

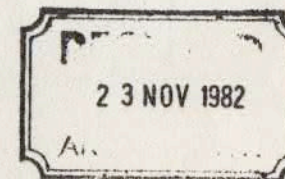


## Micro-Professor Application Note

— DOC. NO. MPF-I-04 -210A —

# PLAYING POKER GAME WITH MPF-I

An Application Example of Z80-PIO.



### MULTITECH INDUSTRIAL CORPORATION

OFFICE : 977, MIN SHEN E. ROAD, TAIPEI, 105, TAIWAN, R.O.C.  
TEL: (02)769-1225 (10 LINES) TELEX: 23756 MULTIC  
FACTORY: 5, TECHNOLOGY ROAD III,  
HSINCHU SCIENCE-BASED INDUSTRIAL PARK,  
HSINCHU, TAIWAN, 300, R.O.C.  
TEL: (035)775102 (3 LINES)

US\$1.00



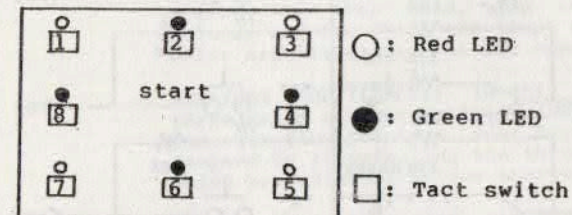
**Purpose:** Simulating poker with PIO in order to familiarize with its functions.

**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

**Experiment 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**



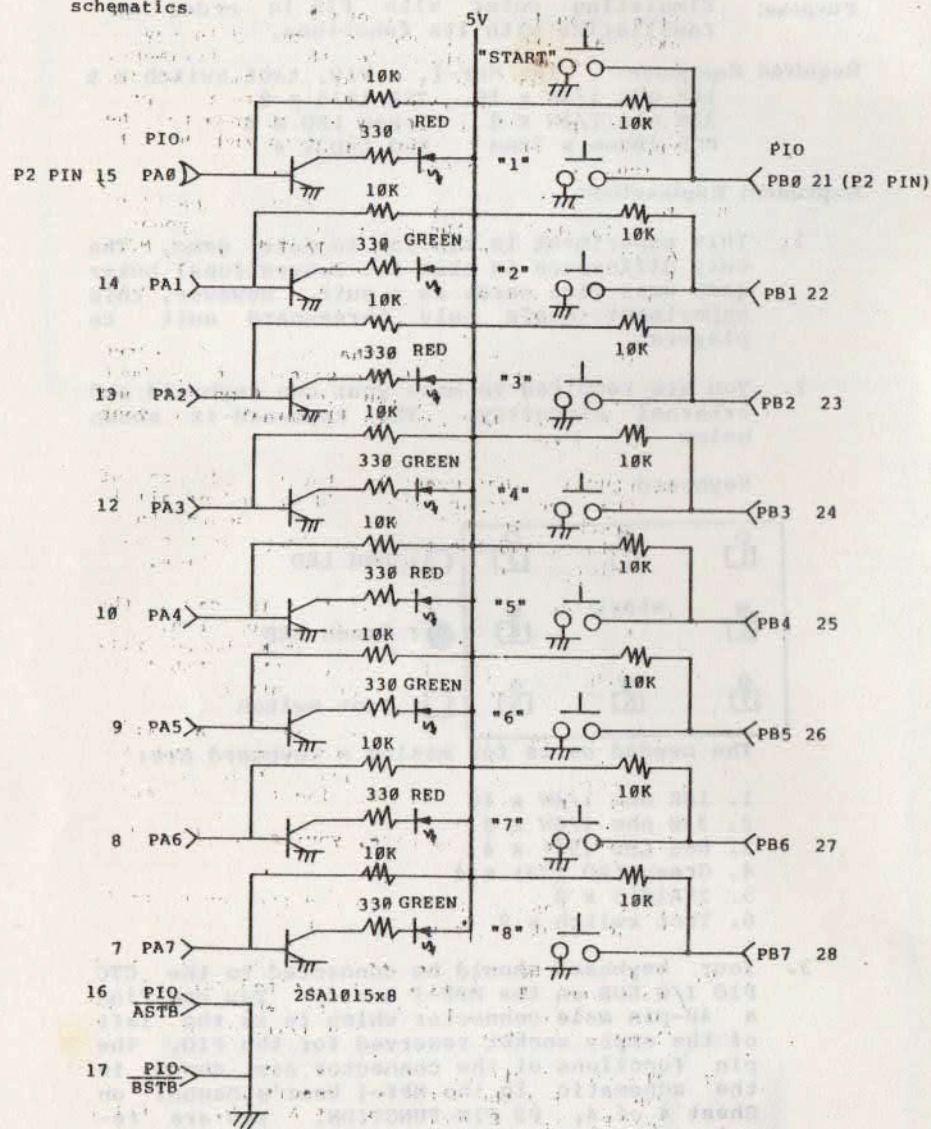
The needed parts for making a keyboard are:

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:



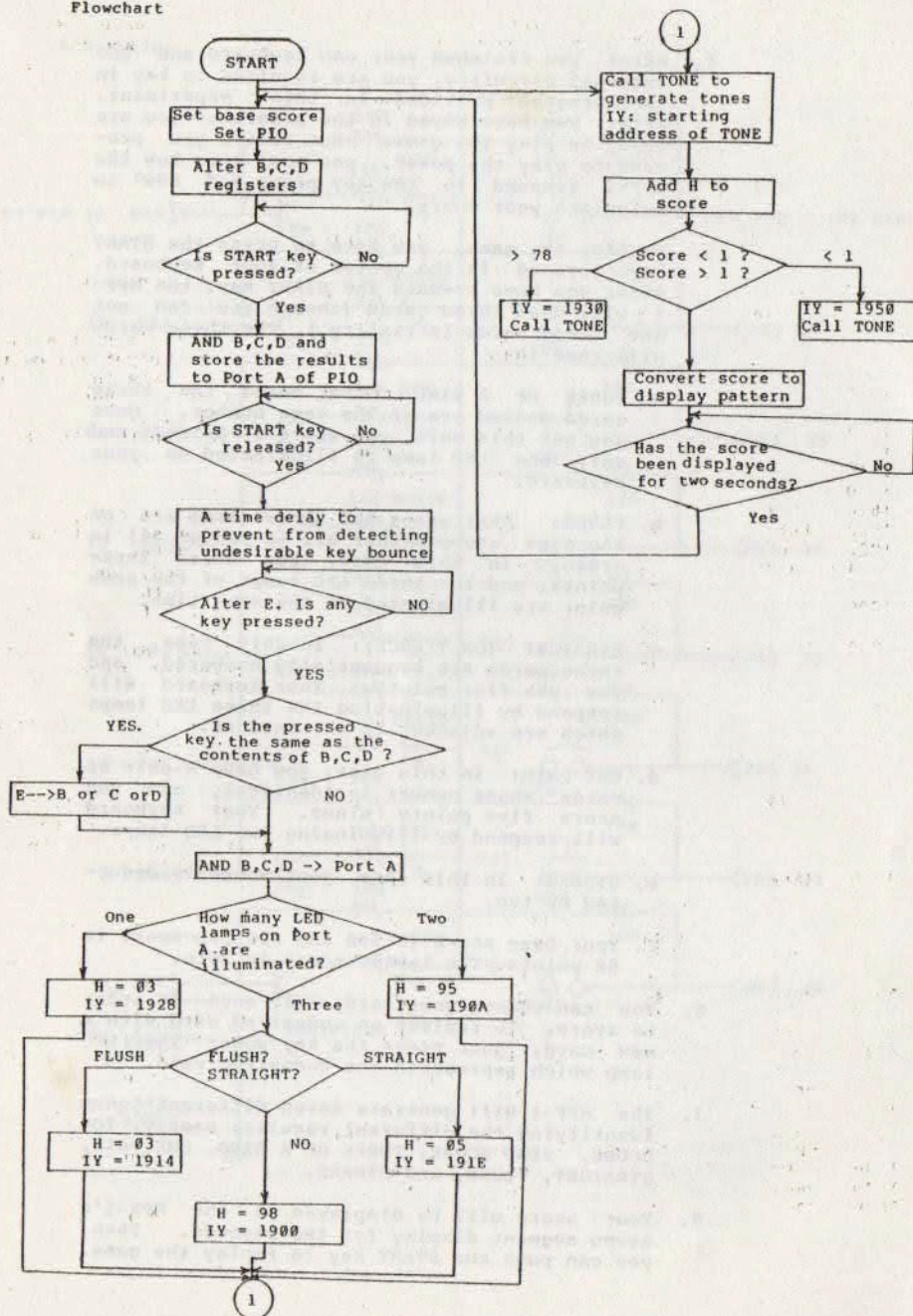
schematics.



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 dealt 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 illuminating 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

LOC	OBJ	CODE	M	STMT	SOURCE	STATEMENT
1800			1	ORG	1800H	
			2	PIODA	EQU	80H
			3	PIODB	EQU	81H
			4	PIOCA	EQU	82H
			5	SCAN1	EQU	0624H
			6	HEX7SG	EQU	0678H
1800	210000		7	LD	HL,0	
1803	220419		8	LD	(SC0BF+2),HL	
1806	220619		9	LD	(SC0BF+4),HL	
1809	3E0A	10	M1:	LD	A,10	;Set base score
180B	320019	11		LD	(SCORE),A	;to 10.
180E	DD210219	12	M2:	LD	IX,SC0BF	
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,0FFH	;Port A outputs
		17				;11111111.
1818	D380	18		OUT	(PIODA),A	;to keep the LED off.
181A	16FE	19	M3	LD	D,0FEH	
181C	4A	20		LD	C,D	
181D	42	21		LD	B,D	
181E	DB81	22	M4	IN	A,(PIODB)	;Check if a key
1820	FEFE	23		CP	0FEH	;is pressed? If the
1822	180C	24		JR	M5	;START key was not
1824	CB00	25		RLC	B	;pressed, then
		26				;alter the
1826	38F6	27		JR	C,M4	;value of registers
		28				;B,C,D.
1828	CB01	29		RLC	C	;If the START key was
182A	38DD	30		JR	C,M1	;pressed, then execute
182C	CB02	31		RLC	D	;M5.
182E	18EE	32		JR	M4	
		33				*****
1830	78	34	M5	LD	A,B	;AND B,C,D
1831	A1	35		AND	C	
1832	A2	36		AND	D	
1833	D380	37		OUT	(PIODA),A	;Store the results of
		38				;ANDed B,C,D to Port A
		39				;to illuminate 1 to 3
		40				;LED lamps.
1835	1EFE	41		LD	E,0FEH	
		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	0FFH	
183B	20FA	47		JR	NZ,M6	
183D	26FF	48		LD	H,0FFH	;A time delay
183F	2EFF	49	M7	LD	L,0FFH	;to prevent from
1841	2D	50	M8	DEC	L	;detecting undesirable
1842	20FD	51		JR	NZ,M8	;key bounce.
1844	25	52		DEC	H	
1845	20F8	53		JR	NZ,M7	
1847	DB81	54		IN	A,(PIODB)	;Detect if a key
1849	CB03	55	M9	RLC	E	;is pressed? If not,
184B	FEFF	56		CP	0FFH	;alter the value
184D	28FA	57		JR	Z,M9	;of E.
184F	B8	58		CP	B	;If the key pressed

PAGE 1  
ASM 5.9



LOC	OBJ CODE	M	STMT	SOURCE STATEMENT	PGM3	PAGE 2 ASM 5.9
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	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	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	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	PGM3	PAGE 3 ASM 5.9
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	34	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,SC0BF		
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		
18FB	20FA	153	JR	NZ,M26 ;Press any key of the MPF-I,		
18FD	C31A18	154	JP	M3 ;then jump to M3.		
1900		155	SCORE	DEFS 2		
1902		156	SC0BF	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		



PGM3 PAGE 2  
ASM 5.9

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 starting 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,

PGM3 PAGE 3  
ASM 5.9

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 starting 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	34	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,SCORE
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
18FB	20FA	153	JR	NZ,M26 ;Press any key of the MPF-I,
18FD	C31A18	154	JP	M3 ;then jump to M3.
1900		155	SCORE DEFS	2
1902		156	SCORF 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

PGM3

PAGE 4  
ASM 5.9

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	

CROSS REFERENCE  
SYMBOL VAL M DEFN REFS

PGM3

PAGE 5

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						
SCOFB	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				