Micro-Professor Application Note

— DOC. NO. MPF-I-04-210A —

PLAYING POKER GAME WITH MPF-I

An Application Example of Z8Ø-PIO.

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US$1.00

Purpose: Simulating poker with PIO in order to familiarize with its functions.

Required Equipment: The MPF-I, a PIO, tact switch x 9

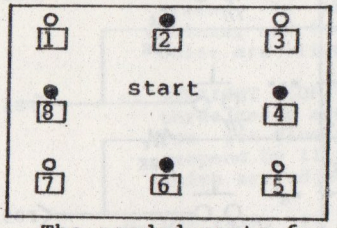
10K ohm 1/4W x 16	2SA 1015 x 8
330 ohm 1/4W x 8	Green LED x 4
PCB 100mm x 70mm	Red LED x 4

Expriment Explanation:

1. This experiment is similar to poker game. The only difference is that the conventional poker game uses five cards as a suit. However, this experiment deals only three-card suit to players.

2. You are required to make your own keyboard and external circuitry. The keyboard is shown below

   Keyboard

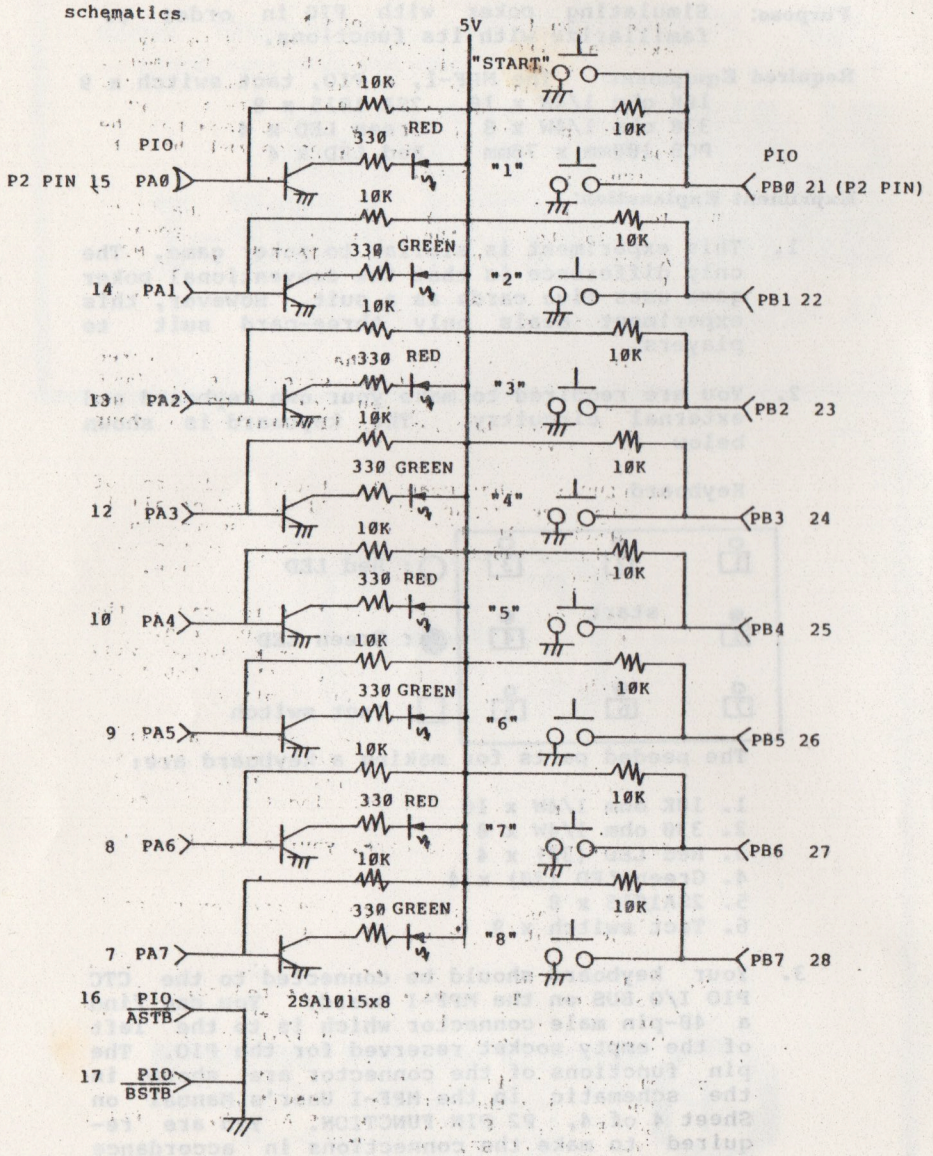


   The needed parts for making a keyboard are:

   1. 10K ohm 1/4W x 16
   2. 330 ohm 1/4W x 8
   3. Red LED (30) x 4
   4. Green LED (30) x 4
   5. 2SA1015 x 8
   6. Tact switch x 9

3. Your keyboard should be connected to the CTC PIO I/O BUS on the MPF-I board. You can find a 40-pin male connector which is to the left of the empty socket reserved for the PIO. The pin functions of the connector are shown in the schematic in the MPF-I User's Manual on Sheet 4 of 4, P2 PIN FUNCTION. You are required to make the connections in accordance with the schematics provided in this experiment, which is shown below:

schematics.



4. After you finished your own keyboard and the external circuitry, you are required to key in the program provided in this experiment. After you have keyed in the program, you are ready to play the game. But before you proceed to play the poker, you must know how the MPF-I respond to the key press and how to calculate your score.

5. To play the game, you have to press the START key located in the center of your keyboard. After you have pressed the START key, the MPF-I will deal three cards (though you can not see these cards in reality.) The three cards will come in

   a. THREE OF A KIND: That means the three cards dealed are of the same number. Once you get this suit, you score 20 points, and only one LED lamp is illuminated on your keyboard.

   b. FLUSH: That means the three cards are of the same group-either all in red or all in green. In this case, you score three points, and the three LED lamps of the same color are illuminated at the same time.

   c. STRAIGHT (OR TIERCE): In this case, the three cards are sequentially numbered, and you get five points. Your keyboard will respond by illuminating the three LED lamps which are adjacent to one another.

   d. ONE PAIR: In this case, you have a pair of cards whose number is identical, and you score five points minus. Your keyboard will respond by illuminaing two LED lamps.

   e. OTHERS: In this case, your score is deducted by two.

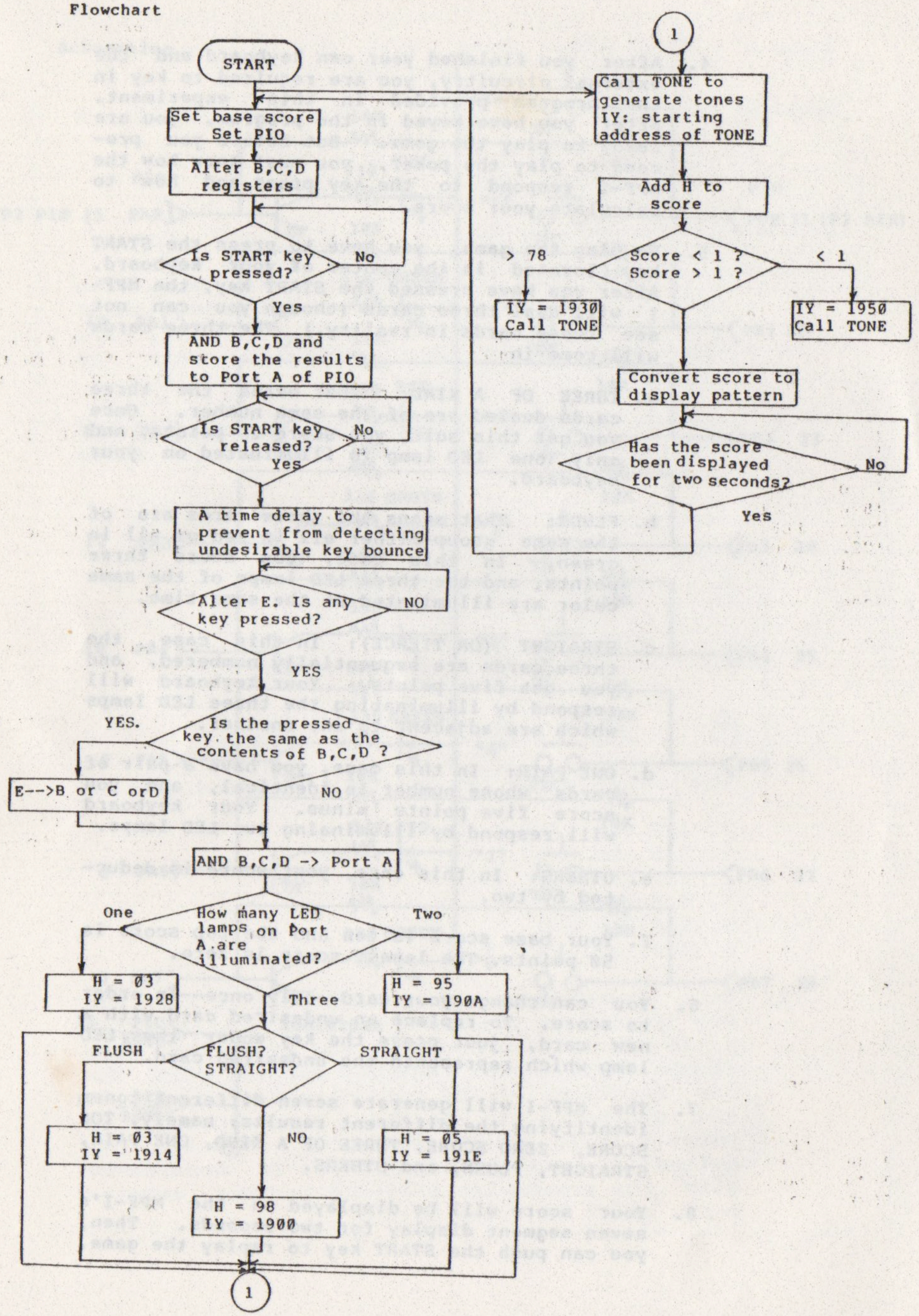
   f. Your base score is ten and the top score is 50 points. The lowest score is zero.

6. You can change your card--only once--in order to score. To replace an undesired card with a new card, just press the key under the LED lamp which represents the undesired card.

7. The MPF-I will generate seven different tones identifying the different results; namely, TOP SCORE, ZERO SCORE, THREE OF A KIND, ONE PAIR, STRAIGHT, FLUSH, and OTHERS.

8. Your score will be displayed on the MPF-I's seven segment display for two seconds. Then, you can push the START key to replay the game.

Flowchart




```
LOC   OBJ CODE M STMT SOURCE STATEMENT                    ASM 5.9

18ØØ                1        ORG    18ØØH
                    2 PIODA  EQU    8ØH
                    3 PIODB  EQU    81H
                    4 PIOCA  EQU    82H
                    5 SCAN1  EQU    Ø624H
                    6 HEX7SG EQU    Ø678H
18ØØ  21ØØØØ        7        LD     HL,Ø
18Ø3  22Ø419        8        LD     (SCOBF+2),HL
18Ø6  22Ø619        9        LD     (SCOBF+4),HL
18Ø9  3EØA         1Ø M1:    LD     A,1Ø          ;Set base score
18ØB  32ØØ19       11        LD     (SCORE),A     ;to 1Ø.
18ØE  DD21Ø219     12 M2:    LD     IX,SCOBF
1812  3E8F         13        LD     A,8FH         ;Set PIO's Port A to
1814  D382         14        OUT    (PIOCA),A     ;byte output and port
                   15                             ;B to byte input mode.
1816  3EFF         16        LD     A,ØFFH        ;Port A outputs
                   17                             ;11111111.
1818  D38Ø         18        OUT    (PIODA),A     ;to keep the LED off.
181A  16FE         19 M3     LD     D,ØFEH
181C  4A           2Ø        LD     C,D
181D  42           21        LD     B,D
181E  DB81         22 M4     IN     A,(PIODB)     ;Check if a key
182Ø  FEFE         23        CP     ØFEH          ;is pressed? If the
1822  18ØC         24        JR     M5            ;START key was not
1824  CBØØ         25        RLC    B             ;pressed, then
                   26                             ;alter the
1826  38F6         27        JR     C,M4          ;value of registers
                   28                             ;B,C,D.
1828  CBØ1         29        RLC    C             ;If the START key was
182A  38DD         3Ø        JR     C,M1          ;pressed, then execute
182C  CBØ2         31        RLC    D             ;M5.
182E  18EE         32        JR     M4
                   33 ;**************************************************
183Ø  78           34 M5     LD     A,B           ;AND B,C,D
1831  A1           35        AND    C
1832  A2           36        AND    D
1833  D38Ø         37        OUT    (PIODA),A     ;Store the results of
                   38                             ;ANDed B,C,D to Port A
                   39                             ;to illuminate 1 to 3
                   4Ø                             ;LED lamps.
1835  1EFE         41        LD     E,ØFEH
                   42 M6:
                   43 ; The next three instructions are to check
                   44 ; whether the pressed key is released?
1837  DB81         45        IN     A,(PIODB)
1839  FEFF         46        CP     ØFFH
183B  2ØFA         47        JR     NZ,M6
183D  26FF         48        LD     H,ØFFH        ;A time delay
183F  2EFF         49 M7     LD     L,ØFFH        ;to prevent from
1841  2D           5Ø M8     DEC    L             ;detecting undesirable
1842  2ØFD         51        JR     NZ,M8         ;key bounce.
1844  25           52        DEC    H
1845  2ØF8         53        JR     NZ,M7
1847  DB81         54        IN     A,(PIODB)     ;Detect if a key
1849  CBØ3         55 M9     RLC    E             ;is pressed? If not,
184B  FEFF         56        CP     ØFFH          ;alter the value
184D  28FA         57        JR     Z,M9          ;of E.
184F  B8           58        CP     B             ;If the key pressed
```

```
LOC  OBJ CODE M STMT SOURCE STATEMENT
1850  2003        59          JR    NZ,M10  ;has the same
1852  43          60          LD    B,E     ;internal code as
                  61                        ;the content of the
                  62                        ;B register,
                  63                        ;load E to B.
1853  180A        64          JR    M12
1855  B9          65    M10   CP    C       ;If the internal code of
1856  2003        66          JR    NZ,M11  ;the key pressed is the same
1858  4B          67          LD    C,E     ;as the content of C,
                  68                        ;load E to C.
1859  1804        69          JR    M12
185B  BA          70    M11   CP    D       ;If the internal code of
185C  2006        71          JR    NZ,M13  ;the key pressed is the same
185E  53          72          LD    D,E     ;as the content of C,
                  73                        ;load E to D.
185F  78          74    M12   LD    A,B     ;Output the ANDed value
1860  A1          75          AND   C       ;of B,C,D to Port A
1861  A2          76          AND   D       ;to illuminate 1 to 3 LED.
1862  D380        77          OUT   (PIODA),A
1864  DB80        78    M13   IN    A,(PIODA);Check the illuminated
1866  2609        79          LD    H,09    ;LED lamps connected to
1868  2E00        80          LD    L,0     ;Port A
186A  25          81    M14   DEC   H
186B  2807        82          JR    Z,M15
186D  CB07        83          RLC   A
186F  38F9        84          JR    C,M14
1871  2C          85          INC   L
1872  18F6        86          JR    M14
1874  7D          87    M15   LD    A,L     ;If L = 1, only one
1875  FE01        88          CP    01      ;LED lamp was illuminated.
1877  2008        89          JR    NZ,M16
1879  FD212819    90          LD    IY,TAB5 ;Load the starting address
                  91                        ;of TONE to IY.
187D  2614        92          LD    H,20    ;Put the score to H.
187F  1845        93          JR    M23
1881  FE02        94    M16   CP    02      ;If L = 2, two LED
1883  2008        95          JR    NZ,M17  ;lamps were illuminated.
1885  FD210F19    96          LD    IY,TAB2 ;Load the stating address
                  97                        ;of TAB2 to IY.
1889  265F        98          LD    H,95    ;Load score to H.
188B  1839        99          JR    M23
188D  DB80       100    M17   IN    A,(PIODA);Check to see how many
188F  2E08       101          LD    L,08    ;LED lamps on Port A
1891  2D         102    M18   DEC   L       ;are illuminated?
1892  2810       103          JR    Z,M19   ;If three adjacent LED
1894  CB07       104          RLC   A       ;lamps are illuminated,
1896  38F9       105          JR    C,M18   ;load 5 to H (which is
1898  CB07       106          RLC   A       ;the register used to put
189A  38F5       107          JR    C,M18   ;score.)
189C  FD211F19   108          LD    IY,TAB4 ;Load the starting address
                 109                        ;of TAB4 to IY.
18A0  2605       110          LD    H,05
18A2  1822       111          JR    M23
18A4  DB80       112    M19   IN    A,(PIODA);Check the illuminated
18A6  2E08       113          LD    L,08    ;LED lamps on Port A.
18A8  1E03       114    M20   LD    E,03    ;If the three lighted
18AA  2D         115          DEC   L       ;LED lamps are of the
18AB  2813       116          JR    Z,M22   ;same color,
```



```
LOC  OBJ CODE M STMT SOURCE STATEMENT
18AD  CB07       117    M21   RLC   A
18AF  38F7       118          JR    C,M20
18B1  CB07       119          RLC   A
18B3  30F3       120          JR    NC,M20
18B5  1D         121          DEC   E
18B6  20F5       122          JR    NZ,M21
18B8  2603       123          LD    H,03    ;then load 3 to H,
18BA  FD211819   124          LD    IY,TAB3 ;and load the stating address
                 125                        ;of TAB3 to IY.
18BE  1806       126          JR    M23
18C0  2662       127    M22   LD    H,98    ;If none of the above happens,
                 128                        ;load 98H (-2 in decimal)
                 129                        ;to H.
18C2  FD210819   130          LD    IY,TAB1 ;and load TAB1 to IY.
18C6  CD5D19     131    M23   CALL  TONE    ;Generate a tone.
18C9  3A0019     132          LD    A,(SCORE);Add accumulated score
18CC  84         133          ADD   A,H     ;together.
18CD  27         134          DAA
18CE  FE01       135          CP    01      ;If the total score < 1,
18D0  F2DD18     136          JP    P,M24
18D3  FD214C19   137          LD    IY,TAB7 ;load TAB7 to IY.
18D7  CD5D19     138          CALL  TONE    ;After generating a tone,
18DA  C30918     139          JP    M1      ;jump to M1 to replay
                 140                        ;the game.
18DD  FE32       141    M24   CP    50      ;If the total score > 50,
18DF  FAEC18     142          JP    M,M25
18E2  FD213D19   143          LD    IY,TAB6 ;load TAB6 to IY.
18E6  CD5D19     144          CALL  TONE    ;After generating a tone,
18E9  C30918     145          JP    M1      ;jump to M1 to replay.
18EC  210219     146    M25   LD    HL,SCOBF
18EF  320019     147          LD    (SCORE),A;Load score to SCORE.
18F2  CD7806     148          CALL  HEX7SG  ;Convert score to
                 149                        ;display pattern.
18F5  26BB       150          LD    H,0BBH
18F7  CD2406     151    M26   CALL  SCAN1
18FA  25         152          DEC   H       ;Press any key of the MPF-I,
18FB  20FA       153          JR    NZ,M26
18FD  C31A18     154          JP    M3      ;then jump to M3.
1900             155    SCORE DEFS  2
1902             156    SCOBF DEFS  6
1908  22BB       157    TAB1: DEFW  0BB22H
190A  66DD       158          DEFW  0DD66H
190C  99FF       159          DEFW  0FF99H
190E  00         160          DEFB  0
190F  6655       161    TAB2: DEFW  5566H
1911  99AA       162          DEFW  0AA99H
1913  CCDD       163          DEFW  0DDCCH
1915  99FF       164          DEFW  0FF99H
1917  00         165          DEFB  0
1918  11AA       166    TAB3: DEFW  0AA11H
191A  2288       167          DEFW  8822H
191C  3366       168          DEFW  6633H
191E  00         169          DEFB  0
191F  11AA       170    TAB4: DEFW  0AA11H
1921  3388       171          DEFW  8833H
1923  11AA       172          DEFW  0AA11H
1925  3388       173          DEFW  8833H
1927  00         174          DEFB  0
```

```
LOC  OBJ CODE  M STMT SOURCE STATEMENT
1850 2003        59        JR    NZ,M10  ;has the same
1852 43          60        LD    B,E     ;internal code as
                 61                      ;the content of the
                 62                      ;B register,
                 63                      ;load E to B.
1853 180A        64        JR    M12
1855 B9          65  M10   CP    C       ;If the internal code of
1856 2003        66        JR    NZ,M11  ;the key pressed is the same
1858 4B          67        LD    C,E     ;as the content of C,
                 68                      ;load E to C.
1859 1804        69        JR    M12
185B BA          70  M11   CP    D       ;If the internal code of
185C 2006        71        JR    NZ,M13  ;the key pressed is the same
185E 53          72        LD    D,E     ;as the content of C,
                 73                      ;load E to D.
185F 78          74  M12   LD    A,B     ;Output the ANDed value
1860 A1          75        AND   C       ;of B,C,D to Port A
1861 A2          76        AND   D       ;to illuminate 1 to 3 LED.
1862 D380        77        OUT   (PIODA),A
1864 DB80        78  M13   IN    A,(PIODA);Check the illuminated
1866 2609        79        LD    H,09    ;LED lamps connected to
1868 2E00        80        LD    L,0     ;Port A
186A 25          81  M14   DEC   H
186B 2807        82        JR    Z,M15
186D CB07        83        RLC   A
186F 38F9        84        JR    C,M14
1871 2C          85        INC   L
1872 18F6        86        JR    M14
1874 7D          87  M15   LD    A,L     ;If L = 1, only one
1875 FE01        88        CP    01      ;LED lamp was illuminated.
1877 2008        89        JR    NZ,M16
1879 FD212819    90        LD    IY,TAB5 ;Load the starting address
                 91                      ;of TONE to IY.
187D 2614        92        LD    H,20    ;Put the score to H.
187F 1845        93        JR    M23
1881 FE02        94  M16   CP    02      ;If L = 2, two LED
1883 2008        95        JR    NZ,M17  ;lamps were illuminated.
1885 FD210F19    96        LD    IY,TAB2 ;Load the stating address
                 97                      ;of TAB2 to IY.
1889 265F        98        LD    H,95    ;Load score to H.
188B 1839        99        JR    M23
188D DB80       100  M17   IN    A,(PIODA);Check to see how many
188F 2E08       101        LD    L,08    ;LED lamps on Port A
1891 2D         102  M18   DEC   L       ;are illuminated?
1892 2810       103        JR    Z,M19   ;If three adjacent LED
1894 CB07       104        RLC   A       ;lamps are illuminated,
1896 38F9       105        JR    C,M18   ;load 5 to H (which is
1898 CB07       106        RLC   A       ;the register used to put
189A 38F5       107        JR    C,M18   ;score.)
189C FD211F19   108        LD    IY,TAB4 ;Load the starting address
                109                      ;of TAB4 to IY.
18A0 2605       110        LD    H,05
18A2 1822       111        JR    M23
18A4 DB80       112  M19   IN    A,(PIODA);Check the illuminated
18A6 2E08       113        LD    L,08    ;LED lamps on Port A.
18A8 1E03       114  M20   LD    E,03    ;If the three lighted
18AA 2D         115        DEC   L       ;LED lamps are of the
18AB 2813       116        JR    Z,M22   ;same color,
```



```
LOC  OBJ CODE  M STMT SOURCE STATEMENT
18AD CB07       117  M21   RLC   A
18AF 38F7       118        JR    C,M20
18B1 CB07       119        RLC   A
18B3 30F3       120        JR    NC,M20
18B5 1D         121        DEC   E
18B6 20F5       122        JR    NZ,M21
18B8 2603       123        LD    H,03    ;then load 3 to H,
18BA FD211819   124        LD    IY,TAB3 ;and load the stating address
                125                      ;of TAB3 to IY.
18BE 1806       126        JR    M23
18C0 2662       127  M22   LD    H,98    ;If none of the above happens,
                128                      ;load 98H (-2 in decimal)
                129                      ;to H.
18C2 FD210819   130        LD    IY,TAB1 ;and load TAB1 to IY.
18C6 CD5D19     131  M23   CALL  TONE    ;Generate a tone.
18C9 3A0019     132        LD    A,(SCORE);Add accumulated score
18CC 84         133        ADD   A,H     ;together.
18CD 27         134        DAA
18CE FE01       135        CP    01      ;If the total score < 1,
18D0 F2DD18     136        JP    P,M24
18D3 FD214C19   137        LD    IY,TAB7 ;load TAB7 to IY.
18D7 CD5D19     138        CALL  TONE    ;After generating a tone,
18DA C30918     139        JP    M1      ;jump to M1 to replay
                140                      ;the game.
18DD FE32       141  M24   CP    50      ;If the total score > 50,
18DF FAEC18     142        JP    M,M25
18E2 FD213D19   143        LD    IY,TAB6 ;load TAB6 to IY.
18E6 CD5D19     144        CALL  TONE    ;After generating a tone,
18E9 C30918     145        JP    M1      ;jump to M1 to replay.
18EC 210219     146  M25   LD    HL,SCOBF
18EF 320019     147        LD    (SCORE),A;Load score to SCORE.
18F2 CD7806     148        CALL  HEX7SG  ;Convert score to
                149                      ;display pattern.
18F5 26BB       150        LD    H,0BBH
18F7 CD2406     151  M26   CALL  SCAN1
18FA 25         152        DEC   H       ;Press any key of the MPF-I,
18FB 20FA       153        JR    NZ,M26
18FD C31A18     154        JP    M3      ;then jump to M3.
1900            155  SCORE DEFS  2
1902            156  SCOBF DEFS  6
1908 22BB       157  TAB1: DEFW  0BB22H
190A 66DD       158        DEFW  0DD66H
190C 99FF       159        DEFW  0FF99H
190E 00         160        DEFB  0
190F 6655       161  TAB2: DEFW  5566H
1911 99AA       162        DEFW  0AA99H
1913 CCDD       163        DEFW  0DDCCH
1915 99FF       164        DEFW  0FF99H
1917 00         165        DEFB  0
1918 11AA       166  TAB3: DEFW  0AA11H
191A 2288       167        DEFW  8822H
191C 3366       168        DEFW  6633H
191E 00         169        DEFB  0
191F 11AA       170  TAB4: DEFW  0AA11H
1921 3388       171        DEFW  8833H
1923 11AA       172        DEFW  0AA11H
1925 3388       173        DEFW  8833H
1927 00         174        DEFB  0
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LOC   OBJ CODE M STMT SOURCE STATEMENT

1928  77FF       175  TAB5:   DEFW    0FF77H
192A  66EE       176          DEFW    0EE66H
192C  55DD       177          DEFW    0DD55H
192E  44CC       178          DEFW    0CC44H
1930  33BB       179          DEFW    0BB33H
1932  22AA       180          DEFW    0AA22H
1934  1199       181          DEFW    9911H
1936  1188       182          DEFW    8811H
1938  8888       183          DEFW    8888H
193A  9977       184          DEFW    7799H
193C  00         185          DEFB    0
193D  11FF       186  TAB6:   DEFW    0FF11H
193F  22EE       187          DEFW    0EE22H
1941  33DD       188          DEFW    0DD33H
1943  44CC       189          DEFW    0CC44H
1945  55BB       190          DEFW    0BB55H
1947  66AA       191          DEFW    0AA66H
1949  7799       192          DEFW    9977H
194B  00         193          DEFB    0
194C  FF11       194  TAB7:   DEFW    11FFH
194E  EE22       195          DEFW    22EEH
1950  DD33       196          DEFW    33DDH
1952  CC44       197          DEFW    44CCH
1954  BB55       198          DEFW    55BBH
1956  AA66       199          DEFW    66AAH
1958  9977       200          DEFW    7799H
195A  FFAA       201          DEFW    0AAFFH
195C  00         202          DEFB    0
195D  D9         203  TONE    EXX
195E  FD7E00     204  M90     LD      A,(IY)
1961  5F         205          LD      E,A
1962  FE00       206          CP      00H
1964  2818       207          JR      Z,M200
1966  FD23       208          INC     IY
1968  FD4E00     209          LD      C,(IY)
196B  3EFF       210          LD      A,0FFH
196D  D302       211  M100    OUT     (02),A
196F  47         212          LD      B,A
1970  00         213  M150    NOP
1971  00         214          NOP
1972  00         215          NOP
1973  10FB       216          DJNZ    M150
1975  EE80       217          XOR     80H
1977  0D         218          DEC     C
1978  20F3       219          JR      NZ,M100
197A  FD23       220          INC     IY
197C  18E0       221          JR      M90
197E  D9         222  M200    EXX
197F  C9         223          RET
```



```
SYMBOL   VAL  M DEFN REFS

HEX7SG 0678      6  148
M1     1809     10   30  139  145
M10    1855     65   59
M100   196D    211  219
M11    185B     70   66
M12    185F     74   64   69
M13    1864     78   71
M14    186A     81   84   86
M15    1874     87   82
M150   1970    213  216
M16    1881     94   89
M17    188D    100   95
M18    1891    102  105  107
M19    18A4    112  103
M2     180E     12
M20    18A8    114  118  120
M200   197E    222  207
M21    18AD    117  122
M22    18C0    127  116
M23    18C6    131   93   99  111  126
M24    18DD    141  136
M25    18EC    146  142
M26    18F7    151  153
M3     181A     19  154
M4     181E     22   27   32
M5     1830     34   24
M6     1837     42   47
M7     183F     49   53
M8     1841     50   51
M9     1849     55   57
M90    195E    204  221
PIOCA  0082      4   14
PIODA  0080      2   18   37   77   78  100  112
PIODB  0081      3   22   45   54
SCAN1  0624      5  151
SCOBF  1902    156    8    9   12  146
SCORE  1900    155   11  132  147
TAB1   1908    157  130
TAB2   190F    161   96
TAB3   1918    166  124
TAB4   191F    170  108
TAB5   1928    175   90
TAB6   193D    186  143
TAB7   194C    194  137
TONE   195D    203  131  138  144
```