♪ Newtechniques ♪

The Model 6 Music Board for S-100 bus computers is sold with a Users Manual
that contains MICROSCORE, a BASIC program for producing musical scores, and
MICROPLAY, an Assembly Language program for playing the scores. The Users
Manual for the Model 68 Music Board has similar programs respectively
entitled SCORE68 and PLAY68.

Newtech music board owners and others interested in microcomputer music may
want to read the October and November 1977 issues of ROM magazine. They
contain a more detailed description of concepts used in our software and
examples of improvements the user can make (e.g., how to make the computer
"transpose", and how to do "ritards" and "accelerandos" by using notes with
odd duration values). The articles also contain data statements for three
tunes -- Chopin's "Minute Waltz", a movement from a Bach Flute Sonata, and
one part of a Bach two-part Invention (with the music for the second part so
you can play along). These issues of ROM are available from computer stores
at $2.00 per copy, or $3.00 ppd. from the publisher. However, readers of
Newtechniques can purchase both copies at the special price of $4.00 ppd.
for both copies directly from ROM Publications, Route 97, Hampton,
Connecticut 06247.

This issue of Newtechniques contains listings of the Rev.B version of
MICROSCORE and MICROPLAY. Changes from Rev.A are indicated by ✳ .
Similar changes can be made fairly easily for SCORE68 and PLAY68. The main
change incorporated into the Rev.B programs is the capability of specifying
one of eight different amplitude envelopes for each musical note. The user
can now output loud, soft, short (staccato), long (legato), and all sorts of
differently shaped notes, as well as rests. Note the processing of the
optional envelope specification character in lines 183 through 197 of
MICROSCORE. The Rev.B version of MICROPLAY, like the Rev.A version, was
written to end by looping endlessly in place at location HERE. The user may
change this to his own ending.

We also include some favorite Christmas tunes that you can type in. Show
your friends and relatives what your computer can do -- play "Auld Lang
Syne" for them at midnight on New Years Eve!

Several users of the Model 6 and the Model 68 have taken the time to write
or call us with helpful suggestions and comments. We'd like to thank, in
particular, Nancy Gleason, Rudy Libenschek, Aileen Harrison, Walt
Caldwell, Cornell Frank, and Robert Doolitle. Both Rudy and Walt are
running the Model 6 on a Poly 88 and were kind enough to send us information
on changes necessary for running the Newtech programs on that system.

Newtech would like to hear from people using microcomputers for sound
generation.

The Model 6 is demonstrated and discussed on the nationally broadcast NBC-TV
show "Not For Women Only" hosted by Frank Field and Lynn Redgrave. The
segment (called "Computers in the Home") is scheduled for Thursday of the
week whose topic is "Computers in our Lives". Check local listings for date
and time.

```
0000                    ; MICROPLAY REV.B DECEMBER 1977
0000                    ; NEWTECH COMPUTER SYSTEMS INC.
0000                    ; 230 Clinton Street
0000                    ; BROOKLYN, N.Y. 11201
0000                    ;
0000                    ; MICROPLAY STARTS AT THE BEGINNING OF THE
0000                    ; MEMORY AREA DESIGNATED "SCORE" AND
0000                    ; TRANSFERS INTO THE PLAY ROUTINE A 1-BYTE
0000                    ; PITCH PARAMETER AND A 2-BYTE DURATION
0000                    ; PARAMETER.  (BITS A5,A4 AND A3 OF THE
0000                    ; DURATION PARAMETER MOST SIGNIFICANT BYTE
0000                    ; IS USED AS A FIELD TO SPECIFY WHICH
0000                    ; AMPLITUDE ENVELOPE IS TO BE USED.)
0000                    ; MICROPLAY CONTINUES TRANSFERRING NOTE
0000                    ; PARAMETERS AND CALLING THE PLAY ROUTINE
0000                    ; UNTIL A PITCH CONSTANT OF ZERO IS
0000                    ; ENCOUNTERED WHICH INDICATES THE END OF
0000                    ; THE MUSICAL SCORE.
0000                    ;     THIS VERSION OF MICROPLAY WAS WRITTEN
0000                    ; FOR A 8080 HAVING 0 WAIT STATES BUT CAN
0000                    ; BE MODIFIED FOR 8080'S WITH WAIT STATES
0000                    ; OR FOR Z80 PROCESSORS.
0000                    ;
0000  31 C1 00    BEGIN LXI   SP,STACK  ;INIT. STACK POINTER.
0003  21 00 01    INIT  LXI   H,SCORE   ;INIT. SCORE POINTER.
0006  22 AF 00          SHLD  PLACE
0009  2A AF 00    NEXT  LHLD  PLACE     ;IF END OF SCORE THEN
000C  3E 00             MVI   A,0       ;LOOP HERE.
000E  BE                CMP   M
000F  CA 0F 00    HERE  JZ    HERE      ;YOUR ENDING?
0012              ;                     ;ELSE TRANSFER
0012              ;                     ;PARAMETERS FOR NEXT
0012              ;                     ;NOTE OF SCORE INTO
0012              ;                     ;PLAY ROUTINE.
0012  7E                MOV   A,M       ;LOAD PITCH.
0013  32 4B 00          STA   XFER2+1
0016  32 6A 00          STA   XFER4+1
0019  23                INX   H
001A  7E                MOV   A,M       ;LOAD NOTE DURATION
001B  32 44 00          STA   XFER1+1   ;LSD.
001E  32 67 00          STA   XFER3+1
0021  23                INX   H
0022  7E                MOV   A,M       ;LOAD NOTE DURATION
0023  E6 07             ANI   07H       ;MASK 3 LSB'S.
0025  32 45 00          STA   XFER1+2   ;MSD.
0028  32 68 00          STA   XFER3+2
002B  7E                MOV   A,M       ;GET MSD AGAIN
002C  E6 38             ANI   38H       ;MASK 3 BITS
002E  C6 6F             ADI   6FH       ;ENVELOPE SPEC ADDRESS
0030  32 3E 00          STA   PLAY+1
0033  23                INX   H
0034  22 AF 00          SHLD  PLACE     ;SAVE PLACE IN SCORE.
0037              ;
0037  CD 3D 00          CALL  PLAY      ;PLAY ONE NOTE.
003A  C3 09 00          JMP   NEXT      ;GO DO NEXT NOTE.
003D              ;
003D              ;
003D              ;
003D  21 6F 00    PLAY  LXI   H,TBL1    ;INIT ENVELOPE POINTER
0040  1E 08             MVI   E,8       ;INIT. SEGMENT COUNT.
0042  7E                MOV   A,M       ;GET STARTING
0043              ;                     ;AMPLTUDE.
0043  01 00 00    XFER1 LXI   B,LNGTH   ;INIT. DURATION COUNT.
0046  40          LOOP2 MOV   B,B       ;WASTE TIME (WTZ)
0047  C3 4A 00          JMP   XFER2     ;(WT)
004A  16 00       XFER2 MVI   D,PITCH   ;INIT. PITCH CONSTANT.
004C  D3 24             OUT   MODL6     ;OUTPUT HALF WAVE TO
004E              ;                     ;MUSIC BOARD.
```

```
100 REM   MICROSCORE REV.B DECEMBER 1977
110 REM   NEWTECH COMPUTER SYSTEMS INC.
120 REM   230 Clinton Street
130 REM   BROOKLYN, N.Y. 11201
140 REM
150 LET U=256 \REM U DEFINES SCORE AREA IN MEMORY.
160 LET K1=2^(1/12)
170 LET K6=2.1 \REM TEMPO CONTROL
175 LET E1=0 \REM ENVELOPE POINTER DEFAULT.
180   DIM Z$(6)
181 FOR V=1TO 1000
182 READ Z$
183 LET E=100 \ REM PROCESS ENVELOPE POINTER. E WILL
184 REM BE ADDED TO THE MOST SIGNIFICANT BYTE OF THE
185 REM DURATION COUNT SO THAT BITS A5,A4 AND A3 ARE
186 REM USED AS AN ENVELOPE POINTER FIELD.
187 REM
188   IF Z$(1,1)="5" THEN E=0 \REM ATTACK
189   IF Z$(1,1)="R" THEN E=8 \REM REST
190   IF Z$(1,1)="S" THEN E=16 \REM STACCATO
191   IF Z$(1,1)="L" THEN E=24 \REM LEGATO
192   IF Z$(1,1)="1" THEN E=32 \REM SOFT STACCATO
193   IF Z$(1,1)="2" THEN E=40 \REM SOFT LEGATO
194   IF Z$(1,1)="3" THEN E=48 \REM SHAPED
195   IF Z$(1,1)="4" THEN E=56 \REM CRESCENDO
196     IF E=100 THEN GOTO 200
197   LET E1=E
198 LET Z$=Z$(2)
200   LET C=1
220   LET N=100
230     IF Z$(1,1)="A" THEN N=1
240     IF Z$(1,1)="B" THEN N=3
250     IF Z$(1,1)="C" THEN N=4
260     IF Z$(1,1)="D" THEN N=6
270     IF Z$(1,1)="E" THEN N=8
280     IF Z$(1,1)="F" THEN N=9
290     IF Z$(1,1)="G" THEN N=11
300    IF  Z$(1,1)="X" THEN GOTO 720
310     IF N=100 THEN GOTO 760
320   LET C=2
330   LET M=100
340     IF Z$(2,2)="!" THEN M=N-1
350     IF Z$(2,2)="#" THEN M=N+1
360     IF Z$(2,2)=" " THEN M=N
370     IF M=100 THEN GOTO 760
380   LET C=3
390   LET P=100
400     IF Z$(3,3)="1" THEN P=M
410     IF Z$(3,3)="2" THEN P=M+12
420     IF Z$(3,3)="3" THEN P=M+24
430     IF P=100 THEN GOTO 760
440   LET C=4
450   LET T=100
460     IF Z$(4,4)="S" THEN T=16
470     IF Z$(4,4)="E" THEN T=8
480     IF Z$(4,4)="Q" THEN T=4
490     IF Z$(4,4)="H" THEN T=2
500     IF Z$(4,4)="W" THEN T=1
510   IF T=100 THEN GOTO 760
520     IF LEN(Z$)=4 THEN GOTO 560
530     LET C=5
540       IF Z$(5,5)="." THEN T=2*T/3
550   REM CALCULATE CONSTANTS
560     LET F1=220*(K1^(P-1))
570     LET T1=10^6/(2*F1)
580     LET K3=(T1-56.5)/7.5
590     LET K4=F1/(K6*T)
600 LET D3=INT(K4) \REM MAKE DURATION EVEN#
610 LET D4=2*D3-2*INT(D3/2)
620 LET D5=INT(D4/256) \REM CALC. 2 BYTES
630 LET D6=D5+1+E1 \REM D6=MSB
640 LET D7=D4-D5*256  \REM D7=LSB
```

```
004E 34                    INR   M          ;WASTE MUCH TIME (WMT)
004F 35                    DCR   M
0050 34                    INR   M
0051 35                    DCR   M
0052 34                    INR   M
0053 35                    DCR   M
0054 15          LOOP3     DCR   D          ;DELAY ACCORDING TO
0055 C2 54 00              JNZ   LOOP3      ;PITCH CONSTANT.
0058 AE                    XRA   M          ;COMPLEMENT A.
0059 0D                    DCR   C          ;COUNT DOWN DURATION #.
005A C2 46 00              JNZ   LOOP2
005D 05                    DCR   B
005E C2 4A 00              JNZ   XFER2
0061 D3 24                 OUT   MODL6
0063 23                    INX   H          ;SET UP NEXT SEGMENT.
0064 1D                    DCR   E          ;DCR SEGMENT COUNT.
0065 C8                    RZ               ;RETURN IF ALL
0066                       ;                ;SEGMENTS DONE.
0066 01 00 00   XFER3      LXI   B,LNGTH
0069 16 00      XFER4      MVI   D,PITCH
006B 7E                    MOV   A,M        ;SET NEW AMPLITUDE.
006C C3 54 00              JMP   LOOP3
006F
006F                       ;ENVELOPE SPECIFICATION:
006F                       ;
006F                       ; TBL1 THRU TBL8 ARE 8 DIFFERENT NOTE
006F                       ; ENVELOPE SPECIFICATIONS, EACH ONE
006F                       ; CONSISTING OF 8 AMPLITUDE SEGMENTS.
006F                       ;
*006F FF FF E0 C0  TBL1    DB   0FFH,0FFH,0E0H,0C0H    ;ATTACK:#5

*0073 A0 90 70 50          DB   0A0H,90H,70H,50H

*0077 00 00 00 00  TBL2    DB   0,0,0,0                ;REST:#R

*007B 00 00 00 00          DB   0,0,0,0

*007F C0 FF 90 60  TBL3    DB   0C0H,0FFH,90H,60H      ;STACCATO:#S

*0083 35 00 00 00          DB   35H,0,0,0

*0087 C0 FF FF FF  TBL4    DB   0C0H,0FFH,0FFH,0FFH    ;LEGATO:#L

*008B FF FF A0 90          DB   0FFH,0FFH,0A0H,90H

*008F 70 80 60 20  TBL5    DB   70H,80H,60H,20H        ;SOFT STACCATO:#1

*0093 00 00 00 00          DB   0,0,0,0

*0097 70 80 80 80  TBL6    DB   70H,80H,80H,80H        ;SOFT LEGATO:#2

*009B 80 80 60 40          DB   80H,80H,60H,40H

*009F A0 B7 D0 FF  TBL7    DB   0A0H,0B7H,0D0H,0FFH    ;"SHAPED":#3

*00A3 FF FF C7 A0          DB   0FFH,0FFH,0C7H,0A0H

*00A7 70 85 A0 B5  TBL8    DB   70H,85H,0A0H,0B5H      ;CRESCENDO:#4

*00AB D0 FF FF A0          DB   0D0H,0FFH,0FFH,0A0H

00AF                       ;
00AF             SP        EQU   6          ;FIX FOR OUR ASSEMBLER
00AF 00 00       PLACE     DW    0          ;SCORE POINTER.
00B1             SCORE     EQU   0100H      ;YOUR SCORE LOCATION?
00B1             MODL6     EQU   24H        ;YOUR OUTPUT PORT?
*00B1            PITCH     EQU   0          ;DUMMY EQUATE
*00B1            LNGTH     EQU   0          ;DUMMY EQUATE
00B1             STACK     EQU   $+10H
```

```
650 REM TRANSFER CONSTANTS TO SCORE AREA.
660 FILL U+3*(V-1),INT(K3+.5)
670 FILL U+3*(V-1)+1,D7
680 FILL U+3*(V-1)+2,D6
690 PRINT V,
700 NEXT V
710 STOP
720 FILL U+3*(V-1),0
730 PRINT
740 PRINT "SCORE COMPILATION COMPLETE!"
750 STOP
760 PRINT "ERROR IN NOTE #",V
770 PRINT "DATA STRING ",Z$
780 PRINT "CHARACTER #",C
790 STOP
800 END
810 REM
820 REM "AULD LANG SYNE"
901DATA"LC 1Q.","F 1Q.","F 1E","F 1Q","A 2Q"
902DATA"G 1Q.","F 1E","G 1Q","A 2E","G 1E"
903DATA"F 1Q.","F 1E","A 2Q","C 2Q"
904DATA"3D 2H.","LD 2Q"
905DATA"C 2Q.","A 2E","A 2Q","F 1Q"
906DATA"G 1Q.","F 1E","G 1Q","A 2E","G 1E"
907DATA"F 1Q.","D 1E","D 1Q","C 1Q"
908DATA"F 1H.","2D 2Q"
909DATA"C 2Q.","A 2E","A 2Q","F 1Q"
910DATA"G 1Q.","F 1E","G 1Q","D 2Q"
911DATA"C 2Q.","A 2E","A 2Q","D 2Q"
912DATA"4D 2H.","LF 2Q"
913DATA"C 2Q.","A 2E","A 2Q","F 1Q"
914DATA"G 1Q.","F 1E","G 1Q","A 2E","G 1E"
915DATA"F 1Q.","D 1E","D 1Q","C 1Q"
916DATA"3F 1W"
9000 DATA "X"


820 REM "GOD REST YE MERRY GENTLEMEN"
901DATA"5E 1Q", "E 1Q","B 2Q","B 2Q","A 2Q"
902DATA"G 1Q","F#1Q","E 1Q","D 1Q"
903DATA"E 1Q","F#1Q","G 1Q","A 2Q"
904DATA"3B 2H.","5E 1Q"
905DATA"E 1Q","B 2Q","B 2Q","A 2Q"
906DATA"G 1Q","F#1Q","E 1Q","D 1Q"
907DATA"E 1Q","F#1Q","G 1Q","A 2Q"
908DATA"3B 2H.","5B 2Q"
909DATA"C 2Q","A 2Q","B 2Q","C 2Q"
910DATA"D 2Q","E 2Q","B 2Q","A 2Q"
911DATA"G 1Q","E 1Q","F#1Q","G 1Q"
912DATA"LA 2H","5G 1Q","A 2Q"
913DATA"LB 2H","5C 2Q","B 2Q"
914DATA"B 2Q","A 2Q","G 1Q","F#1Q"
915DATA"LE 1H","G 1E","F#1E","E 1Q"
916DATA"LA 2H","5G 1Q","A 2Q"
917DATA"B 2Q","C 2Q","D 2Q","E 2Q"
918DATA"B 2Q","A 2Q","G 1Q","F#1Q"
919DATA"3E 1W."
9000 DATA "X"


820 REM "THE EYES OF TEXAS"
901DATA"D 1Q","G 1Q.","D 1E","G 1E.","D 1S","G 1E.","A 2S"
902DATA"B 2H","G 1H"
903DATA"C 2Q.","C 2E","G 1Q","A 2Q"
904DATA"B 2H.","D 1Q"
905DATA"G 1Q.","D 1E","G 1E.","D 1S","G 1E.","A 2S"
906DATA"B 2H","G 1Q","B 2Q"
907DATA"B 2E","A 2Q.","A 2Q","B 2Q"
908DATA"A 2W"
909DATA"A 2Q.","A 2E","G#1E.","A 2S","B 2E.","A 2S"
910DATA"G 1H","D 1Q","B 2Q"
911DATA"C 2Q.","C 2E","G 1E.","G 1S","A 2E.","A 2S"
912DATA"B 2H.","D 1Q"
913DATA"E 1Q.","F#1E","G 1E.","F#1S","G 1E.","E 1S"
914DATA"D 1H","G 1Q","A 2Q"
915DATA"B 2Q.","C 2E","B 2Q","A 2Q"
916DATA"G 1H."
9000 DATA "X"
```

```
820 REM "THE FIRST NOEL"
901DATA"LE 1E","D 1E","C 1Q.","D 1E","E 1E","F 1E"
902DATA"G 1H","A 2E","B 2E"
903DATA"C 2Q","B 2Q","A 2Q"
904DATA"G 1H","A 2E","B 2E"
905DATA"C 2Q","B 2Q","A 2Q"
906DATA"G 1Q","A 2Q","B 2Q"
907DATA"C 2Q","G 1Q","F 1Q"
908DATA"E 1H","2E 1E","D 1E"
909DATA"C 1Q.","D 1E","E 1E","F 1E"
910DATA"G 1H","A 2E","B 2E"
911DATA"C 2Q","B 2Q","A 2Q"
912DATA"G 1H","A 2E","B 2E"
913DATA"C 2Q","B 2Q","A 2Q"
914DATA"G 1Q","A 2Q","B 2Q"
915DATA"C 2Q","G 1Q","F 1Q"
916DATA"E 1H","E 1E","D 1E"
917DATA"C 1Q.","D 1E","E 1E","F 1E"
918DATA"G 1H","C 2E","B 2E"
919DATA"A 2H","A 2Q"
920DATA"4G 1H."
921DATA"LC 2Q","B 2Q","A 2Q"
922DATA"G 1Q","A 2Q","B 2Q"
923DATA"C 2Q","G 1Q","F 1Q"
924DATA"3E 1H."
9000 DATA "X"


820 REM "HARK! THE HERALD ANGELS SING"
901 DATA "5D 1Q","G 1Q","LG 1Q.","F#1E"
902 DATA"5G 1Q","B 2Q","LB 2Q","A 2Q"
903DATA"5D 2Q","D 2Q","LD 2Q.","C 2E"
904DATA"5B 2Q","A 2Q","3B 2H"
905DATA"5D 1Q","G 1Q","LG 1Q.","F#1E"
906DATA"5G 1Q","B 2Q","LB 2Q","A 2Q"
907DATA"LD 2Q","A 2Q","A 2Q.","F#1E"
908DATA"F#1Q","E 1Q","D 1H"
909DATA"5D 2Q","D 2Q","D 2Q","G 1Q"
910DATA"C 2Q","B 2Q","LB 2Q","A 2Q"
911DATA"5D 2Q","D 2Q","D 2Q","G 1Q"
912DATA"C 2Q","B 2Q","LB 2Q","A 2Q"
913DATA"5E 2Q","E 2Q","LE 2Q.","LD 2E"
914DATA"C 2Q","B 2Q","C 2H"
915DATA"2A 2Q","B 2E","C 2E","D 2Q.","G 1E"
916DATA"G 1Q","A 2Q","4B 2H"
917DATA"LE 2Q.","E 2E","E 2Q","D 2Q"
918DATA"C 2Q","B 2Q","C 2H"
919DATA"A 2Q","B 2E","C 2E","D 2Q.","G 1E"
920DATA"G 1Q","A 2Q","G 1H"
9000 DATA "X"
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