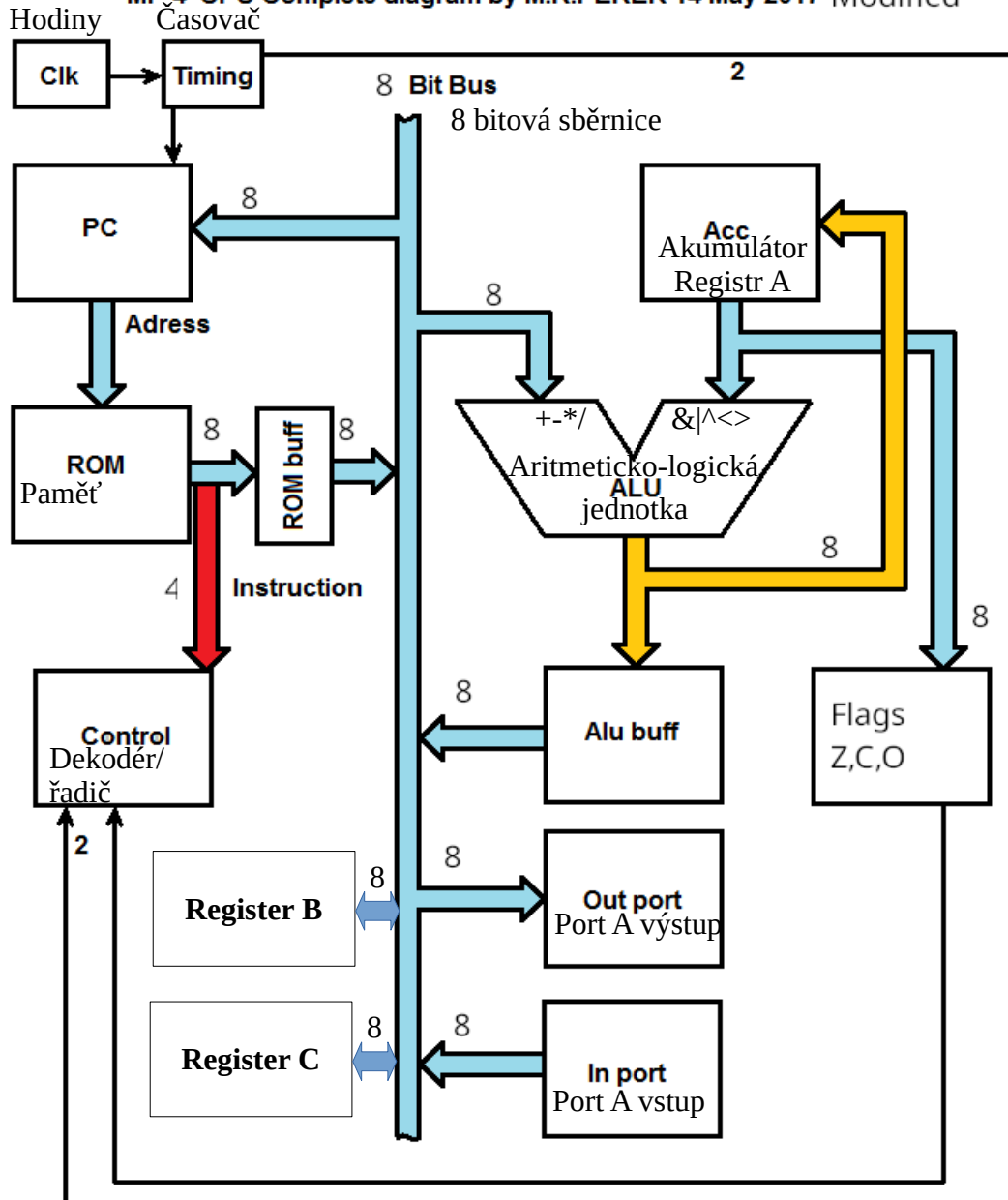


MP-4 CPU Complete diagram by M.K.PEKER 14 May 2017 Modified



bin	hex	dec	mnemo	description	popis
0000	0x0	0	NOP	No operation	Žádná operace
0001	0x1	1	LDA x	Load accumulator	Načti operand do akumulátoru
0010	0x2	2	MOV A, r	Move value r to acc	Přesuň hodnotu registru do akumulátoru
0011	0x3	3	MOV r, A	Move value acc to r	Přesuň hodnotu akumulátoru do registru
0100	0x4	4	ADD r	Add r to accumulator	Přičti hodnotu z registru do akumulátoru
0101	0x5	5	IN A	Load from port to acc	Načti hodnotu z portu do akumulátoru
0110	0x6	6	OUT A	Output acc to port	Zapiš hodnotu akumulátoru do portu
0111	0x7	7	JMP addr	Jump to address	Skoč na adresu
1000	0x8	8	JZ addr	Jump if zero to address	Skoč na adresu pokud je akumulátor 0
1001	0x9	9	JN addr	Jump if negative	Skoč na adresu pokud je akumulátor <0
1010	0xA	10	SUB r	Subtract acc from r	Odečti od akumulátoru hodnotu registeru
1111	0xF	15	HLT	halt the processor	Zastavit vykonávání

Inspired by: <https://www.instructables.com/Simplest-4-Bit-TTL-CPU/>

Also by: [https://en.wikibooks.org/wiki/X86\\_Assembly](https://en.wikibooks.org/wiki/X86_Assembly)

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N Á V Ě S T Í	A D R E S A	I N S T R U K C E	O P E R A N D	P A M Ě Ť	
LABEL	ADDR	INSTR.	OP.	MEMORY	
INIT	0	LDA		0x10	
	1	--		30x03	
	2	MOV B	A	0x30	
TEXT	3	LDA		0x10	
	4	--		720x48	
	5	OUT A		0x60	
	6	LDA		0x10	
	7	--		690x45	
	8	OUT A		0x60	
	9	LDA		0x10	
	10	--		760x4c	
	11	OUT A		0x60	
	12	OUT A		0x60	
	13	LDA		0x10	
	14	--		790x4f	
	15	OUT A		0x60	
NUM	16	LDA		0x10	
	17	--		480x30	
	18	MOV C	A	0x30	
	19	ADD	C	0x42	
	20	OUT A		0x60	
	21	LDA		0x10	
	22	--		100x0a	
	23	OUT A		0x60	
CONDITION	24	LDA		0x10	
	25	--		10x01	
	26	MOV C	A	0x30	
	27	MOV A	B	0x21	
	28	SUB	C	0xa2	
	29	JZ		0x80	
	30	--	@END	0x1e	
	31	JMP		0x70	
	32	--	@TEXT	0x03	
END	33	HLT		0xf0	

Po vykonání programu by měl na výstupním portu A být v ASCII kódu výstup  
HELLO3  
HELLO2  
HELLO1

N Á V Ě S T Í	A D R E S A	I N S T R U K C E	O P E R A N D	P A M Ě Ť	
LABEL	ADDR	INSTR.	OP.	MEMORY	
START	0	IN A		0x50	
	1	MOV B	A	0x30	
	2	IN A		0x50	
	3	ADD	B	0x41	
	4	OUT A		0x60	
	5	JMP		0x70	
	6	--	@START	0x00	
	7	HTL		0xf0	

Vezme 2 čísla ze vstupu, spojí je a pošle na výstup

N Á V Ě S T Í	A D R E S A	I N S T R U K C E	O P E R A N D	P A M Ě Ť	
LABEL	ADDR	INSTR.	OP.	MEMORY	
START	0	IN A		0x50	
	1	JZ		0x80	
	2	--	@START	0x00	
	3	OUT A		0x60	
	4	JMP		0x70	
	5	--	@START	0x00	
	6	HLT		0xf0	

Bere čísla ze vstupu a na výstup dává pouze nenulové

Tabulka ASCII kódů  
ASCII TABLE

HEX	DEC	CHR	DESCRIPTION	HEX	DEC	CHR	HEX	DEC	CHR	HEX	DEC	CHR
0x00	0	NUL	<a href="#">NULL</a> character	0x20	32	(SP)	0x40	64	@	0x60	96	`
0x01	1	SOH	Start of Header	0x21	33	!	0x41	65	A	0x61	97	a
0x02	2	STX	Start of Text	0x22	34	"	0x42	66	B	0x62	98	b
0x03	3	ETX	End of Text	0x23	35	#	0x43	67	C	0x63	99	c
0x04	4	EOT	End of Transmission	0x24	36	\$	0x44	68	D	0x64	100	d
0x05	5	ENQ	Enquiry	0x25	37	%	0x45	69	E	0x65	101	e
0x06	6	ACK	Acknowledge	0x26	38	&	0x46	70	F	0x66	102	f
0x07	7	BEL	Bell	0x27	39	!	0x47	71	G	0x67	103	g
0x08	8	BS	<a href="#">Backspace</a>	0x28	40	(	0x48	72	H	0x68	104	h
0x09	9	HT	<a href="#">Horizontal Tab</a>	0x29	41	)	0x49	73	I	0x69	105	i
0x0A	10	LF	<a href="#">Line feed</a>	0x2A	42	*	0x4A	74	J	0x6A	106	j
0x0B	11	VT	Vertical Tab	0x2B	43	+	0x4B	75	K	0x6B	107	k
0x0C	12	FF	Form Feed	0x2C	44	,	0x4C	76	L	0x6C	108	l
0x0D	13	CR	<a href="#">Carriage return</a>	0x2D	45	-	0x4D	77	M	0x6D	109	m
0x0E	14	SO	Shift Out	0x2E	46	.	0x4E	78	N	0x6E	110	n
0x0F	15	SI	Shift In	0x2F	47	/	0x4F	79	O	0x6F	111	o
0x10	16	DLE	Data Link Escape	0x30	48	0	0x50	80	P	0x70	112	p
0x11	17	DC1	Device Control (XOn)	0x31	49	1	0x51	81	Q	0x71	113	q
0x12	18	DC2	Device Control	0x32	50	2	0x52	82	R	0x72	114	r
0x13	19	DC3	Device Control (XOff)	0x33	51	3	0x53	83	S	0x73	115	s
0x14	20	DC4	Device Control	0x34	52	4	0x54	84	T	0x74	116	t
0x15	21	NAK	Negative Acknowledge	0x35	53	5	0x55	85	U	0x75	117	u
0x16	22	SYN	Synchronous Idle	0x36	54	6	0x56	86	V	0x76	118	v
0x17	23	ETB	End of Transmission Block	0x37	55	7	0x57	87	W	0x77	119	w
0x18	24	CAN	Cancel	0x38	56	8	0x58	88	X	0x78	120	x
0x19	25	EM	End of Medium	0x39	57	9	0x59	89	Y	0x79	121	y
0x1A	26	SUB	Substitute	0x3A	58	:	0x5A	90	Z	0x7A	122	z
0x1B	27	ESC	Escape	0x3B	59	;	0x5B	91	[	0x7B	123	{
0x1C	28	FS	File Separator	0x3C	60	<	0x5C	92	\	0x7C	124	
0x1D	29	GS	Group Separator	0x3D	61	=	0x5D	93	]	0x7D	125	}
0x1E	30	RS	Record Separator	0x3E	62	>	0x5E	94	^	0x7E	126	~
0x1F	31	US	Unit Separator	0x3F	63	?	0x5F	95	_	0x7F	127	DEL

LF = Line feed = Odřádkování = Enter (někdy nutno LF+CR)  
SP = Space = Mezera

0	0x00	0b00000000
1	0x01	0b00000001
2	0x02	0b00000010
3	0x03	0b00000011
4	0x04	0b00000100
5	0x05	0b00000101
6	0x06	0b00000110
7	0x07	0b00000111
8	0x08	0b00001000
9	0x09	0b00001001
10	0x0A	0b00001010
11	0x0B	0b00001011
12	0x0C	0b00001100
13	0x0D	0b00001101
14	0x0E	0b00001110
15	0x0F	0b00001111

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16	0x10	0b00010000
17	0x11	0b00010001
18	0x12	0b00010010
19	0x13	0b00010011
20	0x14	0b00010100
21	0x15	0b00010101
22	0x16	0b00010110
23	0x17	0b00010111
24	0x18	0b00011000
25	0x19	0b00011001
26	0x1A	0b00011010
27	0x1B	0b00011011
28	0x1C	0b00011100
29	0x1D	0b00011101
30	0x1E	0b00011110
31	0x1F	0b00011111

32	0x20	0b00100000
33	0x21	0b00100001
34	0x22	0b00100010
35	0x23	0b00100011
36	0x24	0b00100100
37	0x25	0b00100101
38	0x26	0b00100110
39	0x27	0b00100111
40	0x28	0b00101000
41	0x29	0b00101001
42	0x2A	0b00101010
43	0x2B	0b00101011
44	0x2C	0b00101100
45	0x2D	0b00101101
46	0x2E	0b00101110
47	0x2F	0b00101111







