6502 Processor Instruction Set

Load and Store Group

Mnemônico	Operação	Tipos de Instruções	Código Binário	Nro. Bytes	Flags Afetados
LDA	Load Accumulator	LDA \$aaaa	\$AD	3	N,Z
		LDA \$aa	\$A5	2	
		LDA #\$aa	\$A9	2	
		LDA \$aaaa,X	\$BD	3	
		LDA \$aaaa,Y	\$B9	3	
		LDA \$aa,X	\$B5	2	
		LDA (\$aa,X)	\$A1	2	
		LDA (\$aa),Y	\$B1	2	
LDX	Load X Register	LDX \$aaaa	\$AE	3	N,Z
		LDX \$aa	\$A6	2	
		LDX #\$aa	\$A2	2	
		LDX \$aaaa,Y	\$BE	3	
		LDX \$aa,Y	\$B6	2	
LDY	Load Y Register	LDY \$aaaa	\$AC	3	N,Z
		LDY \$aa	\$A4	2	
		LDY #\$aa	\$A0	2	
		LDY \$aaaa,X	\$BC	3	
		LDY \$aa,X	\$B4	2	
STA	Store Accumulator	STA \$aaaa	\$8D	3	none
		STA \$aa	\$85	2	
		STA \$aaaa,X	\$9D	3	
		STA \$aaaa,Y	\$99	3	
		STA \$aa,X	\$95	2	
		STA (\$aa,X)	\$81	2	
		STA (\$aa),Y	\$91	2	
STX	Store X Register	STX \$aaaa	\$8E	3	none
		STX \$aa	\$86	2	
		STX \$aa,Y	\$96	2	
STY	Store Y Register	STY \$aaaa	\$8C	3	none
		STY \$aa	\$84	2	
		STY \$aa,X	\$94	2	

Arithmetic Group

	nene Group				
ADC	Add with Carry	ADC \$aaaa	\$6D	3	N,V,Z,C
		ADC \$aa	\$65	2	
		ADC #\$aa	\$69	2	
		ADC \$aaaa,X	\$7D	3	
		ADC \$aaaa,Y	\$79	3	
		ADC \$aa,X	\$75	2	
		ADC (\$aa,X)	\$61	2	
		ADC (\$aa),Y	\$71	2	
SBC	Subtract with	SBC \$aaaa	\$ED	3	N,V,Z,C
	Carry	SBC \$aa	\$E5	2	
		SBC #\$aa	\$E9	2	
		SBC \$aaaa,X	\$FD	3	
		SBC \$aaaa,Y	\$F9	3	
		SBC \$aa,X	\$F5	2	
		SBC (\$aa,X)	\$E1	2	
		SBC (\$aa),Y	\$F1	2	
	•	<u> </u>			•

Increment and Decrement Group

INC	Increment a	INC \$aaaa	\$EE	3	N,Z
	memory location	INC \$aa	\$E6	2	
		INC \$aaaa,X	\$FE	3	
		INC \$aa,X	\$F6	2	
INX	Increment the X register	INX	\$E8	1	N,Z
INY	Increment the Y register	INY	\$C8	1	N,Z
1111	increment the T register	IINI	ФCO	1	14,2
DEC	Decrement a	DEC \$aaaa	\$CE	3	N,Z
	memory location	DEC \$aa	\$C6	2	
		DEC \$aaaa,X	\$DE	3	
		DEC \$aa,X	\$D6	2	
DEX	Decrement the X register	DEX	\$CA	1	N,Z
DEY	Decrement the Y register	DEY	\$88	1	N,Z

Register Transfer Group

TAX	Transfer accumulator to X	TAX	\$AA	1	N,Z
TAY	Transfer accumulator to Y	TAY	\$A8	1	N,Z
TXA	Transfer X to accumulator	TXA	\$8A	1	N,Z
TYA	Transfer Y to accumulator	TYA	\$98	1	N,Z

Logical Group

	a Group				
AND	Logical AND	AND \$aaaa	\$2D	3	N,Z
		AND \$aa	\$25	2	
		AND #\$aa	\$29	2	
		AND \$aaaa,X	\$3D	3	
		AND \$aaaa,Y	\$39	3	
		AND \$aa,X	\$35	2	
		AND (\$aa,X)	\$21	2	
		AND (\$aa), Y	\$31	2	
EOR	Exclusive OR	EOR \$aaaa	\$4D	3	N,Z
		EOR \$aa	\$45	2	
		EOR #\$aa	\$49	2	
		EOR \$aaaa,X	\$5D	3	
		EOR \$aaaa,Y	\$59	3	
		EOR \$aa,X	\$55	2	
		EOR (\$aa,X)	\$41	2	
		EOR (\$aa),Y	\$51	2	
ORA	Logical Inclusive	ORA \$aaaa	\$0D	3	N,Z
	OR	ORA \$aa	\$05	2	
		ORA #\$aa	\$09	2	
		ORA \$aaaa,X	\$1D	3	
		ORA \$aaaa,Y	\$19	3	
		ORA \$aa,X	\$15	2	
		ORA (\$aa,X)	\$01	2	
		ORA (\$aa),Y	\$11	2	

Compare and Bit Test Group

CMP	Compare	CMP \$aaaa	\$CD	3	N,Z,C
CIVII	accumulator	CMP \$aa	\$C5	-	11,2,0
	accumulator	· ·		2	
		CMP #\$aa	\$C9	2	
		CMP \$aaaa,X	\$DD	3	
		CMP \$aaaa,Y	\$D9	3	
		CMP \$aa,X	\$D5	2	
		CMP (\$aa,X)	\$C1	2	
		CMP (\$aa),Y	\$D1	2	
CPX	Compare X	CPX \$aaaa	\$EC	3	N,Z,C
	register	CPX \$aa	\$E4	2	
		CPX #\$aa	\$E0	2	
CPY	Compare Y	CPY \$aaaa	\$CC	3	N,Z,C
	register	CPY \$aa	\$C4	2	
	· ·	CPY #\$aa	\$C0	2	
BIT	Bit Test	BIT \$aaaa	\$2C	3	N,V,Z
		BIT \$aa	\$24	2	. ,

Shift and Rotate Group

ASL	Arithmetic Shift	ASL \$aaaa	\$0E	3	N,Z,C
	Left	ASL \$aa	\$06	2	
		ASL A	\$0A	1	
		ASL \$aaaa,X	\$1E	3	
		ASL \$aa,X	\$16	2	
LSR	Logical Shift	LSR \$aaaa	\$4E	3	N,Z,C
	Right	LSR \$aa	\$46	2	
	_	LSR A	\$4A	1	
		LSR \$aaaa,X	\$5E	3	
		LSR \$aa,X	\$56	2	
ROL	Rotate Left	ROL \$aaaa	\$2E	3	N,Z,C
		ROL \$aa	\$26	2	
		ROL A	\$2A	1	
		ROL \$aaaa,X	\$3E	3	
		ROL \$aa,X	\$36	2	
ROR	Rotate Right	ROR \$aaaa	\$6E	3	N,Z,C
	-	ROR \$aa	\$66	2	
		ROR A	\$6A	1	
		ROR \$aaaa,X	\$7E	3	
		ROR \$aa,X	\$76	2	

Jump and Branch Group

սար	and Dranch Group				
JMP	Jump to another location	JMP \$aaaa	\$4C	3	none
	•	JMP (\$aaaa)	\$6C	3	
BCC	Branch if carry flag clear	BCC aa	\$90	2	none
BCS	Branch if carry flag set	BCS aa	\$B0	2	none
BEQ	Branch if zero flag set	BEQ aa	\$F0	2	none
BMI	Branch if negative flag set	BMI aa	\$30	2	none
BNE	Branch if zero flag clear	BNE aa	\$D0	2	none
BPL	Branch if negative flag clear	BPL aa	\$10	2	none
BVC	Branch if overflow flag clear	BVC aa	\$50	2	none
BVS	Branch if overflow flag set	BVS aa	\$70	2	none

Stack Group

TSX	Transfer stack pointer to X	TSX	\$BA	1	N,Z
TXS	Transfer X to stack pointer	TXS	\$9A	1	none
PHA	Push accumulator on stack	PHA	\$48	1	none
PHP	Push processor status on stack	PHP	\$08	1	none
PLA	Pull accumulator from stack	PLA	\$68	1	N,Z
PLP	Pull processor status from stack	PLP	\$28	1	All

Status Flag Change Group

CLC	Clear carry flag	CLC	\$18	1	С	
CLD	Clear decimal mode flag	CLD	\$D8	1	D	
CLI	Clear interrupt disable flag	CLI	\$58	1	I	
CLV	Clear overflow flag	CLV	\$B8	1	V	
SEC	Set carry flag	SEC	\$38	1	С	
SED	Set decimal mode flag	SED	\$F8	1	D	
SEI	Set interrupt disable flag	SEI	\$78	1	I	

Subroutine and Interrupt Group

JSR	Jump to a subroutine	JSR \$aaaa	\$20	3	none
RTS	Return from subroutine	RTS	\$60	1	none
BRK	Force an interrupt	BRK	\$00	1	B, I
RTI	Return from Interrupt	RTI	\$40	1	All
NOP	No Operation	NOP	\$EA	1	none

Memory I/O:

\$E000 Clear terminal window

\$E001 Ascii code will be sent to terminal screen and displayed as a character

\$E002 Ascii code will be sent to screen and displayed as above, but CR/LF will be ignored

\$E003 Ascii code will be sent to screen and displayed as a hexadecimal number

\$E004 If a character has been typed into the terminal screen, it will be copied to this location

\$E005 Controls horizontal location of cursor

\$E006 Controls vertical location of cursor.

Assembler Directives:

.ORG => Start address of code/data generation

.ASCII => String or characters

.DB => Define list of bytes: decimal, hexadecimal (\$), chars or string

.BYTE => Same as .DB

.DW => Define word (16 bits)

.DS => Define space (reserve 'n' bytes of memory space)

ASCII TABLE

Números																										
							_	_		_																
ASCII	0	1	2	3	4	5	6	7	8	9																
Dec.	48	49	50	51	52	53	54	55	56	57																\Box
Hex.	30	31	32	33	34	35	36	37	38	39																
Letras Mai	iúsc	ulas																								
ASCII	Α	В	С	D	Ε	F	G	Н	I	J	K	L	Μ	И	0	P	Q	R	ន	Т	U	V	W	Х	Y	Z
Dec.	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Hex.	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F	50	51	52	53	54	55	56	57	58	59	5A
Letras Min	úsc	ulas																								
ASCII	a	ъ	С	d	е	f	g	h	i	j	k	1	m	n	0	р	q	ť	s	t	u	v	w	х	У	z
Dec.	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122
Hex.	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F	70	71	72	73	74	75	76	77	78	79	7A