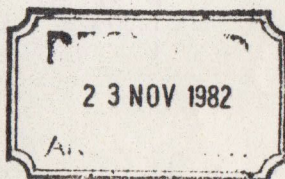


Micro-Professor Application Note

— DOC. NO. MPF-I-04 -210A —

PLAYING POKER GAME WITH MPF-I

An Application Example of Z80-PIO.



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US\$1.00

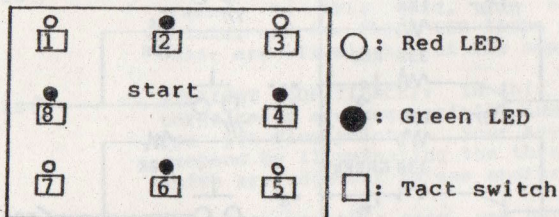
Purpose: Simulating poker with PIO in order to familiarize with its functions.

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

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

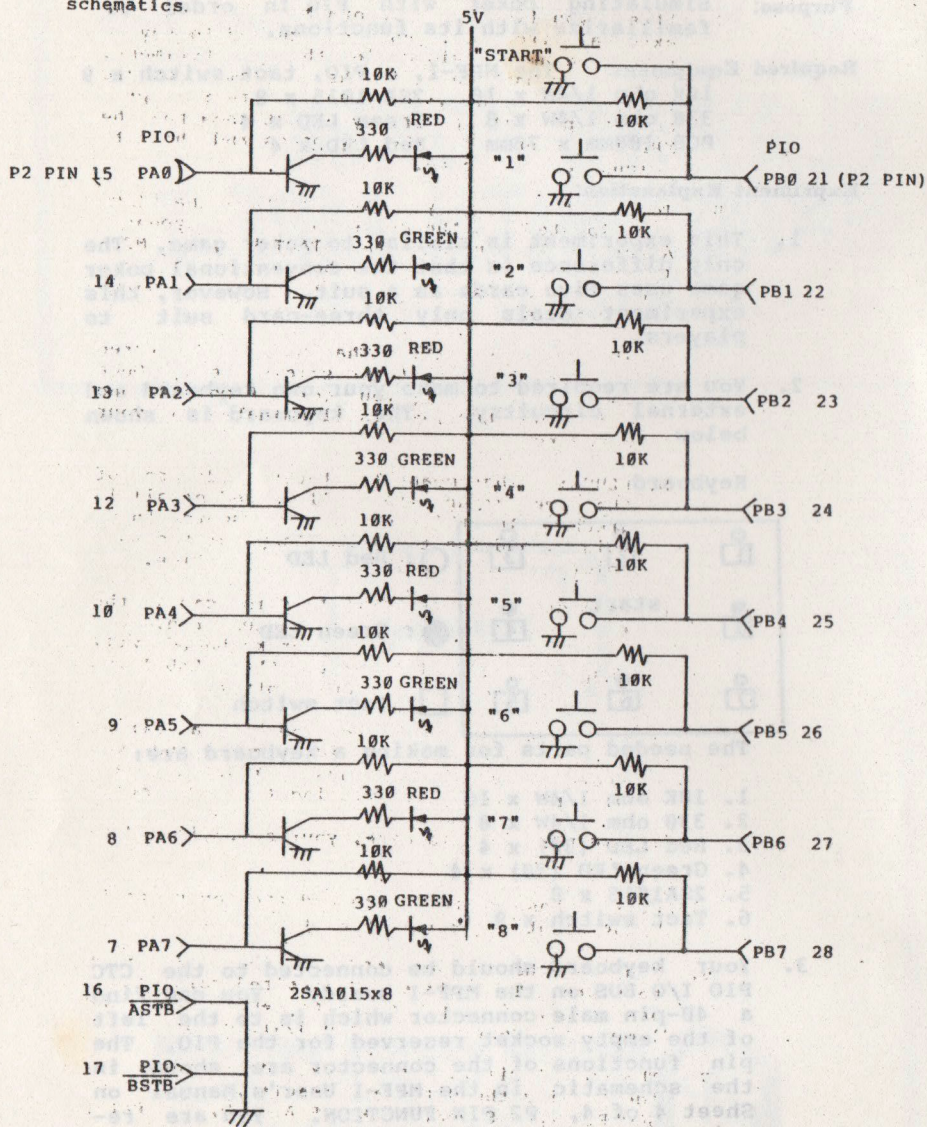
Keyboard



The needed parts for making a keyboard are:

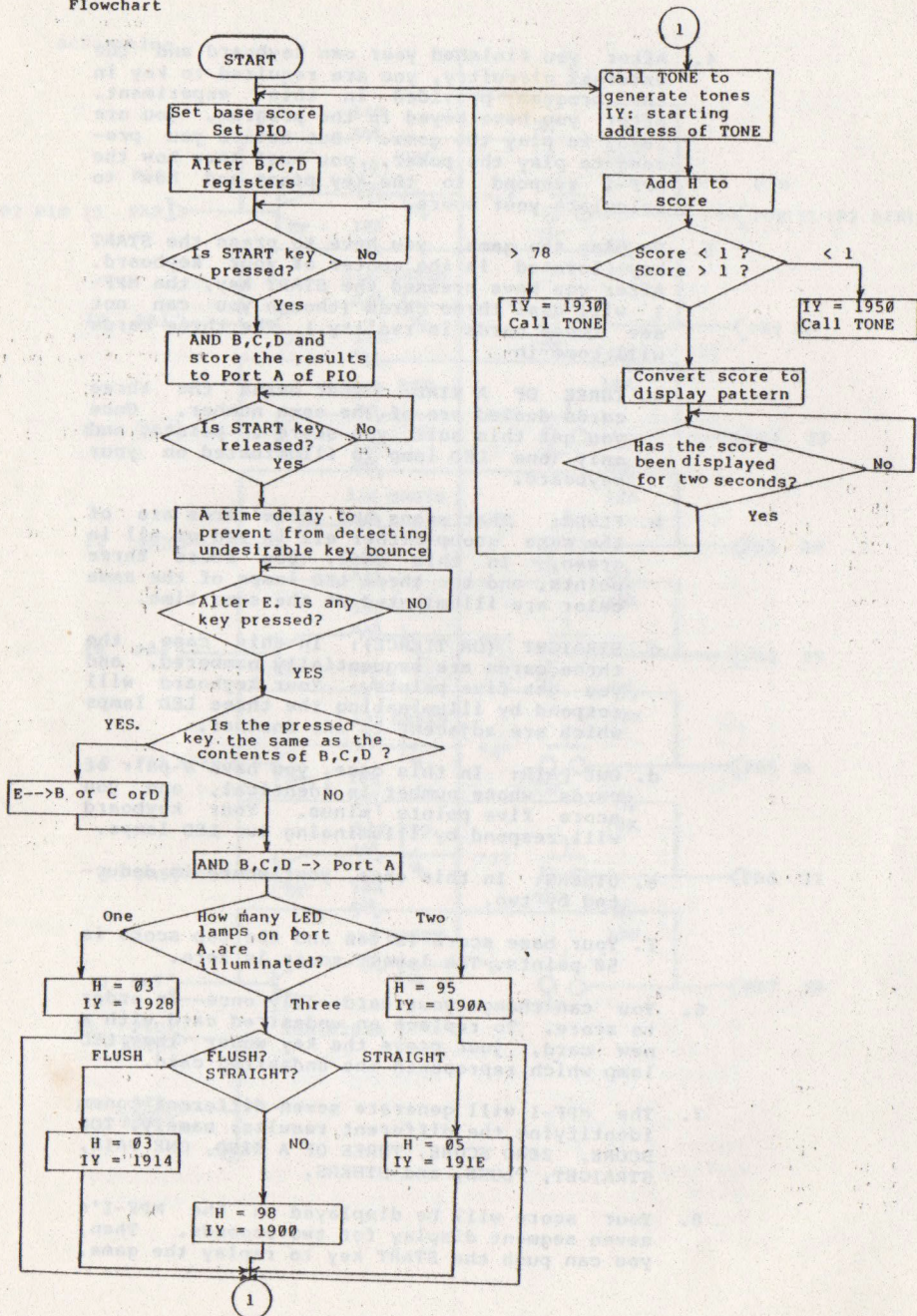
1. 10K ohm 1/4W x 16
 2. 330 ohm 1/4W x 8
 3. Red LED (30) x 4
 4. Green LED (30) x 4
 5. 2SA1015 x 8
 6. Tact switch x 9
3. Your keyboard should be connected to the CTC PIO I/O BUS on the MPF-I board. You can find a 40-pin male connector which is to the left of the empty socket reserved for the PIO. 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



```

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      7      LD      HL,0
1803      8      LD      (SC0BF+2),HL
1806      9      LD      (SC0BF+4),HL
1809      10     M1:     LD      A,10      ;Set base score
180B      11     LD      (SCORE),A      ;to 10.
180E      12     M2:     LD      IX,SC0BF
1812      13     LD      A,8FH      ;Set PIO's Port A to
1814      14     OUT     (PIOCA),A      ;byte output and port
          15     ;B to byte input mode.
1816      16     LD      A,0FFH      ;Port A outputs
          17     ;11111111.
1818      18     OUT     (PIODA),A      ;to keep the LED off.
181A      19     M3     LD      D,0FEH
181C      20     LD      C,D
181D      21     LD      B,D
181E      22     M4     IN      A,(PIODB) ;Check if a key
1820      23     CP      0FEH      ;is pressed? If the
1822      24     JR      M5      ;START key was not
1824      25     RLC      B      ;pressed, then
          26     ;alter the
1826      27     JR      C,M4      ;value of registers
          28     ;B,C,D.
1828      29     RLC      C      ;If the START key was
182A      30     JR      C,M1      ;pressed, then execute
182C      31     RLC      D      ;M5.
182E      32     JR      M4
          33     ;*****
1830      34     M5     LD      A,B      ;AND B,C,D
1831      35     AND      C
1832      36     AND      D
1833      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      41     LD      E,0FEH
          42     M6:
          43     ; The next three instructions are to check
          44     ; whether the pressed key is released?
1837      45     IN      A,(PIODB)
1839      46     CP      0FFH
183B      47     JR      NZ,M6
183D      48     LD      H,0FFH      ;A time delay
183F      49     M7     LD      L,0FFH ;to prevent from
1841      50     M8     DEC     L      ;detecting undesirable
1842      51     JR      NZ,M8      ;key bounce.
1844      52     DEC     H
1845      53     JR      NZ,M7
1847      54     IN      A,(PIODB)
1849      55     M9     RLC      E      ;Detect if a key
184B      56     CP      0FFH      ;is pressed? If not,
184D      57     JR      Z,M9      ;alter the value
184F      58     CP      B      ;of E.
          ;If the key pressed

```

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	EA	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,

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	;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	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	

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	18F5	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

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	;Press any key of the MPP-I,
18FB	20FA	153		JR	NZ,M26	
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	

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						
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				