CIVIL ENGINEERS
POCKET COMPUTER MONTHLY

HYDRAULICS ISSUE

This issue provides a hydraulics program for Mass Storage in a Reservoir, with graphics.

We are indebted to C.R. Neill, Professional Engineer of Northwest Hydraulic Consultants, Ltd, 4823 99 St., Edmonton, Alberta, Canada for this program, as well as the example problems on Pages 2-3.

Also this issue provides an improved version of GCP for PC-2 with and without printer.

PROGRAM LISTING - STORAGE/MASS By C. R. Neill/PC-2

```
100  REM STORAGE/MASS PROGRAM
102  CSIZE 2
105  LPRINT "STORAGE/MASS CURVE":LF2
120  LPRINT"INFLOW VOLS. DATA
     IS IN LINE 900"
125  LLIST 900
130  LPRINT "NO. OF INTERVALS?"
140  INPUT N:LF-1:LPRINT N:LF 1
150  IF N>100THEN 1400
160  REM Q=INFLOW;C=CUM.Q
165  REM R=CUM. DEP.FROM MEAN
170  REM U=CUM.Q FROM SPEC. TIME
175  REM F=CUM.DRAFT;D=DEFICIT
     EX STORAGE
180  DIMQ(100),C(100),R(100),U(100),
     F(100),D(100)
200  LET C(0)=0
210  FOR J=1 TO N
220  READ Q(J)
230  C(J)=C(J-1)+Q(J)
240  NEXT J
250  LPRINT "FINAL CUM. VOL=":
     LPRINT C(N)
255  LPRINT "MEAN INFLOW=":
     LPRINT C(N)/N
265  LPRINT "MASS PLOT(1=YES/0=NO)?"
270  INPUT D1:LF-1:LPRINT D1
275  IF D1<1 THEN 520
290  REM APPROX. 200 SPACES
     IN X-AXIS
300  LPRINT "VOL. SCALE,UNITS/SPACE?"
310  INPUT Y:LF-1:LPRINT Y:LF 3
315  LPRINT "**MASS CURVE  OF****
     CUM. INFLOW**":LF 1
320  GRAPH:GLCURSOR (0,0)
330  GLCURSOR (30,0):LPRINT "VOL.
     UNITS":GLCURSOR (160,0):
     LPRINT 200*Y
340  TEXT:LF 1:GRAPH
350  FOR A=0 TO 200 STEP 20
360  GLCURSOR (A,0):LPRINT "I"
370  NEXT A
430  GLCURSOR (0,0):TEXT:LF 1:GRAPH
435  GLCURSOR (0,0):LPRINT "0":
     GLCURSOR (0,0):LPRINT "*":
     TEXT:LF 1:GRAPH
440  FOR J=1 TO N
450  GLCURSOR (0,0):LPRINT J:
     GLCURSOR (C(J)/Y,0):LPRINT "*"
460  GLCURSOR (0,0):TEXT:LF 1:GRAPH
470  NEXT J
480  FOR A=0 TO 200 STEP 20
490  GLCURSOR (A,0):LPRINT "I"
500  NEXT A
520  TEXT
530  LF 3:LPRINT "RESID. TABLE
       AND CURVE?"
540  INPUT D2:LF -1:LPRINT D2:LF 1
550  IF D2<1 THEN 110
560  CSIZE 1
570  LPRINT TAB 0;"INTVL":LF -1:
     LPRINT TAB 8;"INFLOW":LF -1:
     LPRINT TAB 16;"CUM.I/F":LF -1
580  LPRINT TAB 24;"CUM.DEP":LF 1
590  FOR J=1 TO N
600  LET C3=C(N)
610  R(J)=C(J)-C3*J/N
620  LPRINT TAB 1;J:LF -1:LPRINT
     TAB 8;Q(J):LF -1:LPRINT TAB 16;
     C(J):LF -1:LPRINT TAB 24;R(J)
630  NEXT J
640  LF 3:CSIZE 2
650  LPRINT "DEP.SCALE,UNITS/SPACE?"
660  INPUT Z:LF -1:LPRINT Z
680  LF 2:LPRINT "*RESID.MASS
     CURVE*":LF 1
690  GRAPH:GLCURSOR (0,0)
700  GLCURSOR (30,0):LPRINT "MINUS":
     GLCURSOR (140,0):LPRINT "PLUS"
710  TEXT:LF 1:GRAPH
715  GLCURSOR (0,0):LPRINT"-100":
     GLCURSOR (180,0):LPRINT "100"
720  GLCURSOR (100,0):LPRINT "I"
```

```
730  TEXT:LF 1:GRAPH
735  FOR A=Ø TO 2ØØ STEP 2Ø
740  GLCURSOR (A,Ø):LPRINT "I"
75Ø  NEXT A
76Ø  GLCURSOR (Ø,Ø):TEXT:LF 1:
     GRAPH
78Ø  FOR J=1 TO N
79Ø  GLCURSOR (Ø,Ø):LPRINT J:GLCURSOR
     (R(J)/Z+1ØØ,Ø):LPRINT "*"
8ØØ  GLCURSOR (Ø,Ø):TEXT:LF 1:
     GRAPH
81Ø  NEXT J
82Ø  TEXT:LF 1:GRAPH
825  LINE (1Ø4,Ø)-(1Ø4,22*N):GLCURSOR
     (Ø,Ø)
83Ø  FOR A=Ø TO 2ØØ STEP 2Ø
84Ø  GLCURSOR (A,Ø):LPRINT "I"
845  NEXT A
85Ø  TEXT:LF 1:GRAPH
86Ø  GLCURSOR (1ØØ,Ø):LPRINT "I"
87Ø  GLCURSOR (Ø,Ø):TEXT:LF 1
9ØØ  DATA Ø, 1, 2.5, 8.1, 9.5, .8,
     2, 1Ø.6, 13.7, 13.7, 3.4, 17.6,
     4.9, 9, 2, 2.6
1Ø1Ø LF 3:LPRINT "STORAGE-DRAFT
       TABLE?"
1Ø2Ø INPUT D3:LF-1:LPRINT D3
1Ø3Ø IF D3<1 THEN 15ØØ
1Ø5Ø LF 1:LPRINT "DRAFT,VOL/INTVL?"
1Ø6Ø INPUT F1:LF-1:LPRINT F1
1Ø7Ø LF 1:LPRINT "RES. FULL
     END INTVL#?"
1Ø9Ø INPUT T:LF-1:LPRINT T:LF 1
1Ø95 CSIZE 1
11ØØ LPRINT TAB Ø;"INTVL.":LF-1:
     LPRINT TAB 8;"CUM./F":LF-1:
     LPRINT TAB 16;"CUM.DRAFT"
111Ø LF-1:LPRINT TAB 26;"DEFICIT"
112Ø LF 1
113Ø LPRINT TAB 1;T:LF-1:LPRINT
     TAB 8;Ø:LF-1:LPRINT TAB 16;Ø:
     LF-1:LPRINT TAB 26;Ø
114Ø U(T)=Ø
115Ø F(T)=Ø
116Ø FOR J=(T+1) TO N
117Ø U(J)=U(J-1)+Q(J)
118Ø F(J)=F(J-1)+F1
119Ø D(J)=F(J)-U(J)
12ØØ LPRINT TAB 1;J:LF-1:LPRINT
     TAB 8;U(J):LF-1:LPRINT TAB 16;F(J)
1205 LF-1:LPRINT TAB 26;D(J)
121Ø IF D(J)<Ø THEN 1225
122Ø NEXT J
1225 CSIZE 2
123Ø LF 1:LPRINT "RES. REFILLED"
126Ø LF 1:LPRINT "NEW INITIAL PI?"
127Ø INPUT D4:LF-1:LPRINT D4
128Ø IF D4>Ø THEN 1Ø7Ø
13ØØ LF 1:LPRINT "NEW DRAFT?"
131Ø INPUT D5:LF-1:LPRINT D5
132Ø IF D5>Ø THEN 1Ø5Ø
134Ø GOTO 15ØØ
14ØØ LPRINT "REVISE DIM LINE 18Ø"
15ØØ LF 1:LPRINT "    **END**"
151Ø LF 3:END
```

WORKED OUT EXAMPLES

Example #1:

```
STORAGE/MASS CURVE


INFLOW VOLS. DATA
IS IN LINE 900

900: DATA Ø, 1, 2.5, 8
     .1, 9.5, .8, 2, 10
     .6, 13.7, 13.7, 3
     .4, 17.6, 4.9, 9,
     2, 2.6



NO. OF INTERVALS?16

FINAL CUM. VOL=
                101.4
MEAN INFLOW=
              6.3375
MASS PLOT(1=YES/
Ø=NO)?              1
VOL. SCALE, UNITS/
SPACE?            Ø.5
```

```
**MASS CURVE  OF**
** CUM.   INFLOW **

  VOL.UNITS   100
I I I I I I I I I I I
Ø
*1
*2
*3
 4*
 5  *
 6  *
 7   *
 8     *
 9        *
 10          *
 11          *
 12              *
 13              *
 14                *
 15                *
 16                 *
I I I I I I I I I I I
```

Example #1 (continued)

```
RESID. TABLE
AND CURVE?          1

 INTVL   INFLOW  CUM.I/F CUM.DEP
   1       0       0     -6.3375
   2       1       1     -11.675
   3       2.5     3.5   -15.5125
   4       8.1     11.6  -13.75
   5       9.5     21.1  -10.5875
   6       0.8     21.9  -16.125
   7       2       23.9  -20.4625
   8       10.6    34.5  -16.2
   9       13.7    48.2  -8.8375
  10       13.7    61.9  -1.475
  11       3.4     65.3  -4.4125
  12       17.6    82.9   6.85
  13       4.9     87.8   5.4125
  14       9       96.8   8.075
  15       2       98.8   3.7375
  16       2.6     101.4  0

DEP. SCALE, UNITS/
SPACE?              0.2

*RESID. MASS CURVE*

   MINUS      PLUS
-100     I        100
I I I I I I I I I I I
 1     *  |
 2   *    |
 3*       |
 4 *      |
 5   *    |
 6*       |
*7        |
 8*       |
 9    *   |
 10       *
 11    *  |
 12       |  *
 13       | *
 14       |   *
 15       |*
 16       *
I I I I I I I I I I I
          I

STORAGE-DRAFT
TABLE?              1

DRAFT, VOL/INTVL?
                    6

RES. FULL END
INTVL. #?           5

 INTVL.  CUM.I/F CUM.DRAFT DEFICIT
   5       0       0        0
   6       0.8     6        5.2
   7       2.8     12       9.2
   8       13.4    18       4.6
   9       27.1    24      -3.1

RES. REFILLED

NEW INITIAL PI?     0

NEW DRAFT?          6.3

DRAFT, VOL/INTVL?
                    6.3

RES. FULL END
INTVL. #?           5

 INTVL.  CUM.I/F CUM.DRAFT DEFICIT
   5       0       0        0
   6       0.8     6.3      5.5
   7       2.8     12.6     9.8
   8       13.4    18.9     5.5
   9       27.1    25.2    -1.9

RES. REFILLED

NEW INITIAL PI?     0

NEW DRAFT?          0

      **END**
```

Example #2 - Note: Revise data in line 900 as appropriate.

```
STORAGE/MASS CURVE

INFLOW VOLS. DATA
IS IN LINE 900

900: DATA 72, 108, 60
     , 111, 130, 89, 16
     9, 31, 111

NO. OF INTERVALS? 9

FINAL CUM. VOL=
                  881
MEAN INFLOW=
        97.88888889
MASS PLOT(1=YES/
0=NO)?              1
VOL. SCALE, UNITS/
SPACE?              5

**MASS CURVE  OF**
** CUM.  INFLOW **

   VOL. UNITS   1000
I I I I I I I I I I I
0
 1*
 2 *
 3  *
 4   *
 5    *
 6     *
 7      *
 8      *
 9       *
I I I I I I I I I I I

RESID. TABLE
AND CURVE?          1

 INTVL   INFLOW  CUM.I/F CUM.DEP
   1       72      72    -25.88888889
   2       108     180   -15.77777778
   3       60      240   -53.66666667
   4       111     351   -40.55555556
   5       130     481   -8.444444444
   6       89      570   -12.33333333
   7       169     739    53.77777778
   8       31      770   -13.11111111
   9       111     881    0

DEP. SCALE, UNITS/
SPACE?              1

*RESID. MASS CURVE*

   MINUS      PLUS
-100     I        100
I I I I I I I I I I I
 1     *
 2       *  |
 3  *       |
 4   *      |
 5      *   |
 6      *   |
 7          |  *
 8      *   |
 9        * |
I I I I I I I I I I I
          I

STORAGE-DRAFT
TABLE?              0

      **END**
```

PC-2 REVIEW

Christopher Mallner, PE of Charlotte, North Carolina, is an experienced programmer; he wrote us to offer certain suggestions. Based on these suggestions and our own experience with GCP, we have revised our PC-2 GENERAL COMPUTATION PROGRAMS, printer and non-printer versions. We are grateful for Mr. Mallner's suggestions which will result in an increase in speed and efficiency. The listings of the revised GCP programs are provided below.

Mr. Mallner suggested that Lines 30-37 be replaced with a single line:

```
30 FOR II=1 TO 26:@$(II)=CHR$ (II+64)+ "
   ":NEXT II
```

Mr. Mallner provided an alternative method for inputting data. It seems less time-consuming; also it allows the operator to fully check the data before pressing "ENTER". The data is entered in a single line, where the values of I, J, K, L, etc., are separated by commas. For example:

10, 20, 30, , , , 50, 126, 1E7

Note the omission of zeros (data between commas) explained below:

This is the same as:

I = 10
J = 20
K = 30
L = 0
M = 0
N = 0
O = 50
P = 126
Q = 1E7

Lines 71-82 in the program listings, below, accomplish this technique, which relies on the statements VAL and LEN, but primarily on MID$ (string, position, n) which takes "n" characters beginning at the position in the string. A disadvantage to this method is that it is limited to the length of the display buffer, 80 characters. We suggest the use of scientific notation to save space. Also space and time is saved because there is no need to enter zeros; the omission of a piece of data implies the entry of a zero.

Mr. Mallner reminds us that double-subscripted (two dimensional) arrays are wasteful of memory. For example, A(10,10) will require 800 bytes (10x10x8) to store the actual numbers; however, an additional 175 bytes are required for classifier information, variable name, etc. If a one-dimensioned array, A(100), can be used, the memory usage is 800 plus only 15, or 815 total bytes. By the same reasoning, a non-dimensional variable is more efficient than a one-dimensional array. Something to remember when memory is tight, as it usually is!

The listings of the two versions of GCP are as follows:

GENERAL COMPUTATION PROGRAM/
PC-2 - WITH PRINTER

```
 8:"A"WAIT 70:
   CLEAR :DIM Z9$
   (0)*80
 9:PRINT "GENERAL
   COMPUTATION P
   GM"
13:LS$="**    **
   **    **"
25:PRINT "ENTER A
   PGM TITLE"
27:INPUT "PROGRAM
   TITLE=";PT$
30:FOR II=1TO 26:
   @$(II)=CHR$ (I
   I+64)+" ":NEXT
   II
50:PRINT "PROVIDE
   LBLS FOR<= 18
   PARAMS"
53:PRINT "ENTER T
   HE INPUT PARAM
   S"
54:INPUT "NO. INPU
   T PARAMS=";ZZ
56:IF ZZ>18PRINT
   "ERROR":GOTO 5
   3
57:PRINT "ENTER P
   ARAM LABELS"
58:PRINT "IN THIS
   ORDER: I-Z"
59:WAIT 5
60:FOR II=9TO ZZ+
   8:CLS :FOR I2=
   2TO 22STEP 2:
   CURSOR I2:
   PRINT @$(II):
   NEXT I2:INPUT
   @$(II):NEXT II
61:WAIT 50:GOTO 6
   5
62:"C"SK=1:WAIT 5
   0
65:PRINT "GIVE VA
   LUES TO PARAMS
   "
66:WAIT 200
71:A9$="":Y9=1:
   PRINT "INPUT D
   ATA, I THRU ";@
   $(ZZ+8):INPUT
   "INPUT DATA";Z
   9$(0)
72:FOR Z9=1TO LEN
   Z9$(0):B9$=
   MID$ (Z9$(0),Z
   9,1)
73:IF B9$=","THEN
   77
74:A9$=A9$+B9$
75:IF Z9=LEN Z9$(
   0)LET @(Y9+8)=
   VAL A9$
76:GOTO 82
77:IF Z9=1LET @(Y
   9+8)=0:GOTO 81
78:IF Z9=LEN Z9$(
   0)LET @(Y9+1)=
   0
79:IF MID$ (Z9$(0
   ),Z9-1,1)=","
   LET @(Y9+8)=0:
   GOTO 81
80:@(Y9+8)=VAL A9
   $
81:Y9=Y9+1:A9$=""
```

```
82:NEXT Z9:DI$="N
   ":INPUT "DOCUM
   ENTATION?(Y/N)
   ";DI$
83:IF SK=1THEN 89
84:PRINT "ENTER O
   UTPUT PARAMS":
   INPUT "NO.OUTP
   UT PARAMS=";YY
85:IF YY>8PRINT "
   ERROR":GOTO 84
86:PRINT "ENTER O
   UTPUT PARAM LB
   LS A-H"
87:WAIT 5:FOR II=
   1TO YY:CLS :
   FOR I2=2TO 22
   STEP 2:CURSOR
   I2:PRINT @$(II
   ):NEXT I2:
   INPUT @$(II):
   NEXT II
88:WAIT 100
89:LPRINT :LPRINT
   PT$:LPRINT LS$
   :LPRINT :IF DI
   $="N"THEN 95
90:FOR II=9TO ZZ+
   8:LPRINT @$(II
   );" = ":LPRINT
   @(II):NEXT II
93:LPRINT
95:REM
1203:REM
1210:LPRINT "COMP
     . RESULTS:":
     LPRINT
1220:FOR II=1TO Y
     Y:LPRINT @$(
     II);" = ";
     LPRINT @(II)
     :NEXT II:LF
     1
1250:PRINT "DEF C
      FOR NEW PRO
     B"
1272:IF DI$="N"
     THEN 1280
1275:LF 3:END
1280:LF 2:FOR II=
     9TO ZZ+8:
     LPRINT @(II)
1300:NEXT II:LF 3
     :END
```

GENERAL COMPUTATION PROGRAM/PC-2 WITHOUT PRINTER

```
 8:"A"CLEAR :WAIT
   60:DIM Z9$(0)*
   80:PRINT "GENE
   RAL COMPUTATIO
   N PGM"
30:FOR II=1TO 26:
   @$(II)=CHR$ (I
   I+64)+" ":NEXT
   II:WAIT 200
50:PRINT "PGM WIL
   L ACCEPT<= 18
   PARAMS"
53:PRINT "ENTER T
   HE INPUT PARAM
   S"
54:INPUT "NO.INPU
   T PARAMS=";ZZ
56:IF ZZ>18PRINT
   "ERROR":GOTO 5
   3
61:WAIT 200:GOTO
   65
62:"C"SK=1:WAIT 2
   00
65:PRINT "GIVE VA
   LUES TO PARAMS
   "
67:PRINT "PLACE C
   OMMAS BETW.NUM
   BERS"
71:A9$="":Y9=1:
   INPUT "INPUT D
   ATA: ";Z9$(0)
72:FOR Z9=1TO LEN
   Z9$(0):B9$=
   MID$ (Z9$(0),Z
   9,1)
73:IF B9$=","THEN
   77
74:A9$=A9$+B9$
75:IF Z9=LEN Z9$(
   0)LET @(Y9+8)=
   VAL A9$
76:GOTO 82
77:IF Z9=1LET @(Y
   9+8)=0:GOTO 81
78:IF Z9=LEN Z9$(
   0)LET @(Y9+1)=
   0
79:IF MID$ (Z9$(0
   ),Z9-1,1)=","
   LET @(Y9+8)=0:
   GOTO 81
80:@(Y9+8)=VAL A9
   $
81:Y9=Y9+1:A9$=""
82:NEXT Z9
83:IF SK=1THEN 90
84:PRINT "ENTER O
   UTPUT PARAMS":
   INPUT "NO.OUTP
   UT PARAMS=";YY
85:IF YY>8PRINT "
   ERROR":GOTO 84
86:PRINT "ENTER O
   UTPUT PARAM LB
   LS A-H"
87:WAIT 5:FOR II=
   1TO YY:CLS :
   FOR I2=2TO 22
   STEP 2:CURSOR
   I2:PRINT @$(II
   ):NEXT I2:
   INPUT @$(II):
   NEXT II
90:WAIT 90
95:REM
```

This completes the GCP data input routine. Lines 100-1200 are reserved for your program using input parameters I-Z and output parameters A-H. Lines 1203-1275 will output these answers.

```
1203:REM
1210:PRINT "COMP.
     RESULTS:"
1215:PRINT "PRESS
     ENTER TO DI
     SPLAY ANS"
1220:" "FOR II=1
     TO YY:WAIT 8
     0:PRINT @$(I
     I);" = ";
     WAIT :PRINT
     @(II):NEXT I
     I
1225:WAIT 100:
     PRINT "PRESS
      DEF C FOR N
     EW PROB":
     WAIT
1230:PRINT "INPUT
      REVIEW?PRES
     S ENTER"
1235:FOR II=9TO Z
     Z+8:PRINT @(
     II):NEXT II
1237:WAIT 100:
     PRINT "PRESS
      DEF C FOR N
     EW PROB":
     WAIT
1240:WAIT 80:
     PRINT "REDIS
     PLAY ANSWERS
     ?":WAIT :
     PRINT "PRESS
      DEF SPACE"
1250:WAIT 200:
     PRINT "PRESS
      DEF C FOR N
     EW PROB"
1275:END
```

ERRATA

WOOD MEMBERS IN AXIAL STRESS

It has come to our attention that we have misapplied the axial load factor to members in axial compressive stress; an incorrect concept had been applied to the following programs:

1. Wood Columns (March Issue)
2. Wood Members-Combined Axial and Bending (April Issue)
3. Wood Foundation Wall (Feb. Issue)

Our programs applied the axial (or vertical) load factor to the calculated allowable stress, F_c'. NATIONAL DESIGN SPECIFICATION of NFPA, 1977 Edition, however, restricts the application of this modification as follows:

For short and intermediate members, the allowable axial stress, F_c', should be altered despite whether the factor increases or decreases it. However, the programs, as revised below, will only allow the factor to be applied to long columns if it is less than unity (1). In other words, any load modification factor which decreases F_c', applies to all members despite whether short, intermediate or long. On the other hand, a load factor which increases F_c' applies only to the short and intermediate categories.

GCP Program/PC-2 - AXIALLY LOADED COLUMN

Make the following changes:

Add:

```
155 K=K*O:IF O<1 LET N=N*O
```

Change these lines:

```
16Ø D=.671*√(N/K):IF U$="C" LET D=D*
    4/√12
17Ø IF C> =D LET B=.3*N/C/C:GOTO 2ØØ
18Ø IF C< =11 LET B=K:GOTO 2ØØ
19Ø B=K*(1-((C/D)∧4)/3)
```

The following two runs use the same input as those in the March Issue.

Note: The Allowable Axial Stress changes in both examples. The first example indicates an overstress of about 1/2%. In the second example, the column is grossly overstressed.

Example #1

```
**WOOD  COLUMN**
**   **  **   **

GREATER DIMN, IN =
                 5.5
LESSER DIMN, IN =
                 3.5
COMP. STR, PSI =
                1200
UNB. L, STRONG, FT =
                  15
UNB. L, WEAK, FT =
                 7.5
E, PSI =
             1600000
FACTOR =
                1.15
AXIAL LOAD, LB =
               12000
END COEF, STRONG =
                0.85
END COEF, WEAK =
                   1

COMP. RESULTS:

AXIAL STR, PSI =
        623.3766234
ALL. AX. STR, PSI =
        620.2742534
L/D RATIO, CRIT. =
        27.81818182
```

Example #2

```
**WOOD  COLUMN**
**   **  **   **

GREATER DIMN, IN =
                 5.5
LESSER DIMN, IN =
                 3.5
COMP. STR, PSI =
                1200
UNB. L, STRONG, FT =
                  10
UNB. L, WEAK, FT =
                  10
E, PSI =
             1600000
FACTOR =
                1.15
AXIAL LOAD, LB =
               12000
END COEF, STRONG =
                0.85
END COEF, WEAK =
                   1

COMP. RESULTS:

AXIAL STR, PSI =
        623.3766234
ALL. AX. STR, PSI =
        408.3333332
L/D RATIO, CRIT. =
        34.28571429
```

ERRATA (continued)

GCP Program/PC-2 - WOOD MEMBERS-COMBINED AXIAL AND BENDING

Make the following changes:

Add:

```
115  N=R*N:IF R<1 LET O=R*O
```

Change these lines:

```
220  B=P/I/J/Y
230  D=(S*12*6/J/I/I+B*Y*(6+1.5*G)*U/
     I)/(M-G*B*Y)
240  D=D+(T*12*6/I/J/J+B*Y*(6+1.5*F)*V/
     J)/(M-F*B*Y):D=D/Q
```

The following two runs use the same input as those in the April issue.

```
***WOOD  POLE***
**   **  **   **

MEMBER D, IN =
                5.5
MEMBER W, IN =
                3.5
UNBR.L, X, FT =
                 10
UNBR.L, Y, FT =
                  2
FB, PSI =
               1300
FC, PSI =
               1200
E, PSI =
            1600000
AX.LOAD, LB =
               5640
LD.FACT, TR =
             1.3333
LD.FACT, AX =
               1.15
MOM, X, FT-LB =
             843.75
MOM, Y, FT-LB =
                  0
ECC., X, IN =
                  0
ECC., Y, IN =
                  0
END COEF., X =
                0.8
END COEF., Y =
                0.8
```

```
COMP. RESULTS:

INTERACT.NO. =
   6.168779571E-01
```

```
***WOOD  POLE***
**   **  **   **

MEMBER D, IN =
                5.5
MEMBER W, IN =
                3.5
UNBR.L, X, FT =
                  2
UNBR.L, Y, FT =
                  2
FB, PSI =
               1300
FC, PSI =
               1200
E, PSI =
            1600000
AX.LOAD, LB =
               5640
LD.FACT, TR =
             1.3333
LD.FACT, AX =
               1.15
MOM, X, FT-LB =
               1500
MOM, Y, FT-LB =
                  0
ECC., X, IN =
                  0
ECC., Y, IN =
                  0
END COEF., X =
                0.8
END COEF., Y =
                0.8

COMP. RESULTS:

INTERACT.NO. =
   8.280191147E-01
```

ERRATA (continued)

GCP Program/PC-2 - WOOD FOUNDATION WALL

Make the following changes:

Add:

```
112  IF U=Ø LET U=1
116  IF V=Ø LET V=1
215  M=M*U:IF U<1 LET O=U*O
```

change this line:

```
25Ø  B=P/1/J*K/12:A=B/C
```

The following is the same run shown in the February issue. Note the value of the Allowable Compressive Stress changed to reflect the fact that F_c may be increased in accordance with the Vertical Load Factor. (This had been handled previously in Line 25Ø) Because the column is not "long", the interaction number was unchanged.

```
*WOOD FNDN WALL*
**   **  **   **

STUD DEPTH, IN =
                5.5
STUD WIDTH, IN =
                1.5
STUD SPCING, IN =
                 12
ALLOW BENDING, PS =

               1500
ALLOW COMP, PSI =
               1200
ALLOW SHEAR, PSI =
                 95
E, PSI =
            1600000
VERT LOAD/FT, LB =
                600
FILL HT, FT =
                  7
FILL HT, FAR SIDE =

                  Ø
STUD LGTH, FT =
               7.25
WIDTH, FTG PLATE =
                7.5
LD.FACTOR, VERT =
               1.15
LD FACTOR, HOR =
                0.9
LGTH WALL, FT =
                 85

COMP. RESULTS:

INTER.NO. =
  9.545865295E-01
SHEAR STRESS, PSI =

        89.70486299
ALLOW COMP, PSI =
        1318.155632
RACKING FORCE, LB =

        18221.875
BNDG:FTG PLT, PSI =

        8.888888889
BOT REACT, LB =
        520.625
TOP REACT, LB =
        214.375
BASE PRESS, PSI =
                960
```

GCP/PC-2 Program CHEZY-MANNING FORMULA - PIPE CHANNEL

The following is Run#2 from the March issue with corrected output.

```
C-M FORMULA/PIPE
**   **  **   **

WATER DEPTH, FT= =
                3.33
PIPE DIAM, FT= =
                 3.5
MANNING COEF= =
               Ø.Ø11
GRADIENT =
                Ø.Ø1

COMP. RESULTS:

AREA, FT2= =
       9.448855576
HYD.RADIUS, FT= =
       1.000929654
AV.VELOCITY, FPS= =

       13.51746213
DISCHARGE, CFS= =
       127.7245474
```