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                                CHANEL
      DO 309 MHR=MOHR1,MOHR2
      IN=TES(MHR)
      FLOWT=IN-KSIT*(IN-PREV)
      PREV=FLOWT
      IF (PREV.LT.0.01) PREV=0.0
  309 FLOW(IPT,MHR)=FLOWT*0.02832
      GO TO 3091
C VARIABLE K
3052  DO 30 MHR=MOHR1,MOHR2
      IN=TES(MHR)
      I=(PREV/BASEKT)+1.0
      IF (I.GT.20) I=20
      K=KVT(I)*KSIT
      FLOWT=IN-K*(IN-PREV)
      PREV=FLOWT
      IF (PREV.LT.0.01) PREV=0.0
   30 FLOW(IPT,MHR)=FLOWT*0.02832
C CHANNEL CARRYOVER VALUES
3091  ELE=MAXL(IPT)
      PREVEI(IPT)=PREV
      DO 311 IE=1,ELE
311   TRANSI(IPT,IE)=TES(MOHR2+IE)
      RETURN
      END
```

IGAUSS

```
      SUBROUTINE IGAUSS(IX,S,AM,V)
C SUBROUTINE TO COMPUTE NORMAL RANDOM NUMBERS
C  IX=ODD INTEGER  .LT.9 DIGITS TO BEGIN R.N. GENERATION   S=STANDARD DEVIATION
C  AM=MEAN   V=VALUE OF COMPUTED NORMAL RANDOM NUMBER
      DOUBLE PRECISION X,Y,C
      A=0.0
      DO 50 I=1,12
C START RANDU
      X=IX
      C=1073741827.D0
      Y=X*C
      Y=DMOD(Y,576460752303423488.D0)
      IY=Y
      YFL=Y*.17347234759768070944119244810-17
C END RANDU
C FOR THE 360 SYSTEM SUBSTITUTE THE FOLLOWING BETWEEN START AND END RANDU
C     IY=IX*65539
C     IF (IY) 5,6,6
C5    IY=IY+2147483647+1
C6    YFL=IY
C     YFL=YFL*0.4656613E-9
      IX=IY
50    A=A+YFL
      V=(A-6.0)*S+AM
      RETURN
      END
```

DAILY

```
      SUBROUTINE DAILY(INFRO,MONTH,YEAR,IPT)
C CALCULATION OF SCALED VALUES FOR MEAN DAILY FLOW PLOT
C PLOT CALLS CAN BE ADDED IF COMPUTER HAS PLOT ROUTINES
      INTEGER YEAR,START(2,12),YR1
      REAL INFRO(20),MOCHAR(12)
      DIMENSION LASTDA(2,12),A(2,12),YA(368),YS(368)
C MAIN,HOURLY AND DAILY VARIABLES
      INTEGER FIRST,CHECK(10)
      COMMON/MHD/FLOW1(10,744),PMAX(10),FPN(7),FPNAME(10,7),PLOTMX(10),
     1ACTFLW(10,12,31),SIMFLW(10,12,31),FIRST,CHECK
      DATA MOCHAR/3HOCT,3HNOV,3HDEC,3HJAN,3HFEB,3HMAR,3HAPR,3HMAY,
     13HJUN,3HJUL,3HAUG,3HSEP/
      DATA A/3.0,3.0,6.0,6.0,9.1,9.1,12.2,12.2,15.0,15.1,18.1,18.2,
     121.1,21.2,24.2,24.3,27.2,27.3,30.3,30.4,33.4,33.5,36.4,36.5/
      DATA LASTDA/31,31,28,29,31,31,30,30,31,31,30,30,31,31,31,31,30,30,
     131,31,30,30,31,31/
      DATA START/92,92,123,123,151,152,182,183,212,213,243,244,273,274,
     1304,305,335,336,0,0,31,31,61,61/
      LEAPYR=0
      IF ((YEAR-4*(YEAR/4)).EQ.0) LEAPYR=1
      N=12
      PMAX=PLOTMX(IPT)
      DELTA=PMAX*0.1
      X1=0.0
      L=LEAPYR+1
      NPT=A(L,12)*10.0+1.0
      PUNCH 900,N,DELTA,X1,NPT
      PUNCH 901,(A(L,J),J=1,12)
      PUNCH 902,MOCHAR
      PUNCH 903
      DO 800 J=1,7
800   FPN(J)=FPNAME(IPT,J)
      PUNCH 904,FPN
      YR1=YEAR-1
      IF (YR1.LT.0) YR1=99
      PUNCH 905,YR1,YEAR
      PUNCH 906,INFRO
      PUNCH 907
C SCALE ACTUAL AND SIMULATED FLOW
      DO 801 MO=1,12
      LAST=LASTDA(L,MO)
      IBASE=START(L,MO)
      DO 801 IDA=1,LAST
      FA=(ACTFLW(IPT,MO,IDA)/PMAX)*10.0
      FS=(SIMFLW(IPT,MO,IDA)/PMAX)*10.0
      IF (FA.GT.10.0) FA=10.0
      IF (FS.GT.10.0) FS=10.0
      I=IBASE+IDA
      YA(I)=FA
      YS(I)=FS
801   CONTINUE
      N=365+LEAPYR
      PUNCH 908,(YA(I),I=1,N)
      PUNCH 908,(YS(I),I=1,N)
C FORMAT STATEMENTS
900   FORMAT (I5,F10.2,F5.1,I5)
901   FORMAT (12F5.1)
902   FORMAT (12A3)
903   FORMAT (20HMEAN DAILY FLOW-CFSD)
904   FORMAT (7A4)
905   FORMAT (13HWATER YEAR 19,I2,1H-,I2)
906   FORMAT (20A4)
907   FORMAT (35HBLACK IS OBSERVED--RED IS SIMULATED)
908   FORMAT (16F5.2)
      RETURN
      END
```

```
                                  LPLOT
      SUBROUTINE LPLOT(YEAR,IPT)
C  MEAN DAILY FLOW FOR PRINTER OUTPUT
      INTEGER YEAR
      REAL MOCHAR(12)
      DIMENSION LASTDA(2,12),SCALE(10),ORD(101),LC(2,6)
C  MAIN,MONTHLY AND DAILY VARIABLES
      INTEGER FIRST,CHECK(10)
      COMMON/MHD/FLOW1(10,744),PHPMX(10),EPN(7),EPNAME(10,7),PLOTMX(10),
     1ACTFLW(10,12,31),SIMFLW(10,12,31),FIRST,CHECK
      DATA MOCHAR/3HENE,3HFEB,3HMAR,3HABR,3HMAY,3HJUN,3HJUL,3HAGO,3HSEP,
     13HOCT,3HNOV,3HDIC/
      DATA LASTDA/31,31,28,29,31,31,30,30,31,31,30,30,31,31,31,31,30,30,
     131,31,30,30,31,31/
      DATA LC/5,4,4,4,4,4,3,3,4,4,0,0/
      DATA DOT,BLANK,ASTER,PLUS/1H.,1H ,1H*,1H&/
      LEAPYR=0
      IF ((YEAR-4*(YEAR/4)).EQ.0) LEAPYR=1
      PMAX=PLOTMX(IPT)
      DO 810 MONTH=1,12
      MC=MONTH
      IF (MO.GT.12) MO=MC-12
      MOG=MO-2*(MO/2)
      IF(MOG.EQ.0) GO TO 812
      IF(MO.NE.1) GO TO 811
      PRINT 900,(EPNAME(IPT,J),J=1,7),YEAR
811   DO 813 J=1,10
      DEC=J
813   SCALE(J)=DEC*0.1*PMAX
      PRINT 901,MOCHAR(MONTH),MOCHAR(MONTH+1),SCALE
812   LAST=LASTDA((LEAPYR+1),MO)
      DO 815 IDA=1,LAST
      DO 816 J=1,101,10
      ORD(J)=DOT
      IF (J.EQ.101) GO TO 816
      DO 817 I=1,9
      ORD(J+I)=BLANK
817   CONTINUE
816   CONTINUE
      AF=ACTFLW(IPT,MO,IDA)
      SF=SIMFLW(IPT,MO,IDA)
      LA=(AF/PMAX)*100.0+1.5
      LS=(SF/PMAX)*100.0+1.5
      IF (LA.GT.101) LA=101
      IF (LS.GT.101) LS=101
      ORD(LA)=PLUS
      ORD(LS)=ASTER
      PRINT 902,IDA,ORD,SF,AF
815   CONTINUE
      IF (MOG.GT.0) GO TO 810
      MO6=MONTH/2
      LSKIP=LC((LEAPYR+1),MO6)
      IF (LSKIP.EQ.0)  GO TO 810
      DO 814 J=1,LSKIP
814   PRINT 903
810   CONTINUE
C FORMAT STATEMENTS
900   FORMAT (1H ,20HMEAN DAILY FLOW PLOT,5X,7A4,7X,13HWATER YEAR 19,I2,
     15X,24H*=SIMULATED   &=OBSERVED)
901   FORMAT (1H ,A3,1H-,A3,F11.1,9F10.1,3X,9HSIMULATED,2X,8HOBSERVED)
902   FORMAT (1H ,I3,2X,101A1,4X,2F10.1)
903   FORMAT (1H )
      RETURN
      END
```

RIO BOCONO EN BOCONO

SIMULACION PARAMETRICA

INFORMACION BASICA DE LA CORRIDA

INICIO DE LA CORRIDA 1 DE ENE DE 1971 FINAL DE LA CORRIDA ** DE ** DE 1971

NUMERO DE PUNTOS DE FLUJO = 1 NUMERO DE EST. DE MED. DE PRECIPITACION = 2

PARAMETROS PARA LA VERTIENTE

EST	NOMBRE DE LA EST	KI	IMPV	EPXM	UZSN	LZSN	CB	CC	KJ	K24L	K24EL	1	SS	NN	IRC	KK24	KV
1	SAN RAFAEL DE BOCONO	1.95	0.05	0.10	0.32	4.02	1.250	60.00	0.30	0.0	0.0	100.	0.16	0.35	0.55	0.950	0.0
2	BOCONO	2.10	0.05	0.10	0.31	4.07	1.250	80.00	0.30	0.0	0.0	100.	0.16	0.35	0.55	0.950	0.0

INFILTRATION CURVE POWER FACTOR IS 2.0 UZSN WT. FACTOR= 0.0

ALMACENAMIENTOS INICIALES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI
SAN RAFAEL DE BOCONO	0.30	3.91	2.00	0.0	1.00	1.00	1.50	0.0
BOCONO	0.30	3.95	2.00	0.0	1.00	1.00	1.50	0.0

PARAMETROS DE PUNTOS DE FLUJO

PF	NOMBRE DEL PUNTO DE FLUJO	AREA	KSI	RTIN	COMPARE	CHECK	HISTOGRAMS									
1	BOCONO EN BOCONO	513.00	0.85	1	1	0	TIMEDELAY	0.11	0.15	0.16	0.19	0.05	0.01	0.03	0.04	0.19	0.07
							GAGEAREA	2	2	2	2	2	1	1	1	1	1
							ADDFLOW1	0	0	0	0	0	0	0	0	0	0
							ADDFLOW2	0	0	0	0	0	0	0	0	0	0

AJUSTE DE LA EVAPORACION POTENCIAL

AJUSTE ESTACIONAL	MES	1	2	3	4	5	6	7	8	9	10	11	12
	AJUSTE	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75

AJUSTE PARA LA EST	ESTACION	1	2
	AJUSTE	1.00	1.00

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

ENE 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	1.200	0.000	0.051	1.057	2.224	0.0	1.47	3.599	3.322
2	BOCONO	3.251	0.000	0.045	1.063	2.195	0.0	1.25	3.599	3.283

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.0	3.78	0.67	0.42	0.0	0.0	0.0	1.17	-0.001
BOCONO	0.0	3.69	0.65	0.39	0.0	0.0	0.0	1.17	-0.001

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

FEB 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	1.208	0.0	0.115	0.003	1.090	0.0	3.16	3.706	3.006
2	BOCONO	1.345	0.0	0.159	0.001	1.185	0.0	4.44	3.706	3.073

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.0	2.92	0.44	0.61	0.0	0.0	0.0	1.28	-0.000
BOCONO	0.01	3.64	0.64	0.83	0.0	0.0	0.05	1.28	-0.000

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

MAR 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	0.370	0.0	0.012	0.000	0.358	0.0	0.68	4.651	2.382
2	BOCONO	0.535	0.0	0.010	0.000	0.525	0.0	0.56	4.651	2.701

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.0	1.10	0.10	0.25	0.0	0.0	0.0	1.51	-0.000
BOCONO	0.0	1.43	0.14	0.34	0.0	0.0	0.0	1.51	-0.000

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

ABR 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	0.311	0.0	0.180	0.000	0.131	0.0	4.40	4.683	1.037
2	BOCONO	0.384	0.0	0.193	0.001	0.190	0.0	4.61	4.683	2.139

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.09	3.10	0.26	0.36	0.0	0.0	0.10	1.31	-0.000
BOCONO	0.21	3.23	0.29	0.42	0.0	0.00	0.03	1.31	-0.000

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

MAY 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	4.393	0.0	0.506	1.729	2.244	0.0	11.71	2.779	2.672
2	BOCONO	3.687	0.0	0.444	0.898	2.390	0.0	10.00	2.779	2.644

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.28	5.79	2.27	2.97	0.0	0.01	0.0	0.97	-0.001
BOCONO	0.01	5.75	1.78	2.51	0.0	0.00	0.0	0.97	-0.001

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

JUN 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	5.556	0.0	0.464	0.381	4.730	0.0	11.10	3.032	2.967
2	BOCONO	4.748	0.0	0.440	0.428	3.901	0.0	10.39	3.032	2.952

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.48	6.83	3.55	5.09	0.0	0.02	0.10	0.96	-0.001
BOCONO	0.55	6.70	3.01	4.34	0.0	0.04	0.02	0.96	-0.001

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

JUL 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	10.330	0.0	0.570	3.622	6.313	0.0	12.63	2.468	2.409
2	BOCONO	7.036	0.0	0.388	1.487	5.235	0.0	9.05	2.468	2.409

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.40	7.40	3.03	5.23	0.0	0.01	0.05	0.90	-0.002
BOCONO	0.24	7.24	2.42	4.28	0.0	0.00	0.03	0.90	-0.001

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

AGO 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	5.531	0.0	0.371	1.020	4.191	0.0	8.84	3.718	3.576
2	BOCONO	6.165	0.0	0.446	2.388	3.450	0.0	10.24	3.718	3.473

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.52	7.42	2.55	4.45	0.0	0.03	0.10	1.15	-0.001
BOCONO	0.57	6.86	2.87	4.47	0.0	0.13	0.10	1.15	-0.001

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

SEP 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	5.921	0.001	0.306	2.478	3.260	0.0	7.51	3.514	3.338
2	BOCONO	3.577	0.0	0.133	0.742	2.740	0.0	3.79	3.514	3.269

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.07	7.16	1.52	3.10	0.0	0.00	0.10	1.06	-0.001
BOCONO	0.03	6.11	1.17	2.47	0.0	0.0	0.10	1.06	-0.001

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

OCT 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	2.335	0.0	0.150	0.039	2.151	0.0	4.05	3.213	2.993
2	BOCONO	2.246	0.0	0.157	0.038	2.052	0.0	4.16	3.213	2.951

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.0	6.31	1.21	2.38	0.0	0.0	0.0	1.09	-0.001
BOCONO	0.0	5.32	1.01	2.05	0.0	0.0	0.0	1.09	-0.001

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

NOV 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	3.103	0.0	0.212	0.413	2.498	0.0	5.44	2.858	2.704
2	BOCONO	2.655	0.0	0.201	0.349	2.123	0.0	5.39	2.858	2.720

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.00	6.08	0.98	2.07	0.0	0.0	0.09	1.00	-0.001
BOCONO	0.0	5.37	0.92	1.87	0.0	0.0	0.05	1.00	-0.001

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

DIC 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	1.650	0.0	0.107	0.011	1.534	0.0	2.72	3.272	2.842
2	BOCONO	0.889	0.0	0.025	0.000	0.864	0.0	0.84	3.272	2.631

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.01	4.91	0.67	1.47	0.0	0.0	0.00	1.07	-0.000
BOCONO	0.0	3.28	0.28	0.86	0.0	0.0	0.0	1.07	-0.000

SIMULACION PARA EL AÑO HIDROLOGICO, 19** PARA ND EN BOCONO

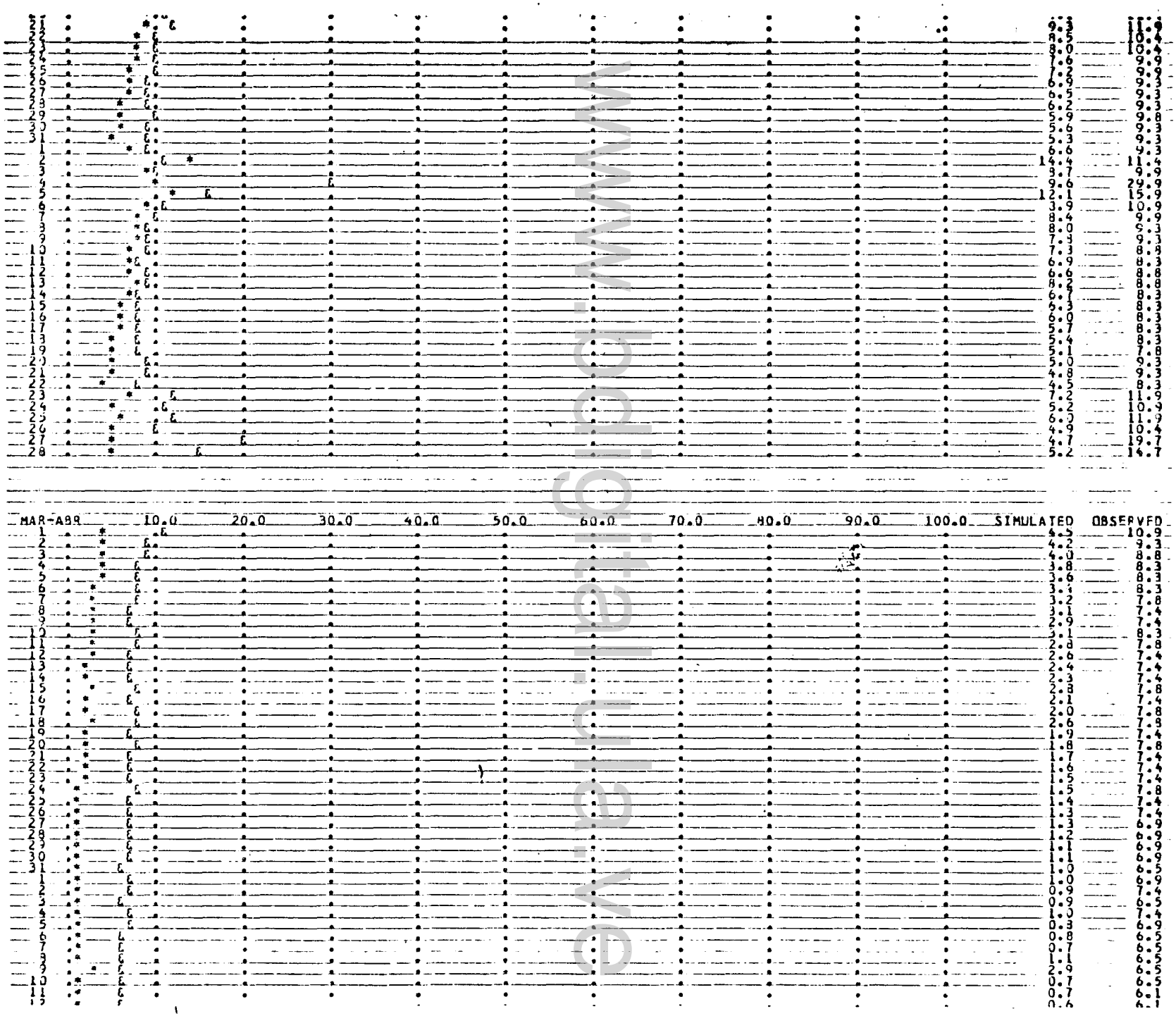
WATER YEAR 1971

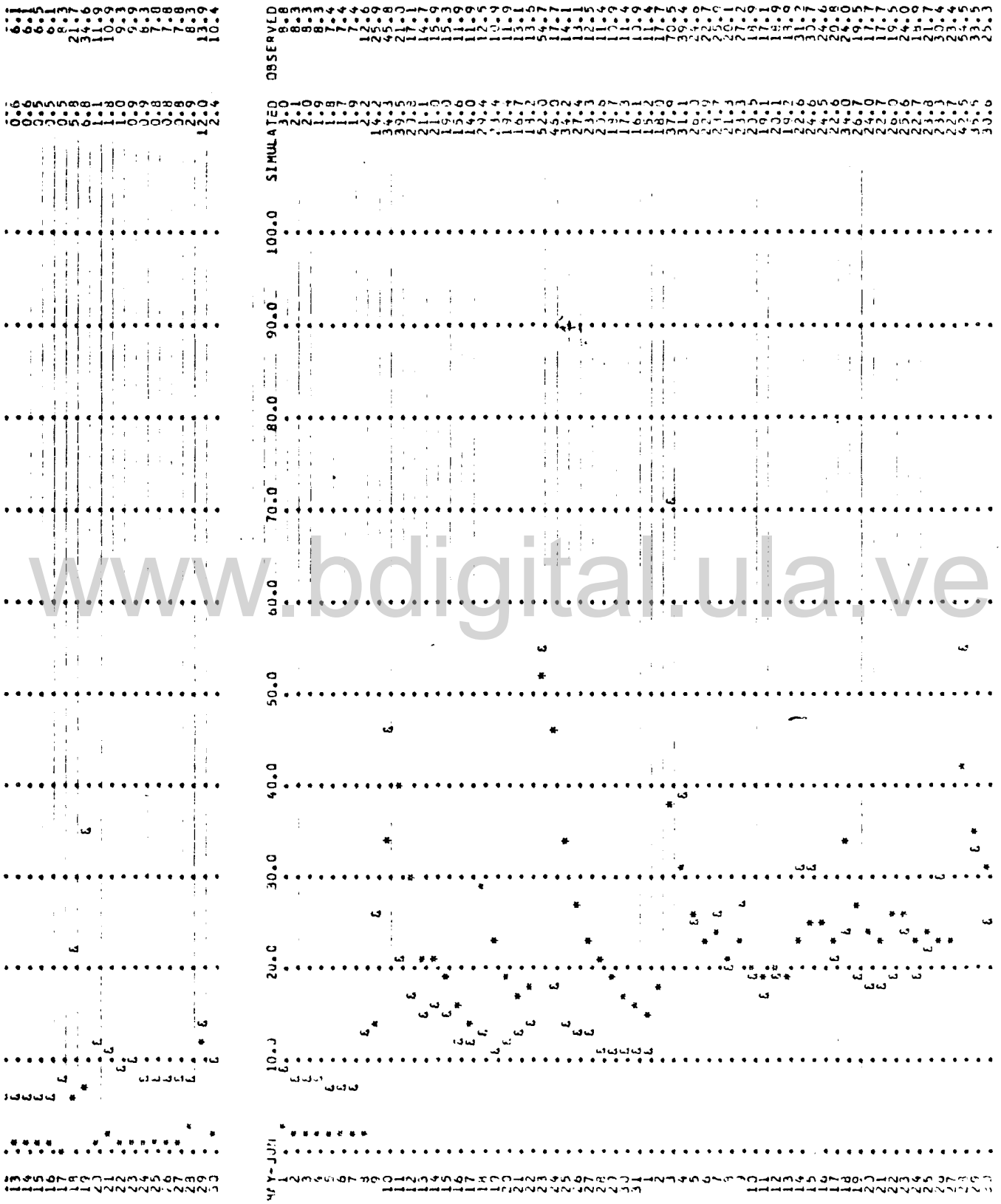
SUMARIO DE LA DESCARGA MEDIA DIARIA

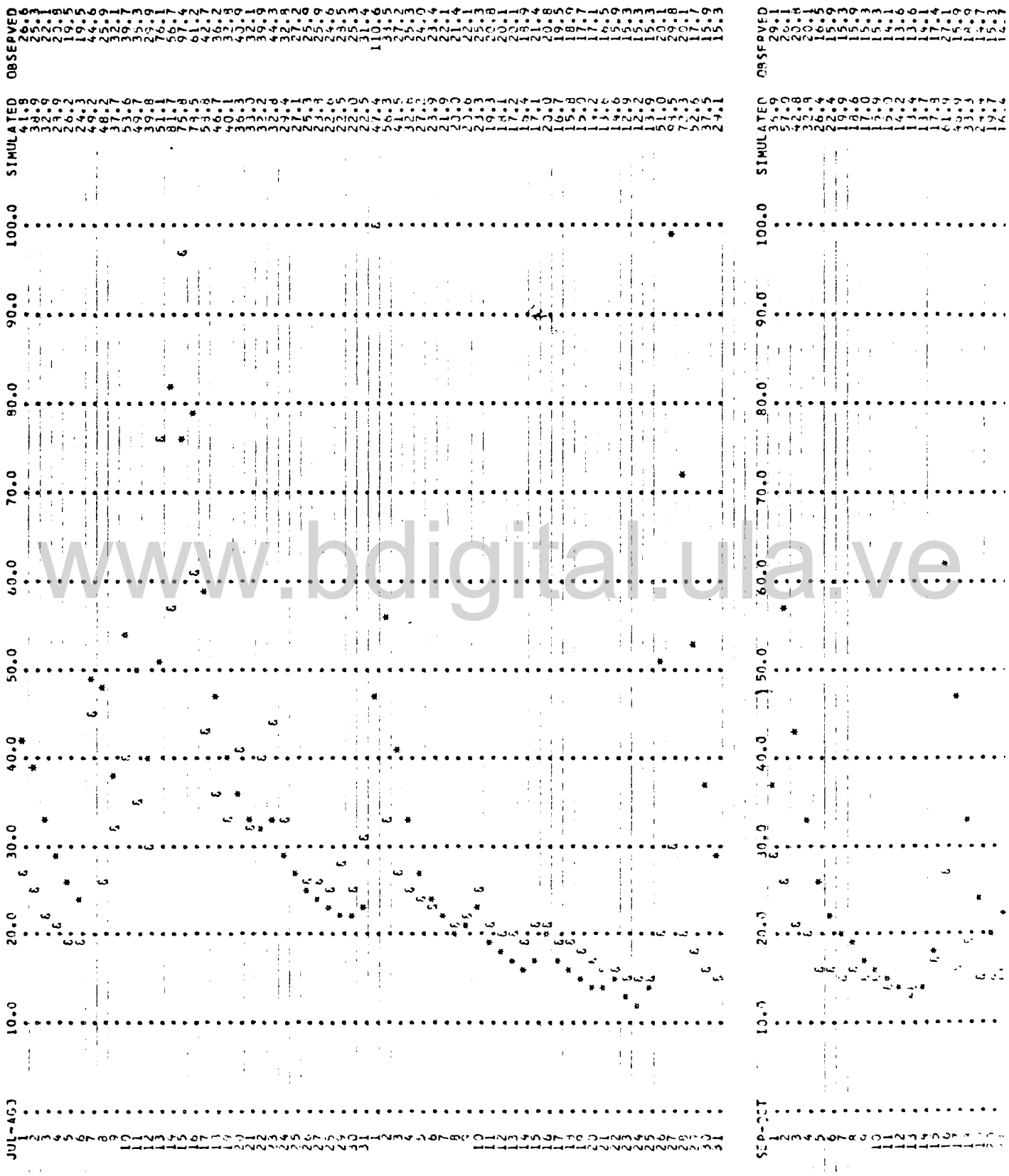
DIA	ENE	FEB	MAR	ABR	MAY	JUNIO	JULIO	AGO	SEPT	OCTB	NOVIEM	DICB	ANUAL
1	54.60	8.62	4.47	0.97	3.02	15.20	41.78	47.44	36.94	11.19	34.96	7.27	
2	62.88	14.37	4.18	0.92	2.10	17.99	38.85	56.27	57.04	10.15	25.38	6.89	
3	47.15	8.74	3.97	0.87	1.97	37.90	32.94	41.47	42.82	9.48	20.79	6.55	
4	33.01	9.58	3.77	0.99	1.86	31.06	28.93	32.61	32.75	10.45	18.01	6.22	
5	25.01	12.07	3.59	0.83	1.77	25.97	26.21	27.24	26.36	9.53	16.72	5.91	
6	20.48	8.94	3.40	0.75	1.68	22.90	24.31	23.37	22.44	8.95	21.05	5.61	
7	17.75	8.42	3.23	0.72	1.59	23.65	49.24	21.90	19.00	11.96	19.38	12.37	
8	15.55	7.99	3.07	1.07	2.25	21.30	40.21	20.01	18.58	10.61	16.39	9.16	
9	14.31	7.61	2.92	2.93	14.24	23.32	37.70	20.56	17.02	9.69	14.66	8.14	
10	13.67	7.23	3.06	0.74	34.27	20.49	53.55	23.30	15.92	9.25	14.13	7.67	
11	13.10	6.94	2.75	0.66	39.52	19.14	49.66	19.30	15.00	8.90	19.36	7.26	
12	12.34	6.59	2.56	0.63	29.82	20.12	39.81	18.15	14.17	8.39	15.44	6.88	
13	11.70	6.20	2.43	0.59	21.10	19.23	51.37	17.19	13.42	9.03	13.93	6.53	
14	11.11	6.75	2.31	0.56	20.99	22.59	81.72	16.44	14.67	8.21	13.39	6.20	
15	10.56	6.30	2.80	0.54	18.99	24.61	75.83	17.09	17.76	7.99	12.60	5.89	
16	10.03	5.98	2.14	0.51	15.56	24.54	78.54	19.98	61.86	8.76	11.72	5.59	
17	9.52	5.68	2.02	0.48	13.99	22.63	58.83	16.72	46.92	10.96	12.50	5.31	
18	9.12	5.40	2.60	5.77	29.41	34.02	46.71	15.77	33.30	25.91	11.23	5.05	
19	13.60	5.13	1.91	6.78	23.44	26.75	40.07	14.95	24.38	16.48	11.24	4.79	
20	9.14	4.99	1.79	1.13	19.35	24.00	36.34	14.19	19.71	14.76	10.60	4.55	
21	8.69	4.75	1.70	1.84	16.71	22.75	32.97	13.59	16.36	13.67	10.15	4.33	
22	8.47	4.45	1.62	1.01	18.22	26.04	32.24	14.56	14.28	12.80	9.56	4.11	
23	8.32	7.20	1.54	0.93	52.02	25.57	32.78	12.35	12.87	12.30	9.07	3.90	
24	7.82	5.24	1.46	0.88	46.01	22.72	29.40	12.13	11.84	12.35	8.27	3.71	
25	7.24	6.60	1.39	0.94	34.23	23.77	27.10	13.94	11.76	12.68	9.60	3.52	
26	6.87	4.89	1.32	0.80	27.45	23.27	25.29	51.00	11.04	11.32	9.63	3.67	
27	6.53	4.69	1.25	0.76	23.31	22.68	23.79	98.51	10.31	10.78	8.61	3.57	
28	6.20	5.20	1.19	2.85	20.56	42.48	22.59	72.28	10.49	10.18	8.61	3.26	
29	5.89		1.13	12.04	18.68	35.50	22.47	52.65	10.19	9.67	8.04	3.09	
30	5.61		1.07	2.44	17.27	30.58	22.02	37.47	10.17	9.18	7.62	4.24	
31	5.32		1.02		16.15		22.04	29.07		8.72		3.78	
TOTAL	477.78	176.47	73.64	52.87	587.42	752.76	1233.62	892.56	669.26	344.57	424.14	174.72	5392. MCSGD
	82.6	33.0	12.4	8.9	98.9	126.7	207.6	150.2	112.7	58.0	71.4	29.4	991.3 MILIM
													508798.687 1000MC
MEAN	366.	330.	240.	275.	467.	771.	1123.	727.	485.	427.	420.	284.	5891. MCXGD
	61.6	51.6	40.3	46.4	78.6	129.8	189.2	122.5	81.6	71.9	70.7	47.8	992.1 MILIM
													508944.437 1000MC

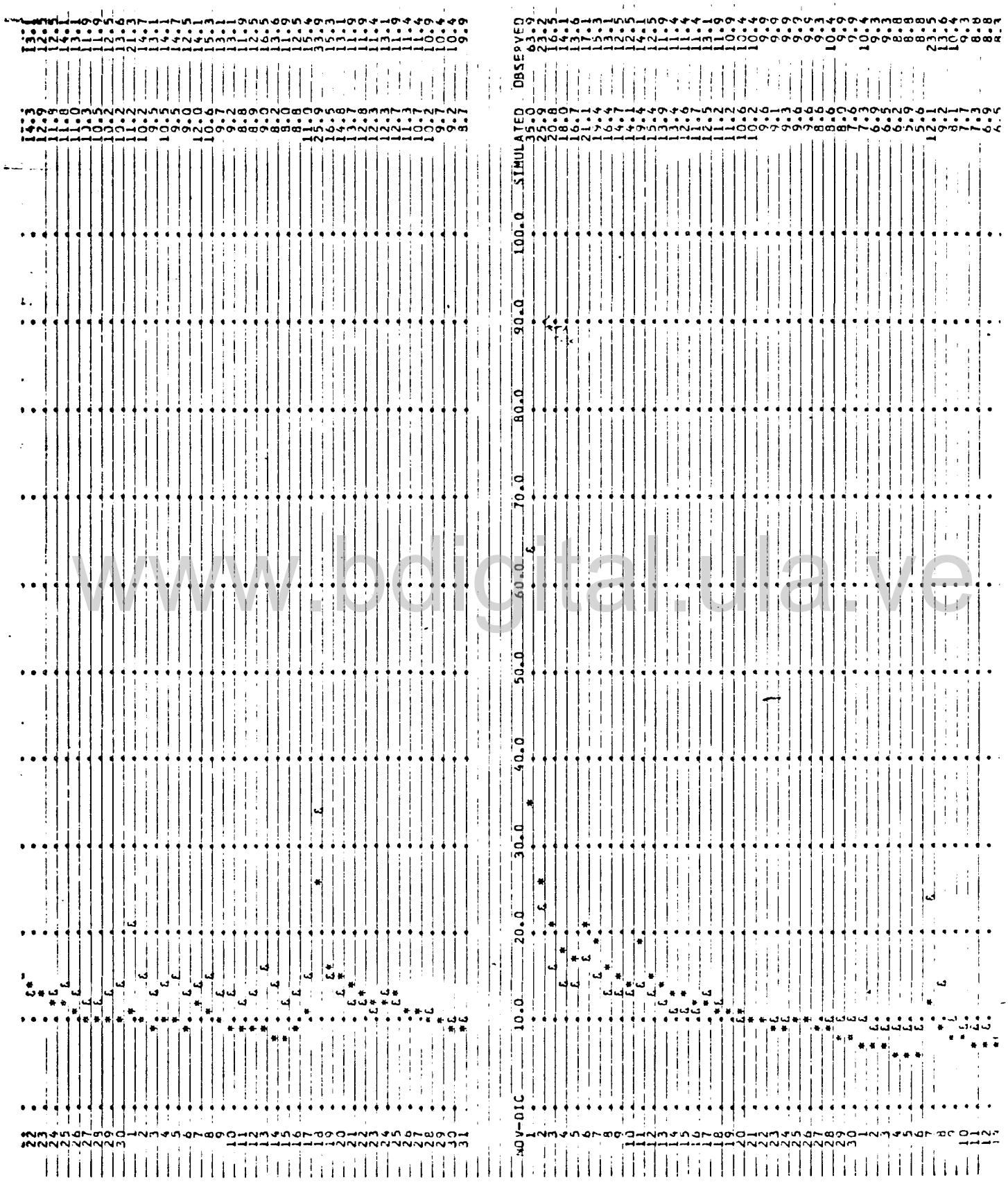
MEAN DAILY FLOW PLOT BOCONO EN BOCONO WATER YEAR 1971 *#SIMULATED &#OBSERVED

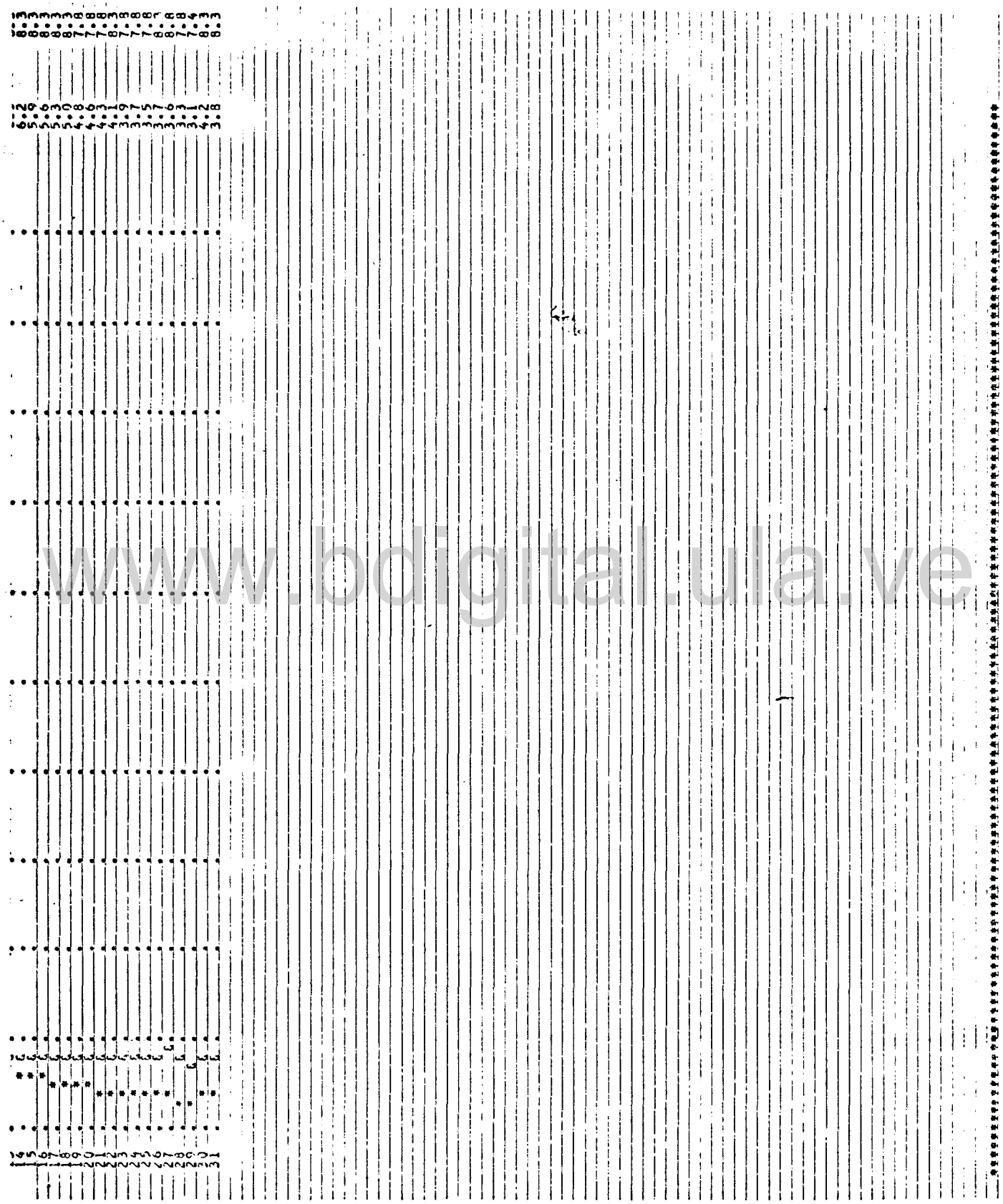
DAY	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	SIMULATED	OBSERVED
1		&			*						54.6	14.1
2			&			*					62.9	17.5
3			&		*						47.1	22.7
4			&	*							33.0	15.9
5			&	*							25.0	13.6
6			&	*							20.5	14.1
7			&	*							17.8	14.1
8			&	*							16.6	12.5
9			&	*							14.9	11.9
10			&	*							13.9	11.4
11			&	*							13.1	11.4
12			&	*							12.3	10.9
13			&	*							11.7	11.4
14			&	*							11.1	10.4
15			&	*							10.6	10.4
16			*								10.0	10.4
17			*								9.5	10.4
18		*&									9.1	10.4
19		* &									10.0	11.9
20		*									9.1	11.4











ANEXO X

LISTADO Y RESULTADOS DEL MODELO STANFORD IV MODIFICADO CON EL SUBPROGRAMA CINEMAT PARA UN PUNTO DE FLUJO

```
                              MAIN
      INTEGER YR2,COMPAR(10),YR,HR,WY,PASE,CTEST,OUTHR,PXIN,PGIN(5),
     1PTEST,PLCT(10),PLOTHR(10),CKTEST,HRTEST,COUNT,DISP,DSN,
     2T1,T2,DSRO,CNGHR,STORE,ROUTE,SKIP,SNOWA(12),
     3TITLE,TITLE1
      REAL LZSI(5), MINFW(10),INCHES(12),KEPTRO(744),MOCHAR(12),
     1KEPTPX(31,24),L,NN,IRC,KK24,INAREA,MINFWT
      DIMENSION UZSI(5),SGWI(5),RESI(5),SRGXI(5),SCEPI(5),RECOBS(11),
     1RECPX(12),PGN(5),SSF(10,12),SAF(10,12),AREA(10),RECFW(4),PXSIX(4),
     2NUM(12),LASTDA(2,12),HRFW(6)
C MAIN,HOURLY AND DAILY VARIABLES
      INTEGER FIRST,CHECK(10)
      COMMON/MHD/FLOW1(10,744),PHRMX(10),FPN(7),FPNAME(10,7),PLOTMX(10),
     1ACTFLW(10,12,31),SIMFLW(10,12,31),FIRST,CHECK
C MAIN,LAND AND CHANEL VARIABLES
      INTEGER ELE,ELEMTS(10),GAGEAR(10,10),ADDFW1(10,10),
     1ADDFW2(10,10),TEST1(10),TEST2(10),RTEINT(10),AVEPE,VARK(10),
     2VARL(10),SNOW,VAREP
      REAL IMPV(5),LZSN(5),K3(5),K24L(5),K24EL(5),KV(5),LKK4(5),
     1LIRC4(5),LZSI(5),KSI(10),KSIV(10,20)
      COMMON/MCL/EPDIST(24),EPXM(5),UZSN(5),CB(5),CC(5),SRC(5),DEC(5),
     1UZSI(5),SGWI(5),GWSI(5),RESI(5),SRGXI(5),SCEPI(5),REPI(5),
     2CFSM(10),PREVFI(10),TRANSI(10,48),EVAP(12,31),
     3FLOW(10,744),RO(5,744),EVAPM(12),SFO(5),SROS(5),SIMPV(5),SINTF(5),
     4SGWF(5),SRECH(5),SPE(5),SPE(5),SET(5),TIMEAR(10,10),PEADJ(12),
     5GAGEPE(5),POWER,BASEK(10),BASEL(10),IMPV,LZSN,K3,K24L,K24EL,KV,
     6LKK4,LIRC4,LZSI,KSI,KSIV,MAXL(10),MINL(10),LAG(10,10),
     7IE,MHR,MOHR1,MOHR2,ELE,ELEMTS,GAGEAR,VAREP,SDEP,EPBIAS,IXEP,
     8ADDFW1,ADDFW2,TEST1,TEST2,RTEINT,AVEPE,VARK,VARL,SNOW,UZSNWF,
     9AEPI(5)
C MAIN,LAND,CHANEL AND SNOW VARIABLES
      INTEGER SIXHR
      REAL K1(5)
      COMMON/MLCS/FCOVER(5),FDEN(5),KOHLER,PE(5,31),COVER(5,31),
     1PX(5,31,24),K1,LAST,IRG,IPT,IDA,IHR,MONTH,I,SIXHR
C MAIN,HOURLY,DAILY AND SNOW VARIABLES
      INTEGER YEAR,DA,FINAL
      REAL INFO(20)
      COMMON/MHDS/X(368),INFO,LEAPYR,N,YEAR,DA,FINAL
C
      REAL LAGRCI(5,30),LIQWI(5),NEGHSI(5)
      INTEGER POINT,CN,STATE,YR1
      DIMENSION SIMSC(10,31),WATEPI(5,12),WEI(5),EXWATI(5),AESCI(5),
     1SRI(5),SEAEI(5),SBWSI(5),AIXI(5),TSI(5),BASIN(20),RGNAME(5,5),
     2TANT(5),TDNT(5)
C  INITIALIZATION OF DATA
      INIT=0
      FIRST=0
      NEWWY=0
      CTEST=0
      PTEST=0
      CKTEST=0
      HRTEST=0
      DO 100 I=1,24
100   EPDIST(I)=0.0
      EPDIST(7)=0.019
      EPDIST(8)=0.041
      EPDIST(9)=0.067
      EPDIST(10)=0.088
      EPDIST(11)=0.102
      EPDIST(12)=0.11
      EPDIST(13)=0.11
      EPDIST(14)=0.11
      EPDIST(15)=0.105
      EPDIST(16)=0.095
      EPDIST(17)=0.081
      EPDIST(18)=0.055
      EPDIST(19)=0.017
      DIST=0.0
      DO 1001 I=1,365
      X(I)=DIST
1001  DIST=DIST+0.1
      DATA MOCHAR/3HENE,3HFEB,3HMAR,3HABR,3HMAY,3HJUN,3HJUL,3HAGO,3HSEP,
     13HOCT,3HNOV,3HDIC/
      DATA LASTDA/31,31,28,29,31,31,30,30,31,31,30,30,31,31,31,31,30,30,
     131,31,30,30,31,31/
      DATA NUM/1,2,3,4,5,6,7,8,9,10,11,12/
C RUN,RAINGAGE AND FLOW-POINT INPUT DATA
C BASIC RUN INFORMATION
```

```
                    MAIN

      READ 901, INFRO
      READ 901, BASIN
      PRINT 900
      PRINT 903, BASIN
      PRINT 902, INFRO
      PRINT 904
      READ 905, MO1,YR1,MO2,YR2,NPTS,PXIN,NGAGES,(RGIN(I),I=1,NGAGES)
      READ 950,CUTHR,LINEP,NOFLW,AVEPE,POWER,SIXHR,CN6HR,
     1STORE,ROUTE,DSRO,SNOW,PCINT,INOUT,VAREP,UZSNWF
      IF (DSRO.GT.0) REWIND DSRO
      IF (STORE.EQ.1) ROUTE=0
      IF (SNOW.EQ.0) PCINT=0
      IF (CN6HR.EQ.1) SIXHR=1
      IF (PCINT.EQ.1) GO TO 1003
      READ 965, PEADJ
      READ 965, (GAGEPE(IRG),IRG=1,NGAGES)
      IF (AVEPE.EQ.0) GO TO 1003
      READ 965, EVAPM
      DO 1004 I=1,12
 1004 EVAPV(I)=EVAPM(I)*PEADJ(I)/0.254
 1003 LEAPYR=0
      IF (VAREP.EQ.1) READ 991,SDEP,EPBIAS,IXEP
      IF ((YR2-4*(YR2/4)).EQ.0) LEAPYR=1
      LAST=LASTDA((LEAPYR+1),MO2)
      PRINT 906, MOCHAR(MO1),YR1,MOCHAR(MO2),LAST,YR2
      PRINT 907, NPTS,NGAGES
      PRINT 936
      IF (PCINT.EQ.0) GO TO 1005
C BASIC RAINGAGE INFORMATION -- POINT#1
      READ 909,RGN,K1(1)
      PRINT 916
      IRG=1
      PRINT 966,IRG,RGN,K1(1)
      DO 1006 I=1,5
 1006 RGNAME(1,I)=RGN(I)
      GO TO 1025
 1005 PRINT 938
C BASIC RAINGAGE INFORMATION
      DO 101 IRG=1,NGAGES
      READ 909, RGN,K1(IRG),IMPV(IRG),EPXM(IRG),UZSN(IRG),LZSN(IRG),
     1CB(IRG),CC(IRG),K3(IRG),K24L(IRG),K24EL(IRG)
      READ 939, L,SS,NN,IRC,KK24,KV(IRG)
      L=L*3.28
      SRC(IRG)=1020.0*SQRT(SS)/(NN*L)
      DEC(IRG)=0.00982*((NN*L/SQRT(SS))**0.6)
      LKK4(IRG)=1.0-(KK24**(1.0/24.0))
      LIRC4(IRG)=1.0-(IRC**(1.0/24.0))
      READ 910, UZSI(IRG),LZSI(IRG),SGWI(IRG),GWSI(IRG),RESI(IRG),
     1SRGXI(IRG),SCEPI(IRG),AEPI(IRG)
      REPI(IRG)=0.0
      L=L/3.28
      PRINT 911, IRG,RGN,K1(IRG),IMPV(IRG),EPXM(IRG),UZSN(IRG),
     1LZSN(IRG),CB(IRG),CC(IRG),K3(IRG),K24L(IRG),K24EL(IRG),L,SS,NN,
     2IRC,KK24,KV(IRG)
      DO 1011 I=1,5
 1011 RGNAME(IRG,I)=RGN(I)
  101 CONTINUE
      PRINT 979,POWER,UZSNWF
      PRINT 937
      PRINT 912
      DO 102 IRG=1,NGAGES
      DO 1021 I=1,5
 1021 RGN(I)=RGNAME(IRG,I)
      PRINT 913, RGN,UZSI(IRG),LZSI(IRG),SGWI(IRG),GWSI(IRG),
     1RESI(IRG),SRGXI(IRG),SCEPI(IRG),AEPI(IRG)
  102 CONTINUE
      IF (SNOW.EQ.0) GO TO 1024
 1025 CONTINUE
      IF (PCINT.EQ.1) GO TO 1051
      GO TO 1023
 1024 IF (NGAGES.LE.3) GO TO 1022
 1023 PRINT 900
      PRINT 903, BASIN
      PRINT 902, INFRO
 1022 PRINT 938
      PRINT 914
C BASIC FLOW-POINT INFORMATION
      DO 103 IPT=1,NPTS
```

```
                    MAIN
      READ 915, FPN,AREA(IPT),KS1(IPT),VARK(IPT),VARL(IPT),
     1RTEINT(IPT),ELEMTS(IPT)
      AREA(IPT)=AREA(IPT)*0.3861
      IF (VARK(IPT).EQ.0) GO TO 150
      READ 984, BASEK(IPT),(KS1V(IPT,I),I=1,10)
      READ 986, (KS1V(IPT,I),I=11,20)
      KS1(IPT)=1.0
150   IF (VARL(IPT).EQ.0) GO TO 1249
      READ 988, BASEL(IPT),(LAG(IPT,I),I=1,10)
1249  READ 976, CHECK(IPT),COMPAR(IPT),PLOT(IPT),
     1PLCTHR(IPT),MINFW(IPT),PLOTMX(IPT),PHRMX(IPT)
      ELE=ELEMTS(IPT)
      IF (COMPAR(IPT).EQ.1) GO TO 1241
      PLOT(IPT)=0
      GO TO 1245
1241  CTEST=1
1245  IF (PLOT(IPT).EQ.0) GO TO 124
      PTEST=1
124   IF (CHECK(IPT).EQ.1) GO TO 1246
      IF (CHECK(IPT).EQ.2) GO TO 1247
      PLCTHR(IPT)=0
      GO TO 1248
1246  CKTEST=1
      GO TO 1248
1247  HRTEST=1
1248  READ 917, (TIMEAR(IPT,IE),IE=1,ELE)
      READ 934, (GAGEAR(IPT,IE),IE=1,ELE)
      READ 934, (ADDFW1(IPT,IE),IE=1,ELE)
      READ 934, (ADDFW2(IPT,IE),IE=1,ELE)
      TEST1(IPT)=0
      TEST2(IPT)=0
      INAREA=0.0
      DO 1243 IE=1,ELE
      IF (ADDFW1(IPT,IE).EQ.0) GO TO 1244
      TEST1(IPT)=1
      I=ADDFW1(IPT,IE)
      INAREA=INAREA+AREA(I)
1244  IF (ADDFW2(IPT,IE).EQ.0) GO TO 1243
      TEST2(IPT)=1
      I=ADDFW2(IPT,IE)
      INAREA=INAREA+AREA(I)
1243  CONTINUE
      CFSM(IPT)=26.9*24.0*(AREA(IPT)-INAREA)
      UMAREA=AREA(IPT)*2.59                                          PL
      PRINT 918,IPT,FPN,UMAREA,KS1(IPT),RTEINT(IPT),COMPAR(IPT),CHECK(IP
     1T),(TIMEAR(IPT,IE),IE=1,ELE)
      PRINT 919, (GAGEAR(IPT,IE),IE=1,ELE)
      PRINT 920, (ADDFW1(IPT,IE),IE=1,ELE)
      PRINT 921, (ADDFW2(IPT,IE),IE=1,ELE)
      IF (VARK(IPT).EQ.0) GO TO 1042
      PRINT 985, BASEK(IPT),(KS1V(IPT,I),I=1,20)
1042  IF (VARL(IPT).EQ.0) GO TO 1041
      PRINT 987, BASEL(IPT),(LAG(IPT,I),I=1,10)
1041  PREVEI(IPT)=0.0
      ELE=ELE*RTEINT(IPT)
      MLAG=0
      IF (VARL(IPT).EQ.0) GO TO 1043
      DO 1044 I=1,10
      IF (LAG(IPT,I).GT.MLAG) MLAG=LAG(IPT,I)
1044  CONTINUE
      DO 1045 I=2,10
      IF (LAG(IPT,I).EQ.0) GO TO 1045
      MINL(IPT)=I
      GO TO 1043
1045  CONTINUE
1043  MAXL(IPT)=ELE+MLAG
      ELE=ELE+MLAG
      DO 104 IE=1,ELE
104   TRANSI(IPT,IE)=0.0
      DO 1031 I=1,7
1031  FPNAME(IPT,I)=FPN(I)
103   CONTINUE
      IF (NPTS.LE.5) GO TO 1032
      PRINT 900
      PRINT 903, BASIN
      PRINT 902, INFRO
1032  PRINT 972
      PRINT 973, (NUM(I),I=1,12)
```

MAIN

```
      PRINT 974, (PFADJ(I),I=1,12)
      PRINT 975, (NUM(IRG),IRG=1,NGAGES)
      PRINT 974, (GAGEPR(IRG),IRG=1,NGAGES)
C END OF RUN,RAINGAGE AND FLOW-POINT INPUT DATA
1051  MONTH=MO1
      YEAR=YR1
C START OF MONTHLY LOOP
C INITIAL MONTHLY VALUES
105   LEAPYR=0
      IF ((YEAR-4*(YEAR/4)).EQ.0) LEAPYR=1
      LAST=LASTDA((LEAPYR+1),MONTH)
      KOHLER=0
      DO 106 IRG=1,NGAGES
      UZSI(IRG)=UZSI(IRG)
      LZSI(IRG)=LZSI(IRG)
      SGWI(IRG)=SGWI(IRG)
      RESI(IRG)=RESI(IRG)
      SRGXI(IRG)=SRGXI(IRG)
      SCEPI(IRG)=SCEPI(IRG)
      SRC(IRG)=0.0
      SRCS(IRG)=0.0
      SIMPV(IRG)=0.0
      SINTF(IRG)=0.0
      SGWF(IRG)=0.0
      SRECH(IRG)=0.0
      SPR(IRG)=0.0
      SPE(IRG)=0.0
106   SET(IRG)=0.0
C INPUT OF MONTHLY DATA
      IF (MONTH.EQ.1) GO TO 131
      IF ((YEAR.EQ.YR1).AND.(MONTH.EQ.MO1)) GO TO 1311
      GO TO 132
1311  DO 1312 IPT=1,NPTS
      DO 1312 MO=1,12
      SSF(IPT,MO)=0.0
      DO 1312 IDA=1,31
1312  SIMFLW(IPT,MO,IDA)=0.0
131   WY=YEAR
      NEWWY=1
      IF (MONTH.GT.12) WY=WY+1
      LEAPYR=0
      IF((WY-4*(WY/4)).EQ.0) LEAPYR=1
C MONTHS DURING WHICH SNOW IS CONSIDERED
      IF (SNOW.EQ.0) GO TO 1313
      READ 989,SNOWA
1313  IF (PCINT.EQ.1) GO TO 1320
C DAILY POTENTIAL EVAPOTRANSPIRATION -- BY WATER YEAR
      IF (AVEPE.EQ.1) GO TO 1331
      DO 133 I=1,36
      READ 931, MO,CN,RECOBS
      FINAL=CN*10
      BASE=FINAL-9
      IF (CN.EQ.3) FINAL=LASTDA((LEAPYR+1),MO)
      N=BASE-1
      DO 133 IDA=BASE,FINAL
133   EVAP(MO,IDA)=RECOBS(IDA-N)/0.254
C ACTUAL MEAN DAILY FLOWS - BY WATER YEAR
1331  IF (CTEST.EQ.0) GO TO 132
      DO 134 IPT=1,NPTS
      IF (CCMPAR(IPT).EQ.1) GO TO 1342
      DO 1341 MO=1,12
      SAF(IPT,MO)=0.0
      DO 1341 IDA=1,31
1341  ACTFLW(IPT,MO,IDA)=0.0
      GO TO 134
1342  DO 1343 MO=1,12
1343  SAF(IPT,MO)=0.0
      DO 135 I=1,36
      READ 932, MO,CN,RECOBS
      FINAL=CN*10
      BASE=FINAL-9
      IF (CN.EQ.3) FINAL=LASTDA((LEAPYR+1),MO)
      N=BASE-1
      DO 135 IDA=BASE,FINAL
      OBS=RECOBS(IDA-N)
      SAF(IPT,MO)=SAF(IPT,MO)+OBS
135   ACTFLW(IPT,MO,IDA)=OBS
134   CONTINUE
```

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```
C MONTHLY INPUT DATA
132   IF (SNOW.EQ.0) GO TO 28
      IF (SNOWA(MONTH).EQ.1) GO TO 25
28    DO   26 IRG=1,NGAGES
      DO   27 I=1,30
      LAGFOI(IRG,I)=0.0
      IF (I.GT.12) GO TO 27
      WATERI(IRG,I)=0.0
27    CONTINUE
      WEI(IRG)=0.0
      LICWI(IRG)=0.0
      EXWATI(IRG)=0.0
      NEGHSI(IRG)=0.0
      ABSCI(IRG)=0.0
      SBI(IRG)=0.0
      SBAGI(IRG)=0.0
      SBWSI(IRG)=0.0
      AIXI(IRG)=0.0
      TSI(IRG)=32.0
      TANT(IRG)=50.0
      TDNT(IRG)=40.0
      DO   26 IDA=1,LAST
26    COVER(IRG,IDA)=0.0
      IF (SNOW.EQ.1) GO TO 25
      DO   29 IRG=1,NGAGES
      FCCVER(IRG)=1.0
29    FDEN(IRG)=1.0
25    IF (PCUTE.EQ.0) GO TO 1320
      DO 20 IRG=1,NGAGES
      READ (DSRO) KEPTRO
      DO 21 MHR=1,744
21    PC(IRG,MHR)=KEPTPC(MHR)
20    CONTINUE
      GO TO 400
1320  IF (NEWWY.EQ.0) GO TO 1321
      READ 978,DISP,DSN,SKIP
      IF ((DSN.GT.0).AND.(INIT.EQ.0)) REWIND DSN
      INIT=1
      NEWWY=0
      IF (SKIP.EQ.0) GO TO 1321
      DO 1329 I=1,SKIP
1329  READ (DSN)
1321  IF (DISP.EQ.1) GO TO 1330
      IF (DSN.GT.0) GO TO 1322
C PRECIPITATION -- BY MONTH
1330  DO 109 IRG=1,NGAGES
      DO 109 IDA=1,31
      DO 109 IHR=1,24
109   PX(IRG,IDA,IHR)=0.0
      DO 107 IG=1,PXIN
      DO 1071 I=1,NGAGES
      IF (PGIN(I).NE.IG) GO TO 1071
      IRG=I
      GO TO 110
1071  CONTINUE
1072  READ 951,STATE
      IF (STATE.EQ.99) GO TO 107
      GO TO 1072
110   READ 922,STATE,YR,MO,DA,CN,RECPX
      IF (STATE.EQ.99) GO TO 107
      IF (SIXHR.EQ.1) GO TO 1081
      BASE=(CN-1)*12
      DO 108 IHR=1,12
      HR=BASE+IHR
108   PX(IRG,DA,HR)=RECPX(IHR)/2.54
      GO TO 110
1081  IF (CN6HR.EQ.1) GO TO 1085
      BASE=(CN-1)*2
      PXSIX(1)=0.0
      PXSIX(2)=0.0
      DO 1082 I=1,6
1082  PXSIX(1)=PXSIX(1)+RECPX(I)
      DO 1083 I=7,12
1083  PXSIX(2)=PXSIX(2)+RECPX(I)
      DO 1084 IHR=1,2
      HR=BASE+IHR
1084  PX(IRG,DA,HR)=PXSIX(IHR)
      GO TO 110
```

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 1085   DO 1086 IHR=1,4
        PX(IRG,DA,IHR)=RECPX(IHR)
 1086   CONTINUE
        GO TO 110
  107   CONTINUE
        IF (DISP.EQ.0) GO TO 400
        DO 1327 IRG=1,NGAGES
        DO 1328 IDA=1,31
        DO 1328 IHR=1,24
 1328   KEPTPX(IDA,IHR)=PX(IRG,IDA,IHR)
 1327   WRITE (DSN) KEPTPX
        GO TO 400
 1322   DO 1323 IG=1,PXIN
        DO 1324 I=1,NGAGES
        IF (PGIN(I).NE.IG) GO TO 1324
        IRG=I
        GO TO 1325
 1324   CONTINUE
        READ (DSN)
        GO TO 1323
 1325   READ (DSN) KEPTPX
        DO 1326 IDA=1,31
        DO 1326 IHR=1,24
 1326   PX(IRG,IDA,IHR)=KEPTPX(IDA,IHR)/2.54
 1323   CONTINUE
C INSTANTANEOUS ACTUAL FLOWS--BY MONTH
C HOURLY FLOW -- ONE STATION
  400   IF (POINT.EQ.1) GO TO 122
        IF (HRTEST.EQ.0) GO TO 401
        DO 405 IPT=1,NPTS
        IF (CHECK(IPT).NE.2) GO TO 405
        DO 402 I=1,744
  402   FLOW1(IPT,I)=0.0
  403   READ 971,STATE,MO,DA,YR,CN,HRFW
        IF (STATE.EQ.99) GO TO 405
        BASE=(DA-1)*24+(CN-1)*6
        DO 404 I=1,6
        MHR=BASE+I
  404   FLOW1(IPT,MHR)=HRFW(I)
        GO TO 403
  405   CONTINUE
  401   IF (CKTEST.EQ.0) GO TO 122
C SIX HOUR FLOWS
        DO 406 IPT=1,NPTS
        IF (CHECK(IPT).NE.1) GO TO 406
        DO 407 I=1,744
  407   FLOW1(IPT,I)=0.0
  408   READ 970,STATE,MO,DA,YR,RECFW,T1,P1,T2,P2
        IF (STATE.EQ.99) GO TO 406
        BASE=(DA-1)*24
        DO 409 I=1,4
        MHR=BASE+(I*6)
  409   FLOW1(IPT,MHR)=RECFW(I)
        IF (T1.EQ.0) GO TO 408
        MHR=BASE+T1
        FLOW1(IPT,MHR)=P1
        IF (T2.EQ.0) GO TO 408
        MHR=BASE+T2
        FLOW1(IPT,MHR)=P2
        GO TO 408
  406   CONTINUE
C SNOW VARIABLES
    122 IF (SNOW.EQ.0) GO TO 123
        IF (SNOWA(MONTH).EQ.0) GO TO 123
C
  123   IF (POINT.EQ.1) GO TO 115
        IF (ROUTE.EQ.0) GO TO 115
        GO TO 114
C COMPUTATION OF SNOWPACK CONDITIONS
  115   IF (SNOW.EQ.0) GO TO 113
        IF (SNOWA(MONTH).EQ.0) GO TO 113
        DO 116 IRG=1,NGAGES
C
  116   CONTINUE
        IF (POINT.EQ.1) GO TO 1259
C COMPUTATION OF SIMULATED CHANNEL INFLOW AND STREAMFLOW
  113   DO 112 IRG=1,NGAGES
        CALL LAND
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112   CONTINUE
114   DO 117 IPT=1,NPTS
      CALL CHANEL
117   CONTINUE
C MONTHLY SUMMARY
      IF (STORE.EQ.0) GO TO 1211
      DO 22 IRG=1,NGAGES
      DO 23 MHP=1,744
23    KEEPRO(MHP)=RO(IRG,MHP)
      WRITE (DSRO) KEEPRO
22    CONTINUE
      GO TO 1210
1211  IF (ROUTE.EQ.0) GO TO 1210
      GO TO 1257
1210  PRINT 923,BASIN
      PRINT 924, MOCHAR(MONTH),YEAR
      PRINT 925
      PRINT 940
      PRINT 926
C OUTPUT LAND STORAGES AND FLOW COMPONENTS
      DO 125 IRG=1,NGAGES
      DO 1251 I=1,5
1251  RGN(I)=RGNAME(IRG,I)
      PRINT 927, IRG,RGN,SRC(IRG),SROS(IRG),SIMPV(IRG),
     1SINTF(IRG),SGWF(IRG),SRECH(IRG),SPR(IRG),SPE(IRG),
     2SET(IRG)
125   CONTINUE
      PRINT 941
      PRINT 942
      DO 1252 IRG=1,NGAGES
      BAL=(LZSI(IRG)+UZSI(IRG)+RESI(IRG)+SRGXI(IRG)-LZSL(IRG)-UZSL(IRG)
     1-RESL(IRG)-SRGXL(IRG))*(1.0-IMPV(IRG))+SGWI(IRG)+SCEPI(IRG)
     2-SGWL(IRG)-SCEPL(IRG)+SRO(IRG)+SET(IRG)+SRECH(IRG)-SPR(IRG)
      DO 1253 I=1,5
1253  RGN(I)=RGNAME(IRG,I)
      PRINT 943, RGN,UZSI(IRG),LZSI(IRG),SGWI(IRG),GWSI(IRG),
     1RESI(IRG),SRGXI(IRG),SCEPI(IRG),AEPI(IRG),BAL
1252  CONTINUE
C OUTPUT OF MONTHLY SNOW SUMMARY
      IF (SNOW.EQ.0) GO TO 1257
      IF (SNOWA(MONTH).EQ.0) GO TO 1257
1259  CONTINUE
      IF (PCINT.EQ.1) GO TO 1361
C SNOW COVER ABOVE EACH FLOW-PCINT
      IF (NPTS.EQ.1) GO TO 1257
      DO 300 IPT=1,NPTS
      ELE=ELEMTS(IPT)
      DO 301 IDA=1,LAST
      SIMSC(IPT,IDA)=0.0
      DO 301 IE=1,ELE
      IRG=GAGEAR(IPT,IE)
      SIMSC(IPT,IDA)=SIMSC(IPT,IDA)+COVER(IRG,IDA)*TIMEAR(IPT,IE)
301   CONTINUE
      ALOCAL=CFSM(IPT)/(26.9*24.0)
      P1=ALOCAL/AREA(IPT)
      IF (P1.EQ.1.0) GO TO 300
      DO 305 IDA=1,LAST
305   SIMSC(IPT,IDA)=SIMSC(IPT,IDA)*P1
      DO 302 IE=1,ELE
      I=ADDFW1(IPT,IE)
      IF (I.EQ.0) GO TO 302
      P2=(AREA(I)/AREA(IPT))
      DO 303 IDA=1,LAST
303   SIMSC(IPT,IDA)=SIMSC(IPT,IDA)+SIMSC(I,IDA)*P2
      I=ADDFW2(IPT,IE)
      IF (I.EQ.0) GO TO 302
      P2=(AREA(I)/AREA(IPT))
      DO 304 IDA=1,LAST
304   SIMSC(IPT,IDA)=SIMSC(IPT,IDA)+SIMSC(I,IDA)*P2
302   CONTINUE
300   CONTINUE
C OUTPUT SIMULATED SNOW COVER
      PRINT 900
      PRINT 903,BASIN
      PRINT 924,MOCHAR(MONTH),YEAR
      PRINT 902
      PRINT 929
      PRINT 944,(NUM(IPT),IPT=1,NPTS)
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      DO 306 IDA=1,LAST
306   PRINT 993,IDA,(SIMSC(IPT,IDA),IPT=1,NPTS)
C COMPUTE MEAN DAILY SIMULATED FLOW
1257  DO 126 IPT=1,NPTS
      SSF(IPT,MONTH)=0.0
      DO 128 IDA=1,LAST
      I=(IDA-1)*24
      TEMPFL=0.0
      DO 127 IHR=1,24
      MHR=I+IHR
127   TEMPFL=TEMPFL+FLOW(IPT,MHR)
      TEMPFL=TEMPFL/24.0
      SIMFLW(IPT,MONTH,IDA)=TEMPFL                                    PL
128   SSF(IPT,MONTH)=SSF(IPT,MONTH)+TEMPFL                            PL
126   CONTINUE
C OUTPUT HOURLY SIMULATED FLOWS ABOVE PRESET VALUE
      IF (OUTHR.EQ.0) GO TO 137
      TITLE=0
      DO 138 IPT=1,NPTS
      MINFWT=MINFW(IPT)
      DO 139 I=1,7
139   FPN(I)=FPNAME(IPT,I)
      TITLE1=0
      DO 140 IDA=1,LAST
      IF (SIMFLW(IPT,MONTH,IDA).LT.MINFWT) GO TO 140
      IF (TITLE.EQ.1) GO TO 1391
      TITLE=1
      PRINT 900
      PRINT 903, BASIN
      PRINT 924, MOCHAR(MONTH),YEAR
      PRINT 945
1391  IF (TITLE1.EQ.1) GO TO 1392
      TITLE1=1
      PRINT 946, FPN,MINFWT
1392  MOHR2=IDA*24-12
      MCHR1=MCHR2-11
      PRINT 947, IDA,(FLOW(IPT,MHR),MHR=MOHR1,MCHR2)
      MCHR1=MOHR1+12
      MCHR2=MCHR2+12
      PRINT 948, (FLOW(IPT,MHR),MHR=MOHR1,MOHR2),
     1SIMFLW(IPT,MONTH,IDA)
140   CONTINUE
138   CONTINUE
C OUTPUT MEAN DAILY SIMULATED FLOW
137   IF (NOFLW.EQ.1) GO TO 1362
      PRINT 900
      PRINT 903, BASIN
      PRINT 924, MOCHAR(MONTH),YEAR
      PRINT 928
      PRINT 929
      PRINT 944, (NUM(IPT),IPT=1,NPTS)
      DO 129 IDA=1,LAST
129   PRINT 930, IDA,(SIMFLW(IPT,MONTH,IDA),IPT=1,NPTS)
      PRINT 935, (SSF(IPT,MONTH),IPT=1,NPTS)
C OUTPUT MEAN DAILY ACTUAL FLOW
      IF (CTEST.EQ.0) GO TO 1362
      PRINT 900
      PRINT 903, BASIN
      PRINT 924, MOCHAR(MONTH),YEAR
      PRINT 933
      PRINT 929
      PRINT 944, (NUM(IPT),IPT=1,NPTS)
      DO 136 IDA=1,LAST
136   PRINT 930, IDA,(ACTFLW(IPT,MONTH,IDA),IPT=1,NPTS)
      PRINT 935, (SAF(IPT,MONTH),IPT=1,NPTS)
C PLOTTING OF HOURLY FLOW
1362  IF ((PRTEST.EQ.0).AND.(CKTEST.EQ.0)) GO TO 1363
      DO 820 IPT=1,NPTS
      IF (PLOTHR(IPT).EQ.0) GO TO 820
      CALL HOURLY(INFRO,MONTH,YEAR,IPT,FLOW)
820   CONTINUE
C WATER YEAR SUMMARY SECTION
1363  IF(MONTH.NE.12) GO TO 1361
C     WATER YEAR SIMULATED FLOW SUMMARY TABLES
      DO 810 IPT=1,NPTS
      DO 811 I=1,7
811   FPN(I)=FPNAME(IPT,I)
      PRINT 952, FPN
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                    MAIN
      PRINT 953, YEAR
      PRINT 954
      PRINT 955
      PRINT 956
      N=28
      IF (LEAPYR.EQ.1) N=29
      DO 812 IDA=1,N
      PRINT 957, IDA,(SIMFLW(IPT,MO,IDA),MO=1,12)
      IF ((IDA-5*(IDA/5)).EQ.0) PRINT 956
812   CONTINUE
      N=N+1
      DO 813 IDA=N,30
      PRINT 958, IDA,SIMFLW(IPT,1,IDA),(SIMFLW(IPT,MO,IDA),MO=3,12)
813   CONTINUE
      IDA=31
      PRINT 959, IDA,SIMFLW(IPT,1,31),SIMFLW(IPT,3,31),SIMFLW(IPT,5,31),
     1SIMFLW(IPT,7,31),SIMFLW(IPT,8,31),SIMFLW(IPT,10,31),SIMFLW(IPT,12,
     231)
      CONV=26.9*AREA(IPT)
      WYFLOW=0.0
      DO 814 MO=1,12
      TEMPFL=SSF(IPT,MO)*35.31
      INCHES(MO)=(TEMPFL/CONV)*25.4
  814 WYFLOW=WYFLOW+TEMPFL*0.02832
      PRINT 960, (SSF(IPT,MO),MO=1,12),WYFLOW                          PL
      WYFLOW=((WYFLOW*35.31)/CONV)*25.4
      PRINT 961, (INCHES(MO),MO=1,12),WYFLOW                           PL
      WYFLOW=WYFLOW*AREA(IPT)*2.59
      PRINT 962, WYFLOW
      IF (COMPAR(IPT).EQ.0) GO TO 810
      WYFLOW=0.0
      DO 815 MO=1,12
      TEMPFL=SAF(IPT,MO)
      INCHES(MO)=(TEMPFL*86.4)/UMAREA
815   WYFLOW=WYFLOW+TEMPFL
      PRINT 963, (SAF(IPT,MO),MO=1,12),WYFLOW                          PL
      WYFLOW=(WYFLOW*86.4)/UMAREA
      PRINT 961, (INCHES(MO),MO=1,12),WYFLOW                           PL
      WYFLOW=WYFLOW*UMAREA
      PRINT 962, WYFLOW
810   CONTINUE
C PLOTTING OF SIMULATED VERSUS OBSERVED MEAN DAILY FLOW--BY WATER YEAR
      IF (PTEST.EQ.0) GO TO 1361
      LP1=0
      IF (LINEP.EQ.1) GO TO 800
      IF (FIRST.EQ.1) GO TO 800
      FIRST=1
800   DO 801 IPT=1,NPTS
      IF (PLOT(IPT).EQ.0) GO TO 801
      IF (LINEP.EQ.1) GO TO 802
      CALL DAILY(INFRO,MONTH,YEAR,IPT)
      GO TO 801
802   IF(LP1.EQ.1) GO TO 803
      LN=3
      IF (COMPAR(NPTS).EQ.0) LN=LN+4
      DO 804 I=1,LN
804   PRINT 949
      LP1=1
803   DO 805 I=1,4
805   PRINT 949
      CALL LPLOT(YEAR,IPT)
801   CONTINUE
C INCREMENT TO THE NEXT MONTH
1361  IF ((YEAR.EQ.YR2).AND.(MONTH.EQ.MO2)) GO TO 130
      MONTH=MONTH+1
      IF (MONTH.LE.12) GO TO 105
      MONTH=1
      YEAR=YEAR+1
      GO TO 105
130   CONTINUE
      IF (FIRST.EQ.1) PUNCH 990
C PROGRAM FORMAT STATEMENTS
900   FORMAT (1H1)
901   FORMAT (20A4)
902   FORMAT (1HO,20A4)
903   FORMAT (1H ,20X,20A4)
  904 FORMAT(1HO,47X,32HINFORMACION BASICA DE LA CORRIDA)
905   FORMAT (7I5,5I3)
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  906 FORMAT(1HO,27HINICIO DE LA CORRIDA    1 DE,1X,A4,1X,5HDE 19,I2,6X,1
     19HFINAL DE LA CORRIDA,3X,I2,4H DE ,A4,6H DE 19,I2)
  907 FORMAT(1HO,23HNUMERO DE PUNTOS DE FLUJO = ,I2,12X,42HNUMERO DE EST
     1. DE MEC. DE PRECIPITACION = ,I3)
  908 FORMAT(1HO,4H EST,2X,16HNOMBRE DE LA EST,7X,2HK1,3X,4HIMPV,2X,
     14HEPXM,3X,4HUZSN,3X,4HLZSN,4X,2HCB,4X,2HCC,4X,2HK3,4X,4HK24L,2X,
     25HK24EL,4X,1H1,5X,2HSS,5X,2HNN,4X,3HIRC,4X,4HKK24,4X,2HKV)
  909 FORMAT (5A4,3F5.2,2F5.1,5F5.2)
  910 FORMAT(20X,8F5.1)
  911 FORMAT (1H ,I3,3X,5A4,3F6.2,2F7.2,F7.3,2F6.2,2F7.2,F7.0,F6.2,
     1F7.2,F6.2,F7.3,F7.2)
  912 FORMAT(1HO,17HNOMBRE DE LA EST.,12X,3HUZS,4X,3HLZS,4X,3HSGW,4X,
     13HGWS,4X,3HRES,3X,4HSRGX,3X,4HSCEP,3X,4HAEPI)
  913 FORMAT (1H ,5A4,6X,8F7.2)
  914 FORMAT(1HO,3H PF,1X,25HNOMBRE DEL PUNTO DE FLUJO,9X,4HAREA,3X,3HKS
     11,2X,4HRTIN,2X,7HCOMPARE,2X,4HCHEK,2X,10HHISTOGRAMS)
  915 FORMAT (7A4,2X,F10.2,F5.2,4I5)
  916 FORMAT (1HO,3H RG,3X,13HRAINGAGE NAME,10X,2HK1)
  917 FORMAT (30X,10F5.2)
  918 FORMAT (1H ,I3,3X,7A4,F8.2,F6.2,I5,2I7,5X,9HTIMEDELAY,10F5.2)
  919 FORMAT (1H ,72X,8HGAGEAREA,1X,10I5)
  920 FORMAT (1H ,72X,8HADDFLOW1,1X,10I5)
  921 FORMAT (1H ,72X,8HADDFLOW2,1X,10I5)
  922 FORMAT (I2,7X,3I3,I2,12F5.2)
  923 FORMAT (1HI,20HSUMARIO MENSUAL PARA,1X,20A4)
  924 FORMAT (1HO,A4,3H 19,I2)
  925 FORMAT(1HO,31X,42HSUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS)
  926 FORMAT(1HO,4H EST,2X,17HNOMBRE DE LA EST.,6X,8HTOTAL RO,3X,
     110HSURFACE RO,3X,7HIMPV RO,3X,9HINTERFLOW,3X,7HGW FLOW,3X,
     28HRECHARGE,3X,6HPRECIP,3X,12HPOTENTIAL-ET,3X,9HACTUAL-ET)
  927 FORMAT (1H ,I3,3X,5A4,F10.3,F12.3,4F11.3,F9.2,2F13.3)
  928 FORMAT (1HO,43X,44HSUMARIO DE LA DESCARGA MEDIA DIARIA SIMULADA)
  929 FORMAT (1HO,5HDIA   ,19X,14HPUNTO DE FLUJO)
  930 FORMAT (1H ,I5,5X,10F10.1)
  931 FORMAT (9X,I2,I1,11F6.3)
  932 FORMAT (9X,I2,I1,11F6.0)
  933 FORMAT (1HO,43X,45HSUMARIO DE LA DESCARGA MEDIA DIARIA OBSERVADA)
  934 FORMAT (30X,10I5)
  935 FORMAT(1HO,5HTOTAL,5X,10F10.1)
  936 FORMAT(1HO,48X,28HPARAMETROS PARA LA VERTIENTE)
  937 FORMAT(1HO,41X,25HALMACENAMIENTOS INICIALES)
  938 FORMAT(1HO,45X,29HPARAMETROS DE PUNTOS DE FLUJO)
  939 FORMAT (20X,F5.0,3F5.2,F5.3,F5.2)
  940 FORMAT(1HO,12X,77HCOMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PREC
     1IPITACION Y DE LA ESCORRENTIA)
  941 FORMAT(1HO,38X,32HALMACENAMIENTOS AL FINAL DEL MES)
  942 FORMAT(1HO,17HNOMBRE DE LA EST.,12X,3HUZS,4X,3HLZS,4X,3HSGW,4X,
     13HGWS,4X,3HRES,3X,4HSRGX,3X,4HSCEP,3X,4HAEPI,4X,7HBALANCE)
  943 FORMAT (1H ,5A4,6X,8F7.2,F10.3)
  944 FORMAT (1H ,9X,10F10)
  945 FORMAT (1HO,43X,39HSUMARIO DE LA DESCARGA HORARIA SIMULADA)
  946 FORMAT (1HO,7A4,10X,44HMINIMO FLUJO MEDIO DIARIO CAUSANDO SALIDA E
     1S,F7.0,5H MCSG)
  947 FORMAT (1HO,I3,3X,2HAM,6F9.1,4X,6F9.1)
  948 FORMAT (1H ,6X,2HPM,6F9.1,4X,6F9.1,F10.1)
  949 FORMAT (1H )
  950 FORMAT (4I5,F5.1,9I5,F5.2)
  951 FORMAT (I2)
  952 FORMAT(1HI,35X,38HSIMULACION PARA EL A#O HIDROLOGICO, 19,I2,5H PAR
     1A,2X,7A4//)
  953 FORMAT (1HO,37X,13HWATER YEAR 19,I2)
  954 FORMAT(1HO,35HSUMARIO DE LA DESCARGA MEDIA DIARIA)
  955 FORMAT (1HO,3X,3HDIA,5X,3HENE,6X,3HFEB,6X,3HMAR,6X,3HABR,6X,3HMAY,
     14X,5HJUNIO,4X,5HJULIO,6X,3HAGO,5X,4HSEPT,5X,4HOCTB,3X,6HNOVIEM,5X,
     24HDICB,7X,5HANUAL)
  956 FORMAT (1HO)
  957 FORMAT (1H ,I5,12F9.2)
  958 FORMAT (1H ,I5,F9.2,9X,10F9.2)
  959 FORMAT (1H ,I3,F9.2,9X,F9.2,9X,F9.2,9X,2F9.2,9X,F9.2,9X,F9.2)
  960 FORMAT(5HTOTAL,12F9.2,F10.0,6H MCSGD)
  961 FORMAT (1H ,5X,12F9.1,F10.1,6H MILIM)
  962 FORMAT (1H ,111X,F12.3,7H 1000MC)
  963 FORMAT(5HOBSV.,12F9.0,F10.0,6H MCXGD)
  965 FORMAT (12F5.3)
  966 FORMAT (1H ,I3,3X,5A4,F6.2)
  970 FORMAT (I2,7X,3I3,2X,4F10.0,I3,F7.0,I3,F7.0)
  971 FORMAT (I2,7X,3I3,I2,6F10.0)
  972 FORMAT(1HO,42X,34HAJUSTE DE LA EVAPORACION POTENCIAL)
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  973 FORMAT(1HO,17HAJUSTE ESTACIONAL,11X,3HMES,9X,12I5)
  974 FORMAT(1H ,27X,6HAJUSTE,8X,12F5.2)
  975 FORMAT(1HO,18HAJUSTE PARA LA EST,08X,8HESTACION,6X,12I5)
C76   FORMAT (30X,4I5,3F10.0)
978   FORMAT (3I5)
979   FORMAT (1HO,10X,34HINFILTRATION CURVE POWER FACTOR IS,F5.1,10X,
     116HUZSN WT. FACTOR#,F5.2)
984   FORMAT (F10.0,10F5.2)
985   FORMAT (1H ,3X,17HVARIABLE K  BASE#,F6.0,3X,2HK#,20F5.2)
986   FORMAT (10X,10F5.2)
987   FORMAT (1H ,3X,20HVARIABLE LAG   BASE#,F6.0,3X,4HLAG#,10I5)
988   FORMAT (F10.0,10I5)
989   FORMAT (12I5)
990   FORMAT (3X,2H99)
991   FORMAT (2F5.2,I10)
992   FORMAT (1HO,43X,34HSIMULATED AREAL SNOW COVER SUMMARY)
993   FORMAT (1H ,I5,5X,10F10.2)
C END OF MAIN PROGRAM
      STOP
      END
```

LAND

```
      SUBROUTINE LAND
C LAND SURFACE RUNOFF SUBROUTINE
C LAND VARIABLES
      REAL LZS,KLT,LZSMT,K3T,K24LT,K24ELT,KVT,LKK4T,LIRC4T,INTF,LNRAT,
     1INFIL,LZI,LCS
C MAIN,LAND AND CHANEL VARIABLES
      INTEGER ELE,ELEMTS(10),GAGEAR(10,10),ADDFW1(10,10),
     1ADDFW2(10,10),TEST1(10),TEST2(10),RTEINT(10),AVEPE,VARK(10),
     2VAREL(10),SNOW,VAREP
      REAL IMPV(5),LZSN(5),K3(5),K24L(5),K24EL(5),KV(5),LKK4(5),
     1LIRC4(5),LZSI(5),KSI(10),KSIV(10,20)
      COMMON/MCL/EPDIST(24),EPXM(5),UZSN(5),CB(5),CC(5),SRC(5),DEC(5),
     1UZSI(5),SGWI(5),GWSI(5),RESI(5),SRGXI(5),SCEPI(5),REPI(5),
     2CFSM(10),PREVFI(10),TRANSI(10,48),EVAP(12,31),
     3FLOW(10,744),RO(5,744),EVAPM(12),SRO(5),SROS(5),SIMPV(5),SINTF(5),
     4SGWE(5),SRECH(5),SPE(5),SET(5),TIMEAR(10,10),PEADJ(12),
     5GAGEPE(5),POWER,BASEK(10),BASEL(10),IMPV,LZSN,K3,K24L,K24EL,KV,
     6LKK4,LIRC4,LZSI,KSI,KSIV,MAXL(10),MINL(10),LAG(10,10),
     7IE,MHR,MOHR1,MOHR2,ELE,ELEMTS,GAGEAR,VAREP,SDEP,EPBIAS,IXEP,
     8ADDFW1,ADDFW2,TEST1,TEST2,RTEINT,AVEPE,VARK,VARL,SNOW,UZSNWE,
     9AEPI(5)
C MAIN,LAND,CHANEL AND SNOW VARIABLES
      INTEGER SIXHR
      REAL KI(5)
      COMMON/MLCS/FCOVER(5),FDEN(5),KOHLER,PE(5,31),COVEP(5,31),
     1PX(5,31,24),KI,LAST,IRG,IPT,IDA,IHR,MONTH,I,SIXHR
C LAND INITIAL VALUES
      SRCT=0.0
      SRCST=0.0
      SINTFT=0.0
      SGWFT=0.0
      SIMPVT=0.0
      SRECHT=0.0
      SETT=0.0
      SPRT=0.0
      SPET=0.0
C INITIAL VALUES OF VARIABLES
      UZS=UZSI(IRG)
      LZS=LZSI(IRG)
      SGW=SGWI(IRG)
      GWS=GWSI(IRG)
      RES=RESI(IRG)
      SRGX=SRGXI(IRG)
      SCEP=SCEPI(IRG)
      REP=REPI(IRG)
      AEPIT=AEPI(IRG)
C INITIAL VALUES OF PARAMETERS
      KLT=KL(IRG)
      AT=IMPV(IRG)
      PA=1.0-AT
      EPXMT=EPXM(IRG)
      UZSNC=UZSN(IRG)
      LZSNT=LZSN(IRG)
      K3T=K3(IRG)
      K24LT=K24L(IRG)
      K24ELT=K24EL(IRG)
      CBT=CB(IRG)
      CCT=CC(IRG)
      KVT=KV(IRG)
      SRCT=SRC(IRG)
      DECT=DEC(IRG)
      LKK4T=LKK4(IRG)
      LIRC4T=LIRC4(IRG)
      FEC=FCOVER(IRG)*FDEN(IRG)
      IHR=1
      IDA=1
C BEGINNING OF HOUR AND DAY LOOP
C VALUES OF POTENTIAL EVAPOTRANSPIRATION AND PRECIPITATION
203   IF (IHR.NE.1) GO TO 206
      IF (KOHLER.EQ.1) GO TO 204
      IF (AVEPE.EQ.0.0) GO TO 205
      EP=EVAPM(MONTH)
      GO TO 2032
205   EP=EVAP(MONTH,IDA)*PEADJ(MONTH)
      GO TO 2032
204   EP=PE(IRG,IDA)*PEADJ(MONTH)
2032  IF (VAREP.EQ.0.0) GO TO 202
      SD=EP*SDEP
```

LAND

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      CALL IGAUSS(IXEP,SD,EP,TV)
      EP=TV+EPBIAS*EP
      IF (EP.LT.0.0) EP=0.0
202   EP=EP*GAGEPE(IRG)
      EPDT=EP
      SPET=SPET+EP
      EP=EFC*EP+(1.0-EFC)*(1.0-COVER(IRG,IDA))*EP
      AEPIT=(AEPIT*0.9)+EP
      UZSNT=UZSNC+UZSNWE*AEPIT
206   IF ((SIXHR.EQ.0).OR.(SNOW.EQ.1)) GO TO 208
      IS=(IHR+5)/6
      PX1=PX(IRG,IDA,IS)/6.0
      GO TO 207
208   PX1=PX(IRG,IDA,IHR)
      IF (SNOW.EQ.1) GO TO 2081
207   PX1=PX1*KIT
2081  SPRT=SPRT+PX1
      PR=PX1
C PX1 IS HOURLY PRECIPITATION -- PR IS HOURLY PRECIPITATION
      RU=0.0
      IF (PR.GT.0.0) GO TO 210
2121  IF (RES.EQ.0.0) GO TO 211
      P3=0.0
      GO TO 212
211   IF (SRGX.EQ.0.0) GO TO 213
      P3=0.0
      ROS=0.0
      GO TO 214
213   P3=0.0
      ROS=0.0
      INTF=0.0
      GO TO 215
C INTERCEPTION STORAGE - SCEP IS INTERCEPTION STORAGE VOLUME
C                      - EPX IS INTERCEPTION STORAGE CAPACITY
210   EPX=EPXMT-SCEP
      IF (EPX.LT.0.0) EPX=0.0
      IF (PR.GE.EPX) GO TO 216
      SCEP=SCEP+PR
      P3=0.0
      GO TO 2121
216   P3=PR-EPX
      SCEP=SCEP+EPX
C P3 IS RAIN REACHING THE GROUND
C P3*AT IS IMPERVIOUS AREA RUNOFF VOLUME
      SIMPVT=SIMPVT+P3*AT
C BEGIN 15 MINUTE LOOP
212   ROS=0.0
      GWIN=0.0
      DO 205 I15=1,4
      P4=0.25*P3+RES
      IF (P4.EQ.0.0) GO TO 205
      LNRAT=LZS/LZSNT
      D3FV=CBT/((LNRAT)**POWER)
      D4F=0.25*D3FV
C P4 IS P3 PLUS SURFACE DETENTION STORAGE
      RATIO=CCT*(2.0**LNRAT)
      IF (RATIO.LT.1.0) RATIO=1.0
      IF (P4.GE.D4F) GO TO 220
      SHRD=P4*P4/(2.0*D4F)
      GO TO 221
220   SHRD=P4-0.5*D4F
221   INFIL=P4-SHRD
C INFIL IS INFILTRATION VOLUME
      IF (P4.GE.(D4F*RATIO)) GO TO 222
      RXX=P4*P4/(2.0*D4F*RATIO)
      GO TO 223
222   RXX=P4-0.5*D4F*RATIO
C RXX IS THE POTENTIAL INCREASE TO OVERLAND FLOW AND SURFACE DETENTION
223   RGXX=SHRD-RXX
C RGXX IS THE POTENTIAL INCREASE TO INTERFLOW DETENTION
C UPPER ZONE CALCULATIONS
      IF (UZS.GE.(2.0*UZSNT)) GO TO 224
      UZI=2.0*ABS(0.5*(UZS/UZSNT)-1.0)+1.0
      PRE=(0.5*UZS/UZSNT)*(1.0/(1.0+UZI))**UZI
      GO TO 225
224   UZI=2.0*ABS(((UZS/UZSNT)-1.0)-1.0)+1.0
      PRE=1.0-(1.0/(1.0+UZI))**UZI
C PRE IS THE PERCENT OF RXX AND RGXX NOT RETAINED IN UPPER ZONE STORAGE
```

LAND

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225     RGX=RGXX*PRE
C RGX IS THE VOLUME TO INTERFLOW DETENTION STORAGE
        SRGX=SRGX+RGX
C SRGX IS INTERFLOW DETENTION STORAGE
        RX=RXX*PRE
C RX IS THE VOLUME TO OVERLAND FLOW AND SURFACE DETENTION
        UZS=UZS+SHRD-RGX-RX
C UZS IS UPPER ZONE STORAGE VOLUME
C OVERLAND FLOW
        IF (RX.LE.RES) GO TO 226
        DE=DECT*((RX-RES)**0.6)
C DE IS SURFACE DETENTION AT EQUILIBRIUM
        GO TO 227
226     DE=(RES+RX)*0.5
227     D=(RES+RX)*0.5
C D IS AVERAGE SURFACE DETENTION
        IF (D.GT.DE) D=DE
        IF (D.LE.0.005) GO TO 228
        ROST=0.25*SRCT*(D**1.67)*((1.0+0.6*((D/DE)**3.0))**1.67)
        GO TO 229
  228   ROST=0.0
  229   IF(ROST.GT.(0.75*RX))  ROST=0.75*RX
C ROS IS OVERLAND FLOW VOLUME
        SROST=SROST+ROST
        RES=RX-ROST
        ROS=ROS+ROST
C RES IS SURFACE DETENTION STORAGE VOLUME
        IF (RES.GE.0.001) GO TO 230
        LZS=LZS+RES
        RES=0.0
230     LZI=1.5*ABS((LZS/LZSNT)-1.0)+1.0
        PRE=(1.0/(1.0+LZI))**LZI
        IF (LZS.LT.LZSNT) PRE=1.0-PRE*(LZS/LZSNT)
C PRE IS THE PERCENT OF INFILTRATION RETAINED IN THE LOWER ZONE
C F3 IS HELD IN LOWER ZONE -- F1 GOES TO GROUNDWATER DETENTION
        F3=PRE*INFIL
        LZS=LZS+F3
C LZS IS LOWER ZONE STORAGE VOLUME
        GWIN=GWIN+INFIL-F3
  209   CONTINUE
C END 15 MINUTE LOOP
        F1A=GWIN
        F1=F1A*(1.0-K24LT)*PA
        RECH=F1A*K24LT*PA
C RECH IS DEEP GROUNDWATER RECHARGE
        SRECHT=SRECHT+RECH
        SGW=SGW+F1
C SGW IS GROUNDWATER STORAGE VOLUME
        GWS=GWS+F1
C GWS IS ANTECEDENT GW INFLOW INDEX
C INTERFLOW CALCULATIONS
214     INTF=LIRC4T*SRGX
C INTF IS INTERFLOW VOLUME
        SINTFT=SINTFT+INTF
        SRGX=SRGX-INTF
        IF (SRGX.GE.0.0001) GO TO 215
        LZS=LZS+SRGX
        SRGX=0.0
C GROUNDWATER FLOW CALCULATIONS
215     IF (SGW.LE.0.0001) GO TO 231
        GWF=SGW*LKK4T*(1.0+KVT*GWS)
        GO TO 232
231     GWF=0.0
        GWS=SGW
C GWF IS GROUNDWATER FLOW VOLUME
232     SGWFT=SGWFT+GWF
        SGW=SGW-GWF
C RU IS TOTAL LAND SURFACE RUNOFF VOLUME
        RU=RU+(ROS+INTF)*PA+P3*AT+GWF
C EVAP-TRANS LOSS FROM INTERCEPTION AND UPPER ZONE STORAGES
        EPHR=EPDIST(IHR)*EP
        IF (EPHR.EQ.0.0) GO TO 234
        IF (SCEP.LE.0.0) GO TO 235
        IF (SCEP.LE.EPHR) GO TO 236
        SCEP=SCEP-EPHR
        SETT=SETT+EPHR
        EPHR=0.0
        GO TO 234
```

LAND

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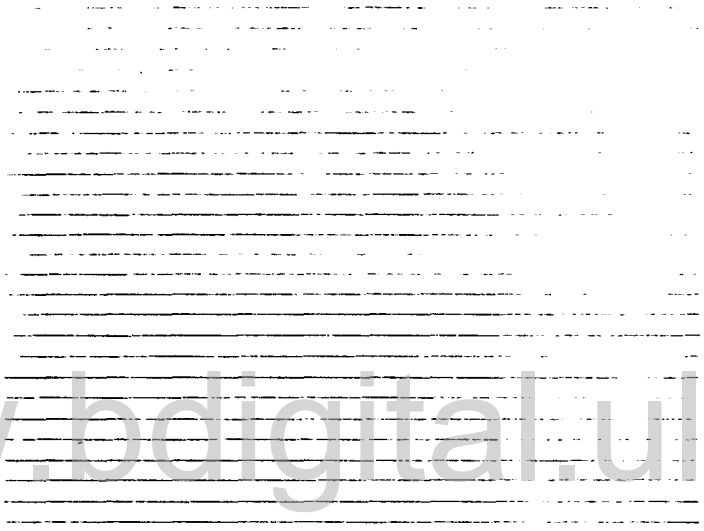
236     SETT=SETT+SCEP
        EPHR=EPHR-SCEP
        SCEP=0.0
235     IF (UZS.LE.0.0) GO TO 237
        IF (UZS.LE.EPHR) GO TO 238
        SETT=SETT+PA*EPHR
        UZS=UZS-EPHR
        EPHR=0.0
        GO TO 234
238     SETT=SETT+UZS*PA
        EPHR=EPHR-UZS
        UZS=0.0
237     REP=REP+EPHR
C REP IS RESIDUAL POTENTIAL EVAPOTRANSPIRATION
C SLOW PERCOLATION FROM UPPER ZONE
234     DEEPL=(LZS/UZSNT)-(LZS/LZSNT)
        IF (DEEPL.LE.0.0) GO TO 239
        LNRAT=LZS/LZSNT
        RECE=0.003*CBT*UZSNT*(DEEPL**3.0)
        UZS=UZS-RECE
        LZI=1.5*ABS(LNRAT-1.0)+1.0
        PRE=(1.0/(1.0+LZI))**LZI
        IF (LZS.LT.LZSNT) PRE=1.0-PRE*LNRAT
        E3=PRE*RECE
        E1A=(1.0-PRE)*RECE
        E1=E1A*(1.0-K24LT)*PA
        RECH=E1A*K24LT*PA
        SRECHT=SRECHT+RECH
        LZS=LZS+E3
        SGW=SGW+E1
        GWS=GWS+E1
C EVAP-TRANS FROM GROUNDWATER AND LOWER ZONE
  239   IF (IHR.NE.21) GO TO 242
        IF (GWS.GT.0.0001) GWS=0.97*GWS
        LOS=K24ELT*EPOT
        IF (LOS.GT.SGW) LOS=SGW
C LOS IS GROUNDWATER EVAPOTRANSPIRATION VOLUME
        SETT=SETT+LOS
        SGW=SGW-LOS
        GWS=GWS-LOS
        IF (GWS.LT.0.0) GWS=0.0
        EP=REP
        IF (EP.EQ.0.0) GO TO 242
        LNRAT=LZS/LZSNT
        IF (EP.GE.(K3T*LNRAT)) GO TO 240
        AETR=EP*(1.0-(EP/(2.0*K3T*LNRAT)))
        LZS=LZS-AETR
        GO TO 241
240     AETR=0.5*K3T*LNRAT
        LZS=LZS-AETR
241     SETT=SETT+PA*AETR
C AETR IS LOWER ZONE EVAPOTRANSPIRATION VOLUME
        REP=0.0
  242   CONTINUE
        MHR=(IDA-1)*24+IHR
        RO(IRG,MHR)=RU
        SROT=SROT+RU
        IF ((IDA.EQ.LAST).AND.(IHR.EQ.24)) GO TO 246
        IHR=IHR+1
        IF (IHR.LE.24) GO TO 203
        IHR=1
        IDA=IDA+1
        GO TO 203
C END OF HOUR AND DAY LOOP
C LAND CARRYOVER VALUES
246     UZSI(IRG)=UZS
        LZSI(IRG)=LZS
        SGWI(IRG)=SGW
        GWSI(IRG)=GWS
        RESI(IRG)=RES
        SRGXI(IRG)=SRGX
        SCEPI(IRG)=SCEP
        REPI(IRG)=REP
        AEPI(IRG)=AEPIT
        SRI(IRG)=SROT
        SRCS(IRG)=SRCST
        SINTF(IRG)=SINTFT
        SIMPV(IRG)=SIMPVT
```

LAND

```
SGWF(IRG)=SGWFT
SRECH(IRG)=SRECHT
SPF(IRG)=SPFT
SPE(IRG)=SPET
SGT(IRG)=SETT
RETURN
END
```



HOURLY

```
      SUBROUTINE HOURLY(INFRO,MONTH,YEAR,IPT,FLOW)
C SUBROUTINE GENERATES SCALED INPUT FOR AUXILIARY PLOT PROGRAM
      INTEGER YEAR,DA1,DA2
      REAL INFRO(20),MOCHAR(12)
      DIMENSION YA(752),YS(752),A(31),NUM(31),FLOW(10,744)
C MAIN,HOURLY AND DAILY VARIABLES
      INTEGER FIRST,CHECK(10)
      COMMON/MHC/FLOW1(10,744),PHRMX(10),FPN(7),FPNAME(10,7),PLOTMX(10),
     1ACTFLW(10,12,31),SIMFLW(10,12,31),FIRST,CHECK
      DATA MOCHAR/3HJAN,3HFEB,3HMAR,3HAPR,3HMAY,4HJUNE,4HJULY,3HAUG,
     14HSEPT,3HOCT,3HNOV,3HDEC/
      MOHR1=1
      M6=6
  880 IF (CHECK(IPT).EQ.1) GO TO 855
C DETERMINE FIRST AND LAST HOUR OF PLOT AND NUMBER OF POINTS
C HOURLY FLOW
      DO 850 MHR=MOHR1,744
      IF (FLOW1(IPT,MHR).EQ.0.0) GO TO 850
      MOHR1=MHR
      GO TO 851
  850 CONTINUE
      GO TO 899
  851 FIRST=1
      DO 852 MHR=MOHR1,744
      IF (FLOW1(IPT,MHR).GT.0.0) GO TO 852
      MOHR2=MHR-1
      GO TO 870
  852 CONTINUE
      MOHR2=744
      GO TO 870
C SIX HOUR FLOWS
  855 DO 856 MHR=M6,744,6
      IF (FLOW1(IPT,MHR).EQ.0.0) GO TO 856
      M6=MHR
      GO TO 857
  856 CONTINUE
      GO TO 899
  857 FIRST=1
      DO 858 MHR=M6,744,6
      IF (FLOW1(IPT,MHR).GT.0.0) GO TO 858
      MOHR2=MHR-6
      GO TO 859
  858 CONTINUE
      MOHR2=744
  859 MOHR1=M6-5
      DO 860 MHR=MOHR1,M6
      IF (FLOW1(IPT,MHR).EQ.0.0) GO TO 860
      MOHR1=MHR
      GO TO 861
  860 CONTINUE
  861 F1=FLOW1(IPT,MOHR1)
      M1=MOHR1+1
  864 DO 862 MHR=M1,MOHR2
      IF (FLOW1(IPT,MHR).EQ.0.0) GO TO 862
      M2=MHR
      F2=FLOW1(IPT,MHR)
      GO TO 863
  862 CONTINUE
  863 IF (M1.EQ.M2) GO TO 865
      FP=(F2-F1)/(M2-M1+1)
      I=M2-1
      DO 866 MHR=M1,I
      X1=MHR-M1+1
  866 FLOW1(IPT,MHR)=F1+FP*X1
  865 IF (M2.EQ.MOHR2) GO TO 870
      M1=M2+1
      F1=F2
      GO TO 864
  870 NPT=MOHR2-MOHR1+1
      DA1=(MOHR1-1)/24+1
      DA2=(MOHR2-1)/24+1
      NDA=DA2-DA1+1
      I=MOHR1-(DA1-1)*24
      X1=I*0.1
      DO 871 I=1,NDA
      NUM(I)=DA1-1+I
  871 A(I)=2.4*I
      PMAX=PHRMX(IPT)
```

HCURLY

```
      DELTA=PMAX*0.1
      PUNCH 900,NDA,DELTA,X1,NPT
      PUNCH 901,(A(I),I=1,NDA)
      PUNCH 902,(NUM(I),I=1,NDA)
      IF (CHECK(IPT).EQ.1) GO TO 872
      PUNCH 903
      GO TO 873
872   PUNCH 904
873   DO 874 I=1,7
874   FPN(I)=FPNAME(IPT,I)
      PUNCH 905,FPN
      PUNCH 906,MOCHAR(MONTH),YEAR
      PUNCH 907,INFRO
      PUNCH 908
      DO 875 MHR=MCHR1,MOHR2
      I=MHR-MCHR1+1
      YA(I)=(FLOW1(IPT,MHR)/PMAX)*10.0
      YS(I)=(FLOW(IPT,MHR)/PMAX)*10.0
      IF (YA(I).GT.10.0) YA(I)=10.0
      IF (YS(I).GT.10.0) YS(I)=10.0
875   CONTINUE
      PUNCH 908,(YA(I),I=1,NPT)
      PUNCH 909,(YS(I),I=1,NPT)
      IF (MCHR2.EQ.744) GO TO 899
      MCHR1=MOHR2+1
      M6=MCHR2+6
      GO TO 880
899   CONTINUE
C HCURLY FORMAT STATEMENTS
900   FORMAT (I5,F10.2,F5.1,I5)
901   FORMAT (16F5.1)
902   FORMAT (20I3)
903   FORMAT (16HHOURLY FLOW--CFS)
904   FORMAT (20HSIX HOURLY FLOW--CFS)
905   FORMAT (7A4)
906   FORMAT (A4,3H 19,I2)
907   FORMAT (20A4)
908   FORMAT (35HBLACK IS OBSERVED--RED IS SIMULATED)
909   FORMAT (16F5.2)
      RETURN
      END
```

CHANEL

```
      SUBROUTINE CHANEL
C CHANNEL ROUTING SUBROUTINE
C CHANEL VARIABLES
      INTEGER GAGET(10),ADD1T(10),ADD2T(10),HALFP,RINT,DHR,VK,VL
      REAL KVT(20),KSIT,IN,K
      DIMENSION TRS(792),TIMET(10),LAGT(10)
      DIMENSION DEX(11),QM(10,744),Q(11,744),DET(744),YYY(11,744)
      DIMENSION TEMP1(20),TEMP2(20)
C MAIN,LAND AND CHANEL VARIABLES
      INTEGER ELE,ELEMTS(10),GAGEAR(10,10),ADDFW1(10,10),
     1ADDFW2(10,10),TEST1(10),TEST2(10),RTEINT(10),AVEPE,VARK(10),
     2VARL(10),SNOW,VAREP
      REAL IMPV(5),LZSN(5),K3(5),K24L(5),K24EL(5),KV(5),LKK4(5),
     1LIRC4(5),LZSI(5),KS1(10),KSIV(10,20)
      COMMON/MCL/EPDIST(24),EPXM(5),UZSN(5),CB(5),CC(5),SRC(5),DEC(5),
     1UZSI(5),SGWI(5),GWSI(5),RESI(5),SRGXI(5),SCEPI(5),FEPI(5),
     2CFSM(10),PREVEI(10),TRANSI(10,48),EVAP(12,31),
     3FLOW(10,744),RO(5,744),EVAPM(12),SRO(5),SROS(5),SIMPV(5),SINTF(5),
     4SGWF(5),SRECH(5),SPF(5),SPE(5),SET(5),TIMEAR(10,10),PEADJ(12),
     5GAGEPE(5),POWER,BASEK(10),BASEL(10),IMPV,LZSN,K3,K24L,K24EL,KV,
     6LKK4,LIRC4,LZSI,KS1,KSIV,MAXL(10),MINL(10),LAG(10,10),
     7IE,MHR,MOHR1,MOHR2,ELE,ELEMTS,GAGEAR,VAREP,SDEP,EPBIAS,IXEP,
     8ADDFW1,ADDFW2,TEST1,TEST2,RTEINT,AVEPE,VARK,VARL,SNOW,UZSNWF,
     9AEPI(5)
C MAIN,LAND,CHANEL AND SNOW VARIABLES
      INTEGER SIXHR
      REAL K1(5)
      COMMON/MCLS/FCOVER(5),FDEN(5),KOHLER,PE(5,31),COVER(5,31),
     1PX(5,31,24),K1,LAST,IRG,IPT,IDA,IHR,MONTH,I,SIXHR
C CHANNEL INITIAL VALUES
      MOHR1=1
      MOHR2=LAST*24
      ELE=ELEMTS(IPT)
      DO 3001 I=1,ELE
      DEX(I)=5000.0
      DO 3001 MHR=MOHR1,MOHR2
 3001 QM(I,MHR)=0.0
      RINT=RTEINT(IPT)
      DO 300 IE=1,ELE
      GAGET(IE)=GAGEAR(IPT,IE)
      TIMET(IE)=TIMEAR(IPT,IE)
      ADD1T(IE)=ADDFW1(IPT,IE)
  300 ADD2T(IE)=ADDFW2(IPT,IE)
      CFS=CFSM(IPT)
      CMS=CFS*0.02832
      IF (TEST1(IPT).EQ.1) GO TO 303
      DO 304 MHR=MOHR1,MOHR2
      DO 304 IE=1,ELE
      J=GAGET(IE)
  304 QM(IE,MHR)=RO(J,MHR)*CMS*TIMET(IE)/DEX(IE)
      GO TO 305
  303 IF (TEST2(IPT).EQ.1) GO TO 306
      DO 307 MHR=MOHR1,MOHR2
      DO 307 IE=1,ELE
      J=GAGET(IE)
      QM(IE,MHR)=RO(J,MHR)*CMS*TIMET(IE)/DEX(IE)
      J=ADD1T(IE)
      IF(ADD1T(IE).GT.0) Q(I,MHR)=FLOW(J,MHR)
  307 CONTINUE
      GO TO 305
  306 DO 308 MHR=MOHR1,MOHR2
      DO 308 IE=1,ELE
      J=GAGET(IE)
      QM(IE,MHR)=RO(J,MHR)*CMS*TIMET(IE)/DEX(IE)
      IF (ADD1T(IE).EQ.0) GO TO 308
      J=ADD1T(IE)
      Q(1,MHR)=FLOW(J,MHR)
      IF (ADD2T(IE).EQ.0) GO TO 308
      J=ADD2T(IE)
      Q(1,MHR)=Q(1,MHR)+FLOW(J,MHR)
  308 CONTINUE
  305 CONTINUE
      N=ELE+1
      DO 1055 IE=1,N
      IF(IPT.EQ.1) GO TO 1054
      IF(MONTH.NE.1) YYY(IE,1)=TEMP2(IE)
      GO TO 1055
 1054 IF(MONTH.NE.1) YYY(IE,1)=TEMP1(IE)
```

CHANEL

```
1055 CONTINUE
     DO 1056 MHR=1,MCHR2
     IF(IPT.EQ.1) Q(1,MHR)=1.0
1056 DET(MHR)=RINT*3600.0
     NT=MCHR2
     CALL COBRE (Q,QM,DET,NT,N,DEX,MONTH,IPT,YYY)
     DO 30 MHR=MCHR1,MCHR2
  30 FLOW(IPT,MHR)=Q(N,MHR)
     DO 1057 IE=1,N
     IF(IPT.EQ.1) TEMP1(IE)=YYY(IE,MCHR2)
     IF(IPT.EQ.2) TEMP2(IE)=YYY(IE,MCHR2)
1057 CONTINUE
     RETURN
     END
```

CCBRE

```
      SUBROUTINE CCBRE (Q,QM,DET,NT,N,DEX,MONTH,IPT,YYY)
C     METODO CINEMATICO PARA TRANSITO DE CAUDALES
      DIMENSION DEX(11),DET(744),RM(11),QM(10,744),Q(11,744),B(11),
     1A(11,2),V(11),BB(11),D(11,2)
      DIMENSION RH(11,2),DIFYY(11),YYY(11,744),DETA(744),SO(11)
      NTT=NT-1
      NM1=N-1
      TETA=0.55
      DO 610 I=1,N
      SO(I)=0.002
      B(I)=6.0
      RM(I)=0.035
      J=1
      IF(MONTH.NE.1) GO TO 325
      Q(I,1)=1.0
      CALL GENER (Q,SO,RM,B,YYY,I,J)
  325 CONTINUE
      A(I,1)=B(I   )*YYY(I,1)
      RH(I,1)=A(I,1)/(B(I   )+2.0*YYY(I,1))
  610 V(I)=Q(I,1)/A(I,1)
      IF(IPT.EQ.1) GO TO 912
      I=1
      DO 917 J=1,NT
      CALL GENER (Q,SO,RM,B,YYY,I,J)
  917 CONTINUE
      GO TO 872
  912 DO 928 J=1,NTT
      YYY(1,J+1)=YYY(1,1)
  928 CONTINUE
  872 CONTINUE
      DETA(1)=0.0
      DO 394 J=1,NTT
  394 DETA(J+1)=DET(J)/3600.0+DETA(J)
      IF(MONTH.GE.3) GO TO 401
      WRITE(6,1004)
 1004 FORMAT(1H1,//,40X,'SIMULACION DEL TRANSITO EN UN CAUCE UTILIZANDO
     1 ',//,53X,'EL METODO CINEMATICO',///)
      WRITE(6,1000)          DEX(1)
 1000 FORMAT(13X,'INTERVALO DE DISTANCIA ENTRE SECCIONES =',F8.2,'MTS.')
      WRITE(6,1001)
 1001 FORMAT(13X,'TIEMPO EN MINUTOS')
      WRITE(6,1002)
 1002 FORMAT(13X,'VELOCIDADES DE FLUJO EN METROS ENTRE SEGUNDOS')
      WRITE(6,1003)
 1003 FORMAT(13X,'ALTURAS DE AGUA EN METROS')
      WRITE(6,1008) RM(1)
 1008 FORMAT(13X,'RUGOSIDAD DE MANNING=',F6.4)
      WRITE(6,1009) SO(1)
 1009 FORMAT(13X,'PENDIENTE DEL FONDO DEL CANAL=',F7.5)
      WRITE(6,381) (  I  ,I=1,N)
      WRITE(6,383) DETA(1),(V(I),I=1,N)
      WRITE(6,384) (YYY  (I,1),I=1,N)
  401 CONTINUE
      DO 251 J=1,NTT
      ITER=2
C
C     PREDICCION PARA ITERACION INICIAL EN UNA LINEA DE TIEMPO
C
      IF(J.NE.1) GO TO 550
      DO 191 I=2,N
  191 YYY(I,J+1)=YYY(I,J)
      GO TO 518
  550 IF(J.NE.2.AND.J.NE.3) GO TO 552
      DO 192 I=2,N
  192 YYY(I,J+1)=ABS(YYY(I,J)+0.5*(YYY(I,J)-YYY(I,J-1)))
      GO TO 518
  552 DO 193 I=2,N
  193 YYY(I,J+1)=ABS(YYY(I,J-2)+1.0*(YYY(I,J)-YYY(I,J-1)))
  518 CONTINUE
C
C    CALCULO DE CARACTERISTICAS HIDRAULICAS EN EL CANAL
C
      DO 194 I=1,N
      A(I,2)=B(I)*YYY(I,J+1)
  194 RH(I,2)=A(I,2)/(B(I)+2.0*YYY(I,J+1))
C
C     CALCULO DE VALORES RESIDUALES UTILIZANDO DATOS DE PRUEBA
C
```

COBRE

```
  231 CONTINUE
      MMB=2
      NND=2
      DO 81 I=1,NM1
      R1=RH(I,1)
      R2=RH(I,2)
      R3=RH(I+1,2)
      R4=RH(I+1,1)
      AI1=A(I,1)
      AI2=A(I,2)
      AI3=A(I+1,2)
      AI4=A(I+1,1)
      BI1=B(I)
      BI2=B(I+1)
      APRO2=(AI1+AI4)/2.0
      APRO1=(AI2+AI3)/2.0
      RH1=(R2+R3)/2.0
      RH2=(R1+R4)/2.0
      PMI1=BI2+2.0*YYY(I+1,J+1)
      PMI2=BI1+2.0*YYY(I,J+1)
      SCP=(SC(I)+SC(I+1))/2.0
      DIVI=SQRT(SCP)/RM(I)
      CAUX=TETA*RH1+(1.0-TETA)*RH2
      DRHX=TETA*(R3-R2)+(1.0-TETA)*(R4-R1)
      AVAR=TETA*APRO1+(1.0-TETA)*APRO2
      DAX=TETA*(AI3-AI2)+(1.0-TETA)*(AI4-AI1)
      CALA1=AI2+AI3-AI1-AI4
      DEXDET=DEX(J)/(2.0*DET(J))
      BB(MMB)=DIVI/CAUX**0.3333*(0.6667*DRHX*AVAR+CAUX*DAX)+CALA1*DEXDET
     1-DEX(J)*GM(I,J+1)
      MMB=MMB+1
C
C     CALCULO DE COEFICIENTES DE SISTEMA DE ECUACIONES SIMULTANEAS
C
C     COEFICIENTES DE MATRIZ D
      DRHH1=0.5*(BI1      *PMI2-AI2      *2.0)/(PMI2*PMI2)*TETA
      DRHH2=0.5*(BI2      *PMI1-AI3      *2.0)/(PMI1*PMI1)*TETA
      D(NND,1)=DIVI/CAUX**0.3333*(0.6667*(DRHX*TETA*BI1 /2.0-AVAR*2.0*DR
     1HH1-AVAR*DRHX* 0.3333*DRHH1/CAUX+DRHH1*DAX)-CAUX*TETA*BI1 )+DEXDET
     1*BI1
      D(NND,2)=DIVI/CAUX**0.3333*(0.6667*(DRHX*TETA*BI2   /2.0+AVAR*2.0*
     1DRHH2-AVAR*DRHX* 0.3333*DRHH2/CAUX+DRHH2*DAX)+CAUX*TETA*BI2   )+
     1DEXDET*BI2
      NND=NND+1
   81 CONTINUE
C
C     CALCULO DE LOS DIFERENCIALES DE HM
C
      DIFYY(1)=0.0
      DO 181 I=2,N
  181 DIFYY(I)=(-BB(I)-D(I,1)*DIFYY(I-1))/D(I,2)
C
C     COMPARACION ENTRE VALOR ANTERIOR Y VALOR ACTUAL DE HM
C
      DO 220 I=1,N
      YYY(I,J+1)=ABS(DIFYY(I)+YYY(I,J+1))
      A(I,2)=YYY(I,J+1)*B(I)
      RH(I,2)=A(I,2)/(B(I)+2.0*YYY(I,J+1))
      TINI=SQRT(SC(I))/RM(I)
      Q(I,J+1)=TINI*RH(I,2)**0.6667*A(I,2)
      V(I)=Q(I,J+1)/A(I,2)
  220 CONTINUE
C
C     SE OBSERVA SI DIFYY ESTA DENTRO DEL RANGO DE ERROR ACEPTABLE
C
      IF(ITER.EQ.2) GO TO 5001
      DO 240 I=2,N
      IF(DIFYY(I).LE.0.01.AND.DIFYY(I).GE.-0.01) GO TO 240
      ITER=ITER+1
      GO TO 231
  240 CONTINUE
      IF(MONTH.GE.3) GO TO 5001
      WRITE(6,383) DETA(J+1),(V(I),I=1,N)
      WRITE(6,384) (YYY  (I,J+1),I=1,N)
 5001 DO 756 I=1,N
      A(I,1)=A(I,2)
      RH(I,1)=RH(I,2)
  756 CONTINUE
```

```
                        COBRE
  251 CONTINUE
  241 CONTINUE
  381 FORMAT(///,3X,'TIEMPO',4X,'I=',I3,4X,10(5X,I2,3X),///)
  383 FORMAT(1X,F8.3,4X,'V=',F7.2,10(3X,F7.2))
  384 FORMAT(13X,'Y=',F7.2,10(3X,F7.2),/)
 3383 FORMAT(1X,F8.3,4X,'V=',F7.2,10(3X,F7.2))
      RETURN
      END
```

CENER

```
      SUBROUTINE GENER (Q,SD,RM,B,YYY,I,J)
      DIMENSION Q(11,744),RM(11),B(11),YYY(11,744),SD(11)
      TAUX=Q(I,J)*RM(I)/SQRT(SD(I))
      W=TAUX**1.5
      H=(2.0*W)/(B(I  )**2.5)
      G=W/B(I)**1.5
      YYYI=4.0*(TAUX/B(I))**0.6
      K=30
      N=1
1551  F=YYYI**2.5-H*YYYI-G
      DF=2.5*YYYI**1.5-H
      U=F/DF
      YYYI=YYYI-U
      IF(ABS(F).LT.0.001.OR.N.GT.K) GO TO 1552
      N=N+1
      GO TO 1551
1552  YYY(I,J)=YYYI
      RETURN
      END
```

IGAUSS

```
      SUBROUTINE IGAUSS(IX,S,AM,V)
C SUBROUTINE TO COMPUTE NORMAL RANDOM NUMBERS
C   IX#DOC INTEGER  .LT.9 DIGITS TO BEGIN G.N. GENERATION   S#STANDARD DEVIATION
C   AM#MEAN    V#VALUE OF COMPUTED NORMAL RANDOM NUMBER
      DOUBLE PRECISION X,Y,C
      A=C.0
      DO 50 I=1,12
C START RANDU
      X=IX
      C=1073741827.DO
      Y=X*C
      Y=DMOD(Y,57646075230342348 8.DO)
      IY=Y
      YFL=Y*.17347234759768070 94411924481D-17
C END RANDU
C FOR THE 360 SYSTEM SUBSTITUTE THE FOLLOWING BETWEEN START AND END RANDU
C     IY=IX*65539
C     IF (IY) 5,6,6
C5    IY=IY+2147483647+1
C6    YFL=IY
C     YFL=YFL*0.4656613E-9
      IX=IY
50    A=A+YFL
      V=(A-6.C)*S+AM
      RETURN
      END
```

DAILY

```
      SUBROUTINE DAILY(INFRO,MONTH,YEAR,IPT)
C CALCULATION OF SCALED VALUES FOR MEAN DAILY FLOW PLOT
C PLOT CALLS CAN BE ADDED IF COMPUTER HAS PLOT ROUTINES
      INTEGER YEAR,START(2,12),YR1
      REAL INFRO(20),MCCHAR(12)
      DIMENSION LASTDA(2,12),A(2,12),YA(368),YS(368)
C MAIN,MONPLY AND DAILY VARIABLES
      INTEGER FIRST,CHECK(10)
      COMMON/MHO/FLOW1(10,744),PHPMX(10),FPN(7),FPNAME(10,7),PLOTMX(10),
     1ACTFLW(10,12,31),SIMFLW(10,12,31),FIRST,CHECK
      DATA MCCHAR/3HOCT,3HNOV,3HDEC,3HJAN,3HFEB,3HMAR,3HAPR,3HMAY,
     13HJUN,3HJUL,3HAUG,3HSEP/
      DATA A/3.0,3.0,6.0,6.0,9.1,9.1,12.2,12.2,15.0,15.1,18.1,18.2,
     121.1,21.2,24.2,24.3,27.2,27.3,30.3,30.4,33.4,33.5,36.4,36.5/
      DATA LASTDA/31,31,28,29,31,31,30,30,31,31,30,30,31,31,31,31,30,30,
     131,31,30,30,31,31/
      DATA START/92,92,123,123,151,152,182,183,212,213,243,244,273,274,
     1304,305,335,336,0,0,31,31,61,61/
      LEAPYR=0
      IF ((YEAR-4*(YEAR/4)).EQ.0) LEAPYR=1
      N=12
      PMAX=PLOTMX(IPT)
      DELTA=PMAX*0.1
      X1=0.0
      L=LEAPYR+1
      NPT=A(L,12)*10.0+1.0
      PUNCH 900,N,DELTA,X1,NPT
      PUNCH 901,(A(L,J),J=1,12)
      PUNCH 902,MCCHAR
      PUNCH 903
      DO 800 J=1,7
800   FPN(J)=FPNAME(IPT,J)
      PUNCH 904,FPN
      YR1=YEAR-1
      IF (YR1.LT.0) YR1=99
      PUNCH 905,YR1,YEAR
      PUNCH 906,INFRO
      PUNCH 907
C SCALE ACTUAL AND SIMULATED FLOW
      DO 801 MO=1,12
      LAST=LASTDA(L,MO)
      IBASE=START(L,MO)
      DO 801 IDA=1,LAST
      FA=(ACTFLW(IPT,MO,IDA)/PMAX)*10.0
      FS=(SIMFLW(IPT,MO,IDA)/PMAX)*10.0
      IF (FA.GT.10.0) FA=10.0
      IF (FS.GT.10.0) FS=10.0
      I=IBASE+IDA
      YA(I)=FA
      YS(I)=FS
801   CONTINUE
      N=365+LEAPYR
      PUNCH 908,(YA(I),I=1,N)
      PUNCH 908,(YS(I),I=1,N)
C FORMAT STATEMENTS
900   FORMAT (I5,F10.2,F5.1,I5)
901   FORMAT (12F5.1)
902   FORMAT (12A3)
903   FORMAT (20HMEAN DAILY FLOW-CFSD)
904   FORMAT (7A4)
905   FORMAT (13HWATER YEAR 19,I2,1H-,I2)
906   FORMAT (20A4)
907   FORMAT (35HBLACK IS OBSERVED--RED IS SIMULATED)
908   FORMAT (16F5.2)
      RETURN
      END
```

LPLOT

```
      SUBROUTINE LPLOT(YEAR,IPT)
C MEAN DAILY FLOW FOR PRINTER OUTPUT
      INTEGER YEAR
      REAL MOCHAR(12)
      DIMENSION LASTDA(2,12),SCALE(10),ORD(101),LC(2,6)
C MAIN,HOURLY AND DAILY VARIABLES
      INTEGER FIRST,CHECK(10)
      COMMON/MHD/FLOW1(10,744),PHPMX(10),EPN(7),EPNAME(10,7),PLOTMX(10),
     1ACTFLW(10,12,31),SIMFLW(10,12,31),FIRST,CHECK
      DATA MOCHAR/3HENE,3HFEB,3HMAR,3HABR,3HMAY,3HJUN,3HJUL,3HAGO,3HSEP,
     13HOCT,3HNOV,3HDIC/
      DATA LASTDA/31,31,28,29,31,31,30,30,31,31,30,30,31,31,31,31,30,30,
     131,31,30,30,31,31/
      DATA LC/5,4,4,4,4,4,3,3,4,4,0,0/
      DATA DOT,BLANK,ASTER,PLUS/1H.,1H ,1H*,1H&/
      LEAPYR=0
      IF ((YEAR-4*(YEAR/4)).EQ.0) LEAPYR=1
      PMAX=PLOTMX(IPT)
      DO 810 MONTH=1,12
      MC=MONTH
      IF (MC.GT.12) MO=MO-12
      MCG=MC-2*(MO/2)
      IF(MCG.EQ.0) GO TO 812
      IF(MO.NE.1) GO TO 811
      PRINT 900,(EPNAME(IPT,J),J=1,7),YEAR
811   DO 813 J=1,10
      DEC=J
813   SCALE(J)=DEC*0.1*PMAX
      PRINT 901,MOCHAR(MONTH),MOCHAR(MONTH+1),SCALE
812   LAST=LASTDA((LEAPYR+1),MC)
      DO 815 IDA=1,LAST
      DO 816 J=1,101,10
      ORD(J)=DOT
      IF (J.EQ.101) GO TO 816
      DO 817 I=1,9
      ORD(J+I)=BLANK
817   CONTINUE
816   CONTINUE
      AF=ACTFLW(IPT,MO,IDA)
      SF=SIMFLW(IPT,MO,IDA)
      LA=(AF/PMAX)*100.0+1.5
      LS=(SF/PMAX)*100.0+1.5
      IF (LA.GT.101) LA=101
      IF (LS.GT.101) LS=101
      ORD(LA)=PLUS
      ORD(LS)=ASTER
      PRINT 902,IDA,ORD,SF,AF
815   CONTINUE
      IF (MCG.GT.0) GO TO 810
      MO6=MONTH/2
      LSKIP=LC((LEAPYR+1),MO6)
      IF (LSKIP.EQ.0)  GO TO 810
      DO 814 J=1,LSKIP
814   PRINT 903
810   CONTINUE
C FORMAT STATEMENTS
900   FORMAT (1H ,20HMEAN DAILY FLOW PLOT,5X,7A4,7X,13HWATER YEAR 19,I2,
     15X,24H*=SIMULATED   &=OBSERVED)
901   FORMAT (1H ,A3,1H-,A3,F11.1,9F10.1,3X,9HSIMULATED,2X,8HOBSERVED)
902   FORMAT (1H ,I3,2X,101A1,4X,2F10.1)
903   FORMAT (1H )
      RETURN
      END
```

RIO BOCONO EN BOCONO

SIMULACION PARAMETRICA

INFORMACION BASICA DE LA CORRIDA

INICIO DE LA CORRIDA 1 DE ENE DE 1971 FINAL DE LA CORRIDA ** DE * DE 1971

NUMERO DE PUNTOS DE FLUJO = 1 NUMERO DE EST. DE MED. DE PRECIPITACION = 2

PARAMETROS PARA LA VERTIENTE

EST	NOMBRE DE LA EST	K1	IMPV	EPXM	UZSN	LZSN	CB	CC	K3	K24L	K2
1	SAN RAFAEL DE BOCONO	1.95	0.05	0.10	0.32	4.02	1.250	60.00	0.30	0.0	0
2	BOCONO	2.10	0.05	0.10	0.31	4.07	1.250	80.00	0.30	0.0	0

INFILTRATION CURVE POWER FACTOR IS 2.0 UZSN WT. FACTOR= 0.0

ALMACENAMIENTOS INICIALES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI
SAN RAFAEL DE BOCONO	0.30	3.91	2.00	0.0	1.00	1.00	1.50	0.0
BOCONO	0.30	3.95	2.00	0.0	1.00	1.00	1.50	0.0

PARAMETROS DE PUNTOS DE FLUJO

PF	NOMBRE DEL PUNTO DE FLUJO	AREA	KSL	RTIN	COMPARE	CHEK	HISTOGRAMS	
1	BOCONO EN BOCONO	513.00	0.85	1	1	0	TIMEDELAY	0.03 0
							GAGEAREA	1
							ADDFLOW1	0
							ADDFLOW2	0

AJUSTE DE LA EVAPORACION POTENCIAL

AJUSTE ESTACIONAL	MES	1	2	3	4	5	6	7	8	9	
	AJUSTE	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0

AJUSTE PARA LA EST	ESTACION	1	2
	AJUSTE	1.00	1.00

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

FEB 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	1.208	0.0	0.115	0.003	1.090	0.0	3.16	3.706	3.006
2	BOCONO	1.345	0.0	0.159	0.001	1.185	0.0	4.44	3.706	3.073

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.0	2.62	0.44	0.61	0.0	0.0	0.0	1.28	-0.000
BOCONO	0.01	3.64	0.64	0.83	0.0	0.0	0.06	1.28	-0.000

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

MAR 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	0.376	0.0	0.012	0.000	0.358	0.0	0.66	4.651	2.232
2	BOCONO	0.535	0.0	0.010	0.000	0.525	0.0	0.56	4.651	2.701

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.0	1.10	0.10	0.25	0.0	0.0	0.0	1.51	-0.000
BOCONO	0.0	1.43	0.14	0.34	0.0	0.0	0.0	1.51	-0.000

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

ABR 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	0.311	0.0	0.120	0.000	0.191	0.0	4.40	4.683	1.937
2	BOCONO	0.384	0.0	0.193	0.001	0.190	0.0	4.61	4.683	2.139

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.09	3.10	0.26	0.36	0.0	0.0	0.10	1.31	-0.000
BOCONO	0.21	3.23	0.29	0.42	0.0	0.00	0.03	1.31	-0.000

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

MAY 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	4.393	0.0	0.506	1.729	2.244	0.0	11.71	2.779	2.672
2	BOCONO	3.887	0.0	0.444	0.898	2.390	0.0	10.00	2.779	2.644

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.23	5.79	1.27	2.97	0.0	0.01	0.0	0.97	-0.001
BOCONO	0.01	5.75	1.78	2.51	0.0	0.00	0.0	0.97	-0.001

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

JUN 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	5.556	0.0	0.464	0.381	4.730	0.0	11.10	3.032	2.967
2	BOCONO	4.748	0.0	0.440	0.428	3.901	0.0	10.39	3.032	2.952

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.48	6.83	3.55	5.09	0.0	0.02	0.10	0.96	-0.001
BOCONO	0.55	6.70	3.01	4.34	0.0	0.04	0.02	0.96	-0.001

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

JUL 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	10.330	0.0	0.570	3.629	6.313	0.0	12.63	2.468	2.409
2	BOCONO	7.036	0.0	0.398	1.487	5.235	0.0	9.05	2.468	2.409

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.40	7.40	3.03	5.23	0.0	0.01	0.05	0.90	-0.002
BOCONO	0.24	7.24	2.42	4.28	0.0	0.00	0.03	0.90	-0.001

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

AGO 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	9.531	0.0	0.371	1.020	4.191	0.0	8.84	3.718	3.576
2	BOCONO	6.165	0.0	0.446	2.388	3.450	0.0	10.24	3.718	3.473

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.52	7.42	2.55	4.45	0.0	0.03	0.10	1.15	-0.001
BOCONO	0.57	6.86	2.87	4.47	0.0	0.13	0.10	1.15	-0.001

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

SEP 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	5.621	0.001	0.306	2.478	3.260	0.0	7.51	3.514	3.338
2	BOCONO	3.577	0.0	0.133	0.742	2.740	0.0	3.79	3.514	3.269

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.07	7.16	1.52	3.10	0.0	0.00	0.10	1.06	-0.001
BOCONO	0.03	6.11	1.17	2.47	0.0	0.0	0.10	1.06	-0.001

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

OCT 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	2.335	0.0	0.150	0.035	2.151	0.0	4.05	3.213	2.993
2	BOCONO	2.246	0.0	0.157	0.038	2.052	0.0	4.16	3.213	2.951

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.0	6.31	1.21	2.38	0.0	0.0	0.0	1.09	-0.001
BOCONO	0.0	5.32	1.01	2.05	0.0	0.0	0.0	1.09	-0.001

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

NOV 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	3.103	0.0	0.212	0.413	2.498	0.0	5.44	2.858	2.704
2	BOCONO	2.655	0.0	0.201	0.349	2.123	0.0	5.39	2.858	2.720

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.00	6.08	0.98	2.07	0.0	0.0	0.09	1.00	-0.001
BOCONO	0.0	5.37	0.92	1.87	0.0	0.0	0.05	1.00	-0.001

SUMARIO MENSUAL PARA RIO BOCONO EN BOCONO

DIC 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PRECIPITACION Y DE LA ESCORRENTIA

EST	NOMBRE DE LA EST.	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONO	1.650	0.0	0.107	0.211	1.534	0.0	2.72	3.272	2.842
2	BOCONO	0.889	0.0	0.025	0.000	0.964	0.0	0.84	3.272	2.631

ALMACENAMIENTOS AL FINAL DEL MES

NOMBRE DE LA EST.	UZS	LZS	SGW	GWS	RES	SRGX	SCEP	AEPI	BALANCE
SAN RAFAEL DE BOCONO	0.01	4.61	0.67	1.47	0.0	0.0	0.00	1.07	-0.000
BOCONO	0.0	3.28	0.28	0.86	0.0	0.0	0.0	1.07	-0.000