

Machine language - short overview

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Mnemonics

Mnemonic	Code	Description	Flags	#	Cycles	Comments
ADB	20	(P)+A->(P)	C Z	1	5	P+1->P
		(P+1)+B+C->(P+1)	* *			
ADCM	196	(P)+A+C->(P)	* *	1	3	
ADIA n	116,n	A+n->A	* *	2	4	
ADIM n	112,n	(P)+n->(P)	* *	2	4	
ADM	68	(P)+A->(P)	* *	1	3	
ADN	12	(P)+A->(P)...	* *	1	7+3*I	P-I-1->P
		(P-I)+C->(P-I)				BCD
ADW	14	(P)+(Q)->(P)...	* *	1	7+3*I	P-I-1->P
		(P-I)+(Q-I)+C->				Q-I-2->Q
		(P-I)				BCD

ANIA n	100,n	A AND n->A	- *	2	4	
ANID n	212,n	(DP) AND n>(DP)	- *	2	6	
ANIM n	96,n	(P) AND n->(P)	- *	2	4	
ANMA	70	(P) AND A->(P)	- *	1	3	
CAL nm	224,n,m	PC+2>(R-1,R-2) R-2->R, nm->PC	--	2	7	0<=n<=31
CALL nm	120,n,m	PC+3->(R-1,R-2), R-2->R, nm->PC	--	3	8	
CPIA n	103,n	A-n	**	2	4	
CPIM n	99,n	(P)-n	**	2	4	
CPMA	199	(P)-A	**	1	3	
DATA	53	(BA)...(BA+1)-> (P)...(P+1)	--	1	11+4*I	auch für int. ROM
DECA	67	A-1->A	**	1	4	2->Q
DECB	195	B-1->B	**	1	4	3->Q
DECI	65	I-1->I	**	1	4	0->Q
DECJ	193	J-1->J	**	1	4	1->Q
DECK	73	K-1->K	**	1	4	8->Q
DECL	201	L-1->L	**	1	4	9->Q
DECP	81	P-1->P	--	1	2	
DECV	75	V-1->V	**	1	4	10->Q
DECW	203	W-1->W	**	1	4	11->Q
DX	5	X-1->X, X->DP	--	1	6	5->Q
DXL	37	X-1->X, X->DP, (DP)->A	--	1	7	5->Q
DY	7	Y-1->Y, Y->DP		1	6	7->Q
DYS	39	Y-1->Y, Y->DP, A->(DP)	--	1	7	7->Q
ETC n,m ...	105 n,nm nm	FOR i=1 TO H IF A=n nm->PC NEXT i	- *)	1)		
EXAB	218	A<->B	--	1	3	
EXAM	219	A<->(P)	--	1	3	
EXB	11	(P)...(P+J)<-> (Q)...(Q+J)	--	1	6+3*J	P+J+1->P Q+J+1->Q
EXBD	27	(P)...(P+J)<-> (DP)...(DP+J)	--	1	7+6*J	P+J+1->p DP+J->DP
EXW	9	(P)...(P+I)<-> (Q)...(Q+I)	--	1	6+3*I	P+I+1->P Q+I+1->Q
EXWD	25	(P)...(P+I)<-> (DP)...(DP+I)	--	1	7+6*I	P+I+1->P DP+I->DP
FILD	31	A->(DP)...(DP+I)	--	1	4+3*I	DP+I->DP
FILM	30	A->(P)...(P+I)	--	1	5+I	P+I+1->P
INA	76	IA-Port->A	- *	1	2	
IMB	204	IB-Port->A	- *	1	2	
INCA	66	A+1->A	**	1	4	2->Q
INCB	194	B+1->B	**	1	4	3->Q
INCI	64	I+1->I	**	1	4	
IMCJ	192	J+1->J	**	1	4	1->Q
INCK	72	K+1->K	**	1	4	8->Q
JNCL	200	L+1->L	**	1	4	9->Q
INCP	80	P+1->P	--	1	2	
INCV	74	V+1->V	**	1	4	10->Q
INCW	202	W+1->W	**	1	4	
IX	4	X+1->X, X->DP	--	1	6	5->Q
IXL	36	X+1->X, X->DP, (DP)->A	--	1	7	5->Q

IY	6	Y+1->Y, Y->DP	--	1	6	7->Q
IYS	38	Y+1->Y, Y->DP, A->(DP)	--	1	7	7->Q
JP nm	121,n,m	nm->PC	--	3	6	
JPC nm	127,n,m	IF C=1 nm->PC	--	3	6	
JPNC nm	125,n,m	IF C=0 nm->PC	--	3	6	
JPNZ nm	124,n,m	IF Z=0 nm->PC	--	3	6	
JPZ nm	126,n,m	IF Z=1 nm->PC	--	3	6	
JPZM n	57,n	IF Z=1 PC+1-n->PC	--	2	7/4	
JRCN n	59,n	IF C=1 PC+1-n->PC	--	2	7/4	
JRCP n	58,n	IF C=1 PC+1+n->PC	--	2	7/4	
JRM n	45,n	PC-1-n->PC	--	2	7	
JRNCM n	43,n	IF C=0 PC+1-n->PC	--	2	7/4	
JRNCP n	42,n	IF C=0 PC+1+n->PC	--	2	7/4	
JRNZM n	41,n	IF Z=0 PC+1-n->PC	--	2	7/4	
JRNZP n	40,n	IF Z=0 PC+1+n->PC	--	2	7/4	
JRP n	44,n	PC+1+n->PC	--	2	7	
JRZN n	57,n	IF Z=1 PC+1-n->PC	--	2	7/4	
JRZP n	56,n	IF Z=1 PC+1+n->PC	--	2	7/4	
LDD	87	(DP)->A	--	1	3	
LDM	89	(P)->A	--	1	2	
LDP	32	P->A	--	1	2	
LDQ	33	Q->A	--	1	2	
LDR	34	R->A	--	1	2	
LIA n	2,n	n->A	--	2	4	
LIB n	3,n	n->B	--	2	4	
LIDL m	17,m	m->DPL	--	2	5	
LIDP nm	16,n,m	nm->DP	--	3	8	
LII n	0,n	n->I	--	2	4	
LIJ n	1,n	n->J	--	2	4	
LIP n	18,n	n->P	--	2	4	
LIQ n	19,n	n->Q	--	2	4	
LOOP n	47,n	(R)-1->(R), IF C=0 DP+1-n->DP	**	2	10/7	
LP n	128+n	n->P	--	1	2	0<=n<63
MVB	10	(Q)...(Q+J)-> (P)...(P+J)	--	1	5+2*J	P+J+1->P Q+J+1->Q
MVBD	26	(DP)...(DP+J)-> (P)...(P+J)	--	1	5+4*J	P+J+1->P DP+J->DP
MVDM	83	(P)->(DP)	--	1	3	
MVMD	85	(DP)->(P)	--	1	3	
MVW	8	(Q)...(Q+I)-> (P)...(P+I)	--	1	5+2*I	P+I+1->P Q+I+1->Q
MVWD	24	(DP)...(DP+I)-> (P)...(P+I)	--	1	5+4*I	P+I+1->P DP+I->DP
NOPT	206	No Operation	--	1	3	
NOPW	77	No Operation	--	1	2	
ORIA n	101,n	A OR n->A	-*	2	4	
ORID n	213,n	(DP) OR n->(DP)	-*	2	6	

ORIM n	97,n	(P) OR n->(P)	- *	2	4	
ORMA n	71,n	(DP) OR n->(DP)	- *	1	3	
OUTA	93	(92)->IA-Port	--	1	3	92->Q
OUTB	221	(93)->IB-Port	--	1	2	93->Q
OUTC	223	(95)->C-PORT	--	1	2	
OUTF	95	(94)->F0-Port	--	1	3	94->Q
POP	91	(R)->A, R+1->R	--	1	2	
PTC	122	n->H,nm->(R-1, R-2), R-2->R	- *	4	9	
PUSH	52	(R)->A, R-1->R	--	1	3	
RC	209	0->C, 1->Z	**	1	2	
RTN	55	(R-1,R-2)->PC R+2->R	--	1	4	
SBB	21	(P)-1->(P) (P+1)-B-C->(P+1)	**	1	5	P+1->P
SBCM	197	(P)-A-C->(P)	**	1	3	
SBIA n	117,n	A-n->A	**	2	4	
SBIM n	113,n	(P)-n->(P)	**	2	4	
SBM	69	(P)-A->(P)	**	1	3	
SBN	13	(P)-A->(P)	**	1	7+3*I	P-I-1->P BCD
SBW	15	(P)-(Q)->(P) (P-I)-(Q-I)-C-> (P-I)	**	1	7+3*I	P-I-1->P Q-I-2->Q BCD
SC	208	1->C, 1->Z	**	1	2	
SL	90	C->A7...A0->C	--	1	2	
SLW	29	(P-1)...(P) 4 Bit SL	--	1	5+I	P-I-1->P
SR	210	C->A0...A7->C	* -	1	2	
SRW	28	(P)...(P+I) 4 Bit SR	--	1	5+I	P+I+1->P
STD	82	A->(DP)	--	1	2	
STP	48	A->P	--	1	2	
STQ	49	A->Q	--	1	2	
STR	50	A->R	--	1	2	
SWP	88	A0...A3<-> A4...A7	--	1	2	
TEST n	107,n	TEST-Byte AND n	- *	2	4	
TSIA n	102,n	A AND n	- *	2	4	
TSID n	214,n	(DP) AND n	- *	2	6	
TSIM n	98,n	(P) AND n	- *	2	4	
WAIT n	78,n	No Operation	--	2	6+n	

Registers

Register	Address	Description
P		7 bit internal RAM pointer
Q		7 bit internal RAM pointer
R		7 bit internal RAM stack pointer
PC		16 bit program counter
DP		16 bit data pointer
Z		Zero Flag
C		Carry Flag
D		Internal index (not accessible for users)
I	&00	Index
J	&01	Index
A	&02	Main Accumulator

B	&03	Secondary Accumulator
XL	&04	$X = XL + 256 \times XH$
XH	&05	
YL	&06	$Y = YL + 256 \times YH$
YH	&07	
K	&08	Common use
L	&09	Common use
M	&0A	Common use
N	&0B	Common use
	&0C - &5B	System stack (starts at &5B and descends)
IA	&5C	I/O Port A
IB	&5D	I/O Port B
FO	&5E	I/O Port F
OUTC	&5F	Control Port
OR X	&10 - &17	Operation register
OR Y	&18 - &1F	Operation register
OR Z	&20 - &27	Operation register
OR W	&28 - &2F	Operation register
ERL	&34	Error number when error occurs
LB,HB	&3E, &3F	Actual line number
LB,HB	&38, &39	Beginning of BASIC block, where the running program
LB,HB	&3A, &3B	Address of a found line
LB,HB	&3C, &3D	The line number of the found line

Test command

Bit Description

- 0 System clock 512 ms
- 1 System clock 2 ms
- 2 -
- 3 BRK/ON key
- 4 -
- 5 -
- 6 RESET key
- 7 Cassette input - Pin 6 printer,

Specialities of PC-1360

Ports

A port

Bit Description

- 0- Keyboard column

B port

Bit Description

- 0 -
- 1 -
- 2 -
- 3 Pin 8 printer, I
- 4 Pin 9 printer,
- 5 Pin 3 serial, IO
- 6 Pin 5 serial, IO

7 Pin 8 serial, IO

C port

Bit Description

- 0 Display 1=on/0=off
- 1 Counter reset
- 2 CPU halt
- 3 Computer 0=on/1=off
- 4 Beeper frequency 0=2kHz/1=4kHz
- 5 Beeper 1=on/0=off (off: Bit 4: Beeper
- 6 -
- 7 -

F port

Bit Description

- 0 -
- 1 Pin 2 serial, O
- 2 Switch RAM bank, 0=bank 0, 1=bank
- 3 -
- 4 -
- 5 -
- 6 -
- 7 -

RAM ports

Addresses &3E00-&3EFF

Value Description

0-7 Keyboard

Addresses &3800-&38FF

Bit Description

- 0 Pin 4 serial und 11 Drucker,
- 1 Pin 14 serial, O
- 2 Pin 11 serial, O
- 3 -
- 4 -
- 5 -
- 6 -
- 7 -

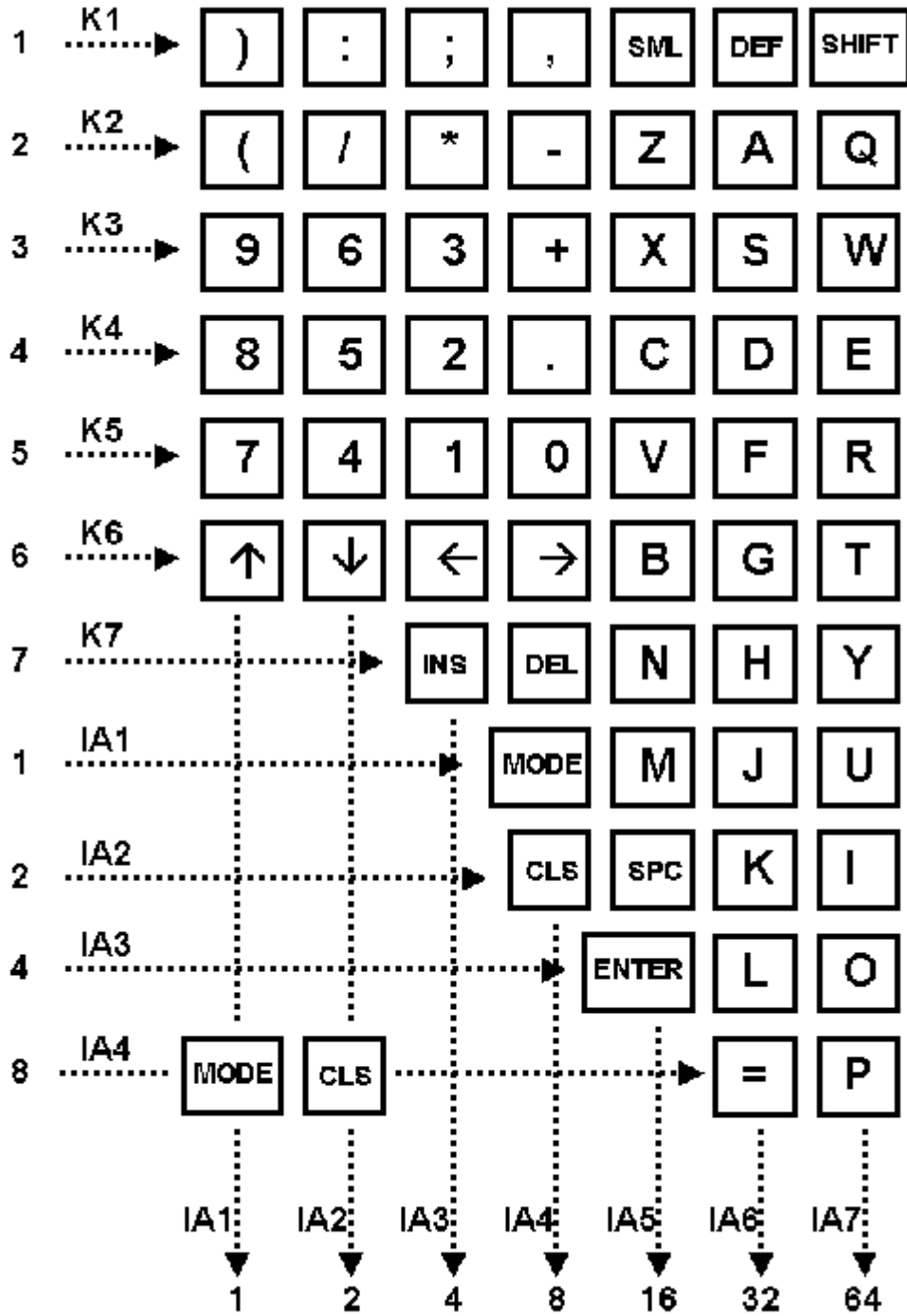
Addresses &3400-&34FF - ROM bank switch

Value Description

- 0 Bank 0
- 1 Bank 1
- 2 Bank 2
- 3 Bank 3
- 4 Bank 4

- 5 Bank 5
- 6 Bank 6
- 7 Bank 7

Keymap PC-1360



Specialities of PC-1350

Port B (&5D = 93 int. RAM)

Bit Pin D=11-Pin-Interface I=In-

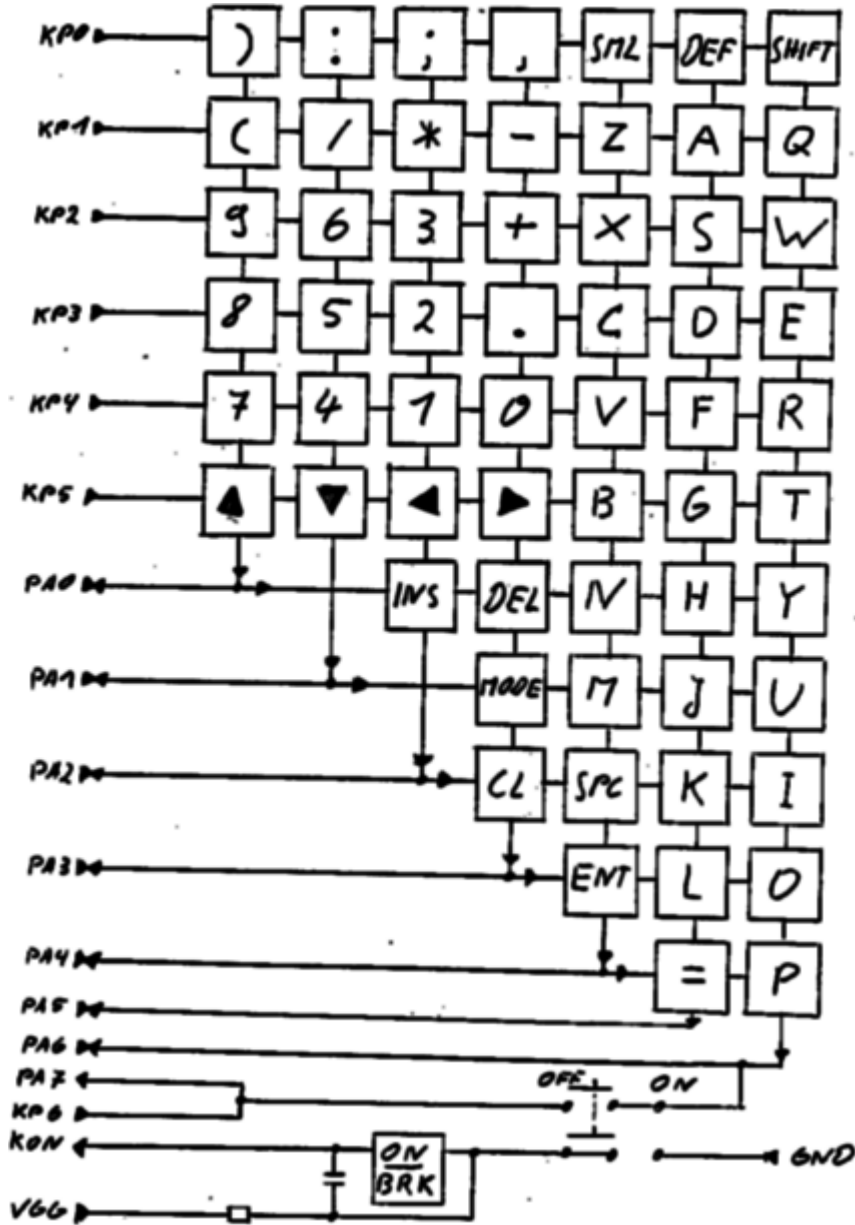
4	11	D	IO
5	10	D	IO
6	9	D	IO

Port F (only output, &5E = 94 int. RAM)

Bit Pin Printer

- 1 5
- 2 4

Keyboard PC-1350



Specialities of PC-1403

Port B (&5D = 93 int. RAM)

Bit Pin D=11-Pin-Interface I=In-

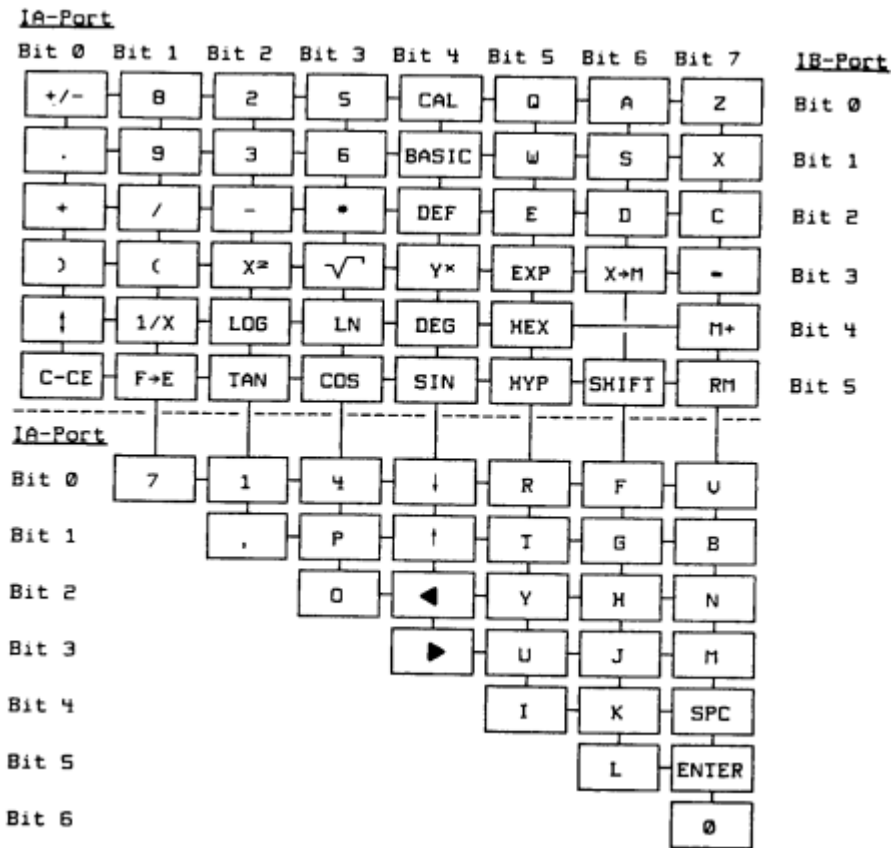
- 6 9 D IO
- 7 8 D IO

Port F (only output, &5E = 94 int. RAM)

Bit Pin Printer

0 4
1 5

Keyboard PC-140x



Specialities of PC-1421

Port B (&5D = 93 int. RAM)

Bit Pin D=11-Pin-Interface I=In-

6 9 D IO
7 8 D IO

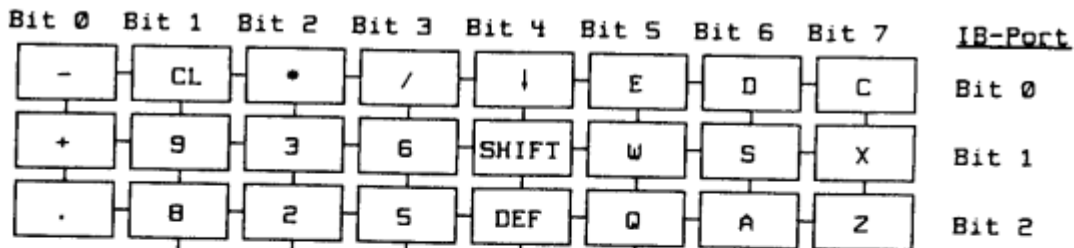
Port F (only output, &5E = 94 int. RAM)

Bit Pin Printer

0 4
1 5

Keyboard PC-1421

IA-Port



IA-Port

