

GB661.2
M63
V.2.

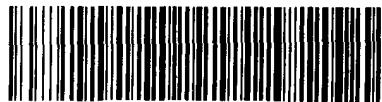
SIMULACION HIDROLOGICA PARA EL ESTUDIO DE PLANICIES INUNDABLES

Por

José Ramón Mogollón Contreras

A N E X O S

SERBIULA - TULIO FEBRES CORDERO



GB661.2 M63 v.2

CENTRO INTERAMERICANO DE DESARROLLO INTEGRAL DE
AGUAS Y TIERRAS
UNIVERSIDAD DE LOS ANDES
Mérida - Venezuela
1979

21 AGO. 1979

BIBLIOTECA CENTRAL

UNIVERSIDAD DE LOS ANDES

Reconocimiento-No comercial-Compartir igual

INDICE DE ANEXOS

Anexos	Página
I Derivadas para las relaciones geométricas del método cinemático para secciones rectangular, trapecial e irregular.....	2
II Flujograma detallado del método cinemático.....	6
III Listado del programa CINEMAT.....	17
IV Instructivo del uso del programa CINEMAT.....	26
V Flujograma detallado del método dinámico	32
VI Listado del programa PLANICIE	53
VII Instructivo de uso del programa PLANICIE	66
VIII Instructivo de uso del modelo Stanford IV original.....	74
IX Listado y resultados del modelo Stanford IV original, que usa, para el tránsito, el método de Clark.....	84
X Listado y resultados del modelo Stanford iV modificado con el subprograma CINEMAT para un punto de flujo.....	119
XI Listado y resultados del modelo Stanford IV modificado con el subprograma PLANICIE para una cuenca ficticia y un punto de flujo.....	157

ANEXO I

DERIVADAS PARA LAS RELACIONES GEOMETRICAS DEL METODO CINEMATICO

PARA SECCIONES RECTANGULAR, TRAPECIAL O IRREGULAR

www.bdigital.ula.ve

Desarrollo para sección rectangular de las derivadas siguientes:

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

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 trapezoidal 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 trapezial 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

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

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

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:

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

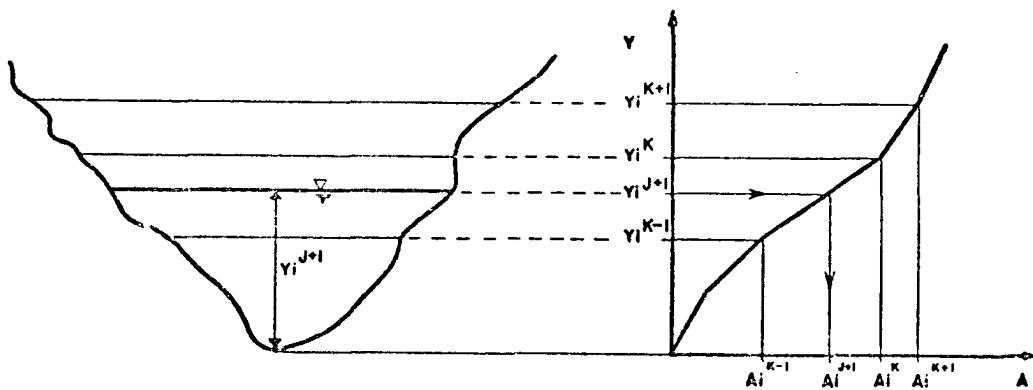


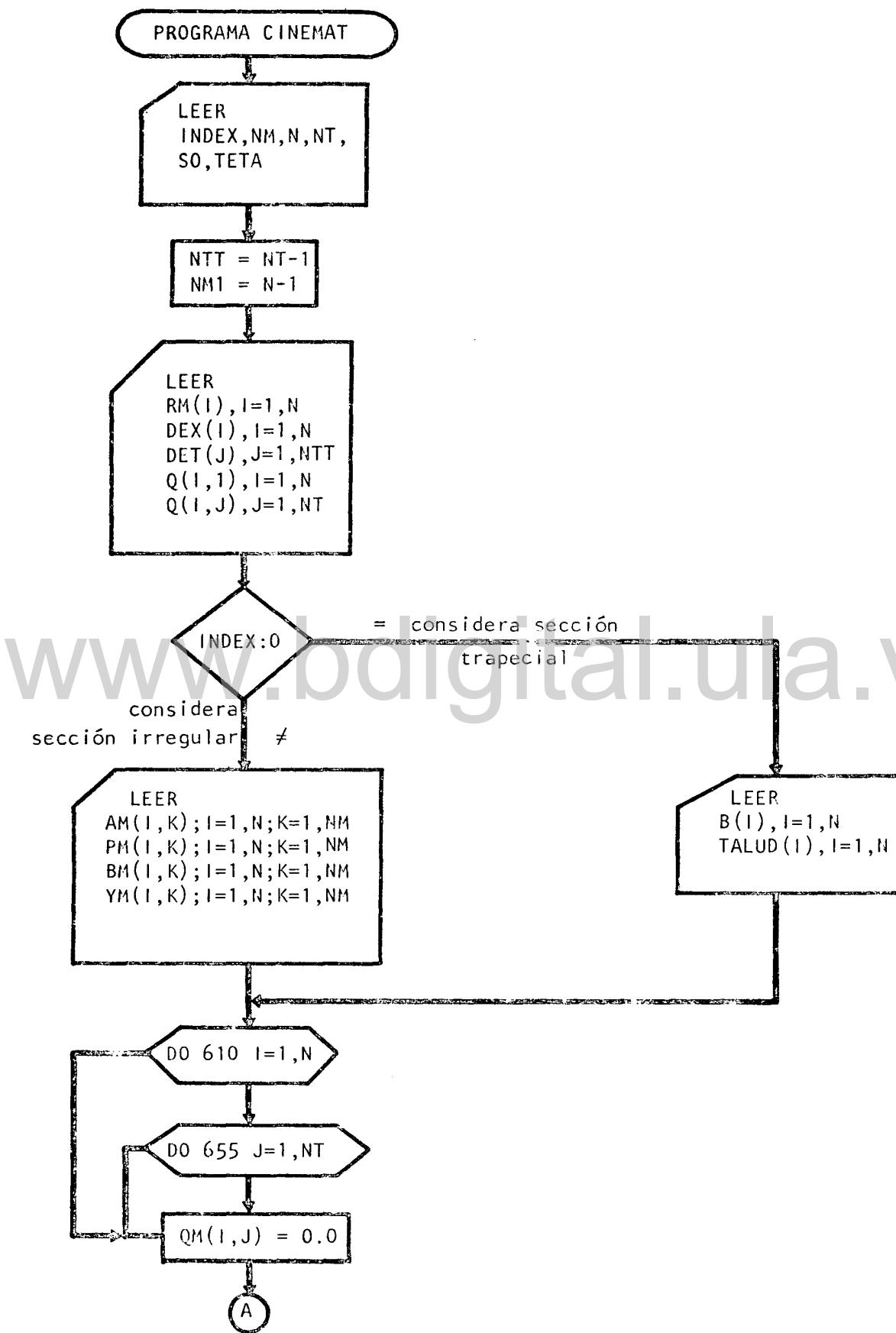
Figura A.1.1. Esquema ilustrativo de la obtención de A_i^{J+1} y su derivada respecto a y_i , mediante valores tabulares del área y la profundidad en la sección.

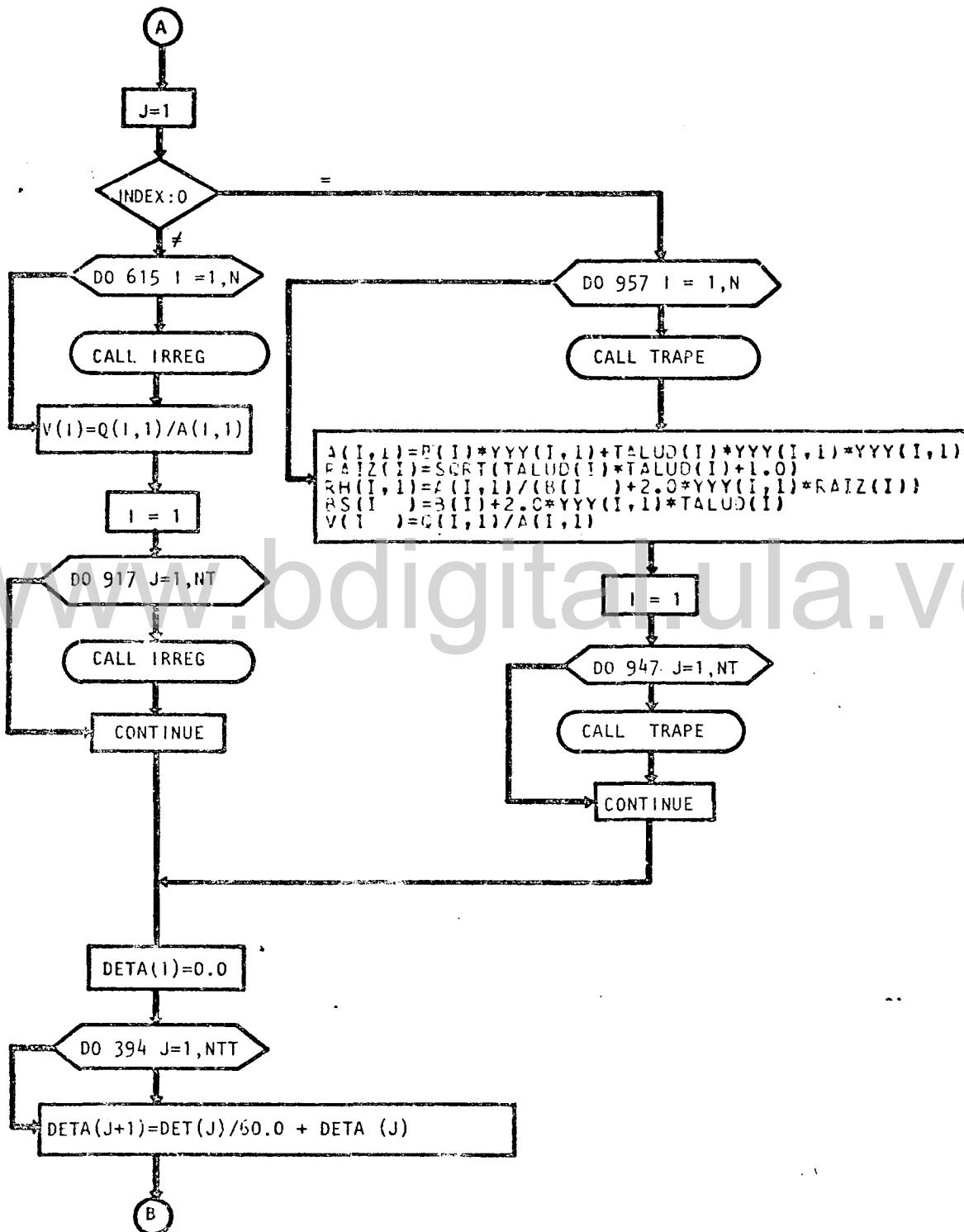
ANEXO II

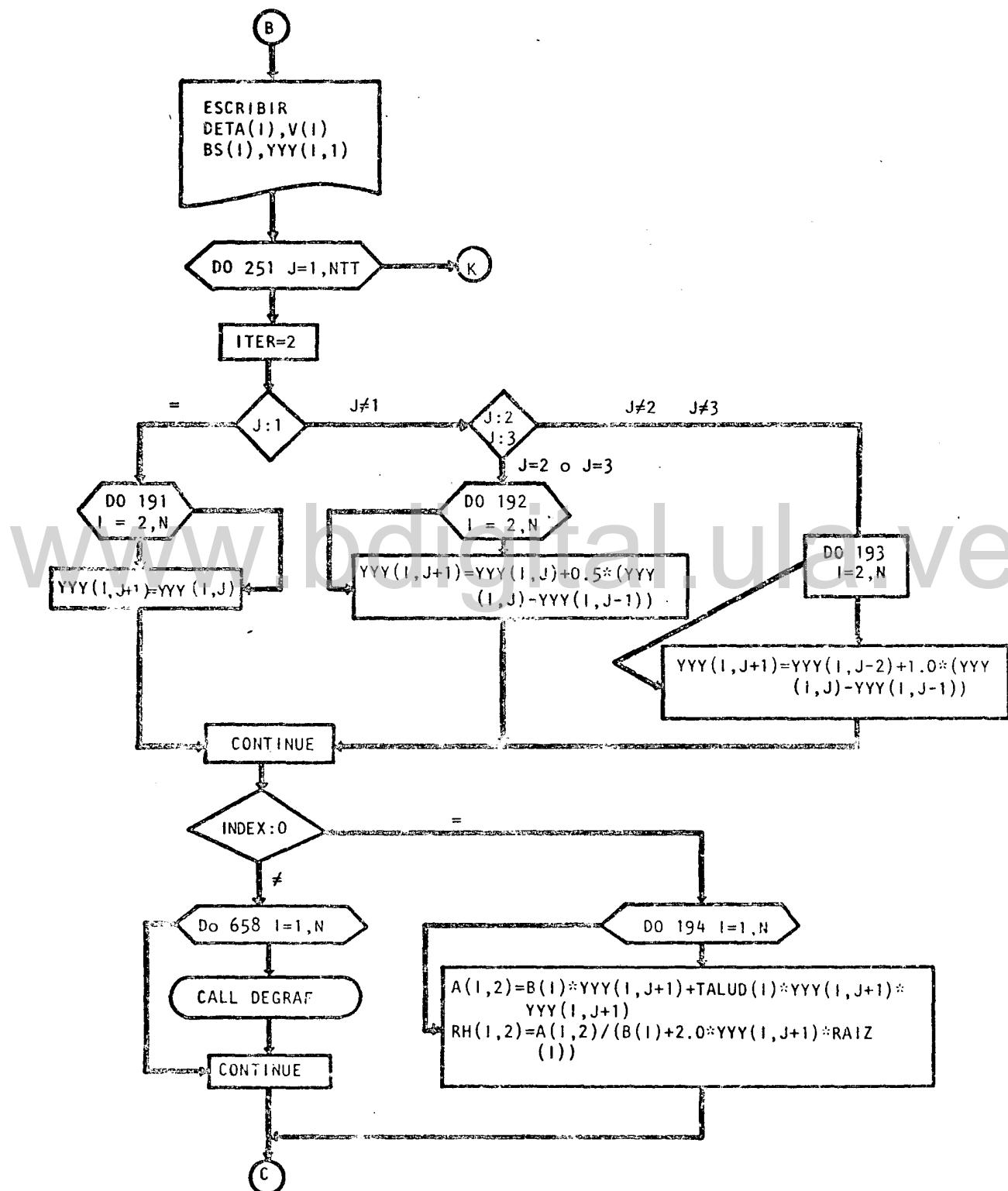
FLUJOGRAMA DETALLADO DEL PROGRAMA

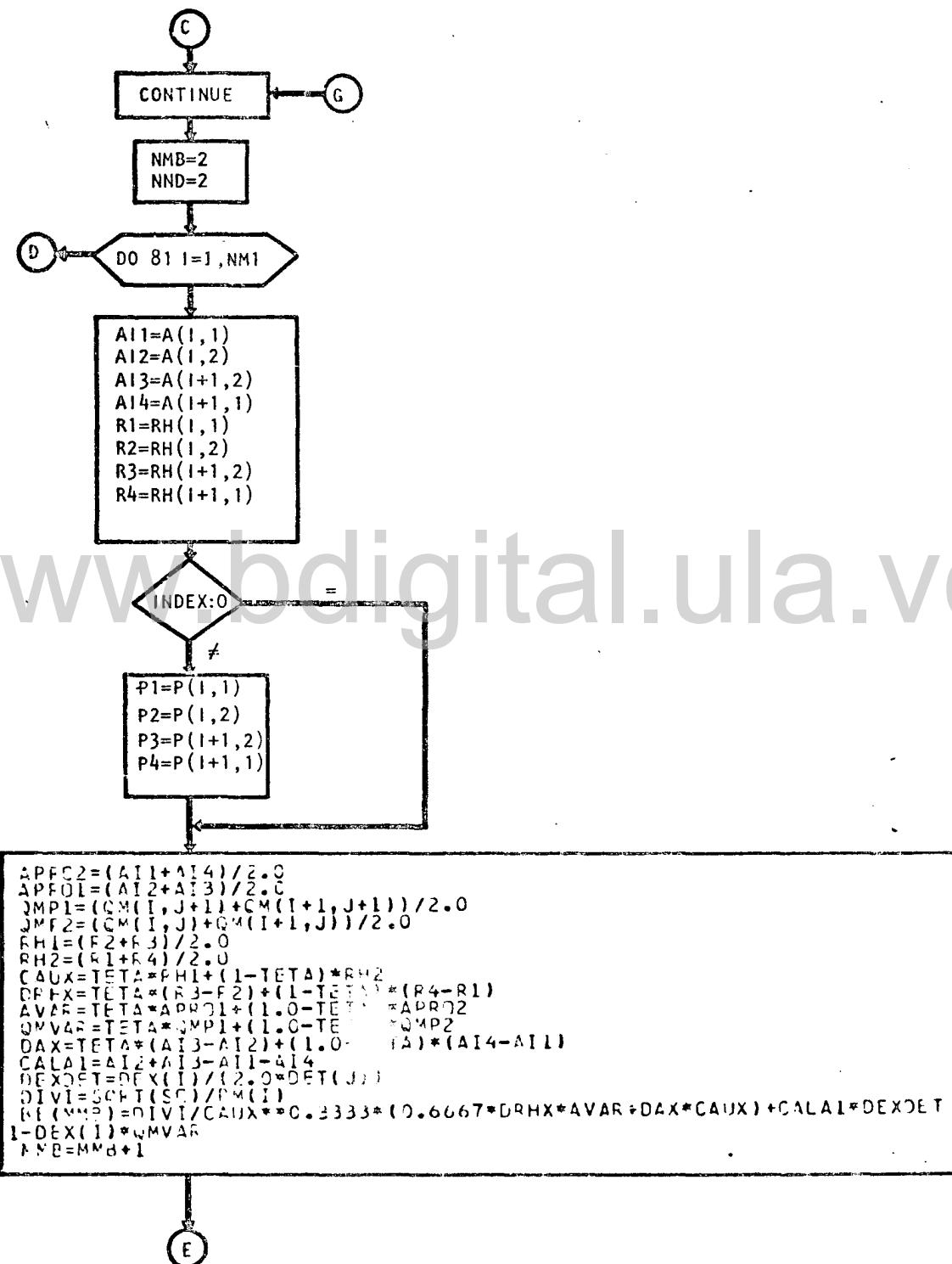
CINEMAT

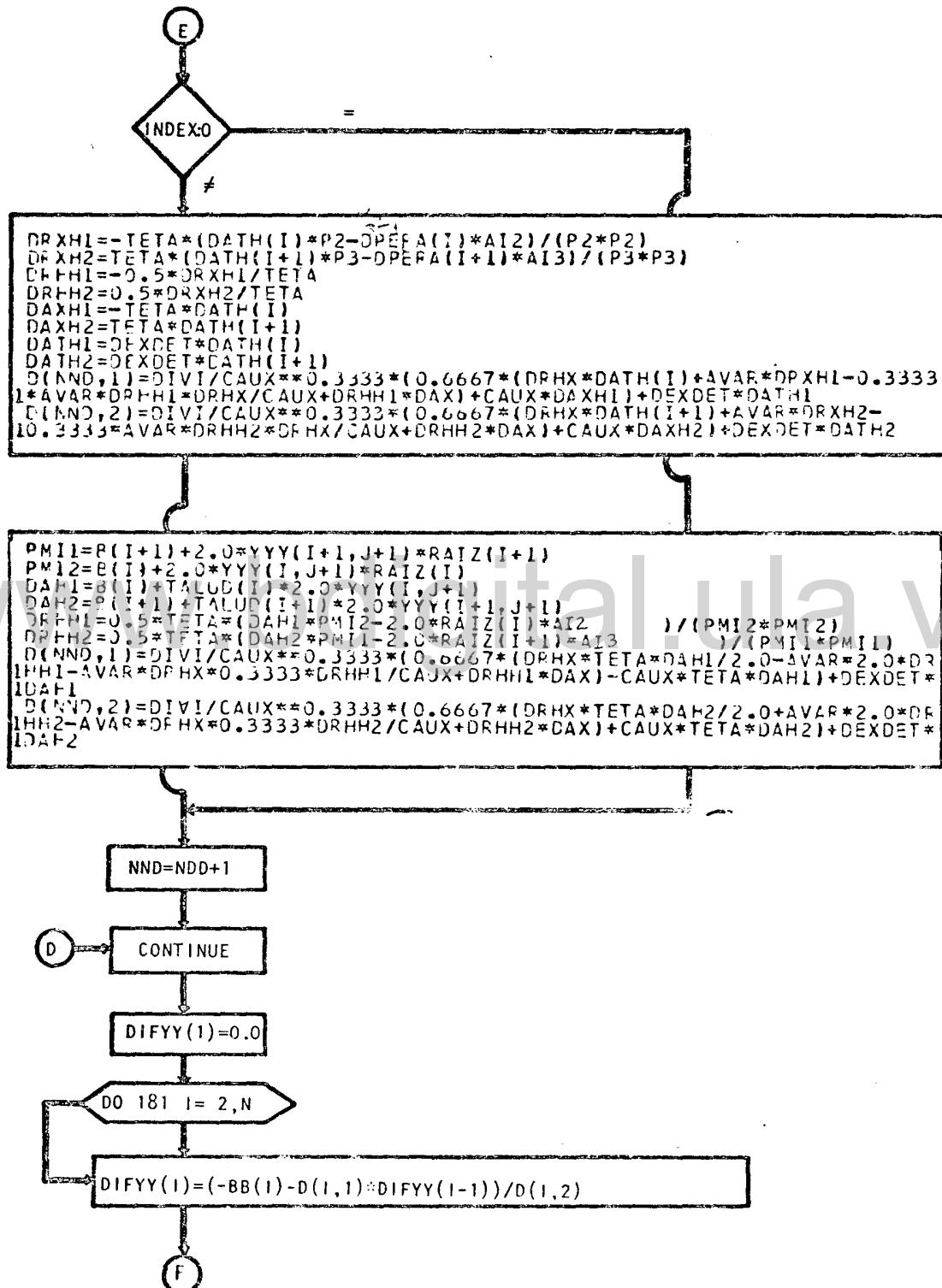
www.bdigital.ula.ve

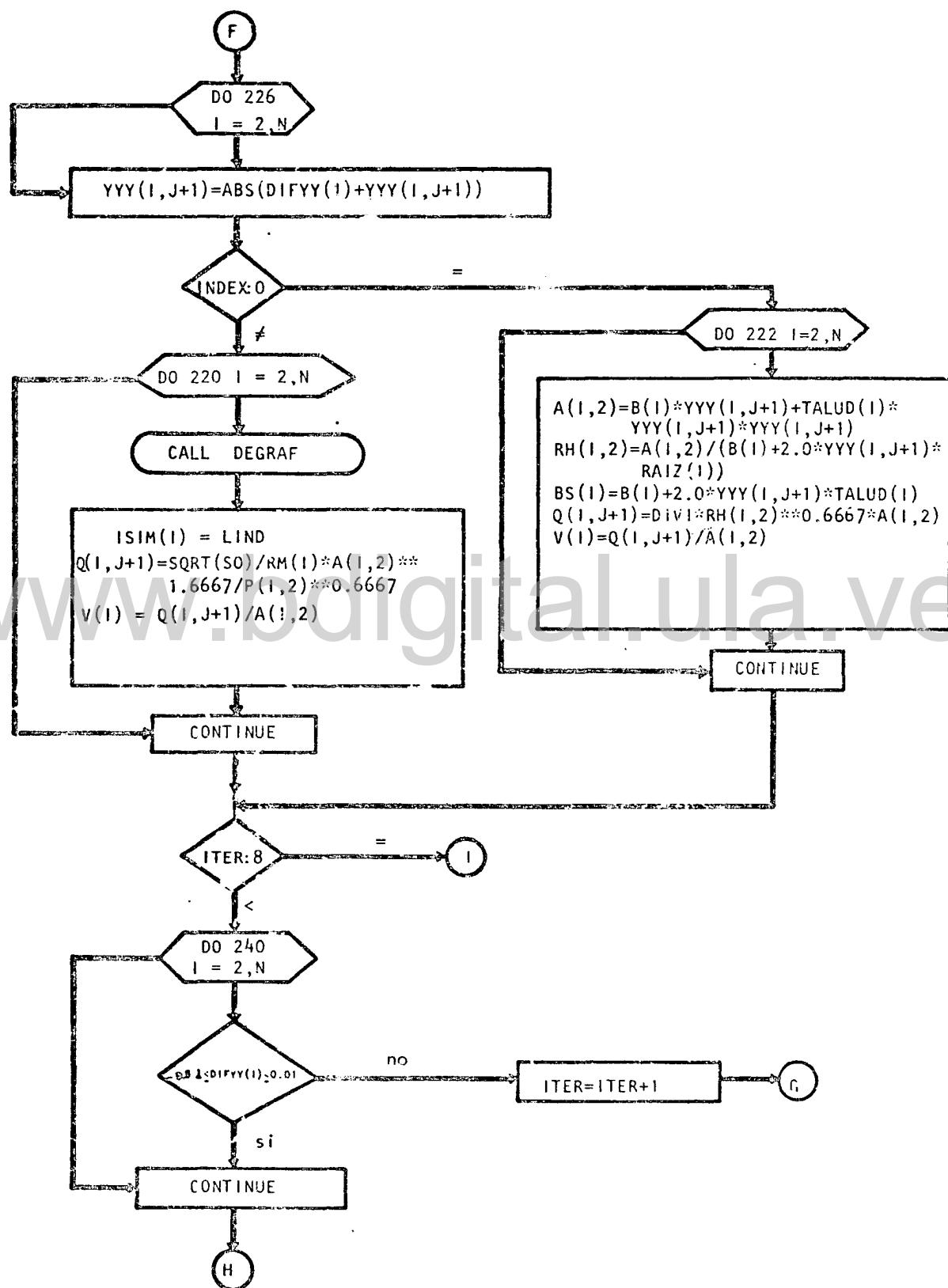


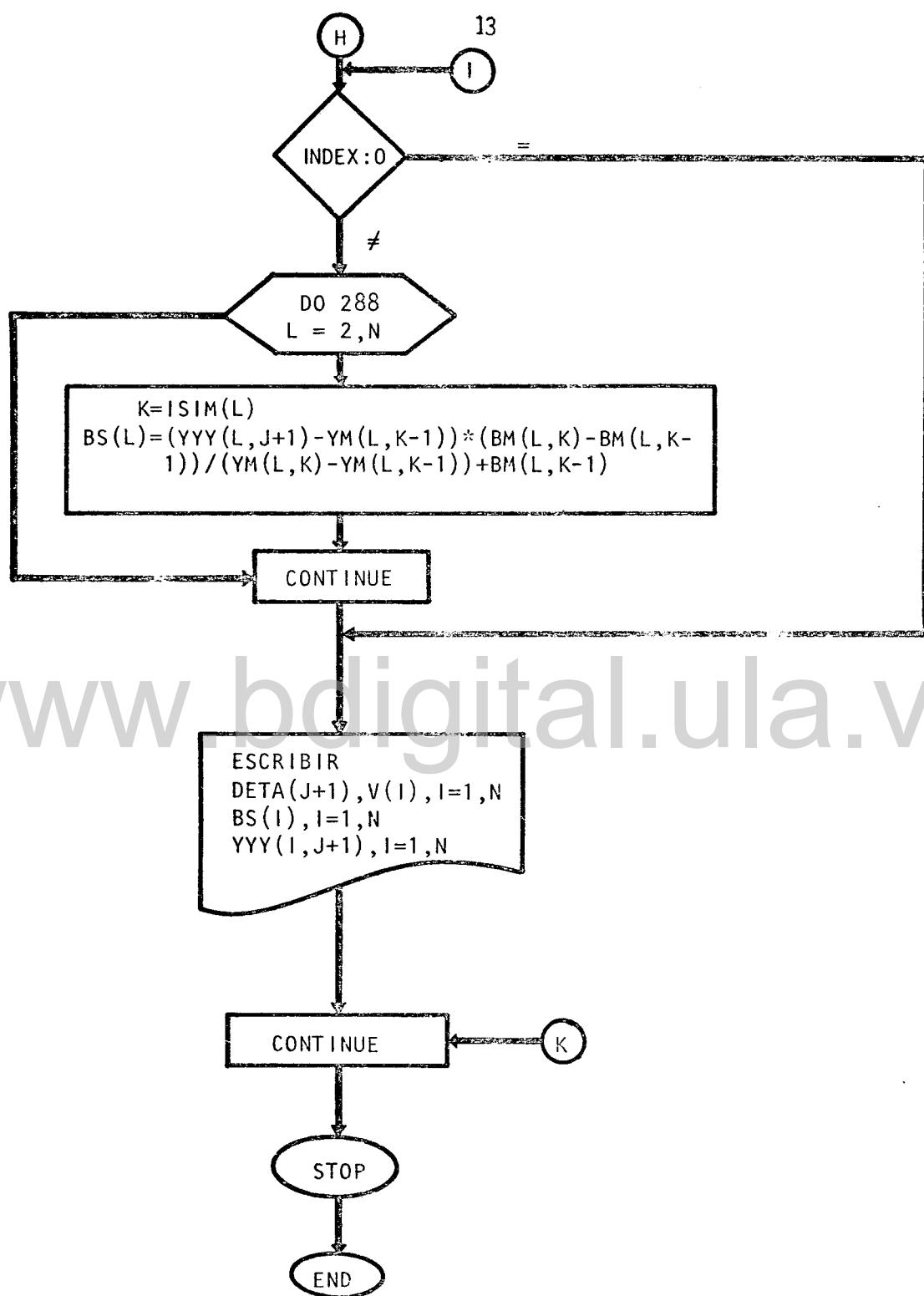


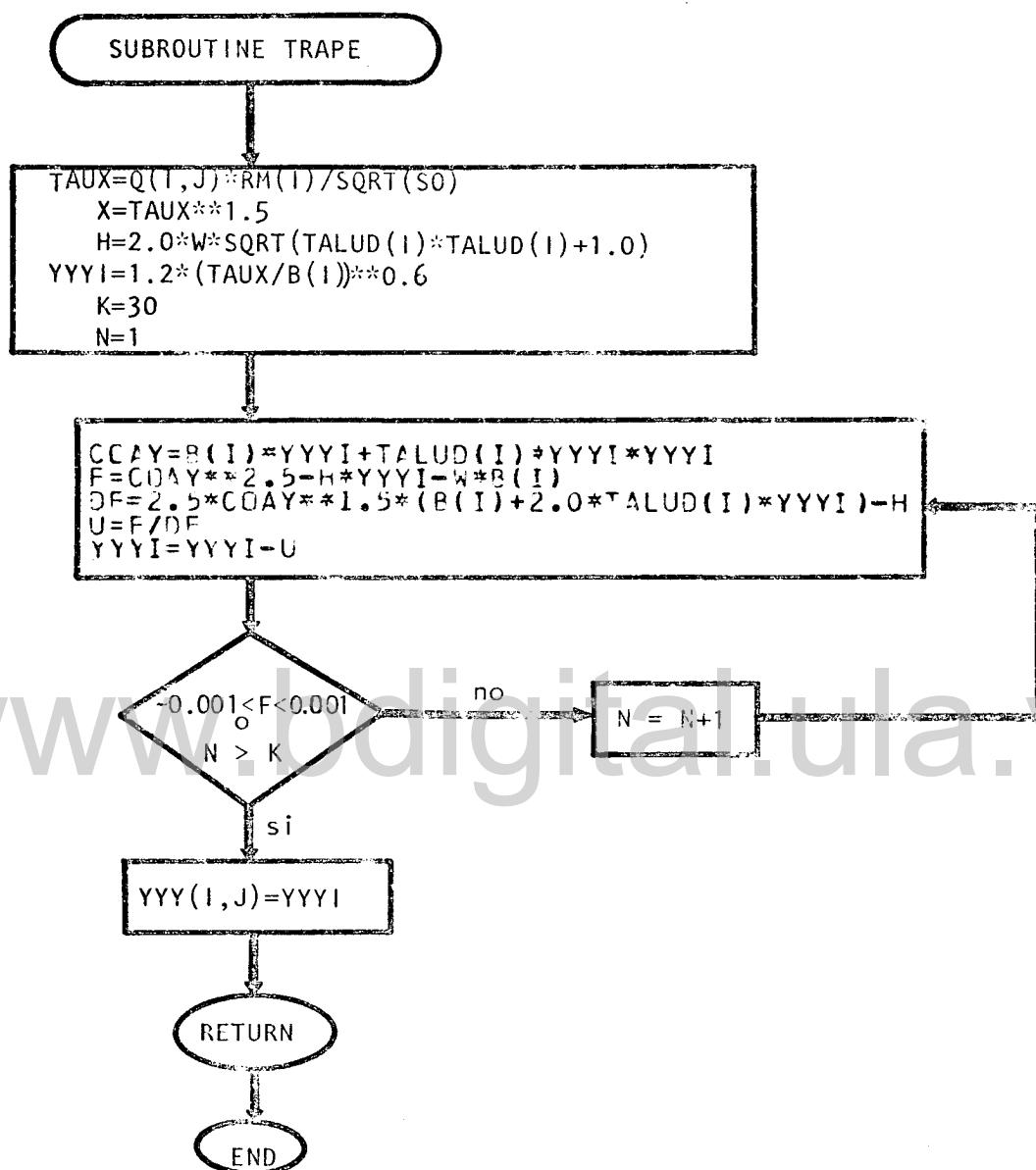


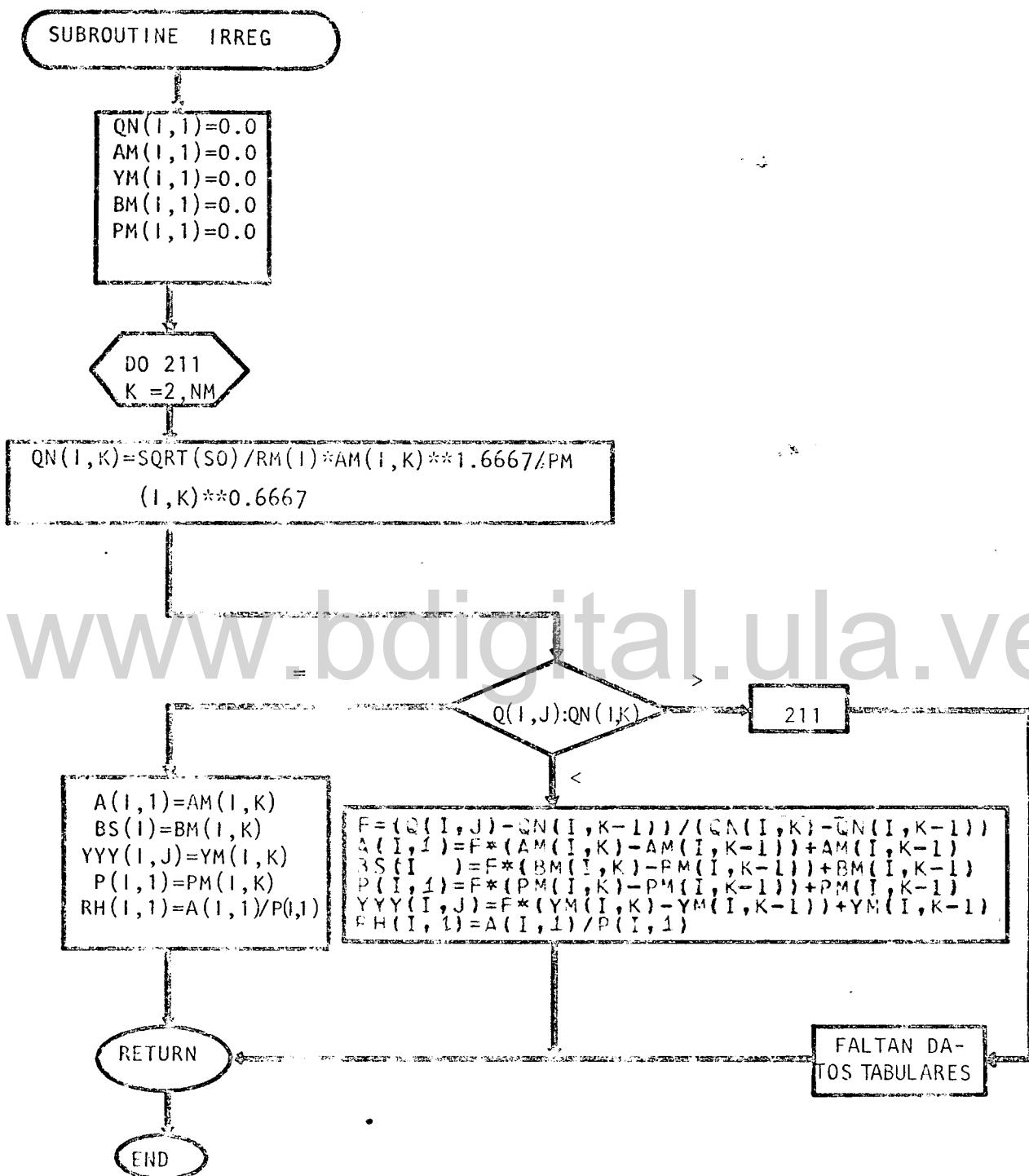


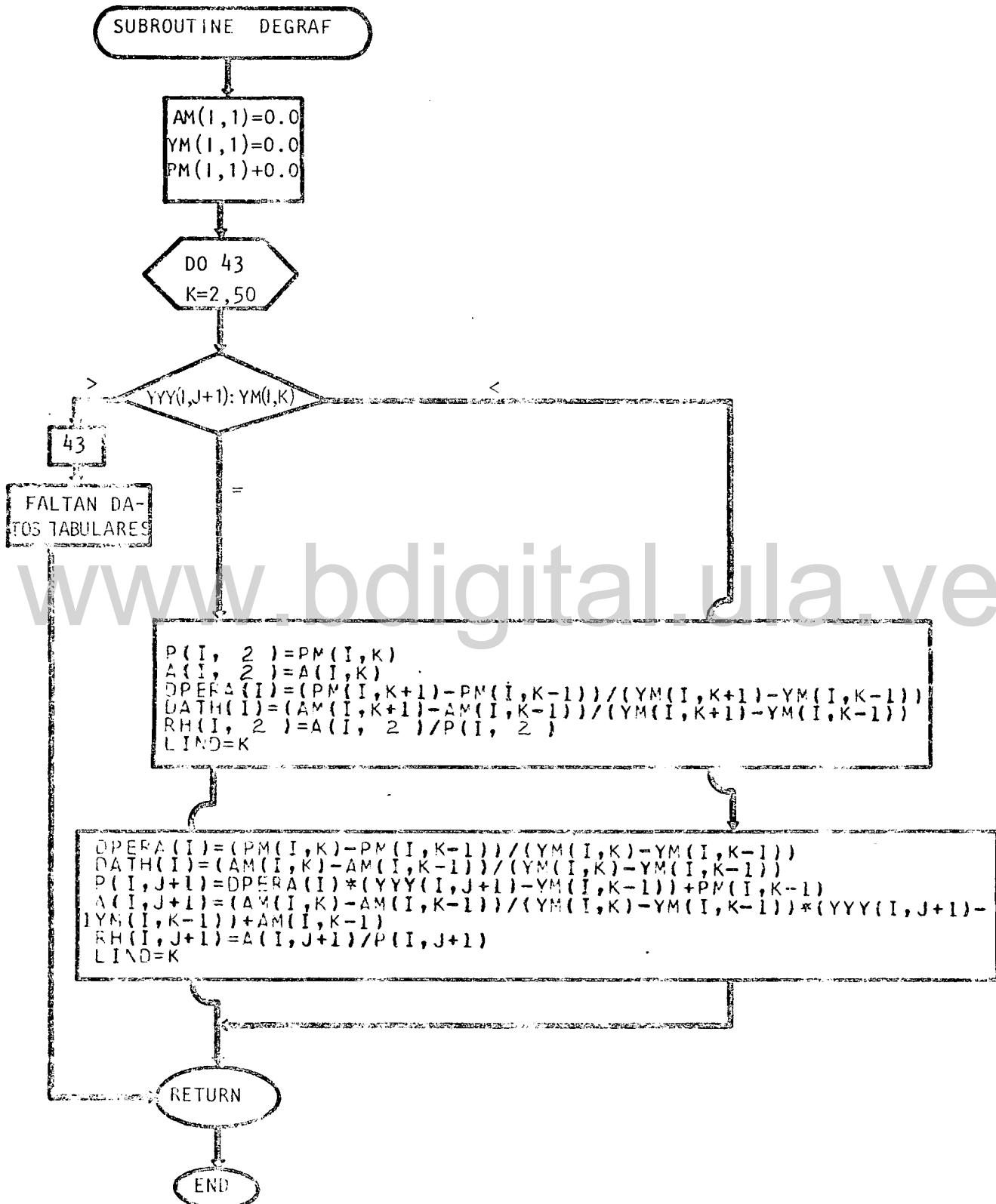












ANEXO III

LISTADO Y RESULTADOS DEL PROGRAMA

CINEMAT

www.bdigital.ula.ve

MAIN

```

C      METODO CINEMATICO PARA TRANSITO DE CAUDALES,SECCION IRREGULAR
      DIMENSION DEX(10),DET(20),RM(10),QM(10,20),D(10,20),
      A(10,2),V(10,1,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),
      OPERA(10),ISIMI(10),YII(10,50)
      DIMENSION DAITH(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(I,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(INDFX.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,J)=B(I)*YYY(I,J)+TALUD(I)*YYY(I,J)*YYY(I,J)
      RAIZ(I)=SQRT(TALUD(I)*TALUD(I)+1.0)
      RH(I,J)=A(I,J)/(B(I)+2.0*YYY(I,J)*RAIZ(I))
      BS(I,J)=B(I)+2.0*YYY(I,J)*TALUD(I)
      V(I,J)=Q(I,J)/A(I,J)
957 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 FFORMAT(10F8.3)
      113 FFORMAT(418,3F8.4)
      117 FFORMAT(10F8.4)
      DETA(1)=0.0
      DO 394 J=1,NT
      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(6,1003) 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,J),J=1,N)
      WRITE(6,385)(BS(I,J),J=1,N)

```

```

      MAIN
      WRITE(6,384)(YYY(I,1),I=1,N)
      DO 251 J=1,NTT
      ITER=2
C      PREDICCION PARA ITERACION INICIAL EN UNA LINEA DE TIEMPO
      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, 1)*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
      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
      APR02=(AI1+AI4)/2.0
      APR01=(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*APR01+(1.0-TETA)*APR02
      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(SOI/RM(I))
      BB(MMB)=DIVI/CAUX*0.3333*(0.6667*DRHX*AVAR+DAX*CAUX)+CALA1*DEXDET
      1-DEX(I)*QMVAR
      MMB=MMB+1
C      CALCULO DE COEFICIENTES DE SISTEMA DE ECUACIONES SIMULTANEAS
      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)=DIV1/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*PMI1)
DRHH2=0.5*TETA*(DAH2*PMI1-2.0*RAIZ(I+1)*AI3 )/(PMI1*PMI1)
D(NND,1)=DIV1/CAUX**0.3333*(0.6667*(DRHX*TETA*DAH1/2.0-AVAR*2.0*DR
1HH1-AVAR*DRHX*0.3333*DRHH1/CAUX+DRH1*DAX)-CAUX*TETA*DAH1)+DEXDET*
1DAH1
D(NND,2)=DIV1/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 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 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,J+1)=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,J+1)=Q(I,J+1)/A(I, 2 )
222 CONTINUE
3230 CONTINUE
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 283 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
```

www.bdigital.ula.ve

```

      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=(C(I,J)*RM(I))/SQRT(SD) )**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

```

www.bdigital.ula.ve

```

      INTI
SUBROUTINE INTI(Q,SD,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(SD)/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

```

www.bdigital.ula.ve

```

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)=(P(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

```

www.bdigital.ula.ve

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 B= 6.00 Y= 0.80	20.00 6.00 0.80								
16.667	Q= 24.18 B= 6.00 Y= 0.93	23.75 6.00 0.92	23.36 6.00 0.91	23.00 6.00 0.90	22.67 6.00 0.89	22.37 6.00 0.88	22.10 6.00 0.87	21.84 6.00 0.87	21.60 6.00 0.87	21.38 6.00 0.86
33.333	Q= 29.44 B= 6.00 Y= 1.07	29.36 6.00 1.06	29.22 6.00 1.06	29.04 6.00 1.06	28.81 6.00 1.05	28.55 6.00 1.04	28.26 6.00 1.03	27.95 6.00 1.02	27.63 6.00 1.02	27.29 6.00 1.01
50.000	Q= 34.98 B= 6.00 Y= 1.20	34.62 6.00 1.19	34.33 6.00 1.18	34.09 6.00 1.18	33.89 6.00 1.17	33.70 6.00 1.17	33.53 6.00 1.16	33.35 6.00 1.16	33.20 6.00 1.16	33.03 6.00 1.15
66.667	Q= 39.71 B= 6.00 Y= 1.30	39.64 6.00 1.30	39.51 6.00 1.30	39.32 6.00 1.30	39.10 6.00 1.29	38.86 6.00 1.28	38.61 6.00 1.27	38.37 6.00 1.27	38.13 6.00 1.26	37.90 6.00 1.26
83.333	Q= 44.55 B= 6.00 Y= 1.41	44.25 6.00 1.41	44.03 6.00 1.40	43.86 6.00 1.40	43.71 6.00 1.39	43.56 6.00 1.39	43.41 6.00 1.39	43.25 6.00 1.38	43.07 6.00 1.38	42.88 6.00 1.37
100.000	Q= 49.52 B= 6.00 Y= 1.52	49.41 6.00 1.52	49.22 6.00 1.52	49.00 6.00 1.51	48.76 6.00 1.50	48.52 6.00 1.50	48.29 6.00 1.49	48.06 6.00 1.48	47.86 6.00 1.48	47.66 6.00 1.48
116.667	Q= 49.52 B= 6.00 Y= 1.52	49.60 6.00 1.52	49.73 6.00 1.52	49.87 6.00 1.52	49.99 6.00 1.53	50.09 6.00 1.53	50.16 6.00 1.53	50.20 6.00 1.53	50.21 6.00 1.53	50.20 6.00 1.53
133.333	Q= 54.61 B= 6.00 Y= 1.63	54.20 6.00 1.62	53.79 6.00 1.61	53.41 6.00 1.60	53.08 6.00 1.59	52.79 6.00 1.59	52.55 6.00 1.58	52.35 6.00 1.57	52.19 6.00 1.57	52.06 6.00 1.57
150.000	Q= 54.82 B= 6.00 Y= 1.73	59.80 6.00 1.73	59.75 6.00 1.73	59.65 6.00 1.73	59.50 6.00 1.73	59.30 6.00 1.72	59.05 6.00 1.72	58.78 6.00 1.71	58.47 6.00 1.71	58.15 6.00 1.70
166.667	Q= 64.93 B= 6.00 Y= 1.84	64.61 6.00 1.83	64.34 6.00 1.82	64.11 6.00 1.82	63.94 6.00 1.82	63.81 6.00 1.81	63.71 6.00 1.81	63.62 6.00 1.81	63.54 6.00 1.81	63.45 6.00 1.81
183.333	Q= 69.78 B= 6.00 Y= 1.93	69.72 6.00 1.93	69.61 6.00 1.93	69.44 6.00 1.93	69.24 6.00 1.92	69.00 6.00 1.92	68.75 6.00 1.91	66.49 6.00 1.91	68.23 6.00 1.90	67.98 6.00 1.90
200.000	Q= 74.70 B= 6.00 Y= 2.03	74.44 6.00 2.02	74.23 6.00 2.02	74.07 6.00 2.02	73.94 6.00 2.01	73.83 6.00 2.01	73.72 6.00 2.01	73.61 6.00 2.01	73.48 6.00 2.00	73.33 6.00 2.00
216.667	Q= 79.69 B= 6.00 Y= 2.12	79.59 6.00 2.12	79.43 6.00 2.12	79.24 6.00 2.12	79.02 6.00 2.11	78.79 6.00 2.11	78.56 6.00 2.10	78.35 6.00 2.09	78.15 6.00 2.09	77.95 6.00 2.09
233.333	Q= 69.78 B= 6.00 Y= 1.93	70.45 6.00 1.93	71.12 6.00 1.96	71.76 6.00 1.97	72.37 6.00 1.98	72.94 6.00 1.99	73.44 6.00 2.00	73.93 6.00 2.01	74.33 6.00 2.03	74.69 6.00 2.03
250.000	Q= 59.82 B= 6.00 Y= 1.73	59.95 6.00 1.74	60.12 6.00 1.74	60.34 6.00 1.74	60.60 6.00 1.75	60.22 6.00 1.75	61.28 6.00 1.76	61.70 6.00 1.77	62.16 6.00 1.78	62.64 6.00 1.79
266.667	Q= 49.52 B= 6.00 Y= 1.52	50.08 6.00 1.53	50.39 6.00 1.54	51.04 6.00 1.55	51.45 6.00 1.56	51.80 6.00 1.57	52.12 6.00 1.57	52.41 6.00 1.58	52.68 6.00 1.59	52.94 6.00 1.59
283.333	Q= 39.71 B= 6.00 Y= 1.30	39.47 6.00 1.31	40.28 6.00 1.32	40.65 6.00 1.33	41.05 6.00 1.34	41.49 6.00 1.34	41.84 6.00 1.35	42.41 6.00 1.36	42.18 6.00 1.36	43.35 6.00 1.36
300.000	Q= 29.44 B= 6.00 Y= 1.07	29.98 6.00 1.08	30.46 6.00 1.09	30.90 6.00 1.10	31.30 6.00 1.11	31.68 6.00 1.12	32.05 6.00 1.13	32.41 6.00 1.14	32.78 6.00 1.15	33.16 6.00 1.15
316.666	Q= 19.22 B= 6.00 Y= 0.80	19.64 6.00 0.81	20.10 6.00 0.83	20.59 6.00 0.84	21.09 6.00 0.85	21.60 6.00 0.87	22.10 6.00 0.88	22.59 6.00 0.89	23.07 6.00 0.91	23.53 6.00 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:

T A E T A	Nº	CINEMAT			PROGRAMA:			FECHA
		BANCO DE PROGRAMAS			CÓDIGO.	DET(1)		
VARIABLE	INDEX	NM	N	NT	SO	TETA	CRM	
Formato	18	18	18	18	F8.4	F8.4	F8.4	
Valor			10	120	0.01000	0.55	0.20	
VARIABLE	DEX(1)	DEX(2)	DEX(3)	DEX(4)	DEX(5)	DEX(6)	DEX(7)	DEX(8)
Formato	9F8.2							
Valor	500.0	1500.0	400.0	450.0	200.0	700.0	450.0	300.0
VARIABLE	DET(1)	DET(2)	DET(3)	DET(4)	DET(5)	DET(6)	DET(7)	DET(8)
Formato	19F8.3							
Valor	100.0	150.0	160.0	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)
Formato								
Valor	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)
Formato	10F8.3							
Valor	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)
Formato	20F8.2							
Valor	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0
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)
Formato								
Valor	90.0	180.0	270.0	360.0	450.0	540.0	630.0	720.0
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)
Formato	8F8.3							
Valor	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0



T
A
R
J
E
T
A

CIDIN

BANCO DE PROGRAMAS

CONTRALERAMERICANO DE
DESARROLLO INICIAL DE
AGUAS Y TIERRAS

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)
Formato	8F8.3							
Valor	0.0	1.5.0	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	B(1)	B(2)	B(3)	B(4)	B(5)	B(6)	B(7)	B(8)
Valor	10F8.3			Sólo si INDEX = 0 (sección prismática)				
Formato	10.0	12.0	8.0	5.0	9.0	13.0	10.0	12.0
Valor								

VARIABLE	TALUD(1)	TALUD(2)	TALUD(3)	TALUD(4)	TALUD(5)	TALUD(6)	TALUD(7)	TALUD(8)	TALUD(9)	TALUD(10)
Formato	10F8.3			sólo si INDEX = 0 (sección prismática)						
Valor	2.0	1.05	2.0	1.0	1.0	2.0	3.0	2.0	1.05	1.0
VARIABLE										
Formato										
Valor										

VARIABLE

Formato

Valor

Equivalencia de las variables de entrada, utilizadas en el ProgramaCINEMAT

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 <u>ca</u> da 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=0
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 <u>toma</u> dos, 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 pro <u>grama</u> acepta un máximo de 50 medidas tabulares en cada sección.

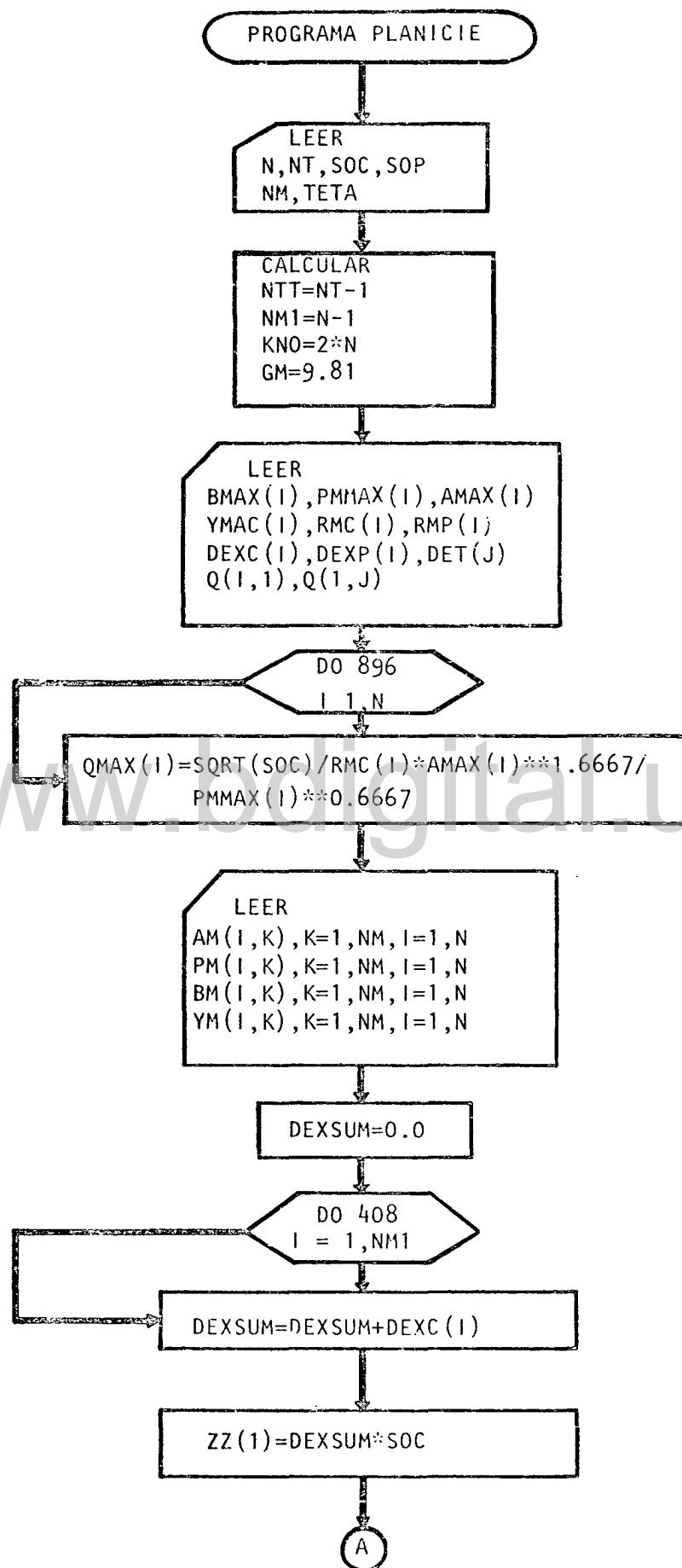
NT	Número total de intervalos de tiempo para el tránsito, el programa acepta un máximo de 100 intervalos de tiempo
PM(I,K)	Datos tabulares del perímetro mojado para diferentes niveles en cada sección irregular en estudio, sólo se leen si INDEX=1
Q(I,1)	Caudal en cada sección en estudio, al inicio del tránsito
Q(1,J)	Hidrograma de entrada
S0	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

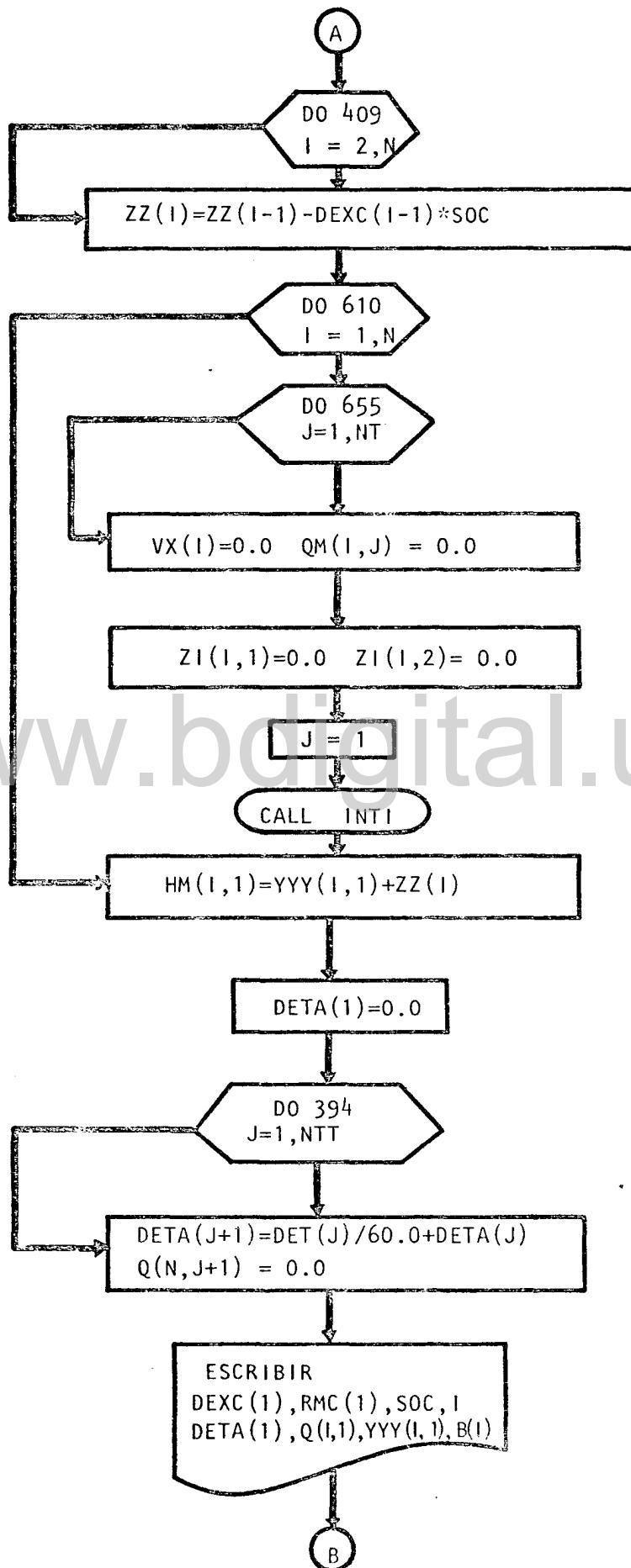
Equivalencia de las variables de salida, dadas por el programa CINEMAT

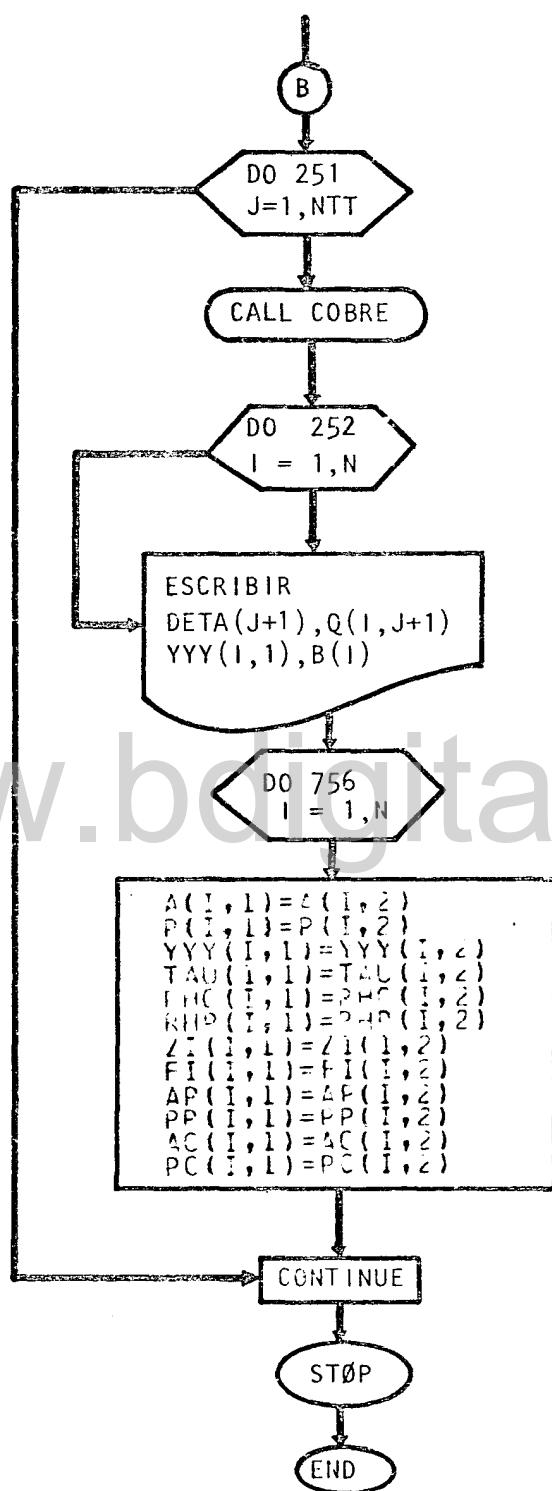
B(I)	Ancho superficial alcanzado por el flujo en cada sección en estudio, para cualquier intervalo de tiempo
I	Parámetro que indica la sección en estudio considerada
Q(I)	Caudal que pasa por cada sección en estudio, para cualquier intervalo de tiempo
Y(I)	Tirante del flujo en cada sección en estudio,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

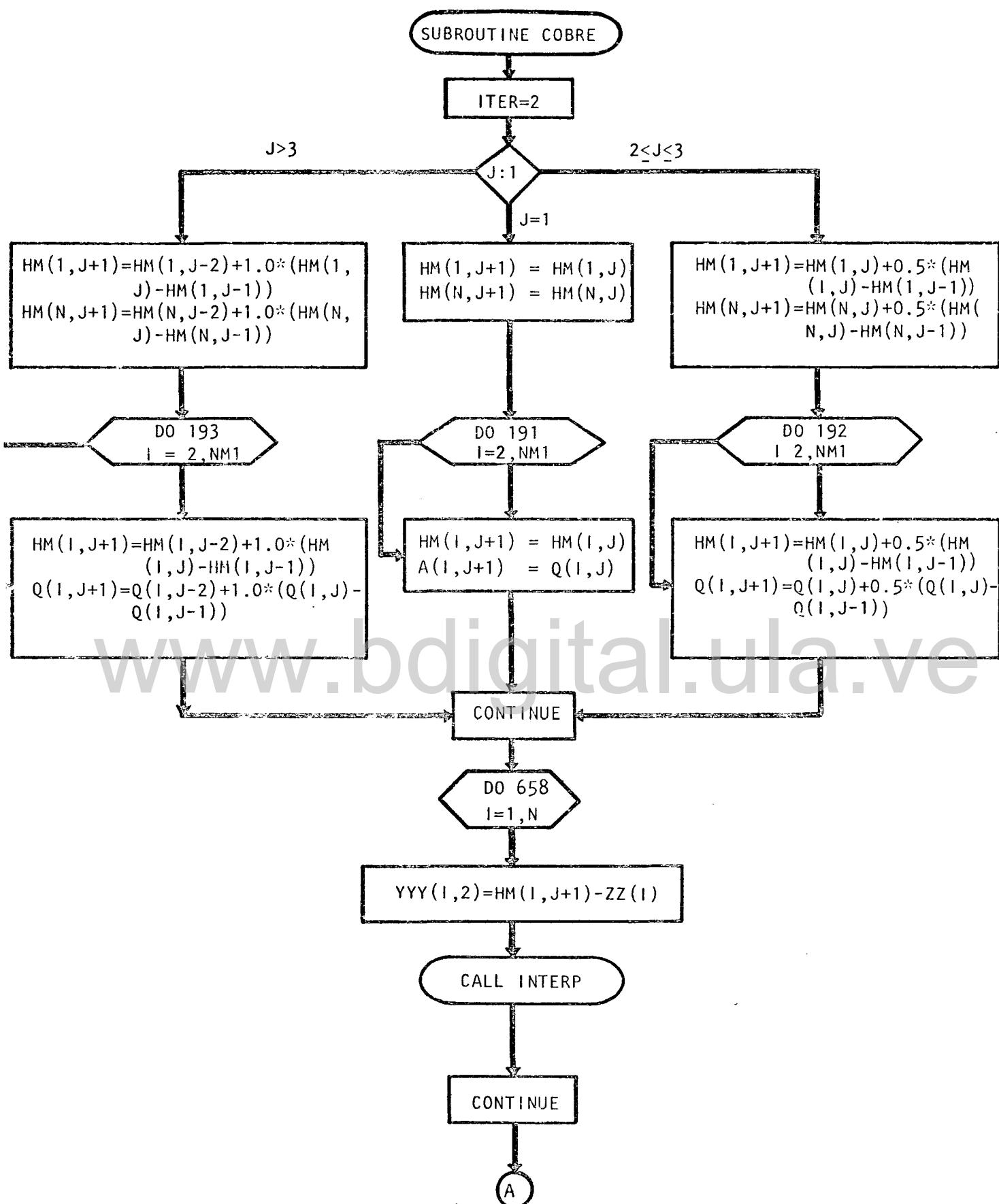
ANEXO V

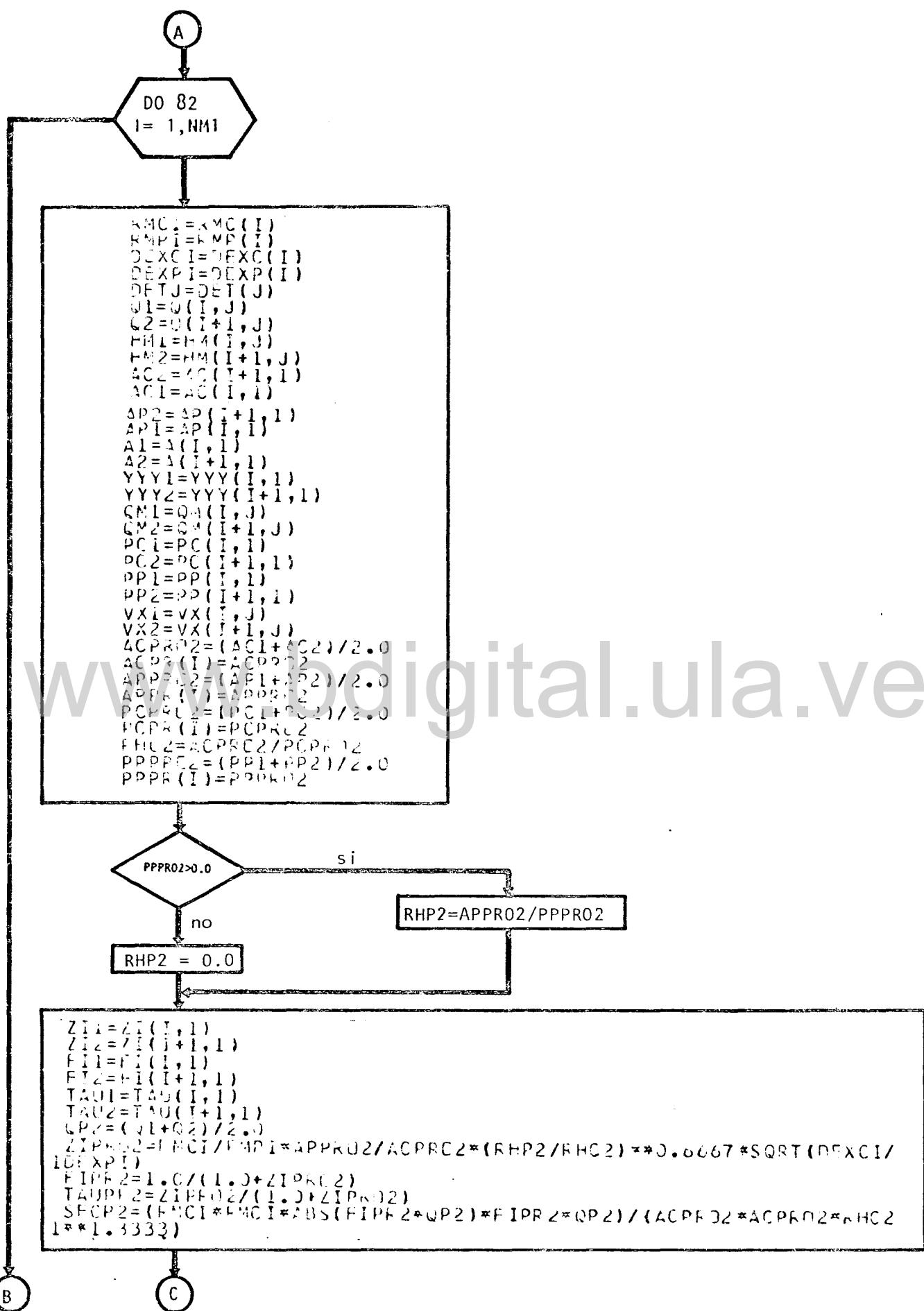
**FLUJOGRAMA DETALLADO DEL PROGRAMA
PLANICIE**

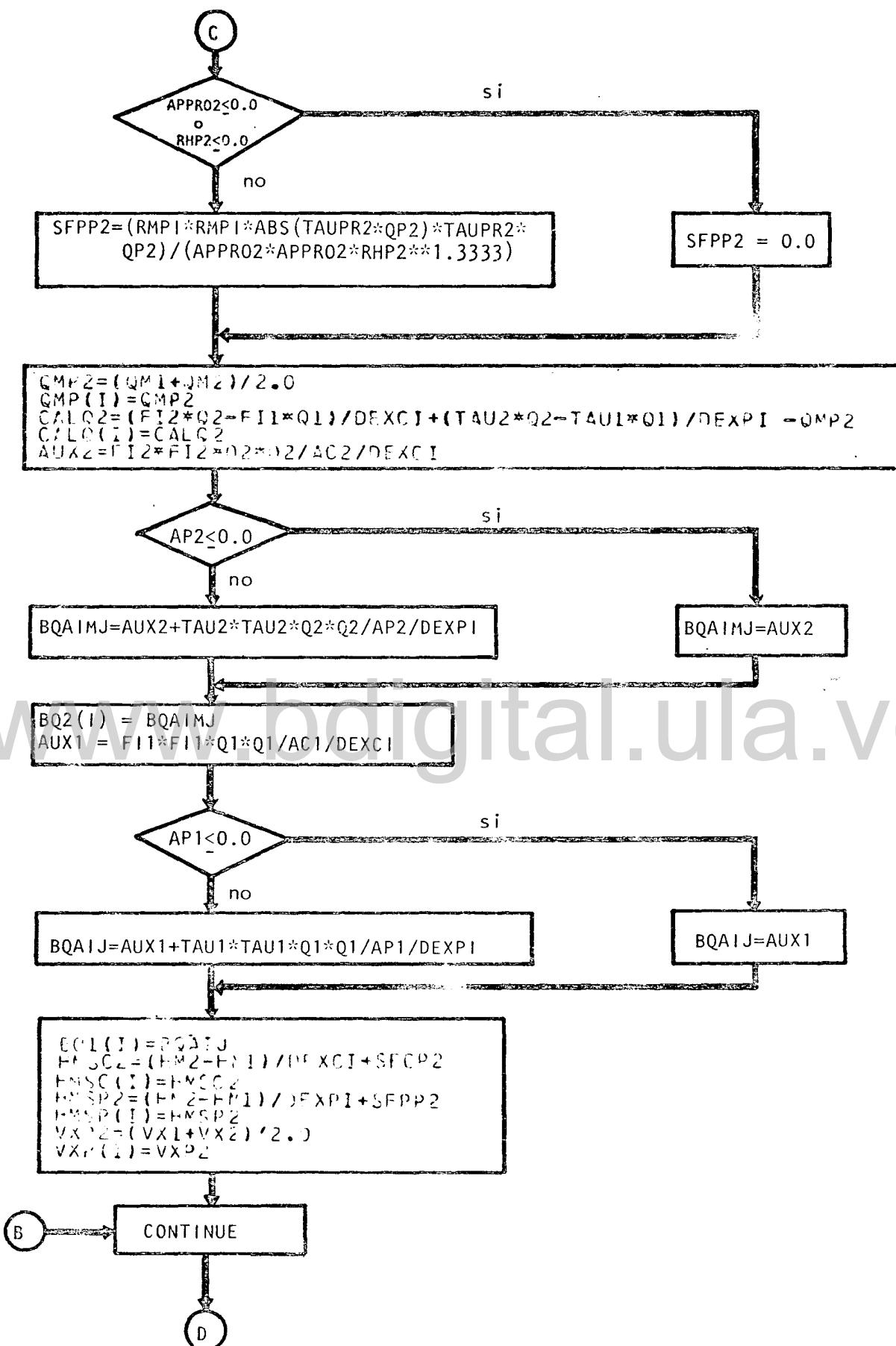


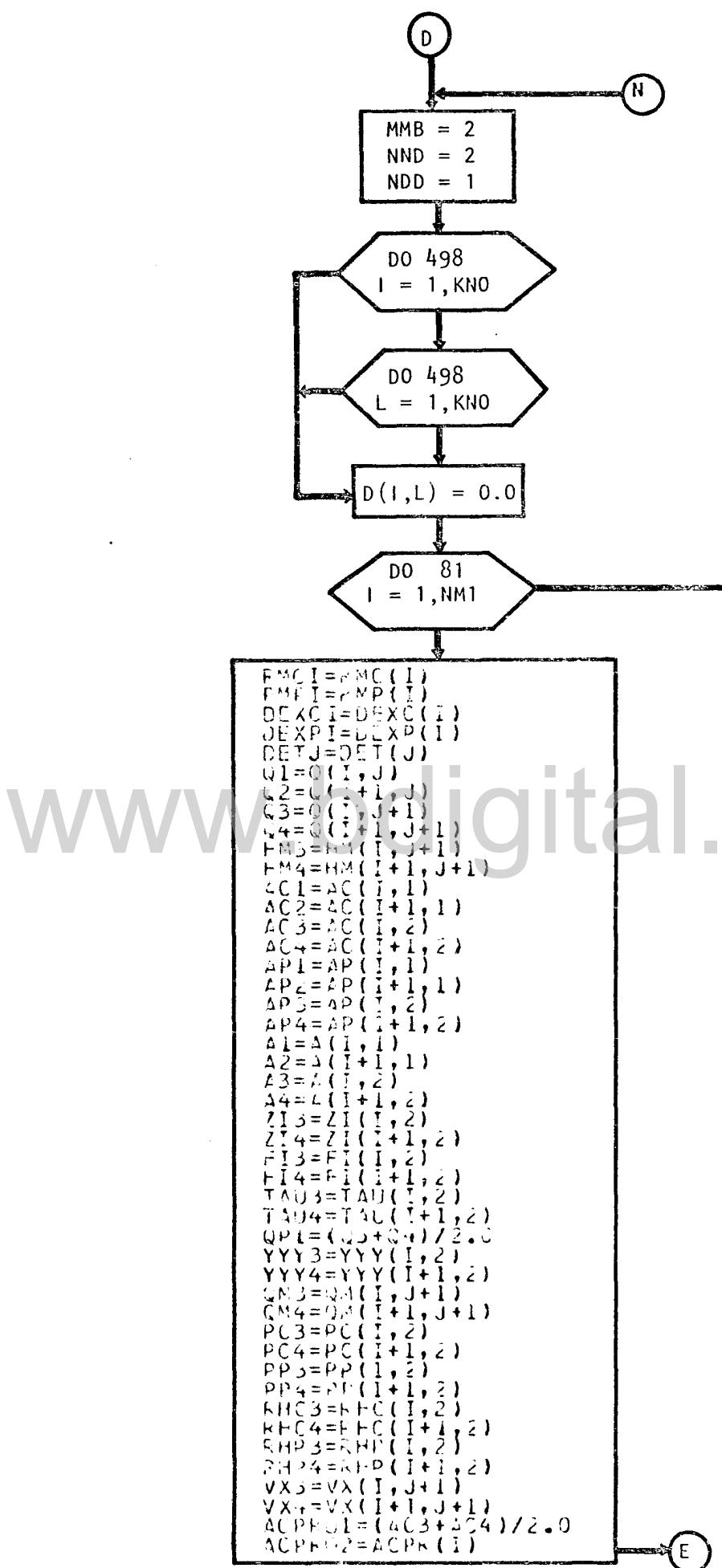


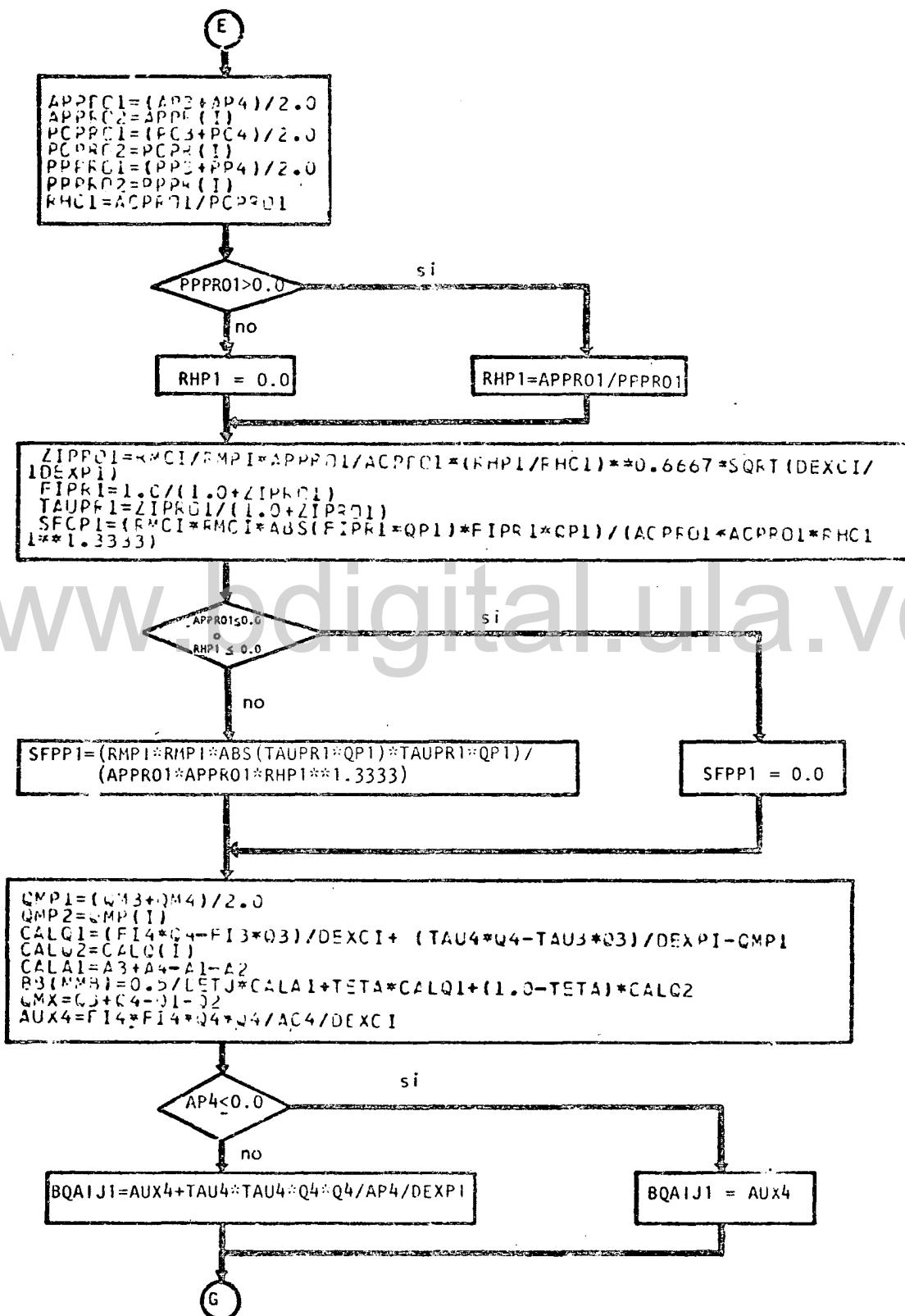


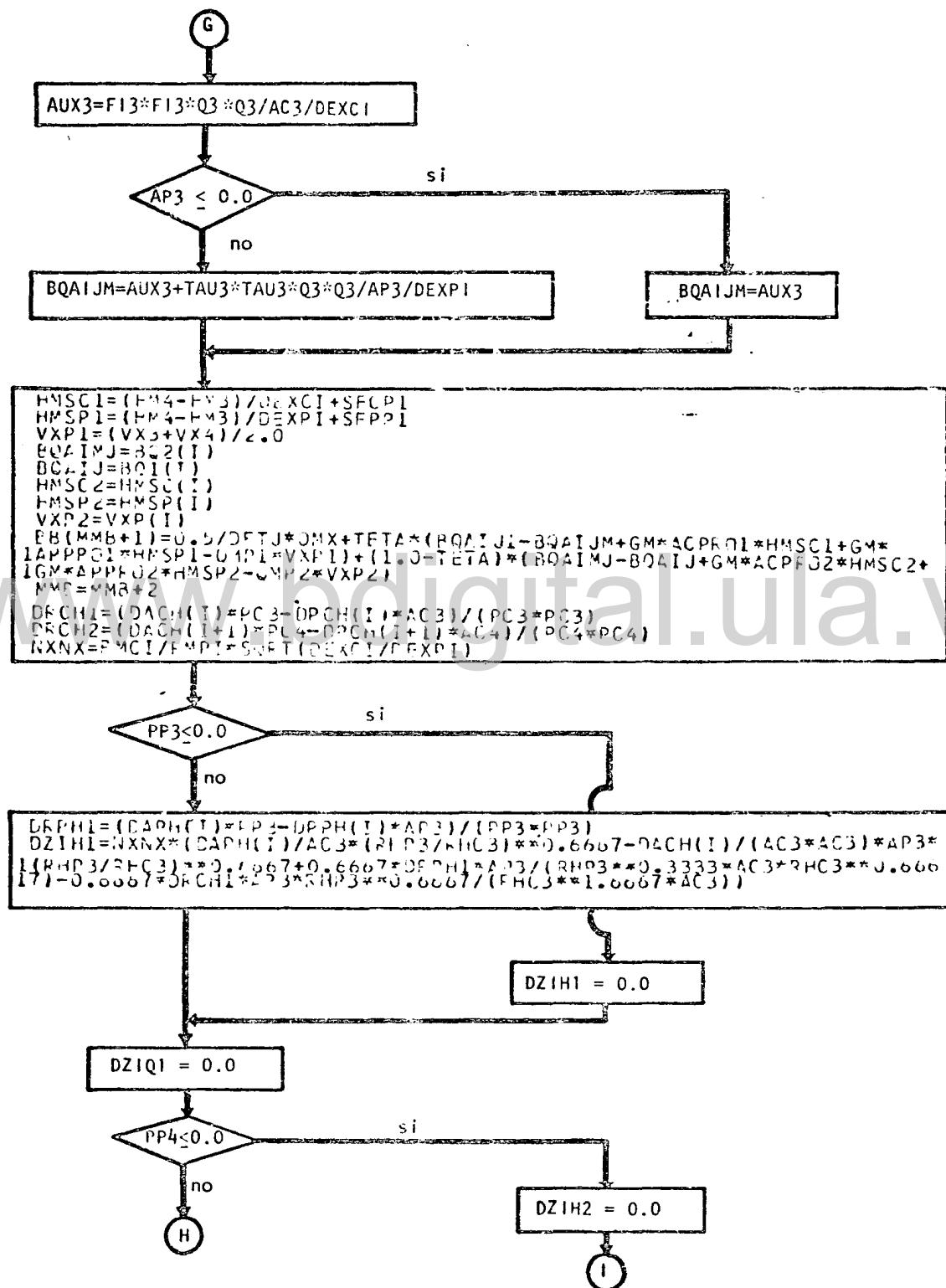


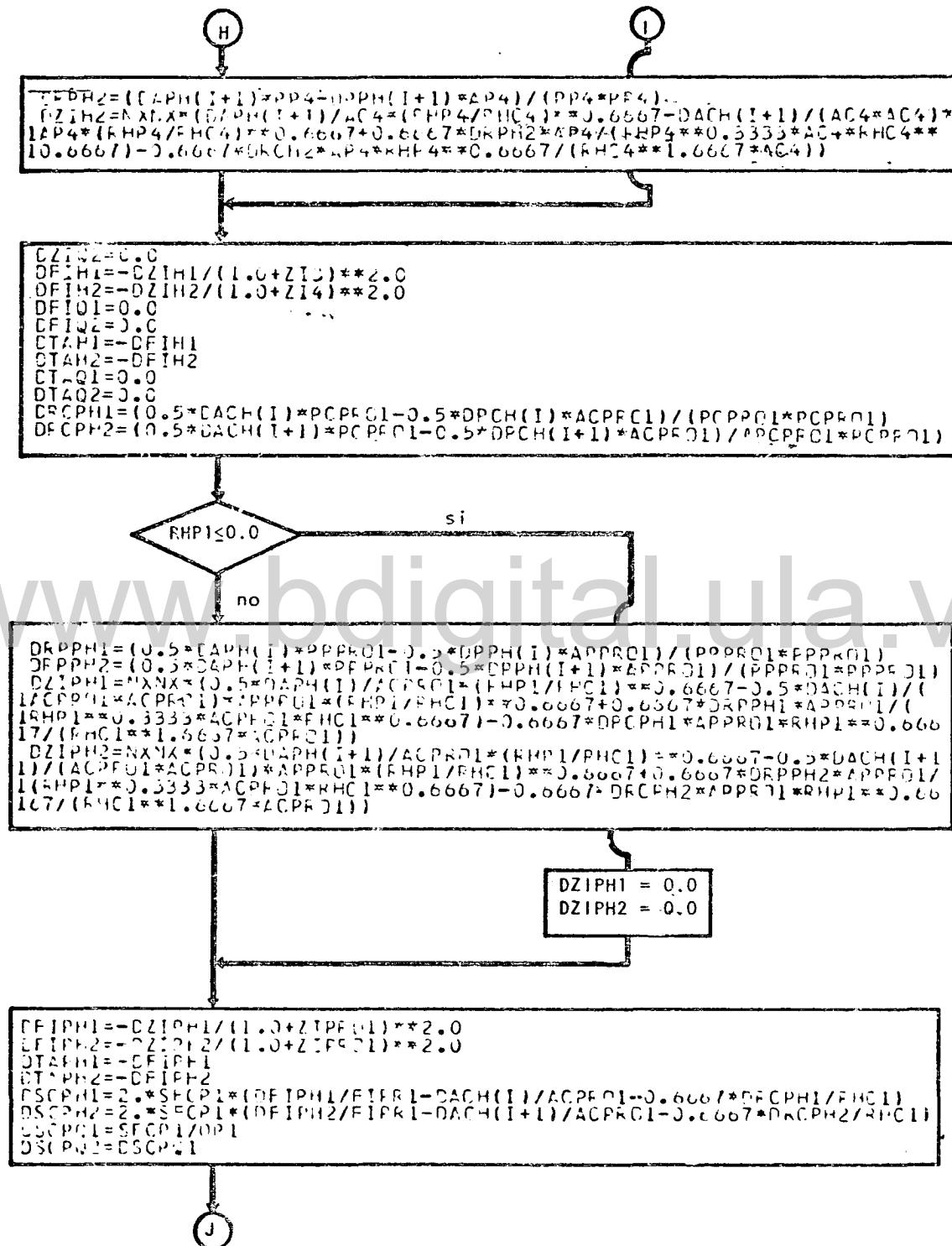


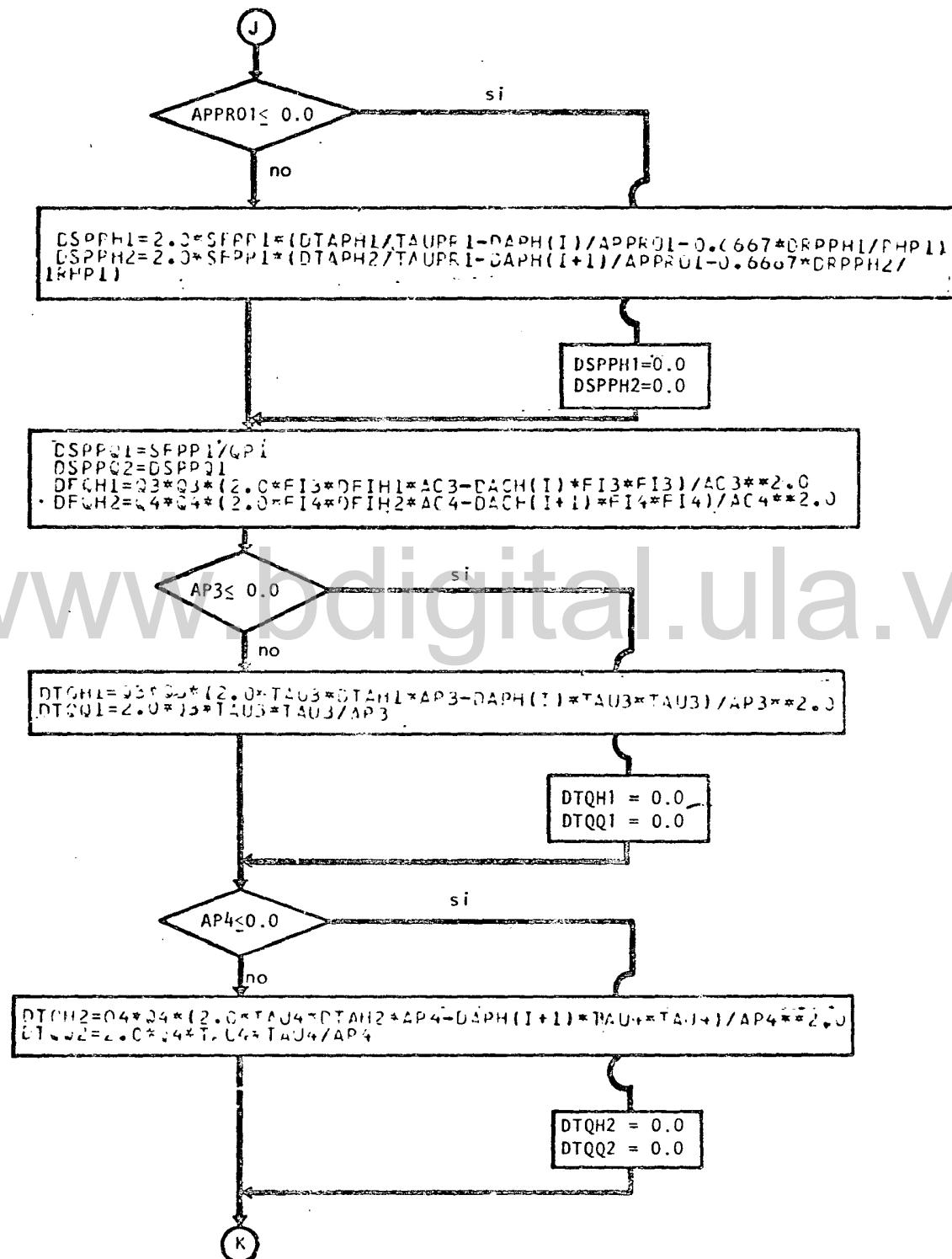


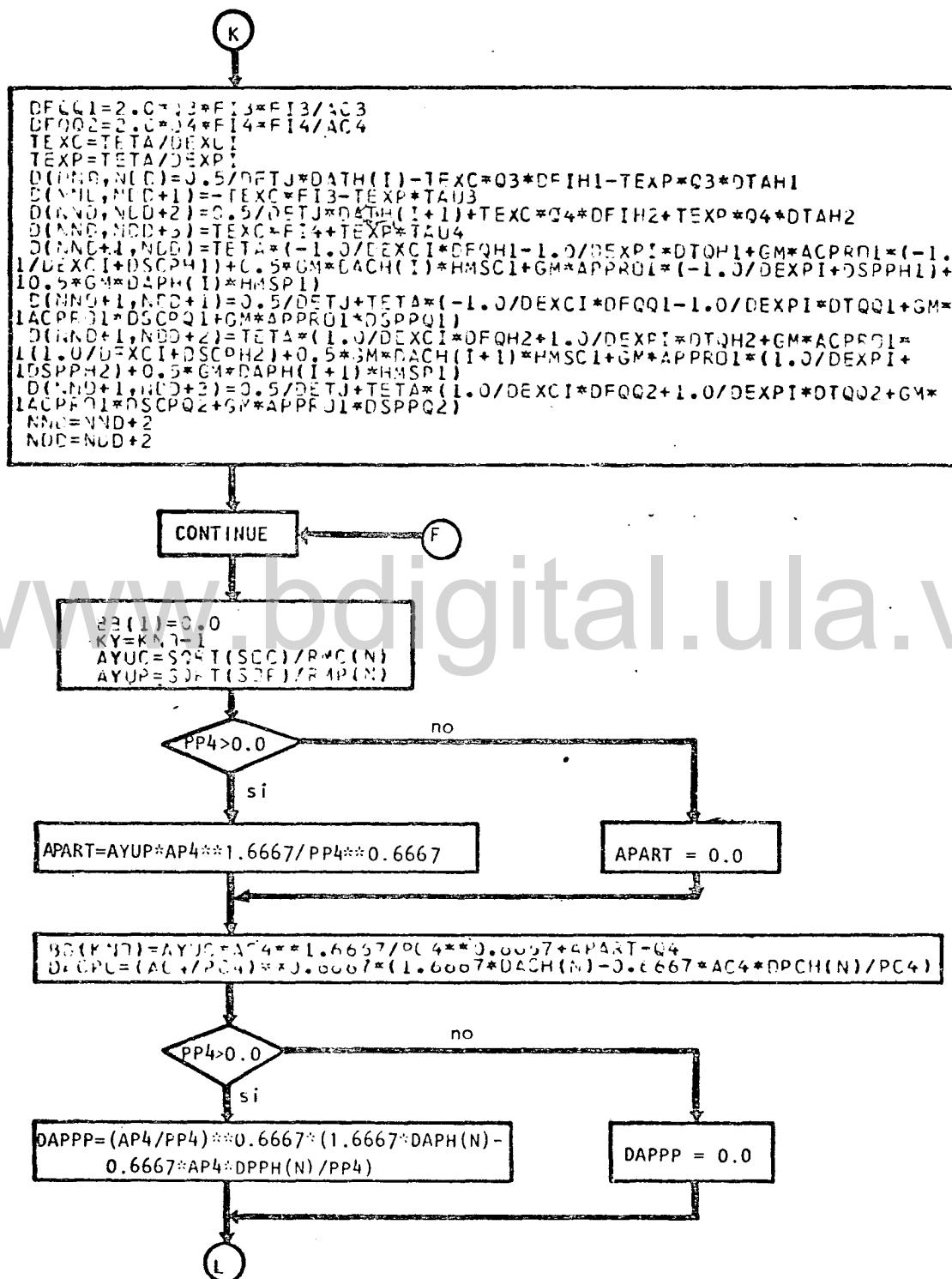


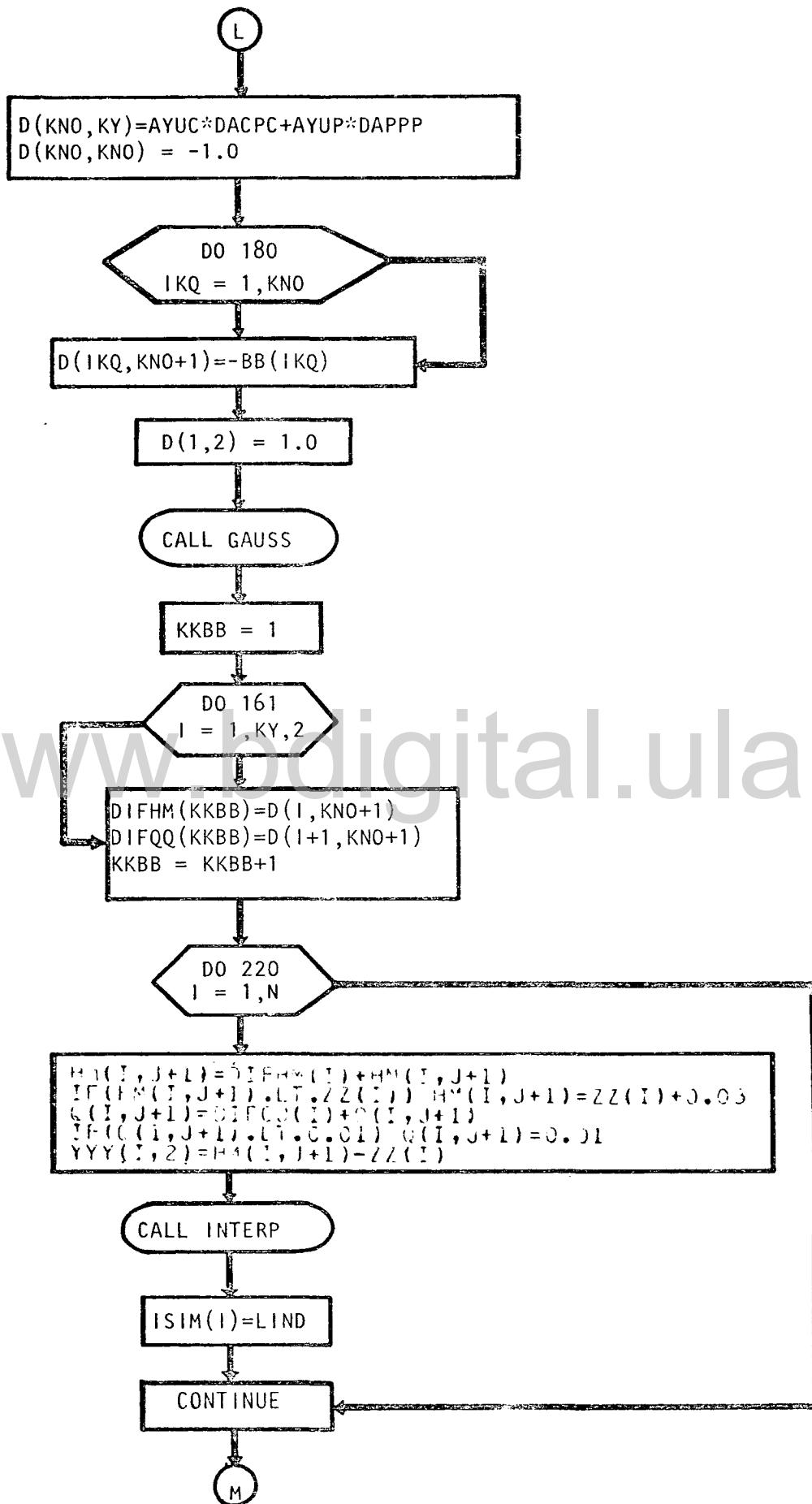


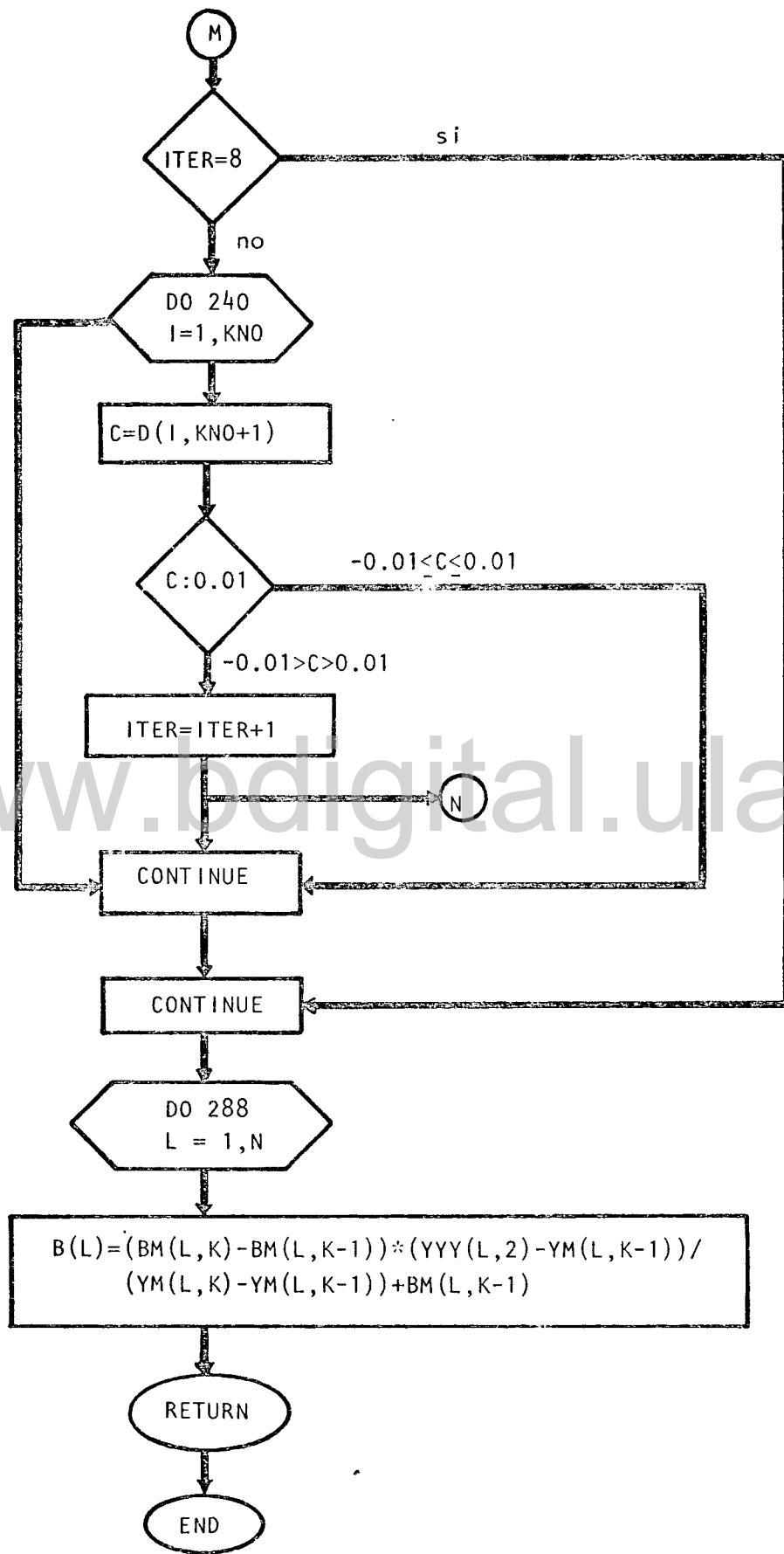


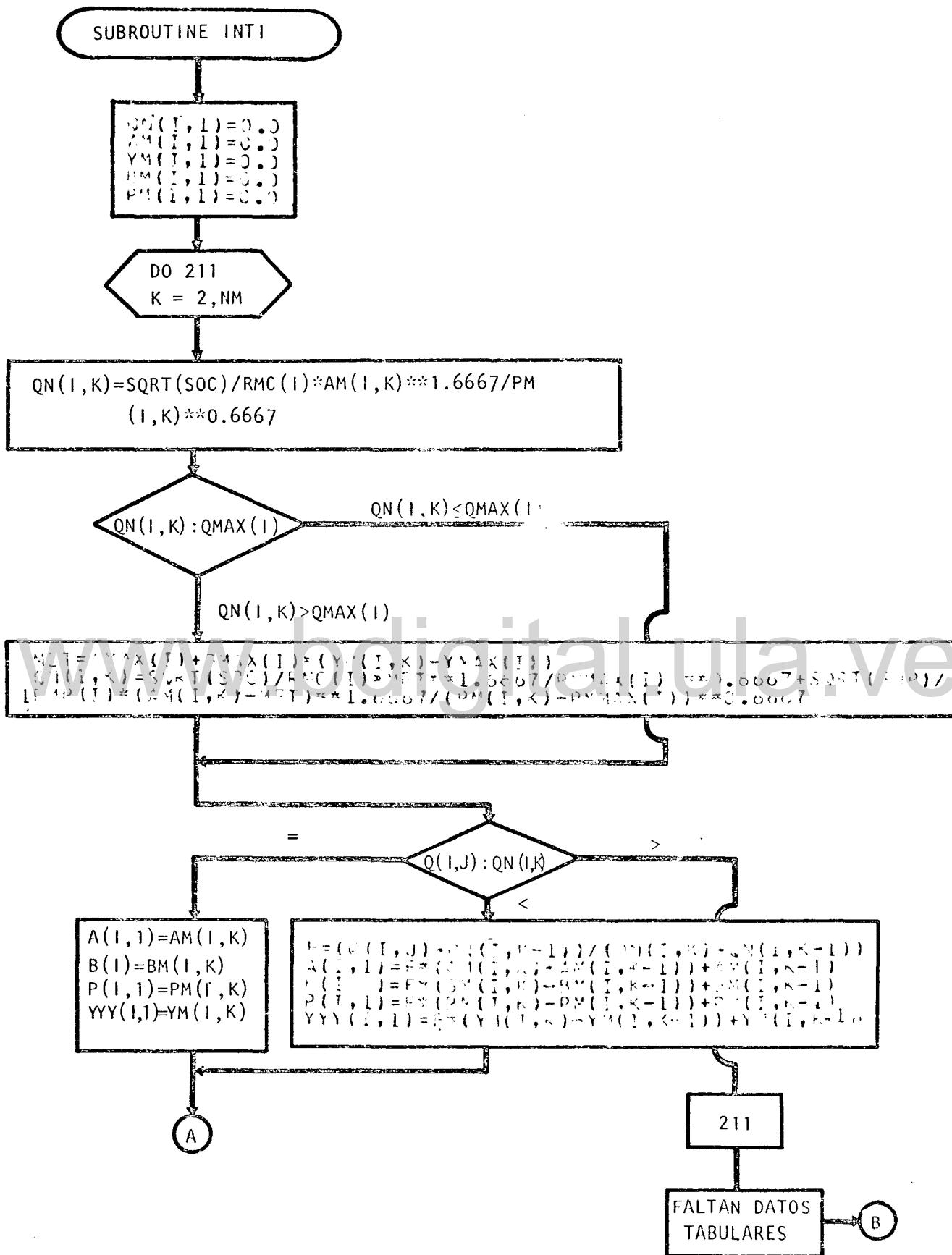


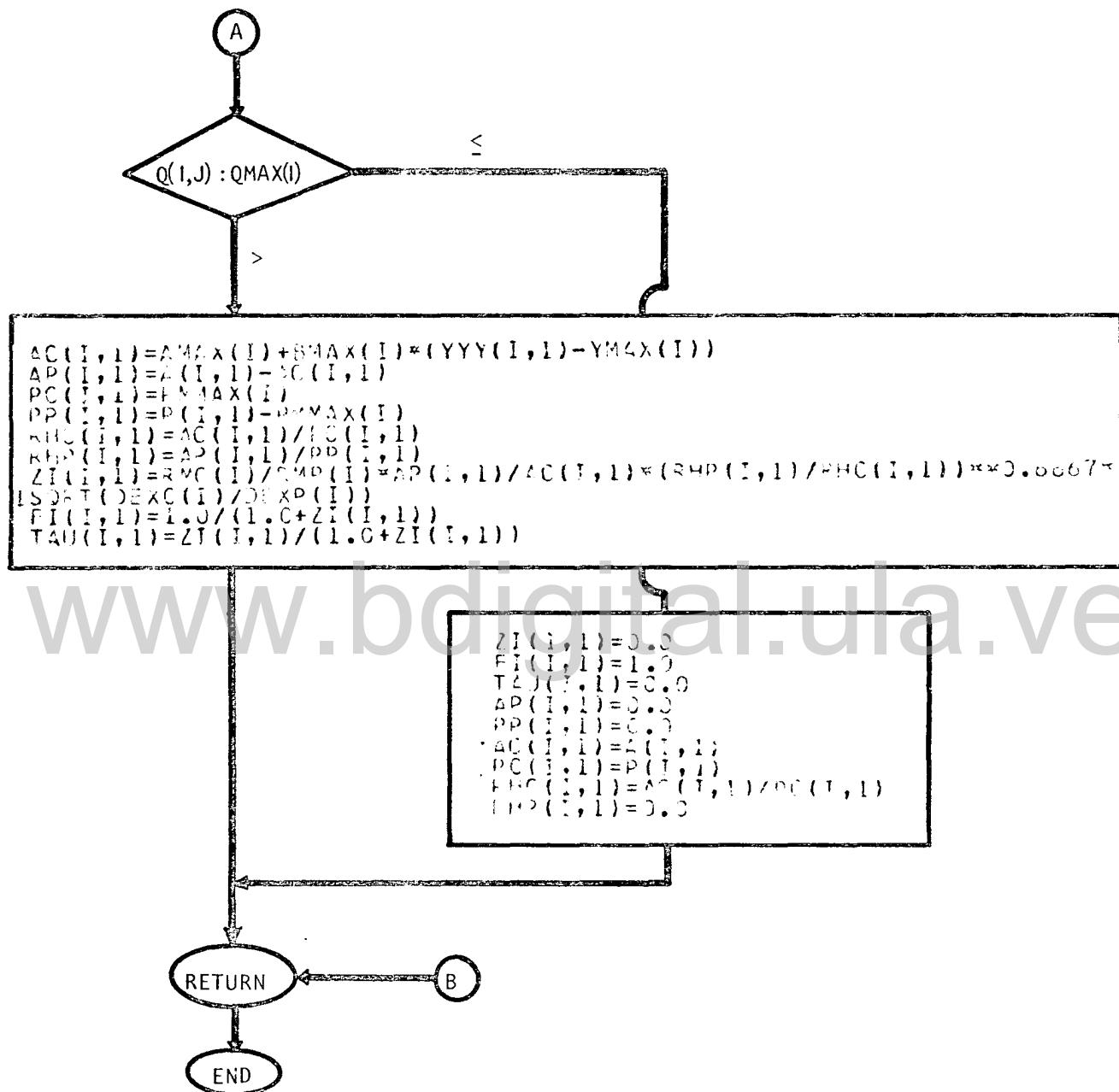


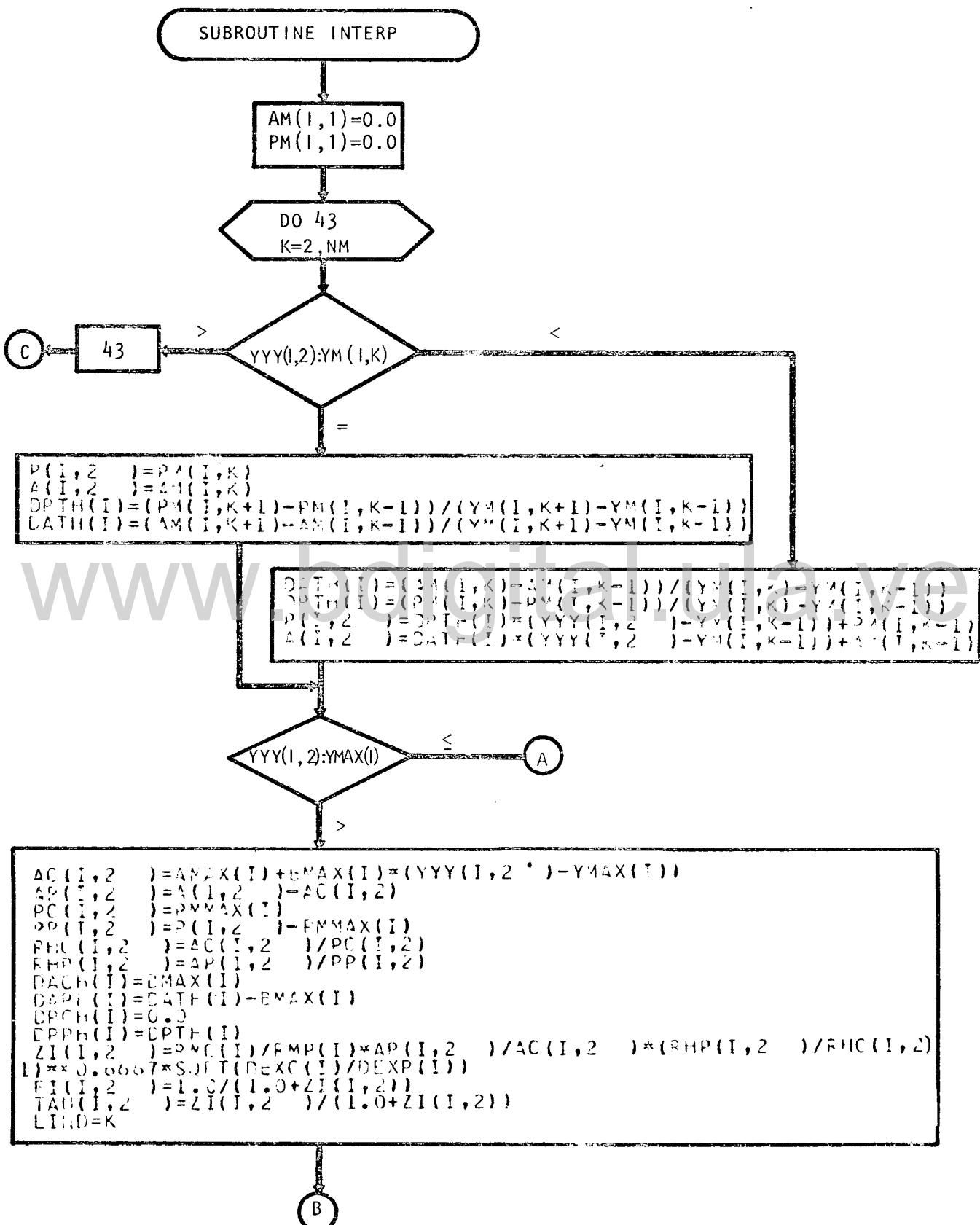


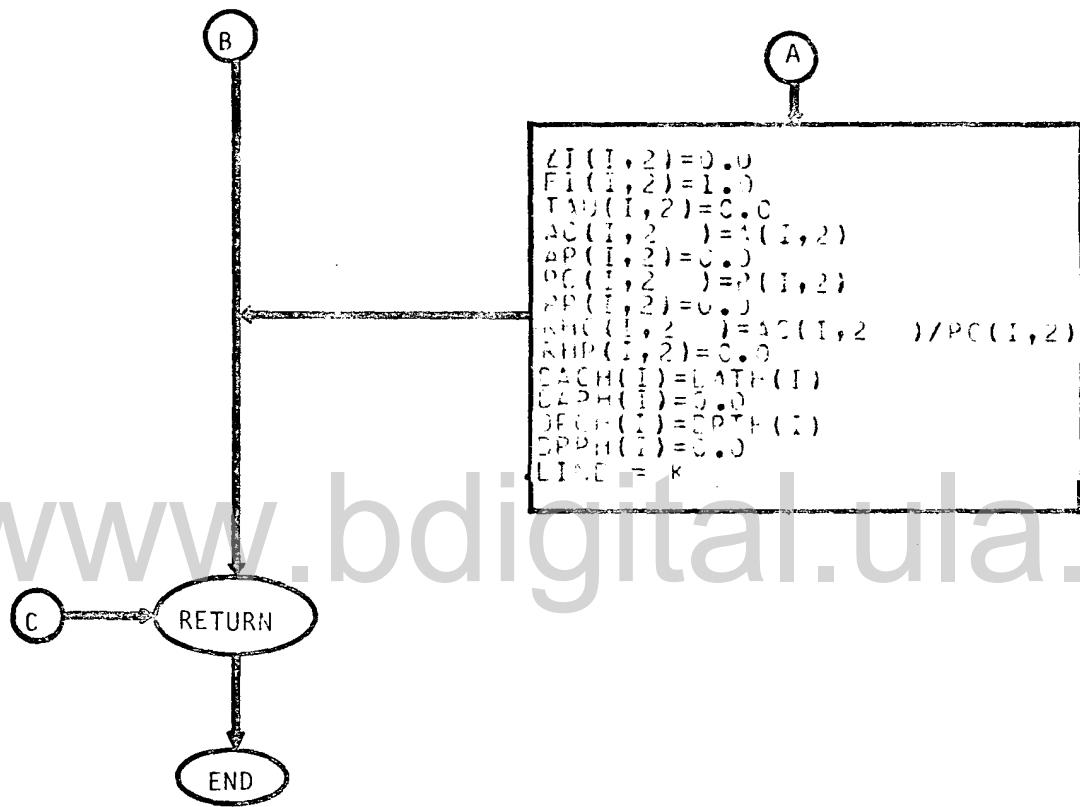


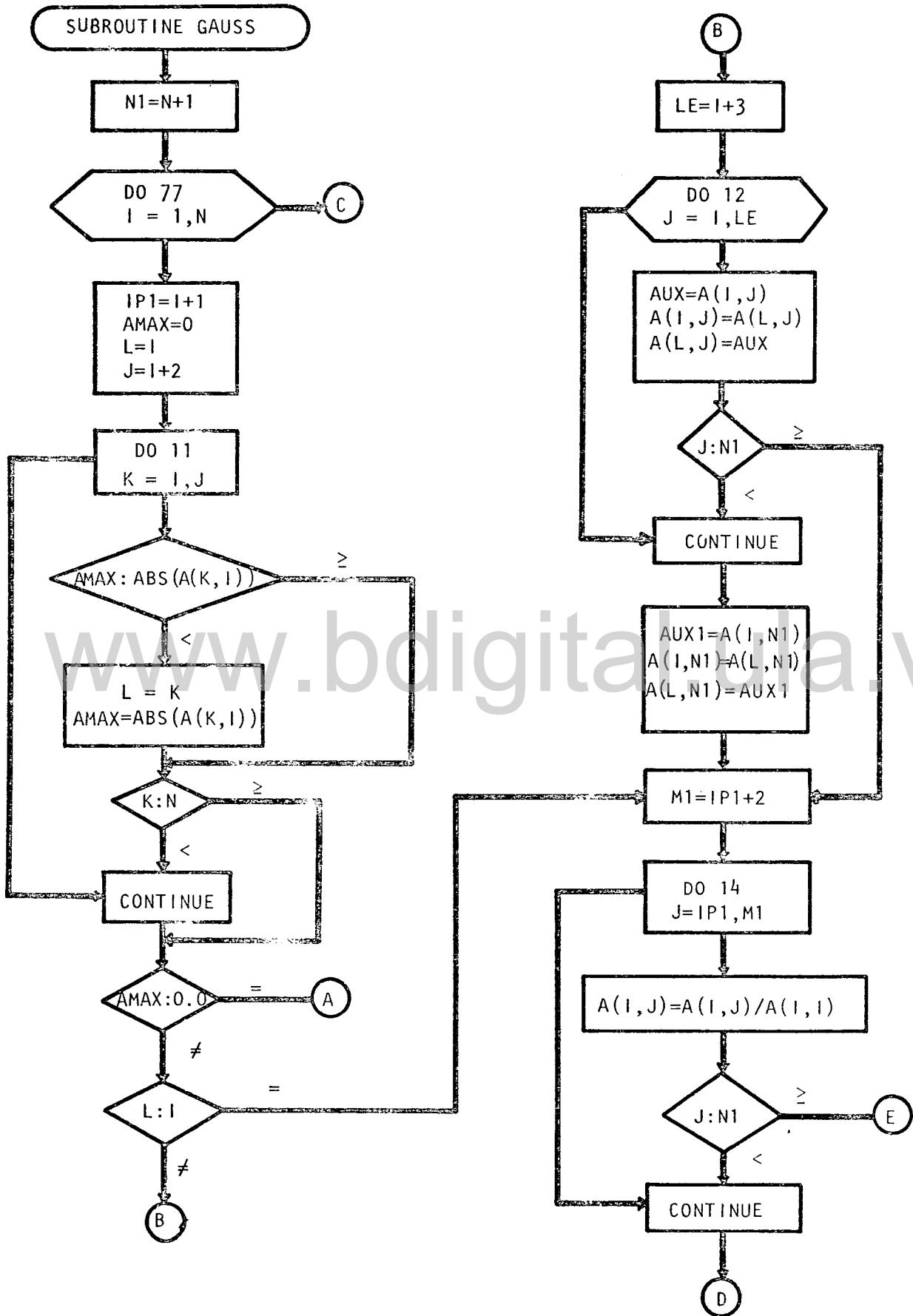


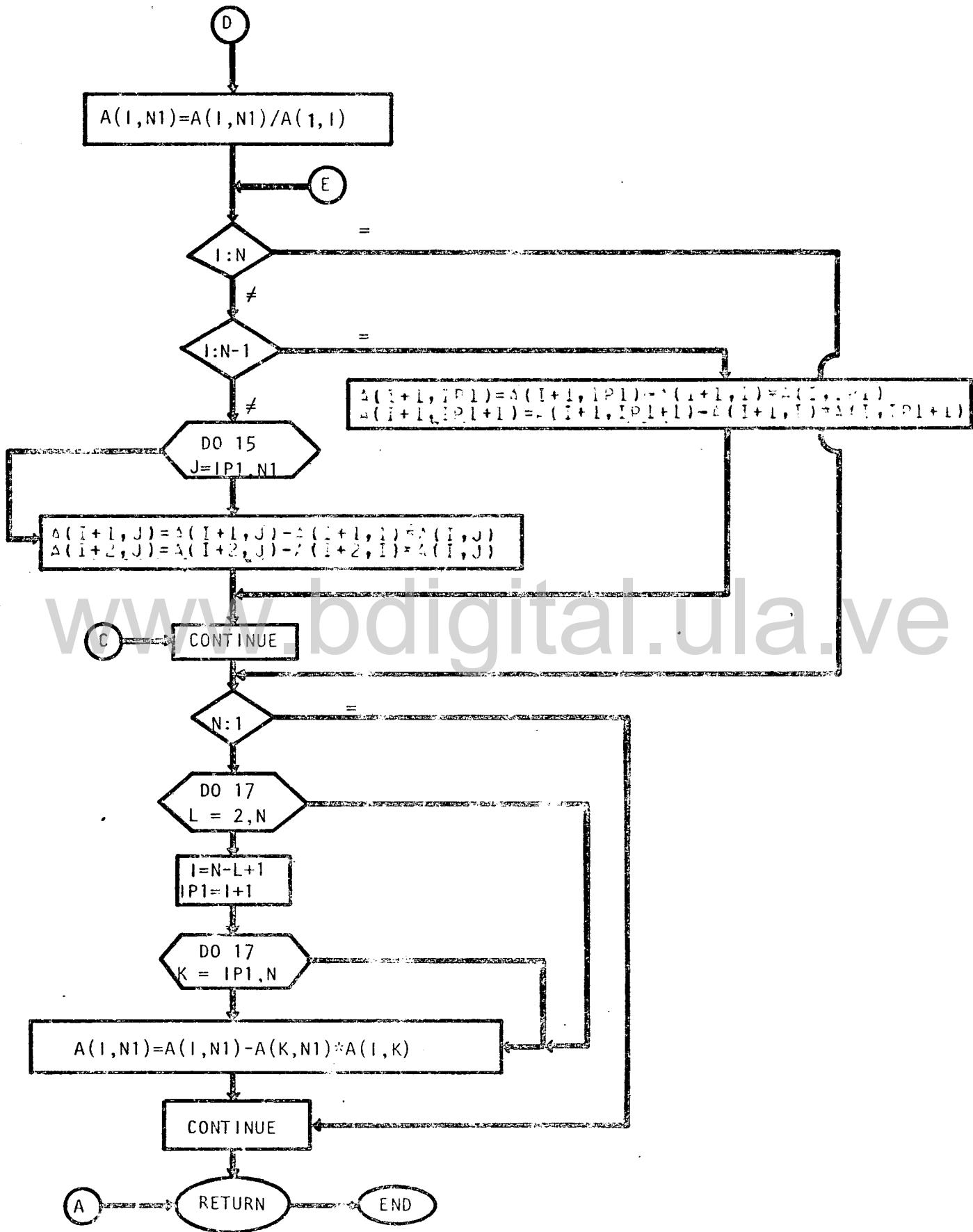












ANEXO VI

LISTADO Y RESULTADOS DEL PROGRAMA

www.bdigital.ula.ve

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),
IZZ(10),DIFH(20),DIFQ(20),YYY(10 ),DETA(20),ZI(10 ),FI(10,2),
TAU(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
CMAX(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,NT)
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 CO3RE (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(6,3363) 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) (YY(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-
DACION 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 MEIROS 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
```

www.bdigital.ula.ve

COBRE

```

SUBROUTINE COBRE(DEXC,DEXP,DET,RMC,RMP,VX,QM,Q,HM,B,A,AC,AP,BM,AM,
IZZ,YYY,YM,N,NT,SUC,SDF,TETA,NTT,NM1,KND,J,GM,FI,TAU,YMAX,INDI,ZI,
1P,PC,PP,AMAX,BMAX,PMMAX,QMAX,PMRHC,RHP)
DIMENSION DEXC(10),DEXP(10),DET(20),RMC(10),RMP(10),VX(10),
1,M(10,20),Q(10,20),HM(10,20),B(10),A(10,2),AC(10,2),AP(10,2),
1,BM(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),
1,QMP(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),
1,PCPR(10),PPPR(10)
DIMENSION DATH(10),DACH(10),DAPH(10),DPTH(10),DPCH(10),DPPH(10),
1,ISIM(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(I,J+1)=HM(I,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)
Q(I,J+1)=Q(I,J)
GO TO 553
550 IF(J.NE.2.AND.J.NE.3) GO TO 552
HM(I,J+1)=ABS(HM(I,J)+0.5*(HM(I,J)-HM(I,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)))
Q(I,J+1)=ABS(Q(I,J)+0.5*(Q(I,J)-Q(I,J-1)))
GO TO 553
552 HM(I,J+1)=ABS(HM(I,J-2)+1.0*(HM(I,J)-HM(I,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)))
Q(I,J+1)=ABS(Q(I,J-2)+1.0*(Q(I,J)-Q(I,J-1)))
553 CONTINUE

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,
1,DPPH,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
RHG2=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
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=RMC1/RMPI*APPRO2/ACPRO2*(RHP2/RHC2)**0.6667*SQRT(DEXCI/
1DEXPI)
FIPR2=1.0/(1.0+ZIPRO2)
TAUPR2=ZIPRO2/(1.0+ZIPRO2)
SFCP2=(RMC1*RMC1*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
CALC(I)=CALQ2
AUX2=FI2*FI2*Q2*Q2/AC2/DEXCI
IF(AP2.LE.0.0) GO TO 22
BQAIMJ=AUX2+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
DO 498 I=1,KNO
DO 498 L=1,KNO
498 D(I,L)=0.0
DO 81 I=1,NM1
RMC1=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=RMCI/RMPI*APPRO1/ACPRO1*(RHP1/RHC1)*0.6667*SQRT(DEXCI/
1DEXPI)
FIPRI=1.0/(1.0+ZIPRO1)
TAUPRI1=ZIPRO1/(1.0+ZIPRO1)
SFCP1=(RMCI*RMCI*ABS(FIPRI*QP1)*FIPRI*QP1)/(ACPRO1*ACPRO1*RHC1
1**1.333)
IF(APPRO1.LE.0.0.OR.RHP1.LE.0.0) GO TO 26
SFPP1=(RMPI*RMPI*ABS(TAUPRI1*QP1)*TAUPRI1*QP1)/(APPRO1*APPRO1*RHP1
1**1.333)
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-QMPI
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*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 CALCULO DE COEFICIENTES DE SISTEMA DE ECUACIONES SIMULTANEAS
C CALCULO DE LAS DERIVADAS PARCIALES RESPECTO A H Y Q

COBRE

```

DRCH1=(DACH(I)*PC3-DPCH(I)*AC3)/(PC3*PC3)
DRCH2=(DACH(I+1)*PC4-DPCH(I+1)*AC4)/(PC4*PC4)
NXNX=RMC1/RMPI*SQRT(DEX1/UEXP1)
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**0.
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/
1(RHP1**0.3333*ACPRO1*RHC1**0.6667)-0.6667*DRCPH1*APPRO1*RHP1**0.66
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
17/(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
DSCPQ1=2.0*SFCP1*(DFIPH1/FIPR1-DACH(I)/ACPRO1-0.6667*DRCPH1/RHC1)
DSCPQ2=2.0*SFCP1*(DFIPH2/FIPR1-DACH(I+1)/ACPRO1-0.6667*DRCPH2/RHC1)
DSCPQ1=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
DTQH2=2.0*Q3*TAU3*TAU3/AP3
GO TO 1810
1800 DTQH1=0.0
DTQC1=C.0
1810 CONTINUE
IF(AP4.LE.0.0) GO TO 1820
DTQH2=Q4*Q4*(2.0*TAU4*DTAH2*AP4-DAPH(I+1)*TAU4*TAU4)/AP4**2.0
DTQC2=2.0*Q4*TAU4*TAU4/AP4
GO TO 1820
1802 DTQH2=0.0
DTQC2=0.0
1820 CONTINUE

```

COBRE

```

DFQQ1=2.0*Q3*FI3*FI3/AC3
DFQQ2=2.0*Q4*FI4*FI4/AC4
TEXC=TETA/DEXCI
TEXP=TETA/DEXPI
D(ND,ND)=0.5/DETJ*DATH(I)-TEXC*Q3*DFIH1-TEXP*Q3*DTAH1
D(ND,ND+1)=-TEXC*FI3-TEXP*TAU3
D(ND,ND+2)=0.5/DETJ*DATH(I+1)+TEXC*Q4*DFIH2+TEXP*Q4*DTAH2
D(ND,ND+3)=TEXC*FI4+TEXP*TAU4
D(ND+1,ND)=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)*HMSPI)
D(ND+1,ND+1)=0.5/DETJ*TETA*(-1.0/DEXCI*DFQH1-1.0/DEXPI*DTQH1+GM*ACPRO1*DSCPQ1+GM*APPRO1*DSPPQ1)
D(ND+1,ND+2)=TETA*(1.0/DEXCI*DFQH2+1.0/DEXPI*DTQH2+GM*ACPRO1*(1.0/DEXCI*DSCPH2)+0.5*GM*DACH(I+1)*HMSC1+GM*APPRO1*(1.0/DEXPI+10*DSPPH2)+0.5*GM*DAPH(I+1)*HMSPI)
D(ND+1,ND+3)=0.5/DETJ*TETA*(1.0/DEXCI*DFQH3+1.0/DEXPI*DTQH3+GM*ACPRO1*DSCPQ2+GM*APPRO1*DSPPQ2)
NND=ND+2
ND=ND+2
81 CONTINUE
CC CONDICIONES DE BORDE
CC
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.LT.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*DACP+AYUP*DAPPP
D(KNO,KNO)=-1.0
DO 180 IKQ=1,KNO
180 D(IKQ,KNO+1)=-BB(IKQ)
D(1,2)=1.0
CC LLAMADA AL SUBPROGRAMA QUE RESUELVE LA MATRIZ FORMADA
CC CALL GAUSS(D,KNO)
CC COMPARACION ENTRE VALORES ACTUALES Y VALORES ANTERIORES
CC
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(C(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,DPHT,DACH,DAPH,DPCH,
1,DPPH,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
CC SE OBSERVA SI DIFHM Y DIFQQ SE ENCUENTRAN DENTRO DEL RANGO DE
CC ERROR ACEPTABLE
IF(ITER.EQ.1) 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)
BIL=I=(BM(L,K)-BM(L,K-1))/(YYY(L)-YM(L,K-1))/(YM(L,K)-

```

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

www.bdigital.ula.ve

```

INTI
SUBROUTINE INTI(Q,SOC,SCP,RMC,RMP,A,AC,AP,AM,B,BM,P,PC,PP,PM,I,J,
1RHC,KHP,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),KHP(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,1)=BM(I,K)
P=PM(I,K)
YYY(I,1)=YM(I,K)
IF(Q(I,J).GT.QMAX(I)) GO TO 97
98 ZI(I,1)=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,1)=AC(I,1)/PC(I,1)
RHP(I,1)=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,1)=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,1)=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,1)-YMAX(I))
AP(I,1)=A(I,1)-AC(I,1)
PC(I,1)=PMMAX(I)
PP(I,1)=P -PMMAX(I)
RHC(I,1)=AC(I,1)/PC(I,1)
RHP(I,1)=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,1)=RMC(I)/RMP(I)*AP(I,1)/AC(I,1)*(RHP(I,1)/RHC(I,1)**0.6667-
1SQRT(DEXAC/DEXAP)
FI(I,1)=1.0/(1.0+ZI(I,1))
TAU(I,1)=ZI(I,1)/(1.0+ZI(I,1))
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
  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 MANGING 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 VV= 1.90 BS= 58.73	60.00 1.90 58.73	ESTABLE									
3.333	Q= 90.00 VV= 2.08 BS= 62.52	99.58 1.90 60.21	62.81 1.92 58.89	60.57 1.90 58.78	59.86 1.90 58.75	59.61 1.90 58.74	59.53 1.90 58.73	59.51 1.90 58.73	59.49 1.90 58.73	59.54 1.90 58.72	ESTABLE	
6.667	Q= 120.00 VV= 2.31 BS= 66.55	99.70 2.16 63.88	79.25 2.03 61.58	68.13 1.96 60.05	63.08 1.92 59.27	60.96 1.91 58.94	60.13 1.90 58.81	59.81 1.90 58.76	59.72 1.90 58.73	59.61 1.90 58.74	ESTABLE	
10.000	Q= 150.00 VV= 2.53 BS= 70.93	127.04 2.37 67.70	107.60 2.22 65.05	81.75 2.09 62.71	73.97 2.00 61.04	66.45 1.95 59.83	62.64 1.92 59.22	60.90 1.91 58.93	60.10 1.90 58.82	59.76 1.90 59.78	ESTABLE	
13.333	Q= 180.00 VV= 2.74 BS= 76.73	156.70 2.59 72.38	133.87 2.43 68.75	114.71 2.27 66.14	95.56 2.15 63.73	80.15 2.05 61.87	70.44 1.98 60.53	64.99 1.94 59.62	62.14 1.92 59.15	60.51 1.91 59.01	ESTABLE	
16.667	Q= 210.00 VV= 2.94 BS= 82.45	186.33 2.79 78.08	163.25 2.64 73.80	140.65 2.48 69.73	121.44 2.34 67.16	102.71 2.21 64.73	86.51 2.10 62.72	74.86 2.01 61.25	67.78 1.96 60.15	63.05 1.94 59.77	ESTABLE	
20.000	Q= 240.00 VV= 3.12 BS= 94.03	215.28 2.99 83.61	194.60 2.83 79.34	169.78 2.68 75.12	147.16 2.54 70.98	127.79 2.39 68.10	109.69 2.29 65.70	92.96 2.14 63.56	79.56 2.05 61.96	69.38 2.02 61.43	ESTABLE	
23.333	Q= 270.00 VV= 3.27 BS= 105.24	245.86 3.13 95.49	220.60 3.02 85.02	199.25 2.88 80.55	178.13 2.73 76.39	153.56 2.54 72.33	133.87 2.34 68.99	116.01 2.11 66.62	98.66 1.97 64.07	82.47 2.10 63.34	ESTABLE	
26.667	Q= 300.00 VV= 3.41 BS= 117.74	300.00 3.31 109.07	277.72 3.19 99.26	253.38 3.06 99.26	227.05 2.92 98.78	203.56 2.77 81.73	182.37 2.67 77.04	159.93 2.54 73.64	139.61 2.49 69.90	120.96 2.38 67.88	101.25 2.35 67.24	ESTABLE
30.000	Q= 330.00 VV= 3.54 BS= 132.09	330.00 3.44 120.30	307.15 3.34 111.92	285.71 3.22 102.33	261.72 3.10 92.03	234.71 2.96 82.95	209.90 2.82 78.90	188.62 2.68 75.03	166.17 2.58 72.12	143.60 2.55 71.30	122.49	ESTABLE
33.333	Q= 360.00 VV= 3.64 BS= 151.31	360.00 3.56 135.68	333.51 3.47 122.39	311.46 3.37 114.50	291.74 3.26 105.37	269.51 3.14 95.36	242.93 3.01 84.62	216.47 2.88 80.56	193.89 2.77 77.65	170.84 2.67 76.85	146.34	ESTABLE
36.667	Q= 390.00 VV= 3.74 BS= 170.99	364.13 3.65 154.40	337.18 3.57 138.95	314.67 3.49 124.18	295.28 3.40 116.73	275.94 3.30 104.22	250.90 3.18 98.62	222.70 3.07 89.44	197.30 2.98 83.50	172.71 2.86 82.92	-ESTABLE	
40.000	Q= 420.00 VV= 3.84 BS= 189.35	394.24 3.76 173.93	368.96 3.67 157.63	341.85 3.59 141.95	317.94 3.51 126.75	299.90 3.42 118.67	280.34 3.33 111.21	257.38 3.24 103.34	229.88 3.15 98.80	202.78 3.03 94.95	ESTABLE	
43.333	Q= 450.00 VV= 3.94 BS= 208.23	424.89 3.85 192.33	398.93 3.77 176.87	373.76 3.69 160.98	347.22 3.61 144.95	321.51 3.53 130.59	302.45 3.45 121.08	283.85 3.38 114.99	262.80 3.32 110.21	237.17 3.31 109.05	ESTABLE	
46.667	Q= 480.00 VV= 3.87 BS= 194.74	399.40 3.83 187.87	404.09 3.83 176.19	392.25 3.77 162.86	372.94 3.70 144.04	356.20 3.62 135.10	224.48 3.55 124.56	304.14 3.49 121.28	285.49 3.45 121.28	267.02 3.45 120.67	ESTABLE	
50.000	Q= 510.00 VV= 3.67 BS= 157.21	310.27 3.73 169.62	350.16 3.78 177.67	370.39 3.78 177.87	373.48 3.74 171.44	364.00 3.70 162.15	348.03 3.63 150.61	326.50 3.58 139.96	305.93 3.54 133.15	288.10 3.54 132.17	ESTABLE	
53.333	Q= 540.00 VV= 3.41 BS= 118.01	239.48 3.36 136.98	278.74 3.36 152.24	313.57 3.36 161.80	337.62 3.36 166.05	349.35 3.31 164.33	349.06 3.28 159.22	340.43 3.25 152.55	325.31 3.21 146.36	306.73 3.16 145.75	ESTABLE	
56.667	Q= 580.00 VV= 3.11 BS= 93.05	158.98 3.09 106.05	210.83 3.04 121.57	253.22 3.05 136.61	286.65 3.02 140.19	311.16 3.02 154.80	329.99 3.01 156.77	331.57 3.00 156.00	326.79 3.00 155.15	320.72 3.00 155.75	ESTABLE	
60.000	Q= 600.00 VV= 2.70 BS= 77.32	108.71 3.01 85.14	145.26 3.01 95.04	185.63 3.01 112.49	226.09 3.01 122.95	262.73 3.01 135.08	289.08 3.01 145.00	305.52 3.01 151.00	314.31 3.01 154.80	321.00 3.01 155.74	ESTABLE	
63.333	Q= 66.00 VV= 2.14 BS= 71.14	74.09 2.73 76.32	106.45 2.95 82.57	130.53 3.11 93.06	170.12 3.05 104.51	204.21 3.05 115.50	237.45 3.05 124.75	267.21 3.05 136.92	289.76 3.05 145.19	307.89 3.05 146.58	ESTABLE	

ANEXO VII

INSTRUCTIVO DEL USO DEL PROGRAMA

PLANICIE

www.bdigital.ula.ve

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:

CIDICIT

CENTRO INTERAMERICANO DE
DESEARROLLO INTEGRAL DE
AGUAS Y TIERRAS

BANCO DE PROGRAMAS

T A R E Z A		PROGRAMA: PLANICIE						FECHA:	
		CODIGO:						1	
VARIABLE	N	NT	NM	SOC	SOP	TETA	CRC	CRP	
Formato	18	18	18	F8.4	F8.4	F8.4			
Valor	110	20	8	0.0010	0.0010	0.0010	0.035	0.035	
VARIABLE	BMAX(1)	BMAX(2)	BMAX(3)	BMAX(4)	BMAX(5)	BMAX(6)	BMAX(7)	BMAX(8)	BMAX(9)
Formato	10F8.3	40.0	45.0	38.0	40.0	32.0	60.0	50.0	47.0
Valor									
VARIABLE	PMMAX(1)	PMMAX(2)	PMMAX(3)	PMMAX(4)	PMMAX(5)	PMMAX(6)	PMMAX(7)	PMMAX(8)	PMMAX(9)
Formato	10F8.3	50.0	65.0	50.0	52.0	40.0	30.0	55.0	42.0
Valor									
VARIABLE	AMAX(1)	AMAX(2)	AMAX(3)	AMAX(4)	AMAX(5)	AMAX(6)	AMAX(7)	AMAX(8)	AMAX(9)
Formato	10F8.3	150.0	130.0	155.0	120.0	140.0	140.0	120.0	140.0
Valor									
VARIABLE	YMAX(1)	YMAX(2)	YMAX(3)	YMAX(4)	YMAX(5)	YMAX(6)	YMAX(7)	YMAX(8)	YMAX(9)
Formato	10F8.3	10.0	11.0	10.0	13.0	9.0	14.0	12.0	11.0
Valor									
VARIABLE	DEXC(1)	DEXC(2)	DEXC(3)	DEXC(4)	DEXC(5)	DEXC(6)	DEXC(7)	DEXC(8)	DEXC(9)
Formato	10F8.3	300.0	300.0	400.0	350.0	250.0	5150.0	400.0	1300.0
Valor									
VARIABLE	DEXP(1)	DEXP(2)	DEXP(3)	DEXP(4)	DEXP(5)	DEXP(6)	DEXP(7)	DEXP(8)	DEXP(9)
Formato	10F8.3	300.0	300.0	400.0	350.0	250.0	550.0	400.0	1300.0
Valor									
VARIABLE	DET(1)	DET(2)	DET(3)	DET(4)	DET(5)	DET(6)	DET(7)	DET(8)	DET(9)
Formato	19F8.3	150.0	160.0	170.0	160.0	160.0	150.0	150.0	140.0
Valor									

CIDIN

BANCO DE PROGRAMAS

T A R J E T A	Nº	PROGRAMA: PLANICIE										FECHA: 2				
		CODIGO.			DET(15)			DET(16)			DET(17)			DET(18)		
VARIABLE		DET(11)	DET(12)	DET(13)	DET(14)	DET(15)	DET(16)	DET(17)	DET(18)	DET(19)	DET(15)	DET(16)	DET(17)	DET(18)	DET(19)	69
Formato		150,0	150,0	150,0	150,0	150,0	150,0	150,0	150,0	150,0	150,0	150,0	150,0	150,0	150,0	
Valor		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)	Q(11,1)	Q(12,1)	Q(13,1)	Q(14,1)	
VARIABLE		Formato	10F8.3	20,0	20,0	20,0	20,0	20,0	20,0	20,0	20,0	20,0	20,0	20,0	20,0	
Formato		Valor	20,0	30,0	40,0	50,0	60,0	70,0	80,0	90,0	100,0	100,0	100,0	100,0	100,0	
VARIABLE		Formato	20F8.3	20,0	30,0	40,0	50,0	60,0	70,0	80,0	90,0	100,0	100,0	100,0	100,0	
Formato		Valor	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)	Q(1,21)	Q(1,22)	Q(1,23)	
VARIABLE		Formato	90,0	80,0	70,0	60,0	50,0	40,0	30,0	20,0	10,0	0,0	0,0	0,0	0,0	
Formato		Valor	AM(1,1)	AM(1,2)	AM(1,3)	AM(1,4)	AM(1,5)	AM(1,6)	AM(1,7)	AM(1,8)	AM(1,9)	AM(1,10)	AM(1,11)	AM(1,12)	AM(1,13)	
VARIABLE		Formato	8F8.3	0,0	10,0	20,0	30,0	40,0	50,0	60,0	70,0	80,0	90,0	100,0	110,0	
Formato		Valor	PM(1,1)	PM(1,2)	PM(1,3)	PM(1,4)	PM(1,5)	PM(1,6)	PM(1,7)	PM(1,8)	PM(1,9)	PM(1,10)	PM(1,11)	PM(1,12)	PM(1,13)	
VARIABLE		Formato	8F8.3	0,0	1,5,5	1,0,5	1,5,5	2,0,8	2,5,8	3,0,9	3,5,9	4,0,9	4,5,9	5,0,9	5,5,9	
Formato		Valor	BM(1,1)	BM(1,2)	BM(1,3)	BM(1,4)	BM(1,5)	BM(1,6)	BM(1,7)	BM(1,8)	BM(1,9)	BM(1,10)	BM(1,11)	BM(1,12)	BM(1,13)	
VARIABLE		Formato	8F8.3	0,0	1,5,0	1,0,0	1,5,0	2,0,0	2,5,0	3,0,0	3,5,0	4,0,0	4,5,0	5,0,0	5,5,0	
Formato		Valor	YM(1,1)	YM(1,2)	YM(1,3)	YM(1,4)	YM(1,5)	YM(1,6)	YM(1,7)	YM(1,8)	YM(1,9)	YM(1,10)	YM(1,11)	YM(1,12)	YM(1,13)	
VARIABLE		Formato	8F8.3	0,0	1,0,0	2,0,0	3,0,0	4,0,0	5,0,0	6,0,0	7,0,0	8,0,0	9,0,0	10,0,0	11,0,0	

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 <u>in</u> tervalo 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.

www.bdigital.ula.ve

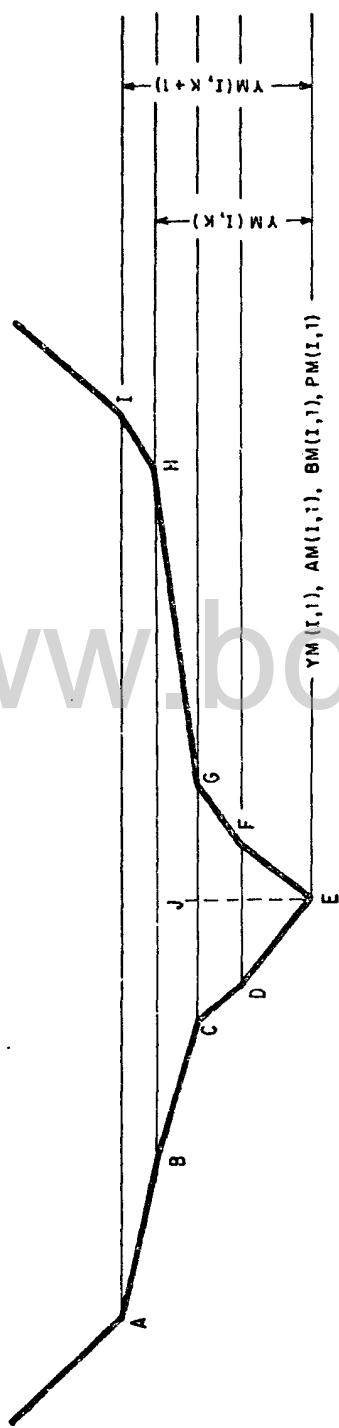


Figura A.VIII.1 Esquema ilustrativo para la obtención de los datos tabulares del área, profundidad, perímetro mojado y ancho superficial en cada sección en estudio.

En donde:

$AM(I,K)$ está representada por el área encerrada entre los puntos \overline{BCDEF} y \overline{GH}
 $PM(I,K)$ 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 \overline{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 EJ

ANEXO VIII

INSTRUCTIVO DE USO DEL MODELO STANFORD IV ORIGINAL

www.bdigital.ula.ve

Entradas del modelo hidrológico STANFORD IV, versión NWS

<u>Variable</u>	<u>Formato</u>	<u>Significado</u>
INFRO ()	20A4	Información general sobre la corrida
*****	*****	*****
BASIN	20A4	Nombre de la cuenca
*****	*****	*****
M01	15	Primer mes, y
YR1	15	Ultimos dos dígitos del primer año de la corrida
M02	15	Último mes, y
YR2	15	Ultimos dos dígitos del último año de la corrida
NPTS	15	Número de puntos de cálculo del caudal
PXIN	15	Número de medidores de precipitación que aportan hacia el cauce
NGAGES	15	Número de medidores de precipitación utilizados en la simulación
RGIN ()	513	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 8º medidor de precipitación que aporta al cauce será el medidor 1 para la simulación; el 2ºmedidor que aporta al cauce será el medidor 2 para la simulación; etc.

OUTHR	15	Si 1, se dan como salida los caudales horarios simulados
LINEP	15	Promedio diario de QS en ploteado si = 1
NOFLW	15	Si 1, suprime impresión del sumario mensual de caudales observados y simulados
AVEPE	15	Si 1, usa evaporación media mensual
POWER	F5.1	Exponente de la ecuación de la curva de infiltración
SIXHR	15	Si 1, se utiliza lluvia promedio de cada 6 horas
GN HR	15	Si 1, se utiliza precipitación acumulada cada 6 horas
STORE	15	Si 1, almacena entradas del canal sobre el conjunto de datos, DSRO
ROUTE	15	Sólo igual a 1 si STORE = 1
DSRO	15	Si = 0, los dos anteriores = 0
SNOW	15	Si 1, se considera nieve
POINT	15	Puntos de computación de nieve si = 1
INOUT	15	Salidas de variables de nieve, si = 1
VAREP	15	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	Índice de infiltración	
CC (IRG)	F5.2	Índice de flujo subsuperficial	
K3 (IRG)	F5.2	Índice 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 <u>superficial</u> 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 <u>subterránea</u>

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	Índice de ETP antecedente

FPN ()	7A4	Nombre de estación de cálculo de Q
AREA	2X, F10.2	Área 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 uti
lizados 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 dia PE diario, sólo si AVEPE = 1
ACTFLW Entrada diaria Caudal diario observado para cada punto de cálculo
 36 tarjetas del caudal. COMPAR = 0; POINT = 0

DISP 15 Sólo si ROUTE = 1
DSN 15 Número de la unidad donde se van a almacenar los datos de precipitación
SKIP 15 Número de registros que deben ser saltados sobre la cinta o disco para llegar a la posición correcta. Es = 0 si se usan tarjetas

PX() Formato Datos de precipitación horaria. 99 en cols. 1-2 después de cada medidor
 SWM

FLOW1 Formato Caudal horario observado para días seleccionados; si
 de caudal CHECK = 2 y POINT=0. Tarjeta 99 indica el fin de los
 horario datos para cada punto de medición del caudal

FLOW1 Formato Caudal de cada seis horas para días seleccionados
 p/caudal pies³/seg - POINT = 0
 de 6 horas



BANCO DE PROGRAMAS

T A R J E S T A	PROGRAMA:	
	CÓDIGO:	FECHA:
	(Información general de la corrida)	
	VARIABLE	INFRO
	Formato	20A4
	Valor	SIMULACION PARAMETRICA
	VARIABLE	BASIN
	Formato	20A4
	Valor	RIO_BOCANO
	VARIABLE	
	Formato	M01 YR1 M02 YR2 NPTS PXIN NGAGE\$ RGIN
	Valor	15 15 15 15 15 15 15 15 5 5 3
	VARIABLE	OUTHR LINEP NOFLW AVEPE POWER S XHR CNCHR STORE ROUTE DSRO SNOW POINT INOUT VAREP UZSNWF
	Formato	15 15 15 15 F5.1 15 15 15 15 15 15 15 15 IF5.2
	Valor	0 1 1 0 2.0 0 0 0 0 0 0 0 0
	VARIABLE	PEADU
	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
	Formato	5F5.3
	Valor	1.0 1.0 1.0 1.0 1.0
	VARIABLE	EVAPM
	Formato	12F5.3
	Valor	
	VARIABLE	SDEP EPBIAS IXEP
	Formato	F5.2 F5.2 110
	Valor	

CIDIN
BANCO DE PROGRAMAS

ESTUDIO INTERAMERICANO DE
DESARROLLO INTEGRAL DE
AGUAS Y TIERRAS

PROGRAMA:

CÓDIGO:

TARJETA	PROGRAMA:	FECHA:
5A4		
VARIABLE	RGN	K1 IMPV UZSN LZSN CB CC K3 K24L K24EL
Formato	5A4	F5.2 F5.2 F5.2 F5.2 F5.2 F5.2 F5.2 F5.2
Valor	SAN RAFAEL DE BOCONQ	10.95 0.05 0.10 0.32 4.04 10.2560.0 0.30 0.0
VARIABLE	RGN	L SS NN IRC KK24 KV
Formato	5A4	F5.0 F5.2 F5.2 F5.2 F5.3 F5.2
Valor	SAN RAFAEL DE BOCONQ	100.0 0.10 0.39 0.55 0.95 0.0
VARIABLE	RGN	UZSI LZSI SGWI GWSI RESI SRGX SCEPI AEP
Formato	5A4	F5.2 F5.2 F5.2 F5.2 F5.2 F5.2 F5.2 F5.2
Valor	SAN RAFAEL DE BOCONQ	0.30 0.91 2.00 0.0 1.0 1.50 0.0
VARIABLE	FPN	AREA KS1 VARK VARL RTEIN ELEM
Formato	7A4	F10.2 F5.2 15 15 15 15
Valor	BOCONO EN BOCONQ	1013.0 0.89 0 0 1 10
VARIABLE	BASEK	KSIV
Formato	5A4	F10.0 10F5.2
Valor		(Sólo si VARK = 1)
VARIABLE		KSIV
Formato		10F5.2
Valor		(Sólo si VARK=1)
VARIABLE	BASEL	LAG
Formato	5A4	F10.0 1015
Valor		
VARIABLE		CHECK COMPAR PLOT PLOTHR MINFW PLOTMX PHRMX
Formato		15 15 15 15 F10.0 F10.0 F10.0
Valor		0 1 1 1 0 10 100 1000

82

Repetir
para
cada

Estación
de

precipita-
ción.

Repetir
para
cada

Repeticion
punto

cada

cauda

para
cada

CIDEIT			PROGRAMA:		
CENTRO INTERAMERICANO DE DESARROLLO INTEGRAL DE AGUAS Y TIERRAS			CODIGO: FECHA:		
BANCO DE PROGRAMAS					
T A R J E T A	Nº	VARIABLE	TI MEAR		
		Formato	10F5.2		
		Valor	0.03 0.03 0.06 0.03 0.19 0.05 0.04 0.21 0.016 0.020		
		VARIABLE	GAGEAR		
		Formato	10I5		
		Valor	1 1 1 1 1 2 2 2 2 2		
		VARIABLE	ADDFW1		
		Formato	10I5		
		Valor	0 0 0 0 0 0 0 0 0 0		
		VARIABLE	ADDFW2		
		Formato	10I5		
		Valor	0 0 0 0 0 0 0 0 0 0		
		VARIABLE			
		Formato			
		Valor			
		VARIABLE			
		Formato			
		Valor			
		VARIABLE			
		Formato			
		Valor			
		VARIABLE			
		Formato			
		Valor			
		VARIABLE			
		Formato			
		Valor			

ANEXO IX

LISTADO Y RESULTADOS DEL MODELO STANFORD IV ORIGINAL

www.bdigital.ula.ve

```

      MAIN
      INTEGER YR2,COMPAR(10),YR,HR,WY,BASE,CTEST,CUTHF,PXIN,EGIN(5),
     1PTTEST,PLOT(10),PLOTHF(10),CKTEST,HRTTEST,COUNT,DISP,DSN,
     2T1,T2,DSN,CN6HF,STORE,ROUTE,SKIP,SNOWA(12),
     3TITLE1
      REAL LZSI(5), MINFW(10), INCHEs(12), KEPTRD(744), MOCHAR(12),
     1KEPTPX(31,24),L,NN,IRC,KK24,INAREA,MINFW,
     1DIMNSION UZSI(5),SGKI(5),RESI(5),SFGXI(5),SCEP1(5),FECDBS(11),
     1KFCPX(12),RGN(5),SSF(10,12),SAFI(10,12),AREAI(10),RECFW(4),PXSIX(4),
     2NUM(12),LASTDA(2,12),HRF(6)
C MAIN,HOURLY AND DAILY VARIABLES
      INTEGER FIRST,CHFCX(10)
      COMMON/MHD/FLDW1(10,744),PHRMX(10),FPN(7),FPNAME(10,7),PLOTHX(10),
     1ACTFLW(10,12,31),SYMFLW(10,12,31),FIRST,CHECK
C MAIN,LAND AND CHANNEL VARIABLES
      INTEGER FLE,FLEMTS(10),GAGEAF(10,10),ADDFW1(10,10),
     1ADDFW2(10,10),TEST1(10),TEST2(10),PTEINT(10),AVEPE,VARK(10),
     2VAFL(10),SNOW,VAPP
      REAL IMPV(5),LZSN(5),K3(5),K24L(5),K24EL(5),KV(5),LKK4(5),
     1LIFC4(5),LZST(5),KS1(10),KSIV(10,20)
      COMMON/MCL/EPIU(24),EPX(5),UZSN(5),CB(5),CC(5),SRC(5),DEC(5),
     1UZSI(5),SGHT(5),GHSI(5),RESI(5),SFGXI(5),SCEPI(5),REPI(5),
     2CFSM(10),PFEVFI(10),TANSI(10,48),EVAP(12,31),
     3FLCX(10,744),RO(5,744),EVAPM(12),SRO(5),SROS(5),SIMPV(5),SINTF(5),
     4SGGEPE(5),SFECH(5),SPR(5),SPE(5),SET(5),TJMEAR(10,10),PEADJ(12),
     5GAGEPE(5),POWEPR,BASEK1(10),BASEL(10),IMPV,LZSN,K3,K24L,K24EL,KV,
     6LKK4,LIFC4,LZSI,KS1,KSIV,MAXL(10),MINL(10),LAG(10,10),
     7TE,MHR,MGRH1,MGRH2,ELE,FLEMTS,GAGEAF,VAPP,SDEP,EPB1AS,IXEP,
     8ADDFW1,ADDFW2,TEST1,TEST2,RTEINT,AVEPE,VARK,VAPP,SNOW,UZSNWF,
     9DEPI(5)
C MAIN,LAND,CHANNEL AND SNOW VARIABLES
      INTEGER SIXHR
      REAL K1(5)
      COMMON/MLCS/FCOVFR(5),FDEN(5),KOHLER,PE(5,31),COVER(5,31),
     1PX(5,31,24),KL, LAST, IIG, IPT, IDA, IHR, MONTH, I, SIXHR
C MAIN,HOURLY,DAILY AND SNOW VARIABLES
      INTEGER YEAR,DA,FINAL
      REAL INFRD(20)
      COMMON/MHDS/X(368),INFRD,LEAPYR,N,YEAR,DA,FINAL
C
      INTEGER POINT,CN,STATE,YR1
      REAL LAGROT(5,30),LIOWI(5),NEGHSI(5)
      DIMENSION SIMSC(10,31),WATER(5,12),WEI(5),EXWATI(5),AESCI(5),
     1SR1(5),SPACI(5),SBWSI(5),AIXI(5),TSI(5),BASIN(20),RGNAME(5,5),
     2TANT(5),TONT(5)
C INITIALIZATION OF DATA
      INIT=0
      FIRST=0
      NEWHY=0
      CTEST=0
      PTEST=0
      CKTEST=0
      HRTTEST=0
      DC 100 I=1,24
      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
      DC 1001 I=1,365
      X(I)=DIST
      1001 DIST=DIST+0.1
      DATA MOCHAR/3HENF,3HFEB,3HMAR,3HABR,3HMAY,3HJUN,3HJUL,3HAGO,3HSEP,
     13HOC,3HNNOV,3HDIC/
      DATA LASTDA/31,31,28,29,31,31,30,30,31,31,30,30,31,31,31,31,31,30,30,
     131,31,30,30,31,31/
      DATA NUM/1,2,3,4,5,6,7,8,9,10,11,12/
C FUN,FAINGAGE AND FLCK-POINT INPUT DATA
C BASIC FUN INFORMATION

```

```

      MAIN

READ 901, INFRO
READ 901, BASIN
PI INT 900
PI INT 903, BASIN
PI INT 902, INFRO
PI INT 904
READ 905, M01,YR1,M02,YR2,NPTS,PXIN,NGAGES,(PGIN(I),I=1,NGAGES)
READ 950,OUTHP,LINHP,NCFLW,AVEPE,POWER,SIXHP,CN6HP,
1STPRE ROUTE,DSPE,SNOW,POINT,INPUT,VAREP,UZSNWF
IF (DSPE.EQ.0) READ DSRO
IF (STPRE.EQ.0) ROUTE=0
IF (SNOW.EQ.0) POINT=0
IF (CN6HP.EQ.0) SIXHR=1
IF (POINT.EQ.0) GO TO 1003
READ 965, PEADJ
READ 965, (GAGEPE(IPG),TRG=1,NGAGES)
IF (AVEPE.EQ.0) GO TO 1003
READ 965, EVAPM
DC 1004 I=1,12
1004 FVAPM(I)=EVAPM(I)*PEADJ(I)/0.254
1003 LEAPYR=0
IF (VARFP.EQ.0) READ 991,SDEP,EPBIAS,IXEP
IF ((YR2-4*(YR2/4)).EQ.0) LEAPYR=1
LAST=LASTDA((LEAPYR+1),M02)
PRINT 206, MCCHAP(M01),YR1,MOCHAR(M02),LAST,YR2
PRINT 907, NPTS,NGAGES
PRINT 936
IF (PCINT.EQ.0) GO TO 1005
C BASIC RAINGAGE INFORMATION -- POINT#1
READ 904,RGN,K1(I)
PRINT 916
IFG=1
PE INT 966,IPG,FGN,K1(I)
DO 1006 I=1,5
1006 RGNNAME(1,I)=RGN(I)
GO TO 1025
1005 PRINT 908
C BASIC RAINGAGE INFORMATION
DO 101 IFG=1,NGAGES
READ 909, PGN,K1(IPG),IMPV(IPG),EPXM(IRG),UZSN(IRG),LZSN(IRG),
1IFC(IRG),CC(IRG),K3(IRG),K24L(IRG),K24EL(IRG)
READ 910, L,SS,NN,IFC,KK24,KV(IRG)
L=L*3.28
SFC(IRG)=1020.0*SQRT(SS)/(NN*L)
DEC(IRG)=0.00382*((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 911, TRG,RGN,K1(IRG),IMPV(IRG),EPXM(IRG),UZSN(IRG),
1LZSN(IRG),CB(IFC),CC(IRG),K3(IRG),K24L(IRG),K24EL(IRG),L,SS,NN,
2IFC,KK24,KV(IFC)
DO 1011 I=1,5
1011 RGNNAME(IRG,I)=RGN(I)
CONTINUE
PRINT 979,PCWER,UZSNWF
PRINT 937
PRINT 912
DC 102 IFG=1,NGAGES
DO 1021 I=1,5
1021 RGN(I)=RGNNAME(IPG,I)
PE INT 913, RGN,UZSI(IRG),LZSI(IPG),SGWI(IRG),GWSI(IRG),
1RESI(IRG),SRGXII(IRG),SCEPI(IPG),AEPI(IPG)
102 CONTINUE
IF (SNOW.EQ.0) GO TO 1024
1025 CONTINUE
IF (PCINT.EQ.0) GO TO 1051
GO TO 1023
1024 IF (NGAGES.LE.3) GO TO 1022
1023 PI INT 900
PRINT 903, BASIN
PRINT 902, INFRO
1022 PRINT 538
PPINT 914
C BASIC FLCK-SCINT INFORMATION
DO 103 IPT=1,NPTS

```

```

      MAIN
      READ 915, FPN, AREA(IPT),KS1(IPT),VARF(IPT),VARL(IPT),
      RTEINT(IPT),ELEMTS(IPT)
      AREA(IPT)=AREA(IPT)*0.3861
      IF (VARF(IPT).EQ.0) GO TO 150
      READ 944, BASEFK(IPT),(KSIV(IPT,I),I=1,10)
      READ 986, (KSIV(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),PLDT(IPT),
      IPLOTIF(IPT),MINFW(IPT),PLOTMX(IPT),PHRMX(IPT)
      ELF=ELEMTS(IPT)
      IF (CCMPAR(IPT).EQ.1) GO TO 1241
      PLDT(IPT)=0
      GO TO 1245
1241  CTFST=1
1245  IF (PLDT(IPT).EQ.0) GO TO 124
      PTFST=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  CKTGST=1
      GO TO 1248
1247  HRGST=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
      IE=ADDFW1(IPT,IE)
      INAREA=INAREA+AREA(I)
      IF (ADDFW2(IPT,IE).EQ.0) GO TO 1243
      TEST2(IPT)=1
      IE=ADDFW2(IPT,IE)
      INAREA=INAREA+AREA(I)
1243  CONTINUE
      CS4(IPT)=26.9*24.0*(AREA(IPT)-INAREA)
      UMAFEA=AREA(IPT)*2.59
      PRINT 918,IPT,FPN,UMAREA,KS1(IPT),RTEINT(IPT),COMPAR(IPT),CHECK(IPT),
      (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 (VARF(IPT).EQ.0) GO TO 1042
      PRINT 985, BASEFK(IPT),(KSIV(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  PSEVFI(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=ELF+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 (INPTS.LE.5) GO TO 1032
      PRINT 900
      PRINT 903, BASIN
      PPINT 902, INFRO
1032  PRINT 972
      PRINT 973, (NUM(I),I=1,12)

```

```

      MAIN
      PRINT 974, (PFAIJ(I),I=1,12)
      PRINT 975, (NUM(IPG),IPG=1,NGAGES)
      PRINT 974, (GASEPE(IPG),IPG=1,NGAGES)
C FIND OF RAIN, CLOUDAGE AND FLOW-POINT INPUT DATA
1051 MCNTH=M01
      YEAF=YR1
C START OF MONTHLY LOOP
C INITIAL MONTHLY VALUES
105  LF/PYR=0
      IF ((YEAR-4*(YEAR/4)).EQ.0) LEAPYR=1
      LAST=LASTDA((LEAPYR+1),MCNTH)
      KOMLFF=0
      DO 106 IF G=1,NGAGES
      UZSI(IPG)=UZSI(IFG)
      LZSI(IPG)=LZSI(IFG)
      SGVI(IPG)=SGVI(IFG)
      RESI(IPG)=RESI(IFG)
      SFGXI(IPG)=SFGXI(IFG)
      SCEPI(IPG)=SCEPI(IFG)
      SPC(IPG)=0.0
      SFOSI(IPG)=0.0
      SIMPV(IPG)=0.0
      SINTF(IPG)=0.0
      SGFII(IPG)=0.0
      SRECH(IPG)=0.0
      SPF(IPG)=0.0
      SPE(IPG)=0.0
106  SET((IPG)=0.0
C INPUT OF MCNTHLY DATA
      IF (MCNTH.EQ.1) GO TO 131
      IF ((YEAR.EQ.YR1).AND.(MCNTH.EQ.M01)) GO TO 1311
      GO TO 132
1311 DC 1312 IPT=1,NPTS
      DO 1312 MO=1,12
      SSF(IPT,MO)=0.0
      DC 1312 IDA=1,31
1312 SINFLW(IPT,MO,IDA)=0.0
131  WY=YEAR
      NEWWY=1
      IF (MCNTH.GT.12) WY=WY+1
      LEAPYF=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 G99,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 G31, MO,CN,RECCBS
      FINAL=CN*10
      BASE=FINAL-9
      IF (CN.EQ.3) FINAL=LASTDA((LEAPYR+1),MO)
      N=BASE-1
      DC 133 IDA=BASE,FINAL
133  EVAP(MO,IDA)=FFFCOR(S(IDA-N))/0.254
C ACTUAL MEAN DAILY FLOWS - BY WATER YEAR
1331 IE (CTGST.EQ.0) GO TO 132
      DC 134 IPT=1,NPTS
      IF (CCMPAF(IPT).EQ.1) GO TO 1342
      DO 1341 MO=1,12
      SAF(IPT,MO)=0.0
      DC 1341 IDA=1,31
1341 ACTFLW(IPT,MO,IDA)=0.0
      GO TO 134
1342 DO 1343 MO=1,12
      SAF(IPT,MO)=0.0
      DC 135 I=1,36
      READ G32, MO,CN,RECCBS
      FINAL=CN*10
      BASE=FINAL-9
      IF (CN.EQ.3) FINAL=LASTDA((LEAPYR+1),MO)
      N=BASE-1
      DO 135 IDA=BASE,FINAL
      DES=FFECOR(S(IDA-N))
      SAF(IPT,MO)=SAF(IPT,MO)+DES
      ACTFLW(IPT,"D",IDA)=NRS
135  CCATINUE
134.

```

MAIN

```

C MONTHLY INPUT DATA
132  IF (SNOW.EQ.0) GO TO 28
      IF (SNOWA(MONTH),EQ.1) GO TO 25
28   DO 26 IFG=1,NGAGES
      DC 27 I=1,30
      LAGRCI(IFG,I)=0.0
      IF (I.GT.12) GO TO 27
      WATRI(I,IFG,I)=0.0
27   CONTINUE
      WEI(IFG)=0.0
      LIGW(I,IFG)=0.0
      EXWATI(IFG)=0.0
      NEGHSI(IFG)=0.0
      AESCI(IFG)=0.0
      SBI(IFG)=0.0
      SPAE(I,IFG)=0.0
      SRWSI(IFG)=0.0
      AIXII(IFG)=0.0
      TSII(IFG)=32.0
      TANT(IFG)=50.0
      TDNT(IFG)=40.0
      DC 26 IDA=1, LAST
      COVER(IFG,IDA)=2.0
      IF (SNOW.EQ.1) GO TO 25
26   DC 29 IFG=1,NGAGES
      FCPOVER(IFG)=1.0
25   FDFN(IFG)=1.0
      IF (ROUTE.EQ.0) GO TO 1320
      DO 20 IFG=1,NGAGES
      READ(1DSRC) KEPTFD
      DO 21 MHP=1,744
      FCL(IFG,MHP)=KEPTFD(MHP)
21   CONTINUE
20   GO TO 400
      IF (NEWHY.EQ.0) GO TO 1321
      READ(978,DISP,DSN,SKIP)
      IF ((DSN.GT.0).AND.(INIT.EQ.0)) REWIND DSN
      INIT=1
      NEWHY=0
      IF (SKIP.EQ.0) GO TO 1321
      DO 1329 I=1,SKIP
      READ(DSN)
1329  IF (DISP.EQ.1) GO TO 1330
      IF (DSN.GT.0) GO TO 1322
C PRECIPITATION -- BY MONTH
1330  DO 109 IFG=1,NGAGES
      DC 109 IDA=1,31
      DC 109 IHF=1,24
109   PX(IFG,IDA,IHR)=0.0
      DO 107 IG=1,PXIN
      DO 1071 I=1,NGAGES
      IF (RGIN(I).NE.IG) GO TO 1071
      IHRG=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 (ISIXHR.EQ.1) GO TO 1081
      BASE=(CN-1)*12
      DO 108 IHF=1,12
      HR=BASE+IH
      108  PX(IFG,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
      DC 1082 I=1,6
1082  PXSIX(1)=PXSIX(1)+RECPX(I)
      DC 1083 I=7,12
1083  PXSIX(2)=PXSIX(2)+RECPX(I)
      DC 1084 IHF=1,2
      HR=BASE+IH
      1084  PX(IFG,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 (DISP.EQ.0.0) GO TO 400
      DO 1327  IEG=1,NGAGES
      DO 1328  IDA=1,31
      DO 1329  IHR=1,24
1328  KEPPTX(IDA,IHR)=PX(IPG,IDA,IHR)
1327  WRITE(LSN) KEPPTX
      GO TO 400
1322  DO 1323  IG=1,PXIN
      DO 1324  I=1,NGAGES
      IF (IGIN(I).NE.IG) GO TO 1324
      IRG=?
      GO TO 1325
1324  CONTINUE
      READ(DSN)
      GO TO 1323
1325  READ(DSN) KEPPTX
      DO 1326  IDA=1,31
      DO 1326  IHR=1,24
1326  PX(IPG,IDA,IHR)=KEPPTX(IDA,IHR)/2.54
1323  CONTINUE
C INSTANTANEOUS ACTUAL FLOWS--BY MONTH
C HOURLY FLOW -- CNE STATION
400   IF (PCINT.EQ.1) GO TO 122
      IF (HFTEST.EQ.0) GO TO 401
      DO 405  IPT=1,NPTS
      IF (CHECK(IPT).NE.2) GO TO 405
      DO 402  I=1,744
      FLOW1(IPT,I)=0.0
403   READ(971,STATE,MN,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
      FLOW1(IPT,MHR)=HRFW(I)
      GO TO 403
405   CONTINUE
401   IF (CKTEST.EQ.0) GO TO 122
C SIX HOUR FLOWS
406   DO 406  IPT=1,NPTS
      IF (CHFCK(IPT).NE.1) GO TO 406
      DO 407  I=1,744
      FLOW1(IPT,I)=0.0
408   READ(970,STATE,MN,DA,YR,RECFW,T1,P1,T2,P2
      IF (STATE.EQ.39) 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(MNTH).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(MNTH).EQ.0) GO TO 113
      DO 116  IPG=1,NGAGES
C
116  CONTINUE
      IF (PCINT.EQ.1) GO TO 1259
C COMPUTATION OF SIMULATED CHANNEL INFLOW AND STREAMFLOW
113  DO 112  IPG=1,NGAGES
      CALL LAND

```

```

        MAIN

112  CONTINUE
114  DO 117 TPT=1,NPTS
      CALL CHANNEL
117  CONTINUE
C MONTHLY SUMMARY
      IF (STOFF.EQ.0) GO TO 1211
      DD 22 IPG=1,NGAGES
      DD 23 MHR=1,744
23   KEPTRD(MHR)=RD(IPG,MHR)
      WRITE (DSR01) KEPTRD
22   CONTINUE
      GO TO 1210
1211  IF (REUTE.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
      DD 125 IPG=1,NGAGES
      DC 1251 I=1,5
1251  FGN(I)=FNAME(IRG,I)
      PRINT 927, IPG,RGN,SP0(IPG),SP0S(IPG),SIMPV(IPG),
      LSINT(IPG),SGWF(IPG),SPECH(IPG),SPR(IPG),SPE(IPG),
      2SFT(IPG)
125  CONTINUE
      PRINT 941
      PPINT 942
      DC 1252 IPG=1,NGAGES
      BAL=(LZSI(IPG)+UZSI(IPG)+RESI(IPG)+SRGXI(IPG)-LZS1(IPG)-UZS1(IPG)
      1-RESI(IPG)-SRGXI(IPG))*[1.0-IMPV(IPG)]+SGWI(IPG)+SCEPI(IPG)
      2-SG41(IPG)-SCEPI(IPG)+SP0(IPG)+SET(IPG)+SPECH(IPG)-SPR(IPG)
      DC 1253 I=1,5
1253  FGN(I)=FNAME(IPG,I)
      PRINT 943, RGN,UZSI(IPG),LZSI(IPG),SGWI(IPG),GWSI(IPG),
      RESI(IPG),SPGX1(IPG),SCEPI(IPG),AEP1(IPG),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.0) GO TO 1361
C SNOW COVER ABOVE EACH FLOW-PCINT
      IF (NPTS.EQ.0) GO TO 1257
      DD 300 IPT=1,NPTS
      ELE=ELMTS(IPT)
      DC 301 IDA=1,LAST
      SIMSC(IPT,IDA)=0.0
      DC 301 IE=1,ELE
      IF G=CAGEAP(IPT,IE)
      SIMSC(IPT,IDA)=SIMSC(IPT,IDA)+COVER(IPG,IDA)*TIMEAP(IPT,IE)
301  CONTINUE
      ALDCAL=CFSM(IPT)/(26.9*24.0)
      P1=ALDCAL/AREA(IPT)
      IF (P1.EQ.1.0) GO TO 300
      DC 305 IDA=1,LAST
      SIMSC(IPT,IDA)=SIMSC(IPT,IDA)*P1
      DC 312 IF=1,ELE
      IF ADDFW1(IPT,IE)
      P2=(4PEA1(I)/APEA(IPT))
      DC 303 IDA=1,LAST
      SIMSC(IPT,IDA)=SIMSC(IPT,IDA)+SIMSC(I,IDA)*P2
      I=4PEA1(IPEA(IPT))
      IF (I.EQ.0) GO TO 302
      P2=(APEA(I)/APEA(IPT))
      DC 304 IDA=1,LAST
      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 982
      PRINT 929
      PPINT 944,(NUM(IPT),IPT=1,NPTS)

```

```

      MAIN
      DO 306 IDA=1,LAST
306  PPINT 993,IDA,(SIMSC(IPT,IDA),IPT=1,NPTS)
C COMPUTE MEAN DAILY SIMULATED FLOW
1257  DC 126 IPT=1,NPTS
      SSF(IPT,MONTH)=0.0
      DO 123 IDA=1,LAST
      I=(IDA-1)/24
      TEMPFL=0.0
      DC 127 IHR=1,24
      MHR=I+THP
127  TEMPFL=TEMPFL+FLOW(IPT,MHR)
      TEMPFL=TEMPFL/24.0
      SIMFLW(IPT,MONTH,IDA)=TEMPFL
128  SSF(IPT,MONTH)=SSF(IPT,MONTH)+TEMPFL
126  CONTINUE
C OUTPUT HOURLY SIMULATED FLOWS ABOVE PRESET VALUE
      IF (PUTHR.EQ.0) GO TO 137
      TITLEF=0
      DO 138 IPT=1,NPTS
      MINFWT=MINFW(IPT)
      DC 139 T=1,7
139  FPN(I)=FPNAME(IPT,I)
      TITLEI=0
      DC 140 IDA=1,LAST
      IF (SIMFLW(IPT,MONTH,IDA).LT.MINFWT) GO TO 140
      IF (TITLE.EQ.1) GO TO 1391
      TITLEI=1
      PRINT 900
      PFINT 903, BASIN
      PFINT 924, MOCHAR(MONTH),YEAR
      PRINT 945
1391  IF (TITLE1.EQ.1) GO TO 1392
      TITLEI=1
      PFINT 946, FPN,MINFWT
1392  MOHR2=IDA*24-12
      MOHR1=MOHR2-11
      MOHF1=MOHR1+12
      MOHF2=MOHR2+12
      PPINT 947, IDA,(FLCW(IPT,MHR),MHR=MOHR1,MOHR2)
      MOHR1=MOHR1+12
      MOHF2=MOHF2+12
      PPINT 948, (FLOW(IPT,MHR),MHR=MOHR1,MOHR2),
      1SIMFLW(IPT,MONTH,IDA)
140  CONTINUE
138  CONTINUE
C OUTPUT MEAN DAILY SIMULATED FLOW
137  IF (NCFLW.EQ.1) GO TO 1362
      PRINT 900
      PRINT 903, BASIN
      PFINT 924, MOCHAR(MONTH),YEAR
      PRINT 928
      PPINT 929
      PFINT 944, (NUM(IPT),IPT=1,NPTS)
      DO 129 IDA=1,LAST
129  PPINT 930, IDA,(SIMFLW(IPT,MONTH,IDA),IPT=1,NPTS)
      PPINT 935, (SSF(IPT,MONTH),IPT=1,NPTS)
C OUTPUT MEAN DAILY ACTUAL FLCW
      IF (CKTEST.EQ.0) GO TO 1362
      PRINT 900
      PFINT 903, BASIN
      PRINT 924, MOCHAR(MONTH),YEAR
      PRINT 933
      PPINT 929
      PRINT 944, (NUM(IPT),IPT=1,NPTS)
      DO 136 IDA=1,LAST
136  PPINT 930, IDA,(ACTFLW(IPT,MONTH,IDA),IPT=1,NPTS)
      PPINT 935, (SF(IPT,MONTH),IPT=1,NPTS)
C PLCTTING OF HOURLY FLCW
1362  IF ((IHRTEST.EQ.0)).AND.(CKTEST.EQ.0)) GO TO 1363
      DO 820 IPT=1,NPTS
      IF (PLOTHR(IPT).EQ.0) GO TO 920
      CALL HOURLY(INFDC,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 910 IPT=1,NPTS
      DO 911 I=1,7
811  FPN(I)=FPNAME(IPT,I)
      PRINT 952, FPN

```

PL
PL

```

MAIN
PRINT 953, YEAF
PRINT 954
PRINT 955
PRINT 956
N=24
IF (LFAPYR.EQ.1) N=29
DO 812 IDA=1,N
PRINT 957, IDA,(SIMFLW(IPT,MD,IDA),MD=1,12)
IF ((IDA-5*(IDA/5)).EQ.0) PRINT 956
CONTINUE
N=N+1
DO 813 IDA=N,30
PRINT 958, IDA,SIMFLW(IPT,1,IDA),(SIMFLW(IPT,MD,IDA),MD=3,12)
CONTINUE
IDA=31
PRINT 959, IDA,SIMFLW(IPT,1,31),SIMFLW(IPT,3,31),SIMFLW(IPT,5,31),
SIMFLW(IPT,7,31),SIMFLW(IPT,8,31),SIMFLW(IPT,10,31),SIMFLW(IPT,12,
231)
CINV=26.9*AREA(IPT)
WYFLOW=0.0
DO 814 MC=1,12
TEMPFL=SSF(IPT,MC)*35.31
INCHEFS(MC)=(TEMPFL/CINV)*25.4
814 WYFLOW=WYFLOW+TEMPFL*0.02332
PRINT 960, (SSF(IPT,MC),MC=1,12),WYFLOW
WYFLOW=((WYFLOW*35.31)/CINV)*25.4
PRINT 961, (INCHEFS(MC),MC=1,12),WYFLOW
WYFLOW=WYFLOW*AREA(IPT)*2.59
PRINT 962, WYFLOW
IF (CCMPAR(IPT).EQ.0) GO TO 810
WYFLOW=0.0
DO 815 MC=1,12
TEMPFL=SSF(IPT,MC)
INCHEFS(MC)=(TEMPFL*36.4)/UMAREA
WYFLOW=WYFLOW+TEMPFL
PRINT 963, (SSF(IPT,MC),MC=1,12),WYFLOW
WYFLOW=(WYFLOW*36.4)/UMAREA
PRINT 961, (INCHEFS(MC),MC=1,12),WYFLOW
WYFLOW=WYFLOW*UMAREA
PRINT 962, WYFLOW
PL
PL
PL
PL
810 CONTINUE
C PLOTTING OF SIMULATED VERSUS OBSERVED MEAN DAILY FLOW--BY WATER YEAR
IF (PTEST.EQ.0) GO TO 1361
LPI=0
IF (LNFP.EQ.1) GO TO 800
IF (FIRST.EQ.1) GO TO 800
FIRST=1
800 DO 801 IPT=1,NPTS
IF (PLNT(IPT).EQ.0) GO TO 801
IF (LNFP.EQ.1) GO TO 802
CALL RAILY(INF0,MONTH,YEAF,IPT)
GO TO 801
802 IF (LPI.EQ.1) GO TO 803
LN=3
IF (CCMPAR(NPTS).EQ.0) LN=LN+4
DO 804 I=1,LN
804 PRINT 949
LPI=1
803 DO 805 I=1,4
805 PRINT 949
CALL LPLOT(YEAR,IPT)
801 CONTINUE
C INCREMENT TO THE NEXT MONTH
1361 IF ((YEAF.EQ.YF2).AND.(MONTH.LE.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 (1H0,20A4)
903 FORMAT (1H1,20X,20A4)
904 FORMAT (1H0,47X,32HINFORMACION BASICA DE LA CORRIDAS)
905 FORMAT (7I5,5I3)

```

MAIN

```

906 FORMAT(1HO,27HINICIO DE LA CORTIDA 1 DE,1X,A+,1X,5HDE 19,I2,6X,1
14HFINAL DE LA CORTIDA,3X,I2,4H DE ,14,6H DE 19,I2)
907 FORMAT(1HO,2BHNUMERO DE PUNTOS DE FLUJO) = ,I2,I2X,42HNUMERO DE EST
1. DE MED. UF PRECIPITACION = ,13)
908 F0F0F04141HO,4H EST,2X,16HNCMPE DE LA EST,7X,2HK1,3X,4HIMPV,2X,
14HCPXM,3X,4HJZSN,3X,4HLZSN,4X,2HCR,4X,2HCC,4X,2HK3,4X,4HK24L,2X,
25HK24EL,4X,1H,5X,2HSS,5X,2H,4X,3HIRC,4X,4HKK24,4X,2HKV)
909 FORMAT(544,3F5,2,2F5,1,F5,2)
910 FORMAT(20X,RF5.1)
911 FORMAT(1H,13,3X,544,3F6.2,2F7.2,F7.3,2F6.2,2F7.2,F7.0,F6.2,
1F7.2,F6.2,F7.3,F7.2)
912 F0FORMAT(1HO,17HNDMBE DE LA EST.,12X,3HUZS,4X,3HLZS,4X,3HSGW,4X,
13HGWS,4X,3HRES,3X,4HSRGA,3X,4HSCEP,3X,4HAEPI)
913 FORMAT(1H,5A4,6X,3F7.2)
914 F0FORMAT(1HO,3H PF,1X,25HNCMPE DEL PUNTO DE FLUJO,9X,4HAREA,3X,3HKS
11,2X,4HPTIN,2X,7HCOPAP,2X,4HCHEK,2X,10HISTOGRAMS)
915 FORMAT(7A4,2X,F10.2,F5.2,4I5)
916 FORMAT(1HO,3H FG,3X,13HFAINGAGE NAME,10X,2HK1)
917 FORMAT(30X,0F5.2)
918 FORMAT(1H,13,3X,7A4,F8.2,F6.2,I5,2I7,5X,9HTIMEDELAY,10F5.2)
919 FORMAT(1H,72X,BHGA,GEAPEA,1X,10I5)
920 FORMAT(1H,72X,BHADDFLCW1,1X,10I5)
921 FORMAT(1H,72X,BHADDFLCW2,1X,10I5)
922 FORMAT(I2,7X,3I3,I2,12F5.2)
923 FORMAT(1H,20HSUMARIO MENSUAL PARA,1X,20A4)
924 FORMAT(1HO,A4,3H 19,I2)
925 F0FORMAT(1HO,31X,42HSUMARIO PARA LAS ESTACIONES PLUVIGRAFICAS)
926 F0FORMAT(1HO,4H EST,2X,17HNDMBE DE LA EST.,6X,8HTOTAL RO,3X,
11DHSINTERFACE RO,3X,7HIMPV PO,3X,9HINTERFLOW,3X,7HGW FLOW,3X,
28HARFAFGE,3X,6HPRECIP,3X,12HPOTENTIAL-FT,3X,9HACTUAL-FT)
927 FORMAT(1H,13,3X,544,F12.3,F12.3,4F11.3,F9.2,2F13.3)
928 FORMAT(1HO,5HDIA,19X,14H PUNTO DE FLUJO)
929 FORMAT(1H,5X,10F10.1)
930 FORMAT(9X,12,11,11F6.3)
931 FORMAT(9X,12,11,11F6.0)
932 FORMAT(1HO,43X,45HSUMARIO DE LA DESCARGA MEDIA DIARIA SIMULADA)
933 FORMAT(30X,10I5)
934 FORMAT(30X,10I5)
935 F0FORMAT(1HO,5HTOTAL,5X,10F10.1)
936 F0FORMAT(1HO,48X,28HPARAMETROS PARA LA VERTIENTE)
937 F0FORMAT(1HO,41X,25HALMACENAMIENTOS INICIALES)
938 F0FORMAT(1HO,+5X,29HPARAMETROS DE PUNTOS DE FLUJO)
939 FORMAT(20X,0,3F5,2,F5,3,F5,2)
940 FORMAT(1HO,12X,77HCOMPONENTES DE LA EVAPOTRANSPIRACION, DE LA PREC
1IPITACION Y DE LA ESCORRENTE)
941 FORMAT(1HO,3X,32HALMACENAMIENTOS AL FINAL DEL MES)
942 FORMAT(1HO,17HNDMBE DE LA EST.,12X,3HUZS,4X,3HLZS,4X,3HSGW,4X,
13HGWS,4X,3HPFS,3X,4HSF5X,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
15,F7.0,5H MCSG)
947 FORMAT(1HO,13,3X,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(1H,05X,3BHSIMULACION 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,3HFNE,6X,3HCCR,6X,3HMAR,6X,3HAPP,6X,3HMAY,
14X,5HJUNIO,4X,5HJULIO,6X,3HAGO,5X,4HSEPT,5X,4HOCTB,3X,6HNOVIEM,5X,
24HOCIE,7X,5HANUAL)
956 FORMAT(1HO)
957 FORMAT(1H,15,12F9.2)
958 FORMAT(1H,15,F9.2,6X,10F9.2)
959 FORMAT(1H,15,FG,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,12F0.1,F10.1,6H MILIM)
962 FORMAT(1H,111X,F12.3,7H 1000MC)
963 FORMAT(5HDESV.,12F9.0,F10.0,6H MCAGD)
964 FORMAT(12F5,3)
965 FORMAT(12F5,3)
966 FORMAT(1H,13,3X,544,F6.2)
970 FORMAT(12,7X,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)

```

```
      MAIN
973 FORMAT(1H0,17HA JUSTE ESTACIONAL,1X,3HMES,9X,12I5)
974 FORMAT(1H ,27X,6HA JUSTE,8X,12F5.2)
975 FORMAT(1H0,18HA JUSTE PARA LA EST,08X,8HESTACION,6X,12I5)
976 FORMAT(30X,4I5,3F10.0)
977 FORMAT(3I5)
979 FORMAT(1H0,10X,34H INFILTRATION CURVE POWER FACTOR IS,F5.1,10X,
116H UZSN WT. FACTOR#,F5.2)
984 FORMAT(F10.0,10F5.2)
985 FORMAT(1H ,3X,17H VARIABLE K  BASE#,F6.0,3X,2HK#,20F5.2)
986 FORMAT(10X,10F5.2)
987 FORMAT(1H ,3X,20H VARIABLE LAG  BASE#,F6.0,3X,4HLAG#,10I5)
988 FORMAT(F10.0,10I5)
989 FORMAT(12I5)
990 FORMAT(3X,2H99)
991 FORMAT(2F5.2,T10)
992 FORMAT(1H0,43X,34H SIMULATED AREAL SNOW COVER SUMMARY)
993 FORMAT(1H ,15,5X,10F10.2)
C END OF MAIN PROGRAM
      STOP
      END
```

www.bdigital.ula.ve

```

      LAND

C SUBROUTINE LAND
C LAND SURFACE RUNOFF SUBROUTINE
C LAND VARIOUS LAND SURFACE VARIABLES
      REAL LZS,K1T,LZSNT,K3T,K24LT,KVT,LKK4T,LIFC4T,INTF,LNRAT,
      INTFL,LZI,LZS
C MATHEMATICAL AND CHANNEL VARIABLES
      INTEGER FILE,LLFTS(10),GAGEAF(10,10),ADDFW1(10,10),
      LLDFW1(10,10),TEST1(10),TEST2(10),PTEINT(10),AVEPE,VARK(10),
      2VAF(10),SNOW,VAREP,
      REAL IMPV(5),LZSN(5),K3(5),K24L(5),K24EL(5),KV(5),LKK4(5),
      LIFC4(5),LZSI(5),KS1(10),KSIV(10,20)
      COMMON/MCL/PPD1ST(24),EPXM(5),UZSN(5),CR(5),CC(5),SRC(5),DEC(5),
      UZSI(5),SGWI(5),GWSI(5),SPGX(5),SCPI(5),REP1(5),
      2CFSA(10),PFVFE(10),TEANST(10,48),EVAP(12,31),
      BFL7W(10,744),PD(5,744),EVADW(12),SF(5),SPGS(5),SIMPV(5),SINTF(5),
      4SGWF(5),SFC(5),SPF(5),SET(5),TIMEAR(10,10),PEADJ(12),
      SGAGEPE(5),POWER,FASEK(10),BSEL(10),IMPV,LZSN,K3,K24L,K24EL,KV,
      6LKK4,LIFC4,LZSI,KS1,KSIV,MAXL(10),MINL(10),LAG(10,10),
      TIE,MHR,MHFL,MHFR2,ELE,ELEMENTS,GAGEAF,VAREP,SDEP,EPBIAS,IXEP,
      RADDW1,ADDFW2,TFST1,TEST2,PTEINT,AVEPE,VARK,VARL,SNUW,UZSNWF,
      GAEP(5)
C MAIN,LAND,CHANNEL AND SNOW VARIABLES
      INTEGER SIXHR
      REAL K1(5)
      COMMON/MICS/FCOVER(5),FDEN(5),KCHLER,PE(5,31),COVER(5,31),
      IPA(5,31,24),KI,LAST,IKG,IPT,IDA,INH,MONTH,I,SIXHR
C LAND INITIAL VALUES
      SRHT=0.0
      SECST=0.0
      SINFT=0.0
      SGHT=0.0
      SIMPV=0.0
      SFECHT=0.0
      SETT=0.0
      SPFT=0.0
      SPFT=C.C
C INITIAL VALUES OF VARIABLES
      UZS=UZSI(IPG)
      LZS=LZSI(IPG)
      SGK=SGWI(IPG)
      GKS=GWSI(IPG)
      PFS=EST(IPG)
      SF_GX=SFGXI(IPG)
      SCFF=SCPEI(IPG)
      FEP=FEPI(IPG)
      AEPIT=AEP(1,IPG)
C INITIAL VALUES OF PARAMETERS
      K1T=K1(1,IPG)
      AT=IMPV(IPG)
      PA=1.0-AT
      EPXT=EPXM(IPG)
      UZSN=UZSN(IPG)
      LZSNT=LZSN(IPG)
      K3T=K3(IPG)
      K24LT=K24L(IPG)
      K24ELT=K24EL(IPG)
      CR1=CR(1,IPG)
      CCT=CC(IPG)
      KV=KV(IPG)
      SPCT=SPC(IPG)
      DECT=DEC(IPG)
      LKK4T=LKK4(IPG)
      LIFC4T=LIFC4(IPG)
      EFC=FCOVER(IPG)*FDEN(IPG)
      THF=1
      IDA=1
C BEGINNING OF HOUR AND DAY LOOP
C VALUES OF POTENTIAL EVAPOTRANSPIRATION AND PRECIPITATION
203  IF (THF.NE.1) GO TO 206
      IF (KCHLER.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(IPG,1,14)*PEADJ(MONTH)
      IF (VAFFP.EQ.0.0) GO TO 202
      SD=EP*SDEP

```

```

        LAND

        CALL IGAUSS(TXFP,SC,EP,TV)
        EP=TV+EPBIAS*EP
        IF (EP.LT.0.0) EP=0.0
        EP=EP*GAGEFEE(IFG)
        EPFT=EP
        SPFT=SPFT+EP
        EP=EP*(1.0-EFC)*(1.0-COVER(IRG,IDA))*EP
        AEPIT=(AEPIT*0.9)+EP
        UZSNT=UZSNC+UZSNWF*AEPIT
        IF ((SIXHF.EQ.0).OR.(SNOW.EQ.1)) GO TO 208
        IS=(IHP+5)/6
        PX1=PX(IFG,IDA,IS)/6.0
        GO TO 207
        208  PX1=PX(IFG,IDA,IHP)
        IF (SNOW.EQ.1) GO TO 2081
        207  PX1=PX1*K1T
        2081 SPFT=SPFT+PX1
        PR=PX1
        C PX1 IS HOURLY PRECIPITATION -- PR IS HOURLY PRECIPITATION
        RU=0.0
        IF (PR.GT.0.0) GO TO 210
        210  IF (PR.EQ.0.0) GO TO 211
        P3=0.0
        GO TO 212
        211  IF (SRGX.EQ.0.0) GO TO 213
        P3=0.0
        POS=0.0
        GO TO 214
        213  P3=0.0
        POS=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
        2121 P3=PR-EPX
        SCEP=SCEP+EPX
        C P3 IS FATE REACHING THE GROUND
        C P3=AT IS IMPREVIOUS AREA RUNOFF VOLUME
        SIMFVT=SIMFVT+P3*AT
        C BEGIN 15 MINUTE LOOP
        212  FCS=0.0
        GWIN=0.0
        GO 209 I15=1,4
        P4=0.25*P3+RFS
        IF (P4.EQ.0.0) GO TO 209
        LN RAT=LZS/LZSNT
        D3FV=CBT/(LN RAT)**POWER
        D4F=0.25*D3FV
        C P4 IS P3 PLUS SURFACE DETENTION STORAGE
        RATIO=CCT*(2.0**LN RAT)
        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=INFIL-P4D
        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 INTEFFLOW DETENTION
        C UPPER ZONE CALCULATIONS
        IF ((UZS.GE.(2.0*UZENT)) GO TO 224
        UZI=2.0*ARS((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*ARS(((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

```

LAND

```

225  RGX=FGXX*PPE
C FGX IS THE VOLUME TO INTERFLOW DETENTION STORAGE
SGX=SRGX+FGX
C SRGX IS INTERFLOW DETENTION STORAGE
FX=PXX*PPE
C RX IS THE VOLUME TO OVERLAND FLOW AND SURFACE DETENTION
LZS=U/S*SHD-FGX-FX
C UZS IS UPPER ZONE STORAGE VOLUME
C OVERLAND FLOW
IF (FX>LE, PES) GO TO 226
JF=DFC1*((RX-PES)**0.6)
C DE IS SURFACE DETENTION AT EQUILIBRIUM
GO TO 227
DE=(PES+FX)*0.5
227  D=(PES+FX)*0.5
C D IS AVERAGE SURFACE DETENTION
IF (D.GT.DE) DE=D
IF (D.LE.0.005) GO TO 228
F0ST=0.25*SFCT*(D**1.67)*((1.0+0.6*((D/DE)**3.0))**1.67)
GO TO 229
228  R0ST=0.0
229  IF (R0ST.GT.(0.75*FX)) R0ST=0.75*RX
C R0S IS OVERLAND FLOW VOLUME
SFCT=SF0ST+R0ST
FES=FX-R0ST
FCS=FCS+R0ST
C R0S IS SURFACE DETENTION STORAGE VOLUME
IF (FES.GE.0.001) GO TO 230
LZS=LZS+FES
FES=0.0
C LOWER ZONE AND GROUNDWATER CALCULATIONS
230  LZI=1.5*APS*((LZS/LZSNT)-1.0)+1.0
PPE=(1.0/(1.0+LZI))*LZI
IF (LZS.LT.LZSNT) PRE=1.0-PPE*(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
PICH=F1A*K24LT*PA
C RECH IS DEEP GROUNDWATER RECHARGE
SPECIIT=SRECHT+RECH
SGW=SGW+F1
C SGW IS GROUNDWATER STORAGE VOLUME
GWS=GWS+F1
C GWS IS ANTECEDENT GW INFLOW INDEX
C INTFFLOW CALCULATIONS
214  INTF=L1FC4T*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
SGK=SGW-GWF
C RU IS TOTAL LAND SURFACE RUNOFF VOLUME
RU=RUI+(FDST+INTF)*PA+P3*AT+GWF
C EVAP-TRANS LOSSES FROM INTERCEPTION AND UPPER ZONE STORAGES
EPHR=EPDIST*(THK)*EP
IF (EPHR.EQ.0.0) GO TO 234
IF (SCFP.LE.0.0) GO TO 235
IF (SCFP.LE.EPHR) GO TO 236
SCFP=SCFP-EPHR
SETT=SETT+EPHR
EPHR=0.0

```

LAND

```

GC_T=234
SETT=SETT+SCFP
EPHF=EPHF-SCFP
SCFP=0.0
IF ((UZS.LE.0.0) GO TO 237
IF ((UZS.LE.EPHF) GO TO 238
SETT=SETT+PA*EPHF
UZS=UZS-EPHF
EPHF=0.0
GC_T=234
SETT=SETT+UZS*PA
EPHF=EPHF-UZS
UZS=0.0
RFF=EPF+EPHF
C REP IS RESIDUAL POTENTIAL EVAPOTRANSPIRATION
C SLOW PUFFATION FROM UPPEF ZONE
DEEPL=(UZS/UZSNT)-(LZS/LZSNT)
IF (DEEPL.LE.0.0) GO TO 239
LNRA=LZS/LZSNT
FFCE=0.03*KHT*UZSNT*(DEEPL**3.0)
UZS=UZS-FFCE
LZI=1.5*ABS(LNRA-1.0)+1.0
PFF=(1.0/(1.0+LZI))**LZI
IF (LZS.LT.UZSNT) PRE=1.0-PRE*LVRAT
F3=PRE*REC
F1A=(1.0-PRE)*FFCE
F1=F1A*(1.0-K24LT)*PA
REC=1A*K24LT*PA
RECHT=REC+REC
LZS=LZS+F3
SGK=SGN+F1
GWS=GWS+F1
C EVAP-TRANS FROM GROUNDWATER AND LOWER ZONE
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
SGK=SGN-LOS
GWS=GWS-LOS
IF (GWS.LT.0.0) GWS=0.0
EP=REP
IF (EP.EQ.0.0) GO TO 242
LNRA=LZS/LZSNT
IF (EP.GE.(K3T*LNRA)) GO TO 240
AETR=EP*(1.0-(EP/(2.0*K3T*LNRA)))
LZS=LZS-AETR
GO TO 241
SETP=0.5*K3T*LNRA
LZS=LZS-AETP
SETT=SETT+PA*AETP
C AETR IS LOWER ZONE EVAPOTRANSPIRATION VOLUME
REP=0.0
242 CREAT TRUE
MHE=(IDA-1)*24+IHR
RC(IFG,MHR)=PU
SACT=SROT+RU
IF ((IDA.EQ.LAST).AND.(IHP.EQ.24)) GO TO 246
IHF=IHS+1
IF (IHF.LE.24) GO TO 203
IHF=1
IDA=IDA+1
GO TO 203
C END OF HOUR AND DAY LOOP
C LAND CAPTURE VALUES
246 UZS(IHG)=UZS
LZS(IHG)=LZS
SGN(IHG)=SGW
GWS(IHG)=GWS
FFSI(IHG)=RES
SGX(IHG)=SGX
SCFP(IHG)=SCFP
REP(IHG)=REP
AEP(IHG)=AEPIT
SFC(IHG)=SFC
SCFS(IHG)=SCFCST
SINTF(IHG)=SINTFT

```

LAND
SIMPV{1FG} = SIMPVT
SGWF{1FG} = SGWFT
SPPCH{1FG} = SPPFCHT
SPRT{1FG} = SPRT
SPET{1FG} = SPET
SETT{1FG} = SETT
RETUFN
END

www.bdigital.ula.ve

```

        HOURLY

      SUBROUTINE HOURLY(INFFD,MONTH,YEAR,IPT,FLOW)
C  SUBROUTINE GENERATES SCALED INPUT FOR AUXILIARY PLOT PROGRAM
      INTEGER YEAR,DAI,DA2
      REAL TWFEO(20),MCHLF(12)
      DIMENSION YA(752),YS(752),A(31),NUM(31),FLCW(10,744)
C  MAIN,HOURLY AND DAILY VARIABLES
      INTERFACE FIRST,CHECK(10)
      COMMON/MHR/FLW1(10,744),PHFMX(10),FPN(7),FPNAME(10,7),PLOTMX(10),
     1ACTFLW(10,12,31),SIMFLW(10,12,31),FIRST,CHECK
      DATA MOCHAD/3HJAN,3HFEB,3HMAF,3HAPR,3HMAY,4HJUNE,4HJULY,3HAUG,
     14HSEPT,3HDEC,3HNNOV,3HDFC/
      MOHR1=1
      M6=6
880  IF (CHECK(IPT).EQ.0.1) GO TO 855
C  DETERMINE FIRST AND LAST HOUR OF PLOT AND NUMBER OF POINTS
C  HOURLY FLOW
      DO 850 MHR=MCHR1,744
      IF (FLW1(IPT,MHR).EQ.0.0) GO TO 850
      MOHR1=MHR
      GO TO 851
850  CONTINUE
      GO TO 899
851  FIRST=1
      DO 852 MHR=MCHR1,744
      IF (FLW1(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 (FLW1(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 (FLW1(IPT,MHR).GT.0.0) GO TO 858
      MOHR2=MHR-6
      GO TO 859
859  CONTINUE
      MOHR2=744
      MOHR1=M6-5
      DO 860 MHR=MCHR1,M6
      IF (FLW1(IPT,MHR).EQ.0.0) GO TO 860
      MOHR1=MHR
      GO TO 861
860  CONTINUE
      F1=FLCW1(IPT,MOHR1)
      M1=MOHR1+1
864  DO 862 MHR=M1,MOHR2
      IF (FLW1(IPT,MHR).EQ.0.0) GO TO 862
      M2=MHR
      F2=FLCW1(IPT,MHR)
      GO TO 863
862  CONTINUE
      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  FLCW1(IPT,MHR)=F1+FP*X1
      IF (M2.EQ.MOHR2) GO TO 870
      M1=M2+1
      F1=F2
      GO TO 864
870  IPT=MCHR2-MOHR1+1
      DA1=(MCHR1-1)/24+1
      DA2=(MOHR2-1)/24+1
      DA3=DA2-DA1+1
      I=MOHR1-(DA1-1)*24
      X1=I*0.1
      DO 871 I=1,NDA
      NLV(I)=DA1-I+1
      A(I)=2.4*I
      PMAX=PHFMX(IPT)

```

```

HOURLY

872      DELTA=PMAX*0.1
873      PUNCH 900,NDA,DELTA,X1,NPT
874      PUNCH 901,(I(I),I=1,NDA)
875      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,MCHAR(MCNTH),YEAR
PUNCH 907,INFR0
PUNCH 908
875      MC=MCHR1,MOHR2
T=MHR-MCHR1+1
YA(I)=(FLCW1(IPT,MHR)/PMAX)*10.0
YS(I)=(FLCW(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
CONTINUE
PUNCH 909,(YA(I),I=1,NPT)
PUNCH 909,(YS(I),I=1,NPT)
IF (MOHR2.EQ.744) GO TO 899
MCHR1=MCHR2+1
M6=MOHR2+6
GO TO 980
890      CONTINUE
C HOURLY FORMAT STATEMENTS
900      FORMAT (15,F10.2,F5.1,I5)
901      FORMAT (16F5.1)
902      FORMAT (20I3)
903      FORMAT (16H1HURLY FLOW--CFS)
904      FORMAT (20HSIX HOURLY FLCW--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)
RETUPN
END

```

```

      CHANNEL
C CHANNEL ROUTING SUBROUTINE
C CHANNEL VARIABLES
      INTEGER, GAGET(10), ADDIT(10), ADD2T(10), HALFR, PINT, DHR, VK, VL
      REAL KV1(20), KS1T, IN, K
      DIMENSION TPS(792), TIMET(10), LAGT(10)
C MAIN AND CHANNEL VAR TABLES
      IF (IER .EQ. 1, ELEMTS(10), GAGEAR(10,10), ADDFW1(10,10),
1000FW2(10,10), TEST1(10), TEST2(10), RTEINT(10), AVEPE, VARK(10),
2VAF(10), SN7W, VAFEP,
      REAL IMPV(5), LZSN(5), K3(5), K24L(5), K24EL(5), KV(5), LKK4(5),
1L1FC4(5), LZSI(5), KSL(10), KSIV(10,20)
      C5***N/MCL/EPDIST(24), EPXM(5), UZSN(5), CR(5), CC(5), SRC(5), DEC(5),
1UZST(5), SGWI(5), GWS(5), PESI(5), SRGX(5), SCEPI(5), REPI(5),
2GFS(10), PEFVFI(10), TRANSI(10,49), FVAP(12,31),
3ELCN(10,744), F7(5,744), FV4PM(12), SFD(5), SFDOS(5), SIMPV(5), SINTF(5),
4SGF(5), SFECH(5), SFR(5), SPE(5), SET(5), TIMEAR(10,10), PEADJ(12),
52AGCDE(5), POWER, PASEK(10), BASEL(10), IMPV, LZSN, K3, K24L, K24EL, KV,
6LKK4, LIFC4, LZSI, KSL, KSIV, MAXL(10), MINL(10), LAG(10,10),
7TF, MHR, MHF1, MOHR2, ELEMTS, GAGEAR, VAFEP, SDFP, EPSIAS, IXEP,
8ADDFW1, ADDFW2, TEST1, TEST2, RTEINT, AVEPE, VARK, VAPL, SNOW, UZSNWF,
9AEPY(5)
C MAIN, END, CHANNEL AND SNOW VARIABLES
      INTEGER SIXHR
      REAL K1(5)
      CCMON/MLC5/FCOVER(5), FDEN(5), KOHLEP, PE(5,31), COVER(5,31),
1PX(5,31,24), K1, LAST, IRG, IPT, ICA, IHR, MCNTH, I, SIXHR
C CHANNEL INITIAL VALUES
      MCHR1=1
      MCHR2=LAST*24
      IF =M0HR2+48
      DO 3001 I=MCHR1,IE
3001   TPS(I)=0.0
      ELSE=ELEMTS(IPT)
      PINT=RTEINT(IPT)
      HALFR=(IN-1)/2
      VK=VARK(IPT)
      VL=VAF(1PT)
      *IF (VK.EQ.0) GO TO 3004
      BASEKT=BASEK(IPT)
      BASEKT=BASEK(IPT)
      DC 3003 I=1,20
3003   KVT(I)=KSIV(IPT,I)
3004   IF (VL.EQ.0) GO TO 3002
      MINLT=MINL(IPT)
      BASELT=BASEL(IPT)
      DC 3005 I=1,10
3005   LAGT(I)=LAG(IPT,I)
3006   DC 300 IE=1,ELE
      GAGET(IE)=GAGEAR(IPT,IE)
      TIMET(IE)=TIMEAR(IPT,IE)
      ADDIT(IE)=ADDFW1(IPT,IE)
300   ADD2T(IE)=ADDFW2(IPT,IE)
      KS1T=KS1(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
      DC 304 MHR=MCHR1,MOHR2
      DHR=MHR+HALFR
      DC 304 IE=1,ELE
      I=DHR+PINT*(IE-1)
      J=GAGET(IE)
      TRS(I)=TPS(I)+RD(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
      DC 307 MHR=MCHF1,MOHR2
      CHFEMHR+HALFR
      DC 307 IE=1,ELE
      I=DHR+PINT*(IE-1)
      J=GAGET(IE)
      TEMP=RD(J,MHR)*CFS*TIMET(IE)
      S=RD(I,IE)
      IF (TEMP(I).GT.0) TEMPOR=TEMPOR+FLOW(J,MHR)
      TRS(I)=TPS(I)+TEMPOR
307   CONTINUE
      GO TO 305
C TRANSLATION IN TIME -- CASE OF AT LEAST ONE ELEMENT OF ADDFW 1 & 2 GT ZERO
306   DC 308 MHR=MCHR1,MOHR2

```

CHANNEL

```

MHR=MHR+HALFF
DO 305 I=1,ELE
I=MHR+FINT*(IE-1)
J=GAGET(I,E)
TEMPPR=TPS(J,MHR)*CFS*TIMET(IE)
IF (ALDIT(IF).EQ.0) GO TO 308
J=SACIT(E)
TEMPR=TEMPPR+FLDW(J,MHR)
IF (ADP2T(IF).EQ.0) GO TO 308
J=ID2T(IE)
TEMPPR=TEMPPR+FLDW(J,MHR)
TF S(I)=TF S(I)+TEMPPR
305 IF (VL.EQ.0) GO TO 3051
C VAF IAPLE LAG
IE=MHR*2+HALFF+FINT*(ELE-1)
DO 51 IHF=M0HRI1,IE
MHR=IE+MCHR1-IHR
R=(TF S(MHR)/BASELT)+1.0
I=F
IF (I.LT.MINLT) GO TO 51
IF (I.LE.10) GO TO 52
C INFLOW GREATER THAN 10*BASELT
L=L4GT(10)
PAFT=TRS(MHR)-BASELT*10.0
TF S(MHR)=TRS(MHR)-PAFT
TRS(MHR+L)=TRS(MHR+L)+PAFT
52 I=10
GO TO 57
C INFLOW BETWEEN #MINLT-1<#BASELT< AND #BASELT*10.0<
52 LTCPLAGT(I)
LBOT=LAGT(I-1)
P=F-T
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))
PAFT=TRS(MHR)-BASELT*(I-1)
TRS(MHR)=TRS(MHR)-PAFT
PART=PART/((LTOP-LBOT)+1.0)
DO 54 L=LBOT,LTOP
54 TRS(MHR+L)=TRS(MHR+L)+PART
GO TO 55
53 LTOP=LBOT+1
LTOP=LBOT-(P*(LBOT-LTOP+1))
PART=TRS(MHR)-BASELT*(I-1)
TRS(MHR)=TRS(MHR)-PART
PART=PAFT/((LBOT-LTOP)+1.0)
DO 56 L=LTOP,LBOT
56 TF S(MHR+L)=TF S(MHR+L)+PART
IF (I.EQ.MINLT) GO TO 51
I=I-1
57 DO 58 I1=MINLT,I
I2=I+MINLT-I
LTCP=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/((LTCP-LBOT)+1.0)
DO 60 L=LBOT,LTOP
60 TRS(MHR+L)=TRS(MHR+L)+PART
GO TO 58
59 LTCP=LTCP+1
TF S(MHR)=TRS(MHR)-BASELT
PAFT=BASELT/((LBOT-LTOP)+1.0)
DO 61 L=LTOP,LBOT
61 TRS("HP+L")=TRS("HP+L")+PART
CONTINUE
58 CONTINUE
51 CONTINUE
3051 IE=MAXL(IPT)
DO 34 I=1,IE
MHR=M0HRI1+(I-1)
34 TF S(MHR)=TRS(MHR)+TRANSI(IPT,I)
PREV=PREVFI(IPT)
C CHANNEL ATTENUATION
IF (VK.EQ.1) GO TO 3052
C CONSTANT K

```

```

        CHANNEL
DC 309 MHR=M0HFI,M0HR2
IN=TFS(MHR)
FLOWT=IN-KSLT*(IN-PREV)
PREV=FLOCWT
IF (PFEV.LT.0.01) PFEV=0.0
309 FLCW(IPT,MHR)=FLOWT*0.02832
GOTO 3091
C VARIABLE K
3052 DC 30 MHR=M0HFI,M0HR2
IN=TFS(MHR)
I=(PFEV/RASEKT)+1.0
IF (I.GT.20) I=20
K=KVT(I)*KSLT
FLOCWT=IN-K*(IN-PREV)
PREV=FLOCWT
IF (PFEV.LT.0.01) PFEV=0.0
30 C CHANNEL CALL YOVER VALUES
3091 FLE=MAXL(IPT)
PREVF1(IPT)=PFEV
DO 311 IF=1,ELE
311 TENS1(IPT,IE)=TFS(M0HR2+IE)
RETURN
END

```

www.bdigital.ula.ve

```

      IGAUSS
      SUBROUTINE IGAUSS(IX,S,AM,V)
C   SUBROUTINE TO COMPUTE NORMAL RANDOM NUMBERS
C   IX=INTEGER .LT. 9 DIGITS TO BEGIN P.N. GENERATION  S=STANDARD DEVIATION
C   AM=FAN  V=VALUE OF COMPUTED NORMAL RANDOM NUMBER
C   DOUBLE PRECISION X,Y,C
      A=0.0
      DO 50 I=1,12
C START RANDU
      X=IX
      C=1373741827.00
      Y=X%C
      Y=DMOD(Y,576460752303423488.00)
      IY=Y
      YFL=Y*.1734723475976807094411924481D-17
C END RANDU
C FOR THE 360 SYSTEM SUBSTITUTE THE FOLLOWING BETWEEN START AND END RANDU
C   IY#IX*65539
C   IF X#Y< 5,6,6
C5   IY#IYC21474E364781
C6   YFL#IY
C   YFL=YFL*0.4656613E-9
      IX=IY
      50 A=A+YFL
      V=(A-0.0)*S+AM
      RETURN
END

```

www.bdigital.ula.ve

```

      DAILY

SUBROUTINE DAILY(INFFD,MONTH,YEAR,IPT)
C CALCULATION OF SCALING VALUES FOR MEAN DAILY FLOW PLOT
C PLOT CALLS CAN BE ADDED IF COMPUTER HAS PLOT ROUTINES
      INTEGER, YEAR, START(2,12), YR1
      REAL, INFR(12), MCCHAR(12)
      DIMENSION LASTDA(2,12), A(2,12), YA(368), YS(368)
C MAIN, HOURLY AND DAILY VARIABLES
      INTEGER FIRST,CHECK(10)
      COMMON/MHD/FLDW(10,744),PHEMX(10),FPN(7),FPNAME(10,7),PL0TMX(10),
     1ACTFLW(10,12,31),SIMELN(10,12,31),FIRST,CHECK
      DATA MCCHAR/3HDEC,3HJAN,3HFEB,3HMAR,3HMAY,
     13HJUN,3HJUL,3HAUG,3HSEP/
      DATA 1/3,0,3,0,6,0,6,0,9,1,9,1,12,2,12,2,15,0,15,1,18,1,18,2,
     12,1,21,2,24,2,24,3,27,2,27,3,30,3,30,4,33,4,33,5,36,4,36,5/
      DATA LASTD/31,31,28,29,31,31,30,30,31,31,30,30,30,31,31,31,31,30,30,
     131,31,30,30,31,31/
      DATA START/92,2,123,123,151,152,182,183,212,213,243,244,273,274,
     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=L*(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 900 J=1,7
      FPN(J)=FPNAME(IPT,J)
      PUNCH 904,FPN
      YR1=YEAR-1
      IF (YR1.LT.0) YR1=99
      PUNCH 905,YR1,YEAR
      PUNCH 906,INFRD
      PUNCH 907
C SCALE ACTUAL AND SIMULATED FLOW
      DO 901 MO=1,12
      LAST=LASTDA(L,MO)
      IE/SF=START(L,MO)
      DO 901 IDA=1,LAST
      FA=(ACTFLW(IPT,MO,IDA)/PMAX)*10.0
      FS=(SIMELW(IPT,MO,IDA)/PMAX)*10.0
      IF (FA.GT.10.0) FA=10.0
      IF (FS.GT.10.0) FS=10.0
      I=IDASE+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 (15,F10.2,F5.1,15)
  901  FCFORMAT (12F5.1)
  902  FFORMAT (12A3)
  903  FORMAT (20HMEAN DAILY FLCW-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

```

I PLOT

```

SUBROUTINE LPLECT(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 NMHD/FLDW1(10,744),PBMX(10),FPN(7),FPNAME(10,7),PLDTMX(10),
1ACTFLW(10,12,31),SMFLW(10,12,31),FIRST,CHECK
DATA MOCHAR/3HENE,3HFEB,3HMAE,3HABR,3HMAY,3HJUN,3HJUL,3HAGO,3HSEP,
13HCT,3HN-JV,3HDTC/
DATA LASTDA/31,31,28,29,31,31,30,30,31,31,30,30,31,31,31,31,31,31,30,30,
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&/
LEAPYR=0
IF ((YEAR-4*(YEAR/4)).EQ.0) LEAPYR=1
PBMX=PLDTMX(IPT)
DO 810 MONTH=1,12
MC=MONTH
IF (MC.GT.12) MC=MC-12
MCG=MC-2*(MC/2)
IF (MCG.EQ.0) GO TO 812
IF (MC.NE.1) GO TO 811
PRINT 900,(FPNAME(IPT,J),J=1,7),YEAR
DO 813 J=1,10
DEC=J
SCALE(J)=DEC*0.1*PBMX
PRINT 901,MOCHAR(MONTH),MOCHAR(MONTH+1),SCALE
812 LAS=LASTDA((LEAPYR+1),MC)
DO 815 IDA=1,LAS
DO 816 J=1,101,10
OBD(J)=DCT
IF (J.EQ.101) GO TO 816
DO 817 I=1,9
OBD(J+I)=BLANK
818 CONTINUE
CONTINUE
AF=ACTFLW(IPT,MC,IDA)
SF=SMFLW(IPT,MC,IDA)
LA=(AF/PBMX)*100.0+1.5
LS=(SF/PBMX)*100.0+1.5
IF (LA.GT.101) LA=101
IF (LS.GT.101) LS=101
OBL(LA)=PLUS
OBL(LS)=ASTER
PRINT 902,IDA,ORD,SF,AF
815 CONTINUE
IF (MCG.GT.0) GO TO 810
MO6=MCNTM/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 19,12,
15X,24H*#SIMULATED 8#OBSERVED)
901 FORMAT (1H ,A3,1H-,A3,F11.1,9F10.1,3X,9HSIMULATED,2X,8HOBSEVED)
902 FORMAT (1H ,13,2X,101A1,4X,2F10.1)
903 FORMAT (1H )
RETURN
END

```

INFORMACION BASICAS DE LA CORRIDA									
INICIO DE LA CORRIDA					FINAL DE LA CORRIDA				
NÚMERO DE PUNTOS DE FLUJO = 1		NÚMERO DE CST. DE MED. DE PRECIPITACIÓN = 2			PARAMETROS PARA LA VERTIENTE				
EST.	KÍPÉ DE LA EST.	KÍPÉ IMPV.	EPRW	UZSN	LISN	CBO	K24	R24EL	NY
1	0.95	0.95	0.10	0.30	1.250	0.90	0.30	0.30	1.05
2	2.10	2.10	0.32	0.32	4.02	0.80	0.30	0.30	0.95
INFILTRACIÓN. CURVE PCMR. FACTOR IS...2.0									
ALMACENAMIENTOS INICIALES									
PESAJE DE LA EST. SÍN. RTIN. COMPARE CHECK. HISTOGRAMS.									
PESAJE DE LA EST. SÍN. RTIN. COMPARE CHECK. HISTOGRAMS.									
PARÁMETROS DE PUNTOS DE FLUJO									
PARÁMETROS DE PUNTOS DE FLUJO									
AJUSTE DE LA EVAPORACION POTENCIAL									
AJUSTE ESTACIONAL	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
AJUSTE	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
AJUSTE PARA LA EST.	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
EJACIACIÓN	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
AJUSTE	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

SUMARIO MENSUAL PARA RÍO BOCONÓ EN BOCONÓ
ENE - 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL F.O.	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONÓ	3.200	0.000	0.051	1.057	2.224	0.0	1.47	3.396	3.372
2	BOCONÓ	3.251	0.000	0.045	1.063	2.195	0.0	1.25	3.399	3.283

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	UZS	LTS	SGW	GWS	RES	SRGX	SCEP	AEP1	BALANCE
1	SAN RAFAEL DE BOCONÓ	0.0	3.78	0.67	0.42	0.0	0.0	1.17	-0.001	0.000
2	BOCONÓ	0.0	3.69	0.65	0.38	0.0	0.0	1.17	-0.001	0.000

FEB - 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL F.O.	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONÓ	2.208	0.012	0.115	2.003	1.090	0.0	3.16	3.706	3.006
2	BOCONÓ	2.345	0.0	0.158	2.001	1.185	0.0	4.44	3.706	3.073

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	UZS	LTS	SGW	GWS	RES	SRGX	SCEP	AEP1	BALANCE
1	SAN RAFAEL DE BOCONÓ	0.0	2.92	0.44	0.61	0.0	0.0	1.28	-0.000	0.000
2	BOCONÓ	0.01	3.64	0.64	0.83	0.0	0.0	1.28	-0.000	0.000

MAR - 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL F.O.	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONÓ	0.370	0.0	0.012	0.000	0.328	0.0	0.68	4.651	2.382
2	BOCONÓ	0.555	0.0	0.010	0.000	0.525	0.0	0.56	4.651	2.701

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	UZS	LTS	SGW	GWS	RES	SRGX	SCEP	AEP1	BALANCE
1	SAN RAFAEL DE BOCONÓ	0.0	1.10	0.10	0.10	0.0	0.0	0.0	-0.000	0.000
2	BOCONÓ	0.0	1.43	0.14	0.34	0.0	0.0	1.51	-0.000	0.000

ABR - 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL F.O.	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONÓ	0.311	0.0	0.180	0.131	0.000	0.0	4.40	4.683	2.837
2	BOCONÓ	0.354	0.0	0.193	0.001	0.190	0.0	4.61	4.683	2.139

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	UZS	LTS	SGW	GWS	RES	SRGX	SCEP	AEP1	BALANCE
1	SAN RAFAEL DE BOCONÓ	0.09	1.56	0.26	0.36	0.0	0.0	1.31	-0.000	0.000
2	BOCONÓ	0.21	3.23	0.23	0.29	0.0	0.0	1.31	-0.000	0.000

SUMARIO MENSUAL PARA RÍO BUCONO EN BOCONÓ

MAY - 1971

SUMARIO PARA LAS ESTACIONES PLUVIÓGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRÉNTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL RÍO	SURFACE RÍO	IMPV RÍO	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONÓ	4.393	0.0	0.506	1.729	0.0	11.7	2.779	2.672
2	BOCONÓ	3.687	0.0	0.444	0.858	2.390	10.0	2.719	2.644

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	U.S.	S.G.H.	R.E.S.	S.G.C.X.	S.C.E.P.	A.E.P.I.	BALANCE
1	SAN RAFAEL DE BOCONÓ	0.28	5.79	0.0	0.0	0.0	0.97	-0.001
2	BOCONÓ	0.01	5.15	2.51	0.0	0.0	0.97	-0.001

JUN 1971

SUMARIO PARA LAS ESTACIONES PLUVIÓGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRÉNTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL RÍO	SURFACE RÍO	IMPV RÍO	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONÓ	4.526	0.0	0.464	1.391	0.0	11.0	3.032	2.967
2	BOCONÓ	4.748	0.0	0.440	0.428	3.901	0.0	3.032	2.952

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	U.S.	S.G.H.	R.E.S.	S.G.C.X.	S.C.E.P.	A.E.P.I.	BALANCE
1	SAN RAFAEL DE BOCONÓ	0.49	6.84	0.0	0.02	0.10	0.96	-0.001
2	BOCONÓ	0.55	6.70	3.01	4.34	0.0	0.02	0.96

SUMARIO MENSUAL PARA RÍO BOCONÓ EN ANCONO

SUMARIO PARA LAS ESTACIONES PLUVIÓGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRÉNTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL RÍO	SURFACE RÍO	IMPV RÍO	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONÓ	10.330	0.0	3.630	3.630	0.0	12.63	2.409	2.409
2	BOCONÓ	7.036	0.0	0.388	1.497	5.235	0.0	2.409	2.409

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	U.S.	S.G.H.	R.E.S.	S.G.C.X.	S.C.E.P.	A.E.P.I.	BALANCE
1	SAN RAFAEL DE BOCONÓ	0.40	7.40	3.03	5.23	0.0	0.05	-0.002
2	BOCONÓ	0.24	7.24	2.42	4.28	0.0	0.03	-0.001

JUL 1971

SUMARIO PARA LAS ESTACIONES PLUVIÓGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRÉNTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL RÍO	SURFACE RÍO	IMPV RÍO	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONÓ	8.231	0.0	0.371	1.020	0.0	8.81	3.576	3.576
2	BOCONÓ	8.165	0.0	0.446	2.388	0.0	10.21	3.718	3.718

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	U.S.	S.G.H.	R.E.S.	S.G.C.X.	S.C.E.P.	A.E.P.I.	BALANCE
1	SAN RAFAEL DE BOCONÓ	0.52	7.42	4.42	4.42	0.0	0.15	-0.001
2	BOCONÓ	0.57	6.86	2.87	4.47	0.0	0.10	1.15

SUMARIO MENSUAL PARA RÍO BOCONÓ EN BOCONÓ

SEPT 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRÁFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST.	NOMBRE DE LA ESTACIÓN	TOTAL RÍO	SURFACE F0	IMPV PO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAYA RAFAEL DE BOCONÓ	5.621	0.01	0.399	2.470	0.3	7.23	2.514	3.338	3.263
2	SUMARIO MENSUAL PARA RÍO BOCONÓ EN BOCONÓ	3.577	0.0	0.133	3.422	0.0	3.73	3.514	3.514	3.263

ALMACENAMIENTOS AL FINAL DEL MES

EST.	NOMBRE DE LA ESTACIÓN	UZS	LZS	SGW	RES	SRCX	SCEP	AEPF	BALANCE
1	SAYA RAFAEL DE BOCONÓ	0.07	7.16	1.52	0.0	0.0	0.0	1.06	-0.001
2	SUMARIO MENSUAL PARA RÍO BOCONÓ EN BOCONÓ	0.03	6.11	1.17	0.2	0.0	0.0	1.06	-0.001

DIC 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRÁFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST.	NOMBRE DE LA ESTACIÓN	TOTAL RÍO	SURFACE F0	IMPV PO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAYA RAFAEL DE BOCONÓ	5.421	0.01	0.159	2.152	0.0	4.06	3.23	2.993	2.991
2	SUMARIO MENSUAL PARA RÍO BOCONÓ EN BOCONÓ	3.421	0.0	0.038	2.052	0.0	4.16	3.23	2.993	2.991

ALMACENAMIENTOS AL FINAL DEL MES

EST.	NOMBRE DE LA ESTACIÓN	UZS	LZS	SGW	RES	SRCX	SCEP	AEPF	BALANCE
1	SAYA RAFAEL DE BOCONÓ	0.0	7.32	1.21	0.0	0.0	0.0	1.09	-0.001
2	SUMARIO MENSUAL PARA RÍO BOCONÓ EN BOCONÓ	0.0	6.32	1.01	0.05	0.0	0.0	1.09	-0.001

MAY 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRÁFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST.	NOMBRE DE LA ESTACIÓN	TOTAL RÍO	SURFACE F0	IMPV PO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAYA RAFAEL DE BOCONÓ	5.300	0.03	0.222	0.413	2.498	0.0	5.14	2.858	2.706
2	SUMARIO MENSUAL PARA RÍO BOCONÓ EN BOCONÓ	3.300	0.0	0.201	0.349	2.123	0.0	5.39	2.858	2.706

ALMACENAMIENTOS AL FINAL DEL MES

EST.	NOMBRE DE LA ESTACIÓN	UZS	LZS	SGW	RES	SRCX	SCEP	AEPF	BALANCE
1	SAYA RAFAEL DE BOCONÓ	0.00	6.38	0.58	0.07	0.0	0.09	1.00	-0.001
2	SUMARIO MENSUAL PARA RÍO BOCONÓ EN BOCONÓ	0.00	5.37	0.92	1.87	0.0	0.05	1.05	-0.001

DIC 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRÁFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST.	NOMBRE DE LA ESTACIÓN	TOTAL RÍO	SURFACE F0	IMPV PO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAYA RAFAEL DE BOCONÓ	5.200	0.02	0.197	0.311	1.534	0.0	2.72	3.372	2.832
2	SUMARIO MENSUAL PARA RÍO BOCONÓ EN BOCONÓ	3.200	0.0	0.025	0.030	0.864	0.0	0.84	3.212	2.631

ALMACENAMIENTOS AL FINAL DEL MES

EST.	NOMBRE DE LA ESTACIÓN	UZS	LZS	SGW	RES	SRCX	SCEP	AEPF	BALANCE
1	SAYA RAFAEL DE BOCONÓ	0.01	5.31	0.67	0.05	0.0	0.07	1.07	-0.001
2	SUMARIO MENSUAL PARA RÍO BOCONÓ EN BOCONÓ	0.01	4.28	0.28	0.86	0.0	0.00	1.07	-0.001

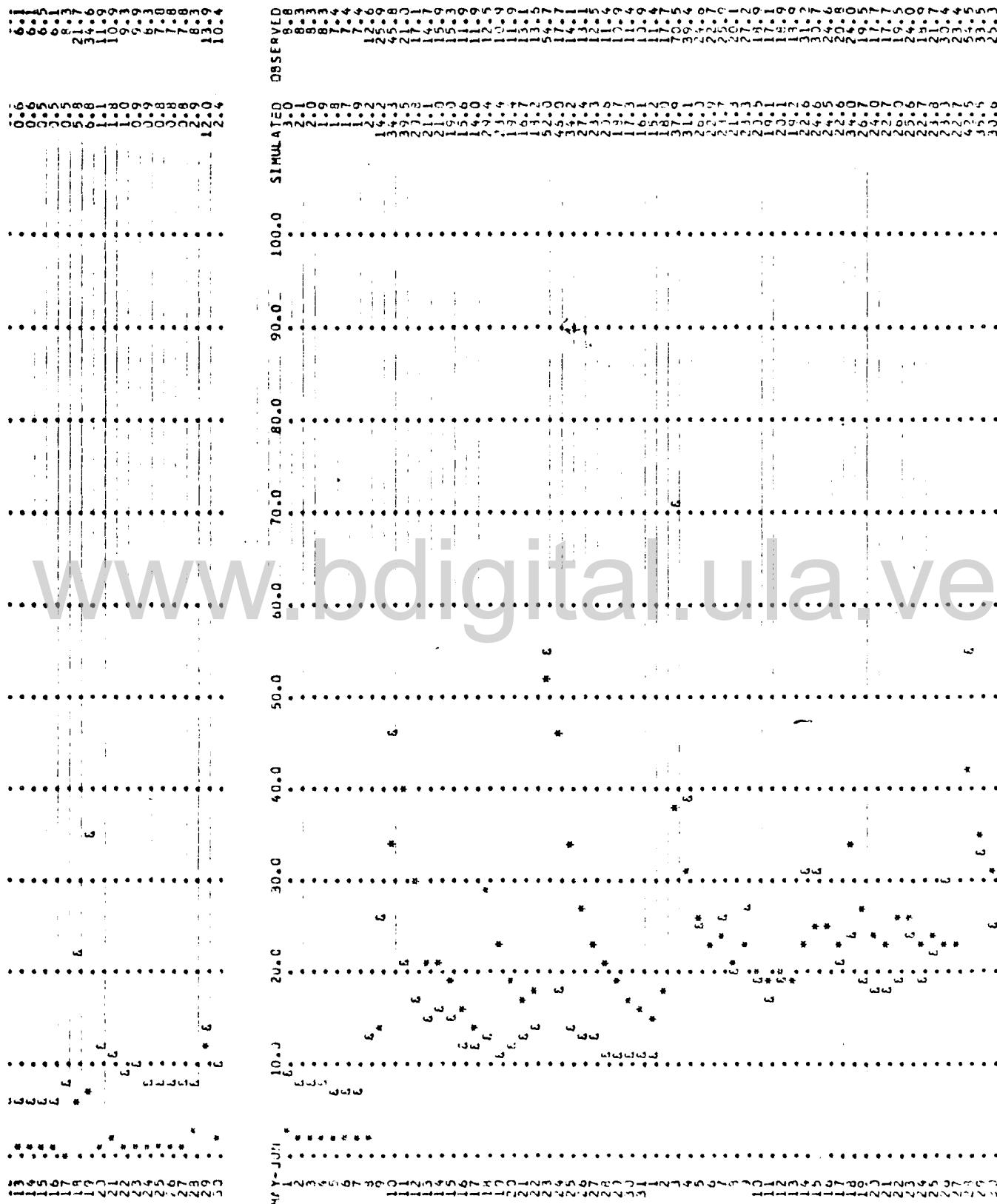
SIMULACION PARA EL AÑO HIDROLOGICO 19** PAPA NO EN BOCONO.

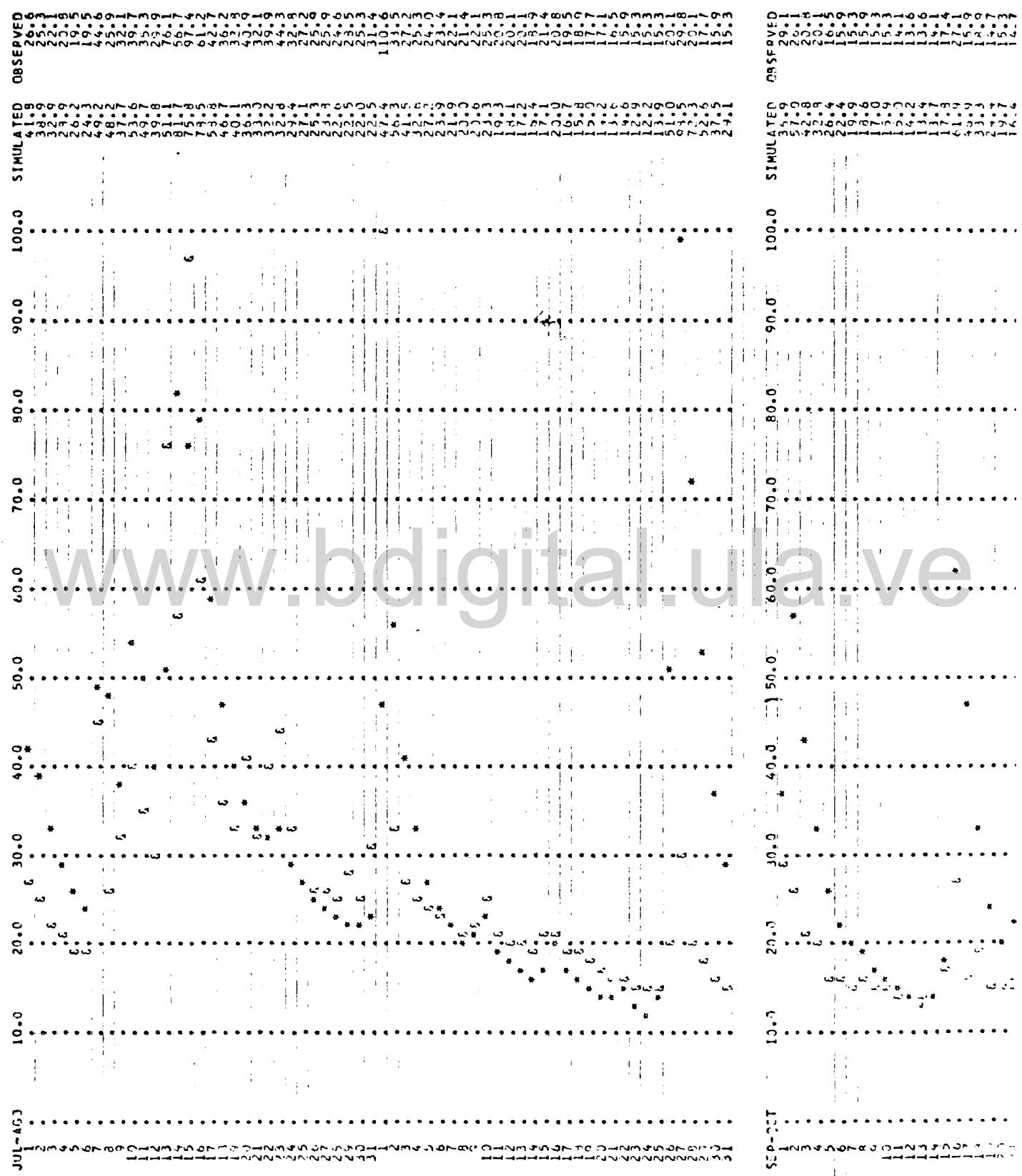
WATER YEAR 1971

SUMARIO DE LA DESCARGA MEDIA DIARIA

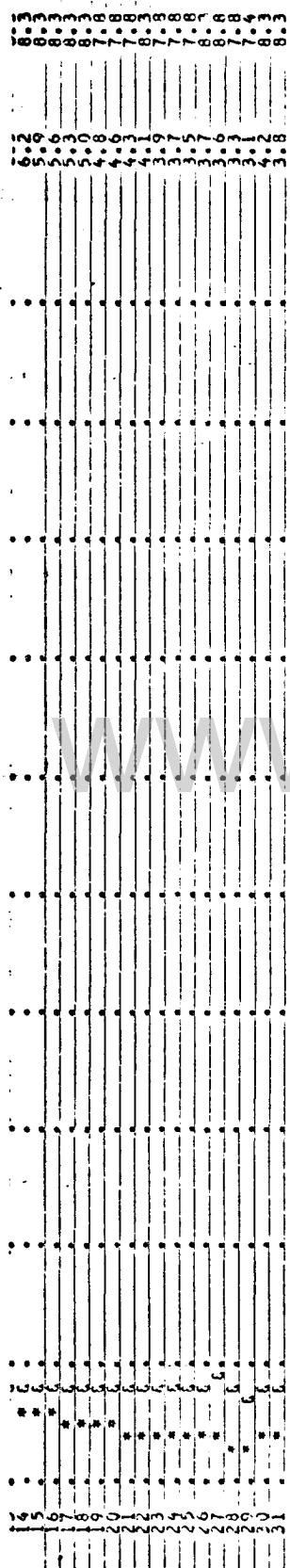
DIA	ENE	FEB	MAR	ABR	MAY	JUNIO	JULIO	SEPT	OCTB	NOVIEM	DICB	ANUAL	
1	24.65	6.62	4.47	6.97	3.02	15.20	41.78	47.44	36.94	11.19	34.96	7.27	
2	62.15	14.37	4.18	0.97	2.10	17.99	38.85	56.27	57.04	10.15	25.38	6.89	
3	47.15	8.74	3.57	2.89	1.97	37.93	32.94	41.47	42.92	9.48	23.79	6.25	
4	14.31	3.57	1.59	3.06	1.96	31.06	26.92	32.61	32.75	10.65	18.91	6.22	
5	25.01	12.37	3.58	3.83	1.77	25.97	26.21	32.94	26.36	9.53	16.72	5.91	
6	19.42	3.24	3.40	3.75	1.63	22.90	24.41	23.37	22.44	4.95	21.05	5.61	
7	17.73	4.42	3.23	2.56	1.93	1.33	23.65	29.24	21.90	11.96	19.33	12.37	
8	15.21	7.79	3.07	2.92	2.06	2.25	21.32	46.21	20.56	16.59	16.39	8.16	
9	14.41	7.61	7.23	3.06	0.74	34.27	25.49	53.55	23.33	9.25	14.13	7.67	
10	13.87	7.23	3.06										
11	13.10	6.94	2.75	0.66	19.52	19.14	49.66	19.30	15.09	8.90	19.36	7.26	
12	12.34	6.56	2.56	2.63	2.63	28.92	20.12	35.81	18.15	14.17	8.39	13.44	
13	11.73	5.23	2.43	2.31	0.56	21.10	32.23	51.72	17.19	13.42	9.03	13.93	
14	11.11	6.75	2.31	0.56	0.54	20.99	22.59	61.72	16.44	13.97	8.21	13.39	
15	10.56	6.30	2.80	0.56	19.79	24.61	75.83	17.03	17.76	7.99	12.60	5.89	
16	10.32	5.68	2.14	0.51	15.56	24.54	78.54	19.98	61.96	9.76	11.72	5.59	
17	10.12	5.08	2.02	0.48	1.48	13.59	22.63	58.83	16.72	46.92	10.96	12.53	
18	10.63	5.13	1.91	1.91	6.78	23.44	34.92	46.71	15.77	13.30	25.31	5.31	
19	9.14	4.99	1.79	1.79	1.13	19.35	24.00	40.97	14.95	24.38	16.48	4.79	
20													
21	2.47	4.75	1.70	1.84	1.84	16.71	22.75	32.97	13.59	16.36	13.67	4.33	
22	1.47	4.43	1.62	1.62	1.01	18.22	26.04	42.04	14.56	14.29	12.83	4.11	
23	3.34	3.20	1.54	1.54	0.93	9.93	24.97	32.79	12.35	12.30	11.23	3.55	
24	7.96	5.44	1.46	0.88	0.88	46.01	22.75	25.49	12.13	11.84	11.24	4.79	
25	7.24	6.63	1.39	1.39	0.94	34.23	25.77	27.10	13.94	19.71	14.76	4.55	
26	6.37	4.99	1.32	0.90	27.45	23.27	25.29	51.00	11.94	11.32	9.63	3.67	
27	6.33	4.26	1.25	0.76	0.76	23.31	22.68	23.79	53.51	10.31	10.78	8.61	
28	5.23	3.20	1.19	1.19	1.19	2.35	42.48	22.59	72.28	10.49	10.13	3.57	
29	5.86	5.62	1.13	1.13	1.13	18.62	35.50	22.47	52.65	10.19	9.67	8.61	
30	5.61	1.63	1.07	2.44	1.72	30.59	22.02	37.47	10.17	9.19	9.34	3.39	
31	1.632	1.632	1.62	1.62	1.62	12.43	22.94	29.57	69.56	12.27	8.72	4.24	
DIA	1.632	1.632	1.62	1.62	1.62	32.87	12.76	12.67	69.56	12.27	34.43	7.74	
32	3.35	73.64	12.4	32.87	32.87	9.63	12.67	23.6	97.60	12.02	42.43	7.4	
33	3.35	1.632	1.632	1.632	1.632	12.4	32.87	12.67	69.56	12.27	34.43	7.74	
34	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
36	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
37	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
38	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
39	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
40	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
41	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
42	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
43	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
44	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
45	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
46	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
47	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
48	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
49	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
50	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
51	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
52	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
53	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
54	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
55	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
56	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
57	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
58	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
59	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
60	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
61	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
62	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
63	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
64	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
65	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
66	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
67	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
68	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
69	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
70	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
71	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
72	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
73	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
74	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
75	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
76	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
77	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
78	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
79	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
80	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
81	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
82	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
83	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
84	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
85	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
86	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	
87	3.35	3.35											

	OBSERVFD	SIMULATED
MAR-A99	100.0	20.0
	100.0	30.0
	100.0	40.0
	100.0	50.0
	100.0	60.0
	100.0	70.0
	100.0	80.0
	100.0	90.0
	100.0	100.0





	NOV-DEC	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	OBSERVED	SIMULATED
12	22	45	47	50	52	54	56	58	60	62	64	63.9	63.9
13	22	49	50	51	52	53	54	55	56	57	58	59.2	59.2
14	22	49	50	51	52	53	54	55	56	57	58	58.7	58.7
15	22	50	51	52	53	54	55	56	57	58	59	59.7	59.7
16	22	50	51	52	53	54	55	56	57	58	59	60.2	60.2
17	22	50	51	52	53	54	55	56	57	58	59	60.7	60.7
18	22	50	51	52	53	54	55	56	57	58	59	61.2	61.2
19	22	50	51	52	53	54	55	56	57	58	59	61.7	61.7
20	22	50	51	52	53	54	55	56	57	58	59	62.2	62.2
21	22	50	51	52	53	54	55	56	57	58	59	62.7	62.7
22	22	50	51	52	53	54	55	56	57	58	59	63.2	63.2
23	22	50	51	52	53	54	55	56	57	58	59	63.7	63.7
24	22	50	51	52	53	54	55	56	57	58	59	64.2	64.2
25	22	50	51	52	53	54	55	56	57	58	59	64.7	64.7
26	22	50	51	52	53	54	55	56	57	58	59	65.2	65.2
27	22	50	51	52	53	54	55	56	57	58	59	65.7	65.7
28	22	50	51	52	53	54	55	56	57	58	59	66.2	66.2
29	22	50	51	52	53	54	55	56	57	58	59	66.7	66.7
30	22	50	51	52	53	54	55	56	57	58	59	67.2	67.2
31	22	50	51	52	53	54	55	56	57	58	59	67.7	67.7



ANEXO X

LISTADO Y RESULTADOS DEL MODELO STANFORD IV MODIFICADO

CON EL SUBPROGRAMA CINEMAT PARA UN PUNTO DE FLUJO

www.bdigital.ula.ve

```

      MAIN
      INTEGER YF2, CMPAR(10), YF, HF, HY, PASE, CTTEST, OUTHE, PXIN, PGIN(5),
      PTTEST, PLCT(10), PLOTHR(10), CKTEST, HTEST, COUNT, DISP, DSN,
      T1, T2, DSFO, CN6HR, STCRE, RCUTE, SKIP, SNOWA(12),
      TITLE, TITLE1
      REAL LZSI(5), MINFW(10), INCHES(12), KEPTRD(744), MOCHAR(12),
      IKEEPTRX(31,24), L, AN, FC, KK24, INAFEA, MINFWT
      DIMENSION JZSI(5), SGWI(5), RESI(5), SRGX1(5), SCEP1(5), RECOBS(11),
      IFCPX(12), PGN(51,55,12), SAF(10,12), AREL(10), RECFW(4), PXSIX(4),
      ZNUM(12), LASTDA(12,12), HRFWT(6)
C MAIN, HOURLY AND DAILY VARIABLES
      INTEGER FIRST, CHECK(10)
      COMMON/MHD/FLCW(10,744), PHRMX(10), FPN(7), FPNAME(10,7), PLOTMX(10),
      IACTFLW(10,12,31), SIMFLW(10,12,31), FIRST, CHECK
C MAIN, LAND AND CHANNEL VARIABLES
      INTEGER ELE, ELEVTS(10), GAGEAF(10,10), ADDFWL(10,10),
      IACDFW2(10,10), TEST1(10), TEST2(10), RTEINT(10), AVEPE, VARK(10),
      2VAFL(10), SNOW, VAFFP
      REAL IMPV(5), LZSN(5), K3(5), K24L(5), K24EL(5), KV(5), LKK4(5),
      LLRC4(5), LZSI(5), KS1(10), KSIV(10,20)
      COMMON/MCL/FPD, ST(24), EPXM(5), JZSN(5), CB(5), CC(5), SRC(5), DEC(5),
      IJZSI(5), SGWI(5), GSXI(5), RESI(5), SRGX1(5), SCEP1(5), REPI(5),
      2CFSM(10), PREVFI(10), TPANSI(10,48), EVAP(12,31),
      3FLCW(10,744), FC(5,744), EVAPM(12), SFD(5), SROS(5), SIMPV(5), SINTF(5),
      4SGWF(5), SRECH(5), SPF(5), SPE(5), SET(5), TI MEAR(10,10), PEADJ(12),
      5GAGEPE(5), POWER, BASEK(10), BASEL(10), IMPV, LZSN, K3, K24L, K24EL, KV,
      6LKK4, LLRC4, LZSI, KS1, KSIV, MAXL(10), MINL(10), LAG(10,10),
      7E, MHR, MOHF1, MOHF2, ELEMNTS, GAGEAF, VAFFP, SDEP, EPBIAS, IXEP,
      8ADDFW1, ADDFW2, TEST1, TEST2, RTEINT, AVEPE, VARK, VAFL, SNOW, UZSNWF,
      9AEP1(5)
C MAIN, LAND, CHANNEL AND SNOW VARIABLES
      INTEGER SIXHR
      REAL K1(5)
      COMMON/MLCS/FCOVER(5), FDEN(5), KOHLER, PE(5,31), COVER(5,31),
      IPX(5,31,24), K1, LAST, IRG, IPT, IDA, IHP, MCNTH, 1, SIXHR
C MAIN, HOURLY, DAILY AND SNOW VARIABLES
      INTEGER YEAR, DA, FINAL
      REAL INF0(20)
      COMMON/MHDS/X(368), INF0, LEAPYR, N, YEAR, DA, FINAL
C
      REAL LAGRC(5,30), LIQWI(5), NEGHSI(5)
      INTEGER POINT, CN, STATE, YR1
      DIMENSION SIMSC(10,31), WATEPI(5,12), WEI(5), EXWATI(5), AESCI(5),
      1SB1(5), SBAEI(5), SBWSI(5), AIXI(5), ISI(5), BASIN(20), RGNAME(5,5),
      2TANT(5), TONT(5)
C INITIALIZATION OF DATA
      INIT=0
      FIPST=0
      NEWY=0
      CTTEST=0
      PTTEST=0
      CKTEST=0
      HRTTEST=0
      DO 100 I=1,24
      EPDIST(1)=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
      DC 1001 I=1,365
      X(1)=DIST
      1001 DIST=DIST+0.1
      DATA MOCHAR/3FENE, 3HFEB, 3HMAR, 3HABR, 3HMAY, 3HJUN, 3HJUL, 3HAGO, 3HSEP,
      13HCCT, 3HNOV, 3HDIC/
      DATA LASTDA/31,31,28,29,31,31,30,30,31,31,30,30,31,31,31,31,31,31,30,30,
      131,31,30,30,31,31/
      DATA NUM/1,2,3,4,5,6,7,8,9,10,11,12/
C RUN, FAINGACE AND FLCW-PCINT INPUT DATA
C BASIC FUN INFORMATION

```

MAIN

```

READ 901, INFFO
READ SC1, BASIN
PRINT 900
PRINT 903, EASIN
PRINT 902, INFRO
PRINT 904
READ SOS, MO1, YR1, MC2, YR2, NPTS, PXTN, NGAGES, (RGIN(I), I=1, NGAGES)
READ OSO, CUTHQ, LINEP, NOFLW, AVEPE, POWER, SIXHR, CN6HR,
1STCRE, ECUTE, DSRC, SN7W, PCINT, INOUT, VAREP, UZSNWF
IF (DSRC.GT.0) REWIND DSRC
IF (STOFE.EQ.0) PCUTE=0
IF (SN7W.EQ.0) PCINT=0
IF (CN6HR.EQ.0) SIXHR=1
IF (PCINT.EQ.0) GO TO 1003
READ 665, PEADJ
READ 665, (GAGEPE(IRG), IRG=1, NCAGES)
IF (AVEPE.EQ.0) GO TO 1003
READ 665, EVAPM
DO 1004 I=1,12
1004 EVAPV(I)=EVAPM(I)*PEADJ(I)/0.254
1003 LEAPYR=0
IF (VAREP.EQ.0) READ 991, SDFP, EPBIAS, IXEP
IF ((YR2-4=(YR2/4)).EQ.0) LEAPYR=1
LAST=LASTDA((LEAPYR+1), MO2)
PRINT 906, MCCHAF(MO1), YR1, MOCHAR(MO2), LAST, YR2
PRINT 907, NPTS, NGAGES
PRINT 936
IF (PCINT.EQ.0) GO TO 1005
C BASIC PAINGAGE INFORMATION -- POINT#1
READ SC9, RGN, K1(1)
PRINT 916
IRG=1
PRINT 966, IRG, RGN, K1(I)
DO 1006 I=1,5
1006 RGNAM(E1,I)=RGN(I)
GO TO 1025
1005 PRINT 908
C BASIC FAINGAGE INFORMATION
DO 101 IFG=1, NGAGES
READ 909, RGN, K1(IFG), IMPV(IFG), EPXM(IFG), UZSN(IFG), LZSN(IFG),
1CB(IFG), CC(IFG), K3(IFG), K24L(IFG), K24EL(IFG)
READ 936, L, SS, NN, IRG, KK24, KV(IFG)
L=L*3.28
SRC(IFG)=1020.0*SQRT(SS)/(NN*L)
DEC(IFG)=0.00982*((NN*L/SQRT(SS))**0.6)
LKK4(IFG)=1.0-(KK24***(1.0/24.0))
LIRC4(IFG)=1.0-(TRC***(1.0/24.0))
READ 910, UZSI(IFG), LZSI(IFG), SGWI(IFG), GWSI(IFG), RESI(IFG),
ISFGXT(IFG), SCEPI(IFG), AEPPI(IFG)
REPI(IFG)=0.0
L=L/3.28
PRINT 911, IRG, PGN, K1(IFG), IMPV(IFG), EPXM(IFG), UZSN(IFG),
1LZSN(IFG), CB(IFG), CC(IFG), K3(IFG), K24L(IFG), K24EL(IFG), L, SS, NN,
2IEC, KK24, KV(IFG)
DO 1011 I=1,5
1011 RGNAM(E1, I)=PGN(I)
101 CONTINUE
PRINT 970, POWER, UZSNWF
PRINT 937
PRINT 912
DO 102 IRG=1, NGAGES
DO 1021 I=1,5
1021 RGN(I)=RGNAM(IFG, I)
PRINT 913, RGN, UZSI(IFG), LZSI(IFG), SGWI(IFG), GWSI(IFG),
1RESI(IFG), SRGXI(IFG), SCEPI(IFG), AEPPI(IPG)
102 CONTINUE
IF (SN7W.EQ.0) GO TO 1024
1025 CONTINUE
IF (PCINT.EQ.0) GO TO 1051
1025 GO TO 1023
1024 IF (NGAGES.LE.3) GO TO 1022
1023 PRINT 900
PRINT 903, BASIN
PRINT 902, INFRC
1022 PRINT 938
PRINT 914
C BASIC FLOW-PCINT INFORMATION
DO 103 IPT=1, NPTS

```

MAIN

```

READ 915, FPN, AREA(IPT), KS1(IPT), VARL(IPT), VARL(IPT),
1F TFEINT(IPT), ELEMITS(IPT)
AREAL(IPT)=AREA(IPT)*0.3861
IF (VSEK(IPT).EQ.0) GO TO 150
READ 984, BASEK(IPT), (KSIV(IPT,I), I=1,10)
READ 986, (KSIV(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),
1PLCTHF(IPT), MINFW(IPT), PLOTMX(IPT), PHRMX(IPT)
ELF=ELEMITS(IPT)
IF (CCMPAF(IPT).EQ.1) GO TO 1241
PLCT(IPT)=0
GO TO 1245
1241 CTTEST=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
GC TO 1248
1247 HTTEST=1
1248 READ 917, (TIMEAP(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
IF (ADDFW1(IPT,IE))
INAREA=INAREA+AREA(I)
1244 IF (ADDFW2(IPT,IE).EQ.0) GO TO 1243
TEST2(IPT)=1
IF (ADDFW2(IPT,IE))
INAREA=INAREA+AREA(I)
1243 CONTINUE
CFSM(IPT)=26.9*24.0*(AREA(IPT)-INAREA)
UMZREA=AREA(IPT)*2.59
PRINT 918, IPT, FPN, UMZREA, KS1(IPT), RTEINT(IPT), COMPAR(IPT), CHECK(IPT),
IT, (TIMEAP(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)
TE (VARL(IPT).EQ.0) GO TO 1042
PRINT 985, FASEK(IPT), (KSIV(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 PFEV(IPT)=0.0
ELF=ELEMITS(IPT)
MLAG=0
IF (VARL(IPT).EQ.0) GO TO 1043
DO 1044 I=1,10
TE (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
GC TO 1043
1043 CONTINUE
1043 MAXL(IPT)=ELE+MLAG
ELF=ELE+MLAG
DO 1044 I=1,ELE
104 TRANSIL(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 9C2, 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, NGAGFS)
      PRINT 974, (GAGEPF(IRG), IRG=1, NGACES)
C END OF FUN, FAINGAGE AND FLOW-POINT INPUT DATA
1051 MCNTH=MC1
      YEAF=YR1
C START OF MCNTHLY LOOP
C INITIAL MCNTHLY VALUES
105  LEAPYR=0
      IF ((YEAF-4*(YEAF/4)).EQ.0) LEAPYR=1
      LAST=LASTDA((LEAPYR+1), MCNTH)
      XCHGR=0
      DO 106 1PG=1, NGACES
      UZSI(IRG)=UZSI(IRG)
      LZSI(IRG)=LZSI(IRG)
      SGW1(IRG)=SGW1(IRG)
      PESI(IRG)=PESI(IRG)
      SFGXI(IRG)=SFGXI(IRG)
      SCEPI(IRG)=SCEPI(IRG)
      SFC(IRG)=0.0
      SFC5(IRG)=0.0
      SIMPV(IRG)=0.0
      STATE(IRG)=0.0
      SGF(IRG)=0.0
      SPECH(IRG)=0.0
      SPK(IRG)=0.0
      SPE(IRG)=0.0
      SETI(IRG)=0.0
106  C INPUT OF MCNTHLY DATA
      IF (MCNTH.EQ.1) GO TO 131
      IF ((YEAF.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 MCNTHS DURING WHICH SNOW IS CONSIDERED
      IF (SNCK.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)=RECCBS(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
      SAF(IPT, MO)=0.0
      DO 135 I=1, 36
      READ 932, MO, CN, RECOBS
      FINAL=CN*10
      PASE=FINAL-9
      IF (CN.EQ.3) FINAL=LASTDA((LEAPYR+1), MO)
      N=BASE-1
      DO 135 IDA=PASE, FINAL
      OBS=RECOBS(IDA-N)
      SAF(IPT, MO)=SAF(IPT, MO)+OBS
      ACTFLW(IPT, MO, IDA)=OBS
135  CONTINUE
134

```

MAIN

```

C MCNTHLY INPUT DATA
132 IF (SNOW.EQ.0) GC TO 28
      IF (SNOWA(MCNTH).EQ.1) GO TO 25
28   DC 26 IFG=1,NGAGES
      DC 27 I=1,30
      LAGFO1(IFG,1)=0.0
      IF (I.GT.12) GO TO 27
      WATERI(IPG,1)=0.0
27   CONTINUE
      WEI(IFG)=0.0
      LTCW1(IFG)=0.0
      EXWA1(IFG)=0.0
      NECHSI1(IFG)=0.0
      ADESC1(IFG)=0.0
      SBI1(IFG)=C.0
      SBAC1(IFG)=0.0
      SBWS1(IFG)=0.0
      AX1(IFG)=0.0
      TS1(IFG)=12.0
      TANT(IFG)=50.0
      TDNT(IFG)=40.0
      DO 26 IDA=1, LAST
26   COVER(IPG,IDA)=0.0
      IF (SNOW.EQ.1) GO TO 25
      DC 29 IPG=1,NGAGES
      FCCVER(IFG)=1.0
29   FOPEN(IPG)=1.0
25   IF (PCUTE.EQ.0) GO TO 1320
      DO 20 IRG=1,NGAGES
      READ (DSR0) KEPTRO
      DO 21 MHR=1,744
      PC(IPG,MHR)=KEPTPC(MHR)
21   CONTINUE
20   GO TO 400
1320 IF (INEWY.EQ.0) GO TO 1321
      READ 978,DISP,DSN,SKIP
      IF ((DSN.GT.0).AND.(INIT.EQ.0)) REWIND DSN
      INIT=1
      NEWY=0
      IF (SKIP.EQ.0) GO TO 1321
      DC 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 DC 109 IRG=1,NGAGES
      DO 109 IDA=1,31
      DC 109 IHF=1,24
109  PX(IRG,IDA,IHF)=0.0
      DO 107 IG=1,PXIN
      DO 1071 I=1,NGAGES
      IF (FGIN(I).NE.IG) GO TO 1071
      IRG=I
      GC TO 110
1071 CONTINUE
1072 READ 951,STATE
      IF (STATE.EQ.99) GO TO 107
      GO TO 1072
110  READ 922,STATE,YR,MT,DA,CN,RECPX
      IF (STATE.EQ.99) GO TO 107
      IF (SIXHR.EQ.1) GO TO 1081
      BASE=(CN-1)*12
      DC 108 IHF=1,12
      HP=BASE+IHF
108  PX(IPG,DA,HR)=RECPX(IHR)/2.54
      GC TO 110
1081 IF (CN6HF.EQ.1) GO TO 1085
      BASE=(CN-1)*2
      PX$IX(1)=0.0
      PX$IX(2)=0.0
      DO 1082 I=1,6
1082 PX$IX(1)=PX$IX(1)+RECPX(I)
      DO 1083 I=7,12
1083 PX$IX(2)=PX$IX(2)+RECPX(I)
      DC 1084 IHF=1,2
      HR=BASE+IHF
1084 PX(IPG,DA,HR)=PX$IX(IHR)
      GO TO 110

```

MAIN

```

1085 DO 1086 IHF=1,4
1086 BX(IHG,DA,IHR)=RECPX(IHP)
1087 CONTINUE
1087 GC TO 110
107 CONTINUE
107 IF (IPSP.EQ.0) GO TO 400
DO 1327 IRG=1,NGAGES
DO 1328 IDA=1,31
DO 1323 IHP=1,24
1328 KEPTPX(IDA,IHR)=PX(IPG,IDA,IHR)
1327 WRITE(DSN) KEPTPX
GO TO 400
1322 DO 1323 IG=1,PXIN
DO 1324 I=1,NGAGES
1324 IF (PGIN(I).NE.IG) GO TO 1324
IRG=1
GO TO 1325
1324 CONTINUE
1324 READ(DSN)
GC TO 1323
1325 READ(DSN) KEPTPX
DO 1326 IDA=1,31
DO 1326 IHR=1,24
1326 PX(IPG,IDA,IHR)=KEPTPX(IDA,IHR)/2.54
1323 CONTINUE
C INSTANTANEOUS ACTUAL FLCWS--BY MCNTH
C HURLY FLOW -- CNE STATION
400 IF (PCINT.EQ.1) GO TO 122
400 IF (IHRTEST.EQ.0) GO TO 401
DO 405 IPT=1,NPTS
405 IF (CHECK(IPT).NE.2) GO TO 405
DO 402 IPT=1,744
402 FLCW(IPT,1)=0.0
403 READ(971,STATE,MO,DA,YR,CN,HPFW
403 IF (STATE.EQ.99) GO TO 405
403 BASE=(DA-1)*24+(CN-1)*6
DO 404 I=1,6
MHR=BASE+I
404 FLCW(IPT,MHR)=HPFW(I)
GC TO 403
405 CONTINUE
401 IF (CKTEST.EQ.0) GC TO 122
C SIX HCUR FLOWS
406 DO 406 IPT=1,NPTS
406 IF (CHECK(IPT).NE.1) GO TO 406
DO 407 I=1,744
407 FLCW(IPT,1)=0.0
408 READ(970,STATE,MO,DA,YR,RECFW,T1,P1,T2,P2
408 IF (STATE.EQ.99) GO TO 406
408 BASE=(DA-1)*24
DO 409 I=1,4
MHR=BASE+(I*6)
409 FLCW(IPT,MHR)=RECFW(I)
IF (T1.EQ.0) GO TO 408
MHR=BASE+T1
FLCW(IPT,MHR)=P1
IF (T2.EQ.0) GO TO 408
MHR=BASE+T2
FLCW(IPT,MHR)=P2
GC TO 408
408 CONTINUE
C SNOW VARIABLES
122 IF (SNOW.EQ.0) GO TO 123
122 IF (SNOWA(MCNTH).EQ.0) GO TO 123
C
123 IF (PCINT.EQ.1) GO TO 115
123 IF (FCUTE.EQ.0) GO TO 115
GC TO 114
C COMPUTATION OF SNOWPACK CONDITIONS
115 IF (SNOW.EQ.0) GO TO 113
115 IF (SNOWA(MCNTH).EQ.0) GO TO 113
DO 116 IRG=1,NGAGES
116 CONTINUE
116 IF (PCINT.EQ.1) GC TO 1259
C COMPUTATION OF SIMULATED CHANNEL INFLOW AND STREAMFLOW
113 DO 112 IFG=1,NGAGES
113 CALL LAND

```

MAIN

```

112  CONTINUE
114  DC 117 IPT=1,NPTS
      CALL CHANNEL
117  CONTINUE
C MONTHLY SUMMARY
    IF (STCFE.EQ.0) GO TO 1211
    DO 22 IFG=1,NGAGES
    DO 23 MHP=1,744
23   KEPTPC(MHP)=90(IFG,MHP)
      WRITE(DSFO) KEPTRO
22   CONTINUE
    GO TO 1210
1211  IF (ROUTE.EQ.0) GO TO 1210
    GO TO 1257
1210  PRINT 923,BASIN
      PRINT 924, MCCHAR(MCNTH),YEAR
      PRINT 925
      PPINT 940
      PRINT 926
C OUTPUT LAND STORAGES AND FLOW COMPONENTS
    DC 125 IFG=1,NGAGES
    DO 1251 I=1,5
1251  RGN(I)=RGNAM(E,IRG,I)
      PRINT 927, IRG,RGN,SFC(IRG),SRCS(IRG),SIMPV(IRG),
      ISINTF(IRG),SGWF(IRG),SRECH(IRG),SPR(IRG),SPE(IRG),
      2SET(IRG)
125  CONTINUE
      PRINT 941
      PRINT 942
      DC 1252 IRG=1,NGAGES
      BAL=(LZSI(IRG)+UZSI(IRG)+RESI(IFG)+SRGX1(IRG)-LZSI(IPG)-UZSI(IRG)
      1-RESI(IFG)-SRGX1(IFG))#(1.0-IMPV(IRG))+SGWI(IRG)+SCEPI(IRG)
      2-SGW1(IRG)-SCEPI(IRG)+SRO(IRG)+SET(IRG)+SRECH(IRG)-SPR(IRG)
      DO 1253 I=1,5
1253  RGN(I)=RGNAM(E,IRG,I)
      PRINT 943, RGN,UZSI(IRG),LZSI(IRG),SGWI(IRG),GWSI(IRG),
      1RESI(IRG),SRGX1(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-POINT
    IF (NFTS.EQ.1) GO TO 1257
    DO 300 IPT=1,NPTS
      ELE=ELEMTS(IPT)
      DC 301 IDA=1,LAST
      SIMSC(IPT,IDA)=0.0
      DC 301 IE=1,ELE
      IF G=GAGEAR(IPT,IE)
      SIMSC(IPT,IDA)=SIMSC(IPT,IDA)+COVER(IRG,IDA)*TIMEAF(IPT,IE)
301  CONTINUE
      ALCAL=CFSM(IPT)/(26.9*24.0)
      PI=ALCAL/AREA(IPT)
      IF (PI.EQ.1.0) GO TO 300
      DC 305 IDA=1,LAST
      SIMSC(IPT,IDA)=SIMSC(IPT,IDA)*PI
      DC 302 IE=1,ELE
      I=ACDFW1(IPT,IE)
      IF (I.EQ.0) GO TO 302
      P2=(AEEA(I)/AREA(IPT))
      DO 303 IDA=1,LAST
      SIMSC(IPT,IDA)=SIMSC(IPT,IDA)+SIMSC(I,IDA)*P2
      I=ACDFW2(IPT,IE)
      IF (I.EQ.0) GO TO 302
      P2=(AEEA(I)/AREA(IPT))
      DO 304 IDA=1,LAST
      SIMSC(IPT,IDA)=SIMSC(IPT,IDA)+SIMSC(I,IDA)*P2
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,MCCHAR(MCNTH),YEAR
      PRINT 932
      PRINT 929
      PRINT 944,(NUM(IPT),IPT=1,NPTS)

```

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, MCNTH)=0.0
      DO 128 IDA=1, LAST
      I=(IDA-1)*24
      TEMPFL=0.0
      DO 127 IHF=1, 24
      MHF=I+IHR
. 127  TEMPFL=TEMPFL+FLCW(IPT, MHR)
      TEMPFL=TEMPFL/24.0
      SIMFLW(IPT, MONTH, IDA)=TEMPFL
128  SSF(IPT, MONTH)=SSF(IPT, MONTH)+TEMPFL
126  CONTINUE
C OUTPUT HOURLY SIMULATED FLOWS ABOVE PRESET VALUE
      IF (OUTHF.EQ.0) GO TO 137
      TITLE=0
      DO 138 IPT=1, NPTS
      MINFWT=MINFWT(IPT)
      DO 139 I=1, 7
139  FPN(I)=FPNAME(IPT, I)
      TITLE=1
      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, MCCHAR(MCNTH), 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, (FLCW(IPT, MHR), MHR=MOHR1, MOHR2)
      MOHR1=MOHR1+12
      MOHR2=MOHR2+12
      PRINT 948, (FLOW(IPT, MHF), MHR=MOHR1, MOHR2),
      ISIMFLW(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, MCCHAR(MCNTH), 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, MCNTH), IPT=1, NPTS)
C OUTPUT MEAN DAILY ACTUAL FLOW
      IF (CTEST.EQ.0) GO TO 1362
      PRINT 900
      PRINT 903, BASIN
      PRINT 924, MCCHAR(MCNTH), YEAR
      PRINT 933
      PRINT 929
      PRINT 944, (NUM(IPT), IPT=1, NPTS)
      DO 135 IDA=1, LAST
135  PRINT 930, IDA, (ACTFLW(IPT, MCNTH, IDA), IPT=1, NPTS)
      PRINT 935, (SAF(IPT, MONTH), IPT=1, NPTS)
C PLOTTING OF HOURLY FLOW
1362  IF ((HTEST.EQ.0).AND.(CKTEST.EQ.0)) GO TO 1363
      DO 820 IPT=1, NPTS
      IF (PLOTHF(IPT).EQ.0) GC TC 820
      CALL HCUFLY(INFRG, MONTH, YEAR, IPT, FLOW)
1363  IF (MONTH.NE.12) GO TO 1361
C WATER YEAR SUMMARY SECTION
      PRINT 920
      CONTINUE
C WATER YEAR SIMULATED FLOW SUMMARY TABLES
      DO 810 IPT=1, NPTS
      DO 311 I=1, 7
1361  FPN(I)=FPNAME(IPT, I)
      PRINT 952, FPN

```

PL
FL

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
CONTINUE
N=N+1
DO 813 IDA=N,30
PRINT 958, IDA,SIMFLW(IPT,1,IDA),(SIMFLW(IPT,MO,IDA),MO=3,12)
CONTINUE
IDA=31
PRINT 959, IDA,SIMFLW(IPT,1,31),SIMFLW(IPT,3,31),SIMFLW(IPT,5,31),
SIMFLW(IPT,7,31),SIMFLW(IPT,8,31),SIMFLW(IPT,10,31),SIMFLW(IPT,12,
31)
CCNV=26.9*AREA(IPT)
WYFLOW=0.0
DO 814 MO=1,12
TEMPFL=SSF(IPT,MO)*35.31
INCHES(MC)=(TEMPFL/CCNV)*25.4
WYFLOW=WYFLCW+TEMPFL*0.02832
PRINT 960, (SSF(IPT,MO),MO=1,12),WYFLOW
WYFLOW=(WYFLOW*35.31)/CCNV*25.4
PRINT 961, (INCHES(MC),MO=1,12),WYFLOW
WYFLOW=WYFLCW*AREA(IPT)*2.59
IF (CCMPAR(IPT).EQ.0) GO TO 810
WYFLCW=0.0
DO 815 MO=1,12
TEMPFL=SAF(IPT,MO)
INCHES(MC)=(TEMPFL*86.4)/UMAREA
WYFLCW=WYFLCW+TEMPFL
PRINT 963, (SAF(IPT,MO),MO=1,12),WYFLOW
WYFLOW=(WYFLCW*86.4)/UMAREA
PRINT 961, (INCHES(MO),MO=1,12),WYFLOW
WYFLOW=WYFLCW/UMAREA
PRINT 962, WYFLOW
CONTINUE
C PLCTTING 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 (PLCT(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 (CCMPAR(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 LPCT(YEAR,IPT)
801 CONTINUE
C INCREMENT TO THE NEXT MONTH
1361 IF ((YEAR.EQ.YR2).AND.(MCNTH.EQ.MC2)) GO TO 130
MCNTH=MCNTH+1
IF (MCNTH.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 FCFMAT (1H1)
901 FCFMAT (2CA4)
902 FCFMAT (1H0,20A4)
903 FCFMAT (1H,20X,20A4)
904 FCFMAT(1H0,47X,32HINFORMACION BASICA DE LA CORRIDA)
905 FCFMAT (715,513)

```

MAIN

```

906 FORMAT(1HO,27HINICIO DE LA CCFPIADA 1 DE,1X,A4,1X,5HDE 19,I2,6X,1
19HFINAL DE LA COPRIDA,3X,124H DE ,A4,6H DF 19,I2)
907 FORMAT(1HO,23HNUMERO DE PUNTOS DE FLUJO = ,I2,I2X,42HNUMERO DE EST
1. DE MED. DE PRECIPITACION = 13)
908 FORMAT(1HO,4H EST,2X,16HNCMARE DE LA EST,7X,2HK1,3X,4HIMPV,2X,
14HFPMXM,3X,4HUZSN,3X,4HLZSN,4X,2HCB,4X,2HCC,4X,2HK3,4X,4HK24L,2X,
25HK24EL 4X,14X,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 FCFMAT(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 FCFMAT(1HO,17HNCMBRE DE LA EST.,I2X,3HUZS,4X,3HLZS,4X,3HSGW,4X,
13HGWS,4X,3HRES,3X,4HSRGX,3X,4HSCEP,3X,4HAEPI)
913 FORMAT(1H,5A4,6X,8F7.2)
914 FCFMAT(1HO,3H PF,1X,25HNCMBRE DEL PUNTO DE FLUJO,9X,4HAREA,3X,3HKS
11,2X,4HFTIN,2X,7HCCMPARE,2X,4HCHEK,2X,10HHISTOGRAMS)
915 FORMAT(7A4,2X,F10.2,F5.2,4F5)
916 FORMAT(1HO,3H RG,3X,13HFAINGAGE NAME,10X,2HK1)
917 FORMAT(30X,10F5.2)
918 FORMAT(1H,I3,3X,7A4,F8.2,F6.2,I5,2I7,5X,9HTIMDELAY,10F5.2)
919 FORMAT(1H,72X,8HGAGEAREA,1X,10F5)
920 FORMAT(1H,72X,8HADDFLEW1,1X,10I5)
921 FORMAT(1H,72X,8HADDFLOW2,1X,10I5)
922 FORMAT(I2,7X,3I3,I2,12F5.2)
923 FORMAT(1H,I20HSUMARIO MENSUAL PAFA,1X,20A4)
924 FORMAT(1HO,A4,3H 19,I2)
925 FORMAT(1HO,3IX,42HSUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS)
926 FORMAT(1HO,4H EST,2X,17HNCMBRE DE LA EST.,6X,3HTOTAL RO,3X,
110HSURFACE RO,3X,7HFTMPV RO,3X,9HTINTERFLOW,3X,7HGW FLOW,3X,
29HRECHARGE,3X,6HPFECP,3X,12HPCENTRAL-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,5HTOTAL,19X,14HPUNTO DE FLUJO)
930 FORMAT(1H,15,5X,1CF10.1)
931 FORMAT(9X,I2,I1,11F6.3)
932 FORMAT(9X,I2,I1,11F6.0)
933 FCFMAT(1HO,43X,45HSUMARIO DE LA DESCARGA MEDIA DIARIA OBSERVADA)
934 FORMAT(30X,10I5)
935 FORMAT(1HO,5HTOTAL,5X,1CF10.1)
936 FORMAT(1HO,4SX,28HPAPAMETROS PARA LA VERTIENTE)
937 FORMAT(1HO,41X,25HALMACENAMIENTOS INICIALES)
938 FORMAT(1HO,45X,29HPAPAMETROS DE PUNTOS DE FLUJO)
939 FORMAT(20X,5.0,3F5.2,F5.3,F5.2)
940 FORMAT(1HO,12X,77HCOMPONENTES DE LA EVAPOTANSPIRACION, DE LA PREC
1IPITACION Y DE LA ESCORTENTIA)
941 FORMAT(1HO,32X,32HALMACENAMIENTOS AL FINAL DEL MES)
942 FCFMAT(1HO,17HNCMBRE DE LA EST.,I2X,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,1D10)
945 FORMAT(1HO,43X,36HSUMARIO DE LA DESCARGA HORARIA SIMULADA)
946 FORMAT(1HO,7A4,10X,44HMINIMO FLUJO MEDIO DIARIO CAUSANDO SALIDA E
15,F7.0,5H MCSG)
947 FCFMAT(1HO,I3,3X,2HAM,6F9.1,4X,6F9.1)
948 FORMAT(1H,6X,2HPM,6F9.1,4X,6F9.1,F10.1)
949 FORMAT(1H,145,F5.1,9I5,F5.2)
950 FORMAT(4I5,F5.1,9I5,F5.2)
951 FORMAT(I2)
952 FORMAT(1H,I20X,38HSIMULACION PARA EL AÑO HIDROLOGICO, 19,T2,5H PAR
11,2X,7A4,/)
953 FORMAT(1HO,37X,13HWATER YEAR 19,I2)
954 FCFMAT(1HO,35HSUMARIO DE LA DESCARGA MEDIA DIARIA)
955 FORMAT(1HO,3X,3HDIAS,5X,3HENE,6X,3HEFB,6X,3HMAR,6X,3HABR,6X,3HMAY,
14X,5HJUNIO,4X,5HJULIO,6X,3HAGO,5X,4HSEPT,5X,4HOCTB,3X,6HNOVIEM,5X,
24HCCIB,7X,5HANUAL)
956 FORMAT(1HO)
957 FORMAT(1H,15,12F9.2)
958 FORMAT(1H,15,F9.2,9X,10F9.2)
959 FORMAT(1H,15,F9.2,9X,F9.2,9X,F9.2,9X,2F9.2,9X,F9.2,9X,F9.2)
960 FCFMAT(5HTOTAL,12F9.2,F10.0,64 MCSGD)
961 FCFMAT(1H,5X,12F9.1,F10.1,6H MILIM)
962 FCFMAT(1H,111X,F12.3,7H 1000MC)
963 FCFMAT(5H03SV,12F9.0,F10.0,6H MCXGD)
964 FORMAT(12F9.3)
965 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,I2,8F10.0)
972 FORMAT(1HO,42X,34HAJUSTE DE LA EVAPORACION POTENCIAL)

```

```

      MAIN
973 FFORMAT(1H),17HAJUSTE ESTACIONAL,11X,3HMFS,9X,12I5)
974 FFORMAT(1H,27X,6HAJUSTE,8X,12E5.2)
975 FFORMAT(1H,18HAJUSTE PARA LA EST,08X,8HFESTACION,6X,12I5)
C76 FORMAT(30X,4I5,3F10.0)
978 FFORMAT(3I5)
979 FFORMAT(1H0,10X,34HINFILTRATION CURVE POWER FACTOR IS,F5.1,10X,
116HZUSN WT. FACTOR#,F5.2)
984 FFORMAT(F10.0,10F5.2)
985 FFORMAT(1H,3X,17H VARIABLE K BASE#,F6.0,3X,2HK#,20F5.2)
986 FFORMAT(10X,10F5.2)
987 FFORMAT(1H,3X,20H VARIABLE LAG BASE#,F6.0,3X,4HLAG#,10I5)
988 FFORMAT(F10.0,10I5)
C89 FORMAT(12I5)
990 FFORMAT(3X,2H99)
991 FFORMAT(2F5.2,I10)
C92 FFORMAT(1H0,43X,34HSIMULATED AREAL SNOW COVER SUMMARY)
993 FFORMAT(1H,I5,5X,10F10.2)
C END OF MAIN PROGRAM
      STCP
      END

```

www.bdigital.ula.ve

LAND

```

      SURFCUTTING LAND
C LAND SURFACE FUNCFF SUBROUTINE
C LAND VARIABLES
      REAL LZS,K1T,LZSMNT,K3T,K24LT,K24ELT,KVT,LKK4T,LIRC4T,INTF,LNRAT,
      INFIL,LZI,LCS
C MAIN LAND AND CHANNEL VARIABLES
      INTEGER ELE,ELEMTS(10),GAGEAR(10,10),ADDFW1(10,10),
      ADDFW2(10,10),TEST1(10),TEST2(10),RTEINT(10),AVEPE,VARK(10),
      VAFFL(10),SNOW,VAFFEP
      REAL IVMFV(5),LZSN(5),K3(5),K24L(5),K24EL(5),KV(5),LKK4(5),
      LIRC4(5),LZSI(5),KS1(10),KSIV(10,20)
      COMMON/MCL/EPD,ST(24),EPXM(5),UZSN(5),CB(5),CC(5),SRC(5),DEC(5),
      UZSI(5),SGWI(5),GWSI(5),PESI(5),SPGX(5),SCEPI(5),REPI(5),
      ZCFSM(10),PREVF(10),TRANSI(10,48),EVAP(12,31),
      SFLCW(10,-44),RD(5,-44),EVAPM(12),SFO(5),SPCS(5),SIMPV(5),SINTF(5),
      SGKEF(5),SFECH(5),SPE(5),SFT(5),TIMEA(10,10),PEADJ(12),
      SGAGEP(5),POWEE,EAEEK(10),BASEL(10),IMPV,LZSN,K3,K24L,K24EL,KV,
      LKK4,LIRC4,LZSI,KS1,KSIV,MAXL(10),MINL(10),LAG(13,10),
      MHR,MUHR1,MUHR2,ELE,ELEMTS,GAGEAR,VAFFEP,SDEP,EPBIAS,IXEP,
      ADDFW1,ADDFW2,TEST1,TEST2,RTEINT,AVEPE,VARK,VARL,SNOW,UZSNWF,
      94EPI(5)
C MAIN LAND, CHANNEL AND SNOW VARIABLES
      INTEGER SIXHR
      REAL K1(5)
      COMMON/MLCS/FCOVER(5),FDEN(5),KOHLER,PE(5,31),COVEP(5,31),
      IPX(5,31,24),K1,LAST,IRG,IPT,IDA,IHR,MONTH,I,SIXHR
C LAND INITIAL VALUES
      SAC=0.0
      SRCST=0.0
      SINTFT=0.0
      SCHFT=0.0
      SPVFT=0.0
      SHCHFT=C.0
      SETT=C.0
      SERT=C.0
      SPET=C.0
C INITIAL VALUES OF VARIABLES
      LZS=UZSI(IRG)
      LZS=LZSI(IRG)
      SGK=SGWI(IRG)
      GWS=GWSI(IRG)
      RESS=PESI(IRG)
      SFGX=SFGX(IRG)
      SCEP=SCEP(IRG)
      PFFF=PEPI(IRG)
      AEPIT=AEPPI(IRG)
C INITIAL VALUES OF PARAMETERS
      K1T=K1(IRG)
      AT=IMPV(IRG)
      PL=1.0-AT
      EPXMT=EPXM(IRG)
      UZSNC=UZSN(IRG)
      LZSNT=LZSM(IRG)
      K3T=K3(IRG)
      K24LT=K24L(IRG)
      K24ELT=K24EL(IRG)
      CCT=CC(IRG)
      CCT=CC(IPG)
      KV=T(KV)
      SFCT=SFC(IRG)
      DEC=DEC(IRG)
      LKK4T=LKK4(IRG)
      LIRC4T=LIRC4(IRG)
      FFC=FCOVER(IRG)*FDEN(IRG)
      TFFF=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 (KCHLES.EQ.1) GO TO 204
      IF (IAVEPE.EQ.0) GO TO 205
      EP=EVAPM(MONTH)
      GO TO 2032
205  EP=EVAP(MONTH,IDA)*PEADJ(MONTH)
      GO TO 2032
204  EP=PE(IPG,IDA)*PEADJ(MONTH)
2032 IF (IAVEPE.EQ.0) GO TO 202
      SC=EP*SDEP

```

LAND

```

CALL IGAUSS(IXEP,SD,EP,TV)
EP=TV+PBIAS*EP
IF (EP.LT.0.0) EP=0.0
EP=EP*GAGEPE(IRG)
EPCT=EP
SPET=SPET+EP
EP=EPFC*EP+(1.0-EFC)*(1.0-COVER(IRG,IDA))*EP
AEPIT=(AEPIT*0.9)+EP
UZSNT=UZSNK+UZSNWF*AEPIT
IF ((ISTXHF.EQ.0).OR.(SNOW.EQ.1)) GO TO 208
IS=(IHP+5)/5
PX1=PX1(IRG,IDA,IS)/6.0
GC TC 207
209 PX1=PX1(IPG,IDA,IHP)
IF (SNCK.EQ.1) GC TO 2081
207 ISX1=PX1*KIT
2081 SPFT=SPFT+PX1
PR=PX1
C PX1 IS HOURLY PRECIPITATION -- PR IS HOURLY PRECIPITATION
RU=0.0
IF (PR.GT.0.0) GO TO 210
210 IF (RES.EQ.0.0) GO TO 211
P3=0.0
211 GO TO 212
IF (SFGX.EQ.0.0) GO TO 213
P3=0.0
PDS=0.0
213 PDS=0.0
FCF=0.0
INTF=0.0
GO TO 215
C INTERCEPTION STORAGE = SCEP IS INTERCEPTION STORAGE VOLUME
C - EPX IS INTERCEPTION STORAGE CAPACITY
214 EPX=EPXMT-SCEP
IF (EPX.LT.0.0) EPX=C.0
IF (PF.GE.EPX) GO TO 216
SCEP=SCEP+PR
P3=0.0
215 GC TO 2121
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 RDS=0.0
GWIN=0.0
DC 209 T15=1.4
P4=0.25*P3+RES
IF (P4.EQ.0.0) GO TO 209
LN RAT=LZS/LZSN
D3FV=CBT*((LNRAT)**POWER)
D4F=0.25*D3FV
C P4 IS P3 PLUS SURFACE DETENTION STORAGE
RATIO=CCT*(2.0**LN RAT)
IF (RATIO.LT.1.0) RATIO=1.0
IF (P4.GE.D4F) GO TO 220
SHFD=P4*P4/(2.0*D4F)
GO TO 221
220 SHFD=P4-0.5*D4F
221 INFIL IS INFILTRATION VOLUME
IF (P4.GE.(D4F*RATIO)) GO TO 222
FXX=P4*P4/(2.0*D4F*RATIO)
GC TC 223
222 FXX=P4-0.5*D4F*RATIO
FXXX IS THE POTENTIAL INCREASE TO OVERLAND FLOW AND SURFACE DETENTION
223 RGXX=SHFD-FXX
RGXX IS THE POTENTIAL INCREASE TO INTERFLOW DETENTION
C UPPER ZONE CALCULATIONS
IF (UZS.GE.(2.0*UZSNT)) GO TO 224
UZI=2.0*ARS((3.5*(UZS/UZSNT)-1.0)+1.0
PRE=(C.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 PFE IS THE PERCENT OF RXX AND RGXX NOT RETAINED IN UPPER ZONE STORAGE

```

LAND

225 $FGX = FGXX * PRE$
 C RGX IS THE VOLUME TO INTERFLOW DETENTION STORAGE
 $SRGX = SRGX + RGX$
 C $SRGX$ IS INTERFLOW DETENTION STORAGE
 $RX = RX * PRE$
 C RX IS THE VOLUME TO OVERLAND FLOW AND SURFACE DETENTION
 $UZS = UZS + SHRD - FGX - RX$
 C UZS IS UPPER ZONE STORAGE VOLUME
 C OVERLAND FLOW
 IF ($RX \leq RES$) GO TO 226
 $DE = DECT * ((RX - RES) ^ * 0.6)$
 C DE IS SURFACE DETENTION AT EQUILIBRIUM
 C GO TO 227
 226 $DE = (RES + RX) ^ * 0.5$
 227 $D = (RES + RX) ^ * 0.5$
 C D IS AVERAGE SURFACE DETENTION
 IF ($D > DE$) $DE = D$
 IF ($D \leq 0.005$) GO TO 228
 $ROST = C_{.25} * SRCT * (D ^ * 1.67) * ((1.0 + 0.6 * ((D / DE) ^ * 3.0)) ^ * 1.67)$
 C GO TO 229
 228 $ROST = 0.0$
 229 IF ($RCST < GT$, $(0.75 * RX)$) $RCST = 0.75 * RX$
 C KCS IS OVERLAND FLOW VOLUME
 $SRCS = SRGST + ROST$
 $RES = PX - ROST$
 $PX = PCS + RCST$
 C RES IS SURFACE DETENTION STORAGE VOLUME
 IF ($RES \geq 0.001$) 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 ZONES
 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
 $GWIN = GWIN + INFIL - F3$
 C CONTINUE
 C ENC 15 MINUTE LOOP
 $FIA = GWIN$
 $F1 = FIA = (1.0 - K24LT) * PA$
 $RECH = FIA * K24LT * PA$
 C $RECH$ IS DEEP GROUNDWATER RECHARGE
 $SREFCH = SPECTH + RECH$
 $SGW = SGW + F1$
 C SGW IS GROUNDWATER STORAGE VOLUME
 $GWS = GWS + F1$
 C GWS IS ANTECEDENT GW INFLOW INDEX
 C INTERFLOW CALCULATIONS
 214 $INTF = L * KG4T * SRGX$
 C $INTF$ IS INTERFLOW VOLUME
 $SINTF = SINTF + INTF$
 $SRGX = SRGX - INTF$
 IF ($SRGX \geq 0.0001$) GO TO 215
 $LZS = LZS + SAGX$
 $SAGX = C_{.0}$
 C GROUNDWATER FLOW CALCULATIONS
 215 IF ($SGW \leq 0.0001$) GO TO 231
 $GWF = SGW * LKK4T * (1.0 + KVT * GWS)$
 C 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
 $RU = RU + (R7S + INTF) * PA + P3 * AT + GWF$
 C EVAP-TTRANS LOSSES FROM INTERCEPTION AND UPPER ZONE STORAGES
 $EPPH = EPDIST(IHR) > EP$
 IF ($EPPH = EQ$, 0.0) GO TO 234
 IF ($SCEP < LE$, $EPPH$) GO TO 235
 IF ($SCEP > LE$, $EPPH$) GO TO 236
 $SCEP = SCEP - EPPH$
 $SETT = SETT + EPPH$
 $EPPH = 0.0$
 C GO TO 234

LAND

```

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=SSETT+PA*EPHR
      UZS=UZS-EPHR
      EPHR=0.0
      GWS=0.0
238 SETT=SSETT+UZS*PA
      EPHR=EPHR-UZS
      UZS=0.0
237 KEP IS RESIDUAL POTENTIAL EVAPTRANSPIRATION
      SLOW PERCOLATION FROM UPPER ZONE
      DEEPL=(LZS/UZSNT)-(LZS/LZSNT)
      IF (DEEPL.LE.0.0) GO TO 239
      LNFR=LZS/LZSNT
      RECE=C.003*C3T*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.LE.LZSNT) PRE=1.0-PRE*LNRAT
      F3=PRE*RECE
      F1A=(1.0-PRE)*RECE
      F1=F1A*(1.0-K24LT)*PA
      RECH=F1A*K24LT*PA
      SRCHECH=SRECH+RECH
      LZS=LZS+F3
      SGW=SGW+F1
      GWS=GWS+F1
C EVAP-TRANS FROM GROUNDWATER AND LOWER ZONE
239 TE(IHP.NE.21) GO TO 242
      GWS=ST.0.0001 GWS=0.97=GWS
      LSC=K24ELT*EPOT
      LOS=(LCS.GT.SGW) LOS=SGW
C LCS IS GROUNDWATER EVAPTRANSPIRATION VOLUME
      SETT=SETT+LOS
      SGW=SGW-LOS
      GWS=GWS-LOS
      EP=EP-GWS
      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=SSETT+PA*AETR
C AETR IS LOWER ZONE EVAPTRANSPIRATION VOLUME
      REP=0.0
242 CLAT=1.0
      MHP=(ICA-1)*24+IHR
      RC(IRG,MHR)=RU
      SCCT=SRCCT+RU
      IF ((ICA.EQ.LAST).AND.(IHR.EQ.24)) GO TO 246
      IHR=IHR+1
      IF (IHP.LE.24) GO TO 203
      IHP=1
      ICA=ICA+1
      GO TO 203
C END OF HOUR AND DAY LCCP
C LAND CARRYOVER VALUES
246 UZSI(IFG)=UZS
      LZSI(IFG)=LZS
      SGWI(IFG)=SGW
      GWSI(IFG)=GWS
      RESI(IFG)=RES
      SRGX1(IFG)=SRGX
      SCEP1(IFG)=SCEP
      REPI(IFG)=REP
      AEPIT(IFG)=AEPIT
      SRC1(IFG)=SRC1
      SRCST(IFG)=SRCST
      SINTF(IFG)=SINTFT
      SIMPV(IFG)=SIMPV

```

LAND

SGWF(IRG)=SGWFT
SGECH(IRG)=SGECHT
SPF(IRG)=SPRT
SPE(IRG)=SPET
SETT(IRG)=SETT
STURN
END

www.bdigital.ula.ve

HOURLY

```

SUBROUTINE HOURLY(INFRD,MONTD,YEAR,IPT,FLCW)
C SUBROUTINE GENERATES SCALED INPUT FOR AUXILIARY PLOT PROGRAM
  INTEGER YEAR,DA1,DA2
  REAL INFRD(20),MCCHAR(12)
  DIMENSION YA(752),YS(752),A(31),NUM(31),FLOW(10,744)
C MAIN,HOURLY AND DAILY VARIABLES
  INTEGER FIRST,CHECK(10)
  COMMON/MHR/FLCW1(10,744),PHFMX(10),FPN(7),FPNAME(10,7),PLOTMX(10),
  14CTFLW(10,12,31),SIMFLW(10,12,31),FIRST,CHECK
  DATA MOCHAR/3HJAN,3HFEB,3HMAR,3HAMPR,3HMAY,4HJUNE,4HJULY,3HAUG,
  14HSEPT,3HOCT,3HNOV,3HDEC/
  MCHR1=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 FLCW
  DC 850 MHR=MCHR1,744
  IF (FLCW1(IPT,MHR).GT.0.0) GO TO 850
  MCHR1=MHR
  GC TO 851
  850 CONTINUE
  GC TO 899
  851 FIRST=1
  DC 852 MHR=MCHR1,744
  IF (FLCW1(IPT,MHR).GT.0.0) GC TO 852
  MCHR2=MHR-1
  GC TO 870
  852 CONTINUE
  MCHR2=744
  GC TO 870
C SIX HOUR FLCS
  855 DC 856 MHR=M6,744,6
  IF (FLCW1(IPT,MHR).EQ.0.0) GC TO 856
  M6=MHR
  GC TO 957
  856 CONTINUE
  GC TO 899
  857 FIRST=1
  DC 858 MHR=M6,744,6
  IF (FLCW1(IPT,MHR).GT.0.0) GO TO 858
  MCHR2=MHR-6
  GC TO 859
  858 CONTINUE
  MCHR2=744
  859 MCHR1=M6-5
  DC 860 MHR=MCHR1,M6
  IF (FLCW1(IPT,MHR).EQ.0.0) GO TO 860
  MCHR1=MHR
  GC TO 861
  860 CONTINUE
  861 F1=FLCW1(IPT,MHR)
  M1=MCHR1+1
  864 DC 862 MHR=M1,MCHR2
  IF (FLCW1(IPT,MHR).EQ.0.0) GO TO 862
  M2=MHR
  F2=FLCW1(IPT,MHR)
  GC TO 863
  862 CONTINUE
  863 IF (M1.EQ.M2) GO TO 865
  FP=(F2-F1)/(M2-M1+1)
  I=M2-1
  DC 866 MHR=M1,!
  X1=MHR-M1+1
  866 FLCW1(IPT,MHR)=F1+FP*X1
  IF (M2.EQ.MCHR2) GO TO 870
  M1=M2+1
  F1=F2
  GC TO 864
  870 NDT=MCHR2-MCHR1+1
  DA1=(MCHR1-1)/24+1
  DA2=(MCHR2-1)/24+1
  NC4=DA2-DA1+1
  I=MCHR1-(DA1-1)*24
  X1=I*0.1
  DC 871 I=1,NDA
  NUM(I)=DA1-1+I
  A(I)=2.4*I
  PMAX=PHFMX(IPT)

```

HOURLY

```

DELT A=PMAX*0.1
PUNCH 900,NDA,DELT A,X1,NPT
PUNCH 901,(Z(I)) {I=1,NDA}
PUNCH 902,(NUM(I),I=1,NDA)
IF (CHECK(IPT).EQ.1) GO TO 872
PUNCH 903
GC TC 873
872 PUNCH 904
873 DC 874 I=1,7
874 FPN(I)=FPNAME(IPT,I)
PUNCH 905,FPN
PUNCH 906,MCHAR(MCNTH),YEAR
PUNCH 907,INFR0
PUNCH 908
DC 875 MHR=MCHR1,MCHR2
I=MHR-MCHR1+1
YA(I)=(FLCW1(IPT,MHR)/PMAX)*10.0
YS(I)=(FLCW(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 CCNTINUE
PUNCH 909,(YA(I),I=1,NPT)
PUNCH 909,(YS(I),I=1,NPT)
IF (MCHR2.EQ.744) GC TO 899
MCHR1=MCHR2+1
M6=MCHR2+6
GO TO 380
399 CCNTINUE
C HOURLY FORMAT STATEMENTS
900 FFORMAT (15,F10.2,F5.1,I5)
901 FFORMAT (16F5.1)
902 FFORMAT (20I3)
903 FFORMAT (16HHOURLY FLCW--CFS)
904 FFORMAT (20HSIX HOURLY FLCW--CFS)
905 EFORMAT (7A4)
906 FFORMAT (A4,3H 19,I2)
907 FFORMAT (20A4)
908 FFORMAT (35HBLACK IS CBSERVED--RED IS SIMULATED)
909 FFORMAT (16F5.2)
RETURN
END

```

CHANNEL

```

SLEEP ROUTINE CHANNEL
C CHANNEL ROUTING SUBROUTINE
C CHANNEL VARIABLES
      INTEGER GAGET(10), ADD1T(10), ADD2T(10), HALFP, RINT, DHR, VK, VL
      REAL KVTR(20), KS1T, IN, K
      DIMENSION TRS(702), TIMET(10), LAGT(10)
      DIMENSION DEX(11), CM(10,744), Q(11,744), DET(744), YYY(11,744)
      DIMENSION TEMP1(20), TEMP2(20)
C MAIN LAND AND CHANNEL VARIABLES
      INTEGER ELE, ELEMENTS(10), GAGEAR(10,10), ADDFW1(10,10),
      . 1ADDFW2(10,10), TEST1(10), TEST2(10), RTEINT(10), AVEPE, VARK(10),
      . 2VAFL(10), SNOW, VAREP
      REAL IMPV(5), LZSN(5), K3(5), K24L(5), K24EL(5), KV(5), LKK4(5),
      1LIFC4(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), SGW(5), GWSI(5), RESI(5), SFGXI(5), SCEPI(5), FEP(5),
      2CFSM(10), PREVT(10), TRANSI(10,43), EVAP(12,31),
      3ELOW(10,744), R0(5,744), EVAPM(12), SR0(5), SR0S(5), SIMPV(5), SINTF(5),
      4SGWF(5), SRECH(5), SPF(5), SPE(5), SET(5), TIMEAR(10,10), PEADJ(12),
      5GAGEPE(5), POWER, EASEK(10), BASEL(10), IMPV, LZSN, K3, K24L, K24EL, KV,
      6LKK4, LIFC4, LZSI, KSIV, MAXL(10), MINL(10), LAG(10,10),
      7IE, MHR, MOHP1, MOHP2, ELE, ELEMENTS, GAGEAR, VAREP, SDEP, EPBIAS, IXEP,
      8ADDFW1, ADDFW2, TEST1, TEST2, RTEINT, AVEPE, VARK, VARL, SNOW, UZSNWF,
      QAEPI(5)
C MAIN, LAND, CHANNEL AND SNOW VARIABLES
      INTEGER SIXHR
      REAL K1(5)
      COMMON/LCS/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
      MOHRI=1
      MOHRC=LAST*24
      ELE=ELEMENTS(IPT)
      DO 3001 IE=1,ELE
      DEX(IE)=5000.0
      DO 3001 MHR=MOHRI, MOHRC
      3001 QM(IE,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)
      ADD2T(IE)=ADDFW2(IPT,IE)
      CFS=CFSM(IPT)
      CMS=CFS*0.02832
      IF (TEST1(IPT).EQ.1) GO TO 303
      DO 304 MHR=MOHRI, MOHRC
      DO 304 IE=1,ELE
      J=GAGET(IE)
      304 QM(IE,MHR)=R0(J,MHR)*CMS*TIMET(IE)/DEX(IE)
      GO TO 305
      303 IF (TEST2(IPT).EQ.1) GO TO 306
      DO 307 MHR=MOHRI, MOHRC
      DO 307 IE=1,ELE
      J=GAGET(IE)
      QM(IE,MHR)=RC(J,MHR)*CMS*TIMET(IE)/DEX(IE)
      J=ADD1T(IE)
      IF (ADD1T(IE).GT.0) Q(1,MHR)=FLOW(J,MHR)
      307 CONTINUE
      GO TO 305
      306 DO 308 MHR=MOHRI, MOHRC
      DO 308 IE=1,ELE
      J=GAGET(IE)
      QM(IE,MHR)=R0(J,MHR)*CMS*TIMET(IE)/DEX(IE)
      IF (ADD1T(IE).EQ.0) GO TO 308
      J=ADD2T(IE)
      Q(1,MHR)=FLOW(J,MHR)
      IF (ADD2T(IE).EQ.0) GO TO 308
      J=ADD2T(IE)
      Q(1,MHR)=Q(1,MHR)+FLEW(J,MHR)
      308 CONTINUE
      305 CONTINUE
      N=FLE+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)

```

CHANNEL

```
1055 CONTINUE
    DD 1056 MHR=1,MCHR2
    IF(IPT.EQ.1) Q(1,MHR)=1.0
1056 DET(MHR)=RINT*3600.0
    NT=MCHR2
    CALL CORRE (Q,QM,DET,NT,N,DEX,MONTH,IPT,YYY)
    DO 30 MHR=MOHR1,MOHP2
30   FLOW(IPT,MHR)=Q(N,MHR)
    DO 1057 IE=1,N
    IF(IPT.EQ.1) TEMP1(IE)=YYY(IE,MOHR2)
    IF(IPT.EQ.2) TEMP2(IE)=YYY(IE,MOHP2)
1057 CONTINUE
    RETURN
    END
```

www.bdigital.ula.ve

CCBRE

```

SUBROUTINE CCBRE (Q,OM,DET,NT,N,DEX,MNTH,IPT,YYY)
METODO CINEMATICO PARA TRANSITO DE CAUDALES
DIMENSION DEX(11),DET(744),FM(11),QM(10,744),Q(11,744),R(11),
11(11,2),V(11)88(11),D(11,2)
DIMENSION FH(11,2),DIFYY(11),YYY(11,744),DETA(744),SO(11)
NTT=NT-1
NM1=N-1
TETA=C.55
DO 610 I=1,N
SC(I)=0.CE2
B(I)=6.0
RM(I)=0.035
J=1
IF(MNTH.NE.1) GO TO 325
Q(I,1)=1.0
CALL GENER (Q,SC,RM,B,YYY,I,J)
325 CCNTINUE
A(I,1)=B(I,1)-YYY(I,1)
RH(I,1)=E(I,1)/(B(I,1)+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,SC,RM,B,YYY,I,J)
917 CCNTINUE
GO TO 872
912 DO 928 J=1,NTT
YYY(I,J+1)=YYY(I,J)
928 CCNTINUE
872 CCNTINUE
DETA(1)=0.0
DO 394 J=1,NTT
DETA(J+1)=DET(J)/3600.0+DETA(J)
IF(MNTH.GE.3) GO TO 401
1004 FORMAT(1H1,/,40X,'SIMULACION DEL TRANSITO EN UN CAUCE UTILIZANDO
1'//,53X,'EL METODO CINEMATICO',//)
WRITE(6,1004)
1000 FORMAT(13X,'INTERVALO DE DISTANCIA ENTRE SECCIONES =',F8.2,'MTS.')
1001 FORMAT(13X,'TIEMPO EN MINUTOS')
WRITE(6,1001)
1002 FORMAT(13X,'VELOCIDADES DE FLUJO EN METROS ENTRE SEGUNDOS')
WRITE(6,1002)
1C03 FFORMAT(13X,'ALTURAS DE AGUA EN METROS')
WRITE(6,1008) FM(I)
1008 FFORMAT(13X,'FUGOSIDAD DE MANNING=',F6.4)
WRITE(6,1C09) SC(I)
1009 FFORMAT(13X,'PENDIENTE DEL FONDO DEL CANAL=',F7.5)
WRITE(6,381) (V(I),I=1,N)
WRITE(6,383) DETA(I),(V(I),I=1,N)
WRITE(6,384) (YYY(I,1),I=1,N)
401 CCNTINUE
DO 251 J=1,NTT
ITER=2
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=1,N
193 YYY(I,J+1)=ABS(YYY(I,J-2)+1.0*(YYY(I,J)-YYY(I,J-1)))
518 CCNTINUE
C CALCULO DE CARACTERISTICAS HIDRAULICAS EN EL CANAL
C
DC 194 I=1,N
A(I,2)=B(I)*YYY(T,J+1)
194 FH(I,2)=A(I,2)/(B(I)+2.0*YYY(I,J+1))
C CALCULO DE VALORES RESIDUALES UTILIZANDO DATOS DE PRUEBA
C

```

COBRE

```

231 CONTINUE
MMB=2
NND=2
DC 81 I=1,NM1
R1=R4(I,1)
R2=RH(I,2)
R3=RH(I+1,2)
R4=RH(I+1,1)
A11=A(I,1)
A12=A(I,2)
A13=A(I+1,2)
A14=A(I+1,1)
B11=B(I,1)
B12=B(I+1,1)
APFO2=(A11+A14)/2.0
APFO1=(A12+A13)/2.0
RH1=(P2+F3)/2.0
RH2=(R1+P4)/2.0
PM11=AI2+2.0*YYY(I+1,J+1)
PM12=BI1+2.0*YYY(I,J+1)
SCP=(SO(I)+SC(I+1))/2.0
DIVI=SQFT(SCP)/RM(I)
CALX=TETA=RH1+(1.0-TETA)*RH2
DFHX=TETA*(R3-R2)+(1.0-TETA)*(P4-R1)
AVAR=TETA*APFO1+(1.0-TETA)*APFO2
DAX=TETA*(AI2-AI3)+(1.0-TETA)*(A14-A11)
CALAI=AI2+AI3-A11-A14
DEXDET=DFX(I)/(2.0*DET(J))
PE(MMB)=DIVI/CAUX**0.3333*(0.6667*DFHX*AVAR+CAUX*DAX)+CALAI*DEXDET
1-DFX(I)*QM(I,J+1)
MMB=MMB+1

```

```

C CALCULO DE COEFICIENTES DE SISTEMA DE ECUACIONES SIMULTANEAS
C COEFICIENTES DE MATRIZ D
DFRH1=0.5*(B11-PMI2-AI2)**2.0/(PMI2*PMI2)*TETA
DRFH2=0.5*(B12-PMI1-AI3)**2.0/(PMI1*PMI1)*TETA
D(NND,1)=DIVI/CAUX**0.3333*(0.6667*(DRH1*TETA*B11/2.0-AVAR*2.0*DRH1-AVAR*DFHX*0.3333*DRH1/CAUX+DRH1*DAX)-CAUX*TETA*B11)+DEXDET
1*B11
D(NND,2)=DIVI/CAUX**0.3333*(0.6667*(DRH1*TETA*B12/2.0+AVAR*2.0*DRH2-AVAR*DFHX*0.3333*DRH2/CAUX+DRH2*DAX)+CAUX*TETA*B12)+DEXDET*B12
NND=NND+1
81 CONTINUE

```

```

C CALCULO DE LOS DIFERENCIALES DE HM

```

```

DIFYY(1)=0.0
DC 181 I=2,N
181 DIFYY(I)=(-BE(I)-D(I,1)*DIFYY(I-1))/D(I,2)

```

```

C COMPARACION ENTRE VALOR ANTERIOR Y VALOR ACTUAL DE HM

```

```

DC 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=SQFT(SO(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 SE OBSERVA SI DIFYY ESTA DENTRO DEL RANGO DE ERROR ACEPTABLE

```

```

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

```

```

F(MCNTH,CE,3) GO TO 5001
WRITE(6,383) DET1(J+1),(V(I),I=1,N)
WRITE(6,384) YYY(I,J+1),I=1,N

```

```

5001 DC 756 I=1,N
A(I,1)=E(I,2)
RH(I,1)=RH(I,2)
756 CONTINUE

```

COSRE

```
251 CONTINUE
241 CONTINUE
381 F0FMAT( //, 3X, 'TIEMPO', 4X, 'I=', I3, 4X, 10(5X, I2, 3X), //)
382 F0FMAT( 1X, F8.3, 4X, 'V=', E7.2, 10(3X, F7.2))
384 F0FMAT( 13X, 'Y=', F7.2, 10(3X, F7.2), )
3383 F0FMAT( 1X, F8.3, 4X, 'V=', F7.2, 10(3X, F7.2))
      RETURN
      END
```

www.bdigital.ula.ve

```

CENERP
SUBROUTINE GENER (Q,SO,PM,R,YYY,I,J)
DATA CN,Q(11,744),R(11),E(11),YYY(11,744),SD(11)
TAX=X=Q(I,J)*PM(I)/SQRT(SD(I))
K=TAUX**1.5
H=(2.0*K)/(B(I))**2.5
G=K/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(AHS(F).LT.0.001.OR.N.GT.K) GO TO 1552
N=N+1
GO TO 1551
1552 YYY(I,J)=YYYI
RETURN
END

```

www.bdigital.ula.ve

```

IGAUSS
C SUBROUTINE IGAUSS(IX,S,AM,V)
C IX#DDC INTEGER LT.9 DIGITS TO BEGIN S.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.D0
      Y=X*C
      Y=DYDC(Y,57646752303423488.D0)
      IY=Y
      YFL=Y*.1734723475976807C94411924481D-17
C END RANDU
C FOR THE 360 SYSTEM SUBSTITUTE THE FOLLOWING BETWEEN START AND END RANDU
C   IY+IX*65E39
C   IF 8*IY<E,6
C5   IY#IY&2147493647&1
C6   YFL#IY
C   YFL#YFL*0.4E56613E-9
      IX=IY
50   A=A+YFL
      V=(A-C)*S+AM
      RETURN
END

```

www.bdigital.ula.ve

DAILY

```

      SUBROUTINE DAILY(INFRO,MNTH,YEAR,IPT)
C CALCULATION OF SCALFD VALUES FOR MEAN DAILY FLOW PLOT
C PLCT CALLS CAN BE ADDED IF COMPUTER HAS PLOT ROUTINES
      INTEGER YEAR,START(2,12),YR1
      REAL INFR(12),MCCHAF(12)
      DIMENSION LASTDA(2,12),A(2,12),YA(368),YS(368)
C MAIN SUPPLY AND DAILY VARIABLES
      INTEGER FIRST,CHECK(10)
      COMMON/MHS/FLW(10,12,31),SIMFLW(10,12,31),FIRST,CHECK
      DATA MCCHAF/3HOCT,3HNNOV,3HDCE,3HJAN,3FFEB,3HMAR,3HAMR,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,
     12.1,12.2,24.2,24.3,27.2,27.3,30.3,30.4,33.4,33.5,36.4,36.5/
      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/82,92,123,123,151,152,182,183,212,213,243,244,273,274,
     1304,305,335,336,0,0,31,31,61,61/
      LEAPYF=0
      IF ((YEAF-4*(YEAR/4)).EQ.0) LEAPYR=1
      N=12
      PMAX=PLCTMX(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,MCCHAF
      PUNCH 903
      DO 800 J=1,7
      FFM(J)=FPNAME(IPT,J)
      PUNCH 904,FPN
      YR1=YEAR-1
      *P 7(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 CCNTINUE
      N=365+LEAPYR
      PUNCH 908,(YA(I),I=1,N)
      PUNCH 909,(YS(I),I=1,N)
      C FORMAT STATEMENTS
      900  FFORMAT (15,F10.2,F5.1,I5)
      901  FFORMAT (12F5.1)
      902  FFORMAT (I2A3)
      903  FFORMAT (2CHMEAN DAILY FLOW-CFSD)
      904  FFORMAT (7A4)
      905  FFORMAT (13HWATER YEAR 10,I2,1H-,I2)
      906  FFORMAT (20A4)
      907  FFORMAT (35HBLACK IS OBSERVED--RED IS SIMULATED)
      908  FFORMAT (16F5.2)
      RETURN
      END

```

```

      LPLCT
      SUBROUTINE LPLCT(YEAR,IPT)
C MEAN DAILY FLOW FOR PRINTER OUTPUT
      INTEGER YEAR
      REAL MOCHAR(12)
      DIMENSION LASTDA(2,12),SCALE(10),ORD(10),LC(2,6)
C MAIN: HOURLY AND DAILY VARIABLES
      INTEGER FIRST,CHECK(10)
      COMMON/MHD/FLGWL(10,744),PHPMX(10),FPN(7),FPNAME(10,7),PLOTMX(10),
     1ACTFLW(10,12,31),SIMFLW(10,12,31),FIRST,CHECK
      DATA MCCHAR/3HENE,3HFEB,3HMAR,3HABR,3HMAY,3HJUN,3HJUL,3HAGO,3HSEP,
     13HCCT,3HNOV,3HDEC/
      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/5,4,4,4,4,3,3,4,4,0,0/
      DATA DLT,BLANK,ASTER,PLUS/1H.,1H*,1H&/
      LEAPYR=0
      IF ((YEAR-4*(YEAR/4)).EQ.0) LEAPYR=1
      PMAX=PLCTMX(IPT)
      MC=MCNTH=1,12
      MC=MCATH
      IF (MC.GT.12) MC=MC-12
      MCG=MC-2*(MC/2)
      IF (MCG.EQ.0) GO TO 812
      IF (MC.NE.1) GO TO 811
      PRINT 900,(FPNAME(IPT,J),J=1,7),YEAR
  811  DO 813 J=1,10
      DEC=J
  813  SCALE(J)=DEC*0.1*PMAX
      PRINT 901,MOCHAR(MCNTH),MOCHAR(MCNTH+1),SCALE
  812  LAST=LASTDA((LEAPYR+1),MC)
      DO 815 IDA=1,LAST
      DO 816 J=1,10,I,10
      DCF(J)=DCT
      TF (J.EQ.101) GC TO 816
      DO 817 I=1,9
      DCF(J+I)=BLANK
  817  CCNTINUE
  816  CCNTINUE
      AF=ACTFLW(IPT,MO,IDA)
      SF=SIMFLW(IPT,MO,IDA)
      LA=(AF/PMAX)*100.0+1.5
      LS=(SF/PMAX)*1CO.0+1.5
      TF (LA.GT.101).LA=101
      IF (LS.GT.101).LS=101
      DCF(LA)=PLUS
      DCF(LS)=ASTER
      PRINT 902,IDA,ORD,SF,AF
  815  CCNTINUE
      IF (MCG.GT.0) GO TO 810
      MC=MCNTH/2
      LSKIP=LC((LEAPYR+1),MC)
      TF (LSKIP.EQ.0) GO TO 810
      DO 814 J=1,LSKIP
  814  PRINT 903
  815  CCNTINUE
C FORMAT STATEMENTS
  900  FCFMAT (1H,20HMEAN DAILY FLOW PLOT,5X,7A4,7X,13HWATER YEAR 19,I2,
     15X,24H*#SIMULATED &#OBSERVED)
  901  FFORMAT (1H ,A3,IH-,A3,F11.1,9=10,I,3X,9HSIMULATED,2X,BHOBERVED)
  902  FFORMAT (1H ,I3,2X,10IA1,4X,2F10.1)
  903  FORMAT (1H )
      RETURN
      END

```

RIC BOCANO EN ECCCNO
SIMULACION PARAFMETRICA

INICIO DE LA CORRIDA 1 DE ENE DE 1971
FINAL DE LA CORRIDA ** DE ** DE 1971
NUMERO DE EST. DE MED. DE PRECIPITACION = 2

PARAMETROS PARA LA VERTIENTE

EST NOMBRE DE LA ESTI	K1	IMPPY	EPMX	UZSN	CB	K3	K24L	K2
SAN RAFAEL DE BOCCANO	1.45	0.05	0.10	0.32	4.07	1.250	60.00	0.30
BOCCANO	2.10	0.05	0.10	0.31	4.07	1.250	80.00	0.30

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

ALMACENAMIENTOS INICIALES

NO. DE LA ESTI	UZS	UZS	SGW	GWS	RES	SRGX	SCEP	AEP1
SAN RAFAEL DE BOCCANO	C	3.91	2.00	0.3	1.00	1.00	1.50	0.0
BOCCANO	0.30	3.95	2.00	0.3	1.00	1.00	1.50	0.0

PARAMETROS DE PUNTOS DE FLUJO

PRECIPITACION DEL PUNTO DE FLUJO	AREA	KSL	RTIN	COMPARE	CHEK	HISTOGRAM	TIMEDELAY	0.03
1.32 EN BOCCANO	513.00	0.85	1	1	1	1	1	0

AJUSTE DE LA EVAPORACION POTENCIAL

AJUSTE ESTACIONAL	MES	1	2	3	4	5	6	7	8	9	10	11	12
AJUSTE	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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

SUMARIO MENSUAL PARA EL RÍO BOCONÓ EN BOCONÓ

FEbrero 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL RC	SURFACE RO	IMPV RD	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONÓ	1.208	0.0	0.115	0.003	1.090	0.0	3.706	3.066	3.066
2	BOCONÓ	1.345	0.0	0.159	0.001	1.185	0.0	4.44	3.706	3.706

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	UZS	LGS	SGW	GWS	RES	SRGX	SCEP	AEP1	BALANCE
1	SAN RAFAEL DE BOCONÓ	0.01	2.62	0.44	0.63	0.0	0.0	0.0	1.28	-0.000
2	BOCONÓ	0.01	2.64	0.64	0.63	0.0	0.06	0.0	1.28	-0.000

SUMARIO MENSUAL PARA EL RÍO BOCONÓ EN BOCONÓ

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL RC	SURFACE RO	IMPV RD	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONÓ	0.35	0.3	0.012	0.000	0.358	0.0	4.651	2.32	2.32
2	BOCONÓ	0.35	0.3	0.012	0.000	0.325	0.0	4.651	2.701	2.701

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	UZS	LGS	SGW	GWS	RES	SRGX	SCEP	AEP1	BALANCE
1	SAN RAFAEL DE BOCONÓ	0.35	1.29	0.10	0.25	0.0	0.0	0.0	1.51	-0.000
2	BOCONÓ	0.35	1.30	0.10	0.24	0.0	0.0	0.0	1.51	-0.000

MARZO 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL RC	SURFACE RO	IMPV RD	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONÓ	0.34	0.31	0.012	0.000	0.40	0.0	4.40	1.37	1.37
2	BOCONÓ	0.34	0.31	0.012	0.000	0.311	0.0	4.61	2.133	2.133

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	UZS	LGS	SGW	GWS	RES	SRGX	SCEP	AEP1	BALANCE
1	SAN RAFAEL DE BOCONÓ	0.09	2.23	0.26	0.36	0.0	0.0	0.10	1.31	-0.000
2	BOCONÓ	0.09	2.23	0.29	0.42	0.0	0.0	0.03	1.31	-0.000

ABRIL 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL RC	SURFACE RO	IMPV RD	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONÓ	0.38	0.34	0.012	0.000	0.190	0.0	4.683	2.137	2.137
2	BOCONÓ	0.38	0.34	0.012	0.000	0.193	0.0	4.683	2.133	2.133

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	UZS	LGS	SGW	GWS	RES	SRGX	SCEP	AEP1	BALANCE
1	SAN RAFAEL DE BOCONÓ	0.01	2.75	0.79	1.78	2.51	0.0	0.0	0.97	-0.001
2	BOCONÓ	0.01	2.75	0.75	1.78	2.51	0.0	0.0	0.97	-0.001

MAYO 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL RC	SURFACE RO	IMPV RD	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCONÓ	0.38	0.34	0.012	0.000	0.244	0.0	4.779	2.642	2.642
2	BOCONÓ	0.38	0.34	0.012	0.000	0.290	0.0	4.779	2.644	2.644

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	UZS	LGS	SGW	GWS	RES	SRGX	SCEP	AEP1	BALANCE
1	SAN RAFAEL DE BOCONÓ	0.01	2.75	0.79	1.78	2.51	0.0	0.0	0.97	-0.001
2	BOCONÓ	0.01	2.75	0.75	1.78	2.51	0.0	0.0	0.97	-0.001

SUMARIO MENSUAL PFA - RIO BOCCON EN BOCCON

JUN 1971

SUMARIO PARA LAS ESTACIONES PLUVIOMÉTRICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL RQ	SURFACE RO	IMPV PO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCCON	5.556	0.0	0.494	0.428	4.730	0.0	11.10	3.032	2.957
2	SAN RAFAEL DE BOCCON	4.748	0.0	0.440	0.428	3.901	0.0	10.39	3.032	2.952

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	LZS	GWS	RES	SRCX	AEP1	BALANCE
1	SAN RAFAEL DE BOCCON	0.8	3.55	5.09	0.0	0.96	-0.001
2	SAN RAFAEL DE BOCCON	0.55	3.01	4.34	0.0	0.96	-0.001

JUL 1971

SUMARIO PARA LAS ESTACIONES PLUVIOMÉTRICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL RQ	SURFACE RO	IMPV PO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCCON	10.330	0.0	0.570	2.629	6.313	0.0	12.63	2.468	2.409
2	SAN RAFAEL DE BOCCON	17.036	0.0	0.398	5.235	1.487	0.0	19.05	2.468	2.409

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	LZS	GWS	RES	SRCX	AEP1	BALANCE
1	SAN RAFAEL DE BOCCON	0.9	3.43	5.23	0.01	0.90	-0.002
2	SAN RAFAEL DE BOCCON	0.24	2.42	4.28	0.0	0.90	-0.001

AGO 1971

SUMARIO PARA LAS ESTACIONES PLUVIOMÉTRICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL RQ	SURFACE RO	IMPV PO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCCON	2.531	0.0	0.271	1.320	4.191	0.0	3.718	3.576	3.473
2	SAN RAFAEL DE BOCCON	6.165	0.0	0.446	2.388	3.450	0.0	10.24	3.718	3.693

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	LZS	GWS	RES	SRCX	AEP1	BALANCE
1	SAN RAFAEL DE BOCCON	4.42	2.55	6.47	0.03	1.15	-0.001
2	SAN RAFAEL DE BOCCON	6.42	2.87	6.47	0.0	1.15	-0.001

SEP 1971

SUMARIO PARA LAS ESTACIONES PLUVIOMÉTRICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL RQ	SURFACE RO	IMPV PO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
1	SAN RAFAEL DE BOCCON	5.921	0.0	0.306	2.478	3.260	0.0	7.51	3.514	3.514
2	SAN RAFAEL DE BOCCON	3.571	0.0	0.133	0.742	2.740	0.0	3.79	3.514	3.269

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	LZS	GWS	RES	SRCX	AEP1	BALANCE
1	SAN RAFAEL DE BOCCON	3.87	1.52	5.10	0.00	1.06	-0.001
2	SAN RAFAEL DE BOCCON	6.11	1.17	2.47	0.0	1.06	-0.001

SUMARIO MENSUAL PARA RÍO BOCONÓ EN BOCONÓ

DICIEMBRE 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
EST 1	SAN RAFAEL DE BOCONÓ	2.336	0.9	0.150	0.032	2.151	0.0	4.05	3.213	2.993
EST 2	SAN RAFAEL DE BOCONÓ	2.246	0.8	0.157	0.038	2.052	0.0	4.16	3.213	2.951

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	UZS	GWS	SGW	RES	SRGX	SCGP	AEP	BALANCE
EST 1	SAN RAFAEL DE BOCONÓ	3.0	6.31	1.21	2.38	0.0	0.0	0.0	-0.001
EST 2	SAN RAFAEL DE BOCONÓ	3.05	5.32	1.01	2.05	0.0	0.0	1.09	-0.001

DICIEMBRE 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
EST 1	SAN RAFAEL DE BOCONÓ	3.055	0.9	0.212	0.413	2.438	0.0	5.44	2.828	2.720
EST 2	SAN RAFAEL DE BOCONÓ	3.055	0.8	0.201	0.399	2.123	0.0	5.39	2.858	2.720

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	UZS	GWS	SGW	RES	SRGX	SCGP	AEP	BALANCE
EST 1	SAN RAFAEL DE BOCONÓ	3.00	6.59	0.98	2.07	0.0	0.0	1.03	-0.001
EST 2	SAN RAFAEL DE BOCONÓ	3.0	5.37	0.92	1.87	0.0	0.0	1.03	-0.001

DICIEMBRE 1971

SUMARIO PARA LAS ESTACIONES PLUVIOGRAFICAS

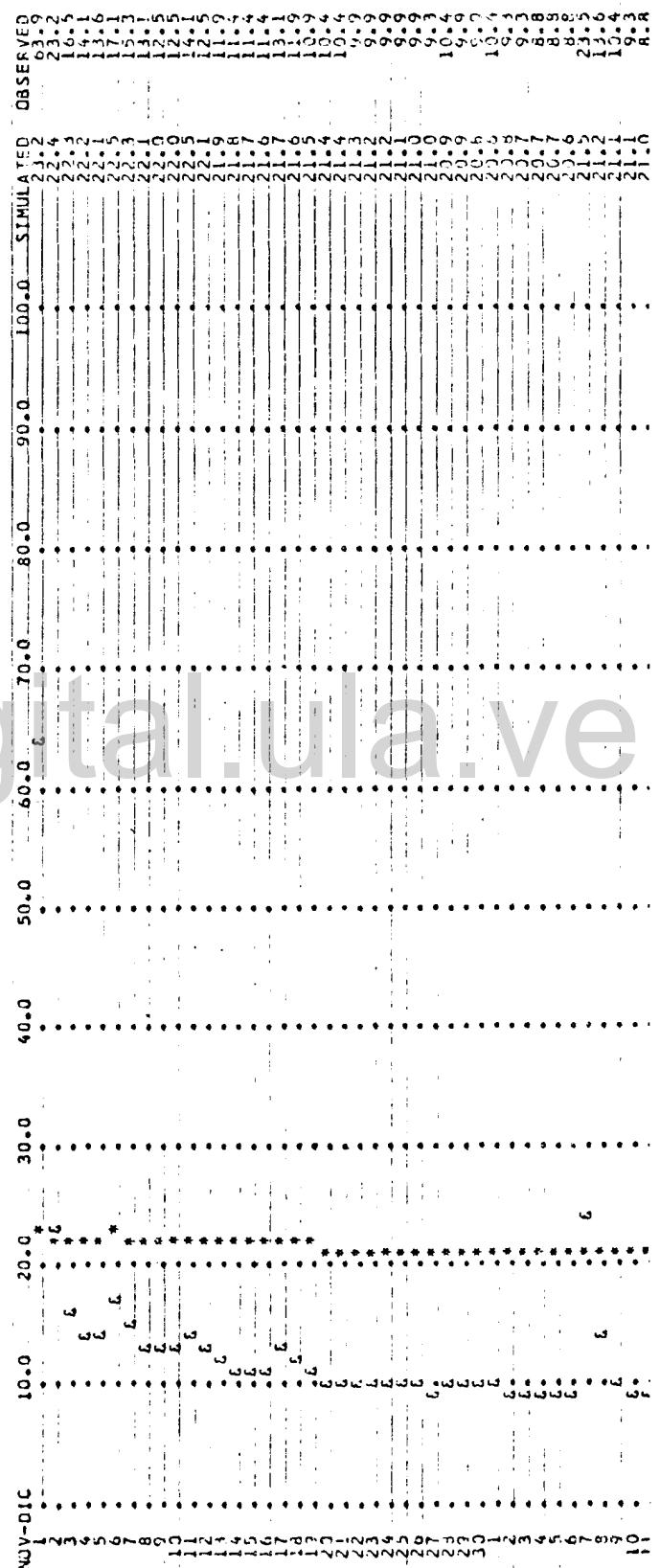
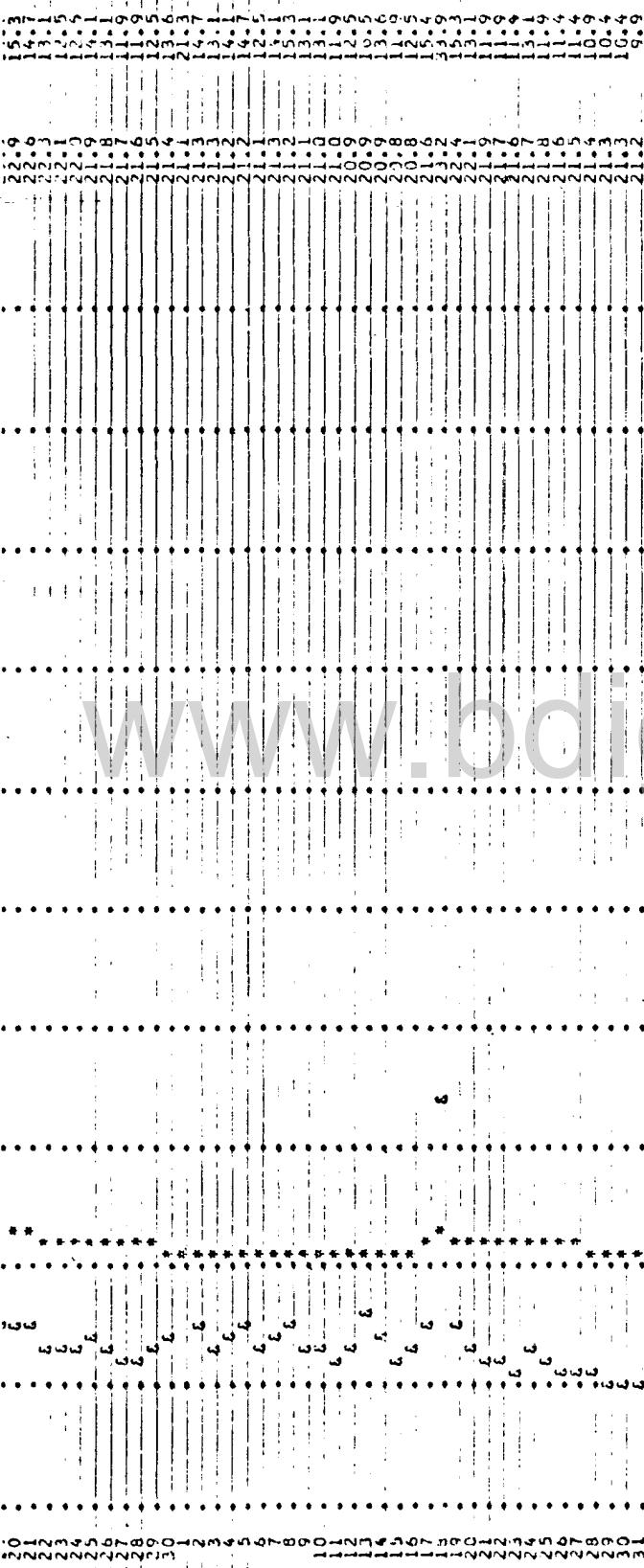
COMPONENTES DE LA EVAPOTRANSPIRACIÓN, DE LA PRECIPITACIÓN Y DE LA ESCORRIENTIA

EST	NOMBRE DE LA ESTACIÓN	TOTAL RO	SURFACE RO	IMPV RO	INTERFLOW	GW FLOW	RECHARGE	PRECIP	POTENTIAL-ET	ACTUAL-ET
EST 1	SAN RAFAEL DE BOCONÓ	0.888	0.0	0.127	0.211	0.984	0.0	2.72	3.272	2.842
EST 2	SAN RAFAEL DE BOCONÓ	0.888	0.0	0.025	0.000	0.984	0.0	0.84	3.272	2.631

ALMACENAMIENTOS AL FINAL DEL MES

EST	NOMBRE DE LA ESTACIÓN	UZS	GWS	SGW	FES	SRGX	SCGP	AEP	BALANCE
EST 1	SAN RAFAEL DE BOCONÓ	0.01	4.64	0.67	1.47	0.0	0.0	1.07	-0.005
EST 2	SAN RAFAEL DE BOCONÓ	0.0	3.28	0.28	0.86	0.0	0.0	1.07	-0.000

200



www.digital.ujae.vc