

6502 & 65816 Instructions

Name and Description	Addressing Modes	Op-Codes	Status NVMDIZC	Name and Description	Addressing Modes	Op-Codes	Status NVMDIZC	Name and Description	Addressing Modes	Op-Codes	Status NVMDIZC
ADC Add memory to accumulator with carry	ADC (ZP,X) ADC SR, S ADC ZP ADC [ZP] ADC #Imm ADC Addr ADC LongAddr ADC (ZP),Y •ADC (ZP) ADC (SR, S), Y ADC ZP,X ADC [ZP],Y ADC Addr,Y ADC Addr,X ADC LongAddr,X	61 - 63 - 65 - 67 - 69 - 6D -- 6F --- 71 -- 72 - 73 - 75 - 77 - 79 -- 7D -- 7F ---	NV----ZC NV----ZC NV----ZC NV----ZC NV----ZC NV----ZC NV----ZC NV----ZC NV----ZC NV----ZC NV----ZC NV----ZC NV----ZC NV----ZC NV----ZC	CLD Clear decimal mode flag	CLD	D8	----D---	INY Increment index Y by 1	INY	C8	N----Z-
AND "AND" memory with accumulator	AND (ZP,X) AND SR, S AND ZP AND [ZP] AND #Imm AND Addr AND LongAddr AND (ZP),Y •AND (ZP) AND (SR, S), Y AND ZP,X AND [ZP],Y AND Addr,Y AND Addr,X AND LongAddr,X	21 - 23 - 25 - 27 - 29 - 2D -- 2F --- 31 -- 32 - 33 - 35 - 37 - 39 -- 3D -- 3F ---	N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z-	CLI Clear interrupt disable flag	CLI	58	----I--	JML Jump to new, long indirect location	JML [Addr]	DC --	-----
ASL Shift left one bit (Memory or Accumulator)	ASL ZP ASL A ASL Addr ASL ZP,X ASL Addr,X	06 - 0A 0E -- 16 - 1E --	N----ZC N----ZC N----ZC N----ZC N----ZC	CLV Clear overflow flag	CLV	B8	-V-----	JMP Jump to new location	JMP Addr JMP LongAddr JMP (Addr) JMP (Addr,X)	4C -- 5C --- 6C -- 7C --	----- ----- ----- -----
BCC Branch if carry clear	BCC Rel	90 -	-----	CMP Compare accumulator and memory	CMP (ZP,X) CMP SR, S CMP ZP CMP [ZP] CMP #Imm CMP Addr CMP LongAddr CMP (ZP),Y •CMP (ZP) CMP (SR, S), Y CMP ZP,X CMP [ZP],Y CMP Addr,Y CMP Addr,X CMP LongAddr,X	C1 - C3 - C5 - C7 - C9 - CD -- CF --- D1 -- D2 - D3 - D5 - D7 - D9 -- DD -- DF ---	N----ZC N----ZC N----ZC N----ZC N----ZC N----ZC N----ZC N----ZC N----ZC N----ZC N----ZC N----ZC N----ZC N----ZC N----ZC	JSL Jump subroutine long, saving return addr	JSL LongAddr	22 ---	-----
BCS Branch if carry set	BCS Rel	B0 -	-----	COP Co-Processor Enable	COP IMM	02	----DI--	JSR Jump to subroutine, saving return addr	JSR Addr JSR (Addr,X)	20 -- FC --	----- -----
BEQ Branch if equal	BEQ Rel	F0 -	-----	COP Co-Processor Enable	COP IMM	02	----DI--	LDA Load accumulator from memory	LDA (ZP,X) LDA SR, S LDA ZP LDA [ZP] LDA #Imm LDA Addr LDA LongAddr LDA (ZP),Y •LDA (ZP) LDA (SR, S), Y LDA ZP,X LDA [ZP],Y LDA Addr,Y LDA Addr,X LDA LongAddr,X	A1 - A3 - A5 - A7 - A9 - AD -- AF --- B1 -- B2 - B3 - B5 - B7 - B9 -- BD -- BF ---	N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z-
BMI Branch if minus	BMI Rel	30 -	-----	CPX Compare memory with index X	CPX #Imm CPX ZP CPX Addr	E0 - E4 - EC --	N----ZC N----ZC N----ZC	LDX Load index X from memory	LDX #Imm LDX ZP LDA Addr LDX ZP,Y LDX Addr,Y	A2 - A6 - AE -- B6 - BE --	N----Z- N----Z- N----Z- N----Z- N----Z-
BNE Branch if not equal	BNE Rel	D0 -	-----	CPY Compare memory with index Y	CPY #Imm CPY ZP CPY Addr	C0 - C4 - CC --	N----ZC N----ZC N----ZC	LDY Load index Y from memory	LDY #Imm LDY ZP LDY Addr LDY ZP,X LDY Addr,X	A0 - A4 - AC -- B4 - BC --	N----Z- N----Z- N----Z- N----Z- N----Z-
BPL Branch if plus	BPL Rel	10 -	-----	DEC Decrement memory by 1	•DEC A DEC ZP DEC Addr DEC ZP,X DEC Addr,X	3A C6 - CE -- D6 - DE --	N----Z- N----Z- N----Z- N----Z- N----Z-	LSR Shift right one bit (Memory or Accumulator)	LSR ZP LSR A LSR Addr LSR ZP,X LSR Addr,X	46 - 4A - 4E -- 56 - 5E --	N----ZC N----ZC N----ZC N----ZC N----ZC
BRA Branch always	•BRA Rel	80 -	-----	DEX Decrement index X by 1	DEX	CA	N----Z-	MVN Move memory block in a negative direction	MVN Src, Dest	54 --	-----
BRK Break	BRK	00	----DI--	DEY Decrement index Y by 1	DEY	88	N----Z-	MVP Move memory block in a positive direction	MVP Sec, Dest	44 --	-----
BRL Branch Long Always	BRL Rel	82 -	-----	EOR "Exclusive OR" accumulator with memory	EOR (ZP,X) EOR SR, S EOR ZP EOR [ZP] EOR #Imm EOR Addr EOR LongAddr EOR (ZP),Y •EOR (ZP) EOR (SR, S), Y EOR ZP,X EOR [ZP],Y EOR Addr,Y EOR Addr,X EOR LongAddr,X	41 - 43 - 45 - 47 - 49 - 4D -- 4F --- 51 -- 52 - 53 - 55 - 57 - 59 -- 5D -- 5F ---	N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z-	NOP No operation	NOP	EA	-----
BVC Branch if overflow clear	BVC Rel	50 -	-----	INC Increment memory by 1	•INC A INC ZP INC Addr INC ZP,X INC Addr,X	1A E6 - EE -- F6 - FE --	N----Z- N----Z- N----Z- N----Z- N----Z-	ORA "OR" accumulator with memory	ORA (ZP,X) ORA SR, S ORA ZP ORA [ZP] ORA #Imm ORA Addr ORA LongAddr ORA (ZP),Y •ORA (ZP) ORA (SR, S), Y ORA ZP,X ORA [ZP],Y ORA Addr,Y ORA Addr,X ORA LongAddr,X	01 - 03 - 05 - 07 - 09 - 0D -- 0F --- 11 -- 12 - 13 - 15 - 17 - 19 -- 1D -- 1F ---	N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z- N----Z-
BVS Branch if overflow set	BVS Rel	70 -	-----	INX Increment index X by 1	INX	E8	N----Z-	PEA Push effective absolute address	PEA Addr	F4 --	-----
CLC Clear carry	CLC Rel	18 -	-----C					PEI Push effective indirect address	PEI ZP	D4 -	-----



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PER Push effective program counter relative address	PER Rel	62 --	-----	RTS Return from subroutine	RTS	60	-----	TCD Transfer 16-bit accumulator to direct page reg	TCD	5B	N-----Z-
PHA Push accumulator onto stack	PHA	48	-----	SBC Subtract memory from accumulator with borrow	SBC (ZP,X) SBC SR, S SBC ZP SBC [ZP] SBC #Imm SBC Addr SBC LongAddr SBC (ZP),Y • SBC (ZP) SBC (SR, S), Y SBC ZP,X SBC [ZP],Y SBC Addr,Y SBC Addr,X SBC LongAddr,X	E1 - E3 - E5 - E7 - E9 - ED -- EF --- F1 -- F2 - F3 - F5 - F7 - F9 -- FD -- FF ---	NV---ZC NV---ZC NV---ZC NV---ZC NV---ZC NV---ZC NV---ZC NV---ZC NV---ZC NV---ZC NV---ZC NV---ZC NV---ZC NV---ZC	TCS Transfer 16-bit accumulator to stack pointer	TCS	1B	-----
PHB Push data bank register onto stack	PHB	48	-----	SEC Set carry flag	SEC	38	-----C	TDC Transfer direct page reg to 16-bit accumulator	TDC	7B	N-----Z-
PHD Push direct page register onto stack	PHD	0B	-----	SED Set decimal flag	SED	F8	----D--	TRB Test and reset bits against accumulator	• TRB ZP • TRB Addr	14 - 1C --	-----Z- -----Z-
PHK Push pgm bank register onto stack	PHK	4B	-----	SEI Set interrupt disable flag	SEI	78	----I--	TSB Test and set bits against accumulator	• TSB ZP • TSB Addr	04 - 0C --	-----Z- -----Z-
PHP Push processor status on stack	PHP	08	-----	SEP Set processor status bits	SEP	E2	NVMXDIZC	TSC Transfer stack pointer to 16-bit accumulator	TSC	3B	N-----Z-
PHX Push index X onto stack	• PHX	DA	-----	STA Store accumulator to memory	STA (ZP,X) STA SR, S STA ZP STA [ZP] STA Addr STA LongAddr STA (ZP),Y • STA (ZP) STA (SR, S), Y STA ZP,X STA [ZP],Y STA Addr,Y STA Addr,X STA LongAddr,X	81 - 83 - 85 - 87 - 8D -- 8F --- 91 -- 92 - 93 - 95 - 97 - 99 -- 9D -- 9F ---	----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- -----	TSX Transfer stack pointer to index X	TSX	BA	N-----Z-
PHY Push index Y onto stack	• PHY	5A	-----	STP Stop processor	STP	DB	-----	TXA Transfer index X to accumulator	TXA	8A	N-----Z-
PLA Pull accumulator from stack	PLA	68	N-----Z-	STX Store index X to memory	STX ZP STX Addr STX ZP,Y	86 - 8E -- 96 -	----- ----- -----	TXS Transfer index X to stack pointer	TXS	9A	-----
PLB Pull data bank register from stack	PLB	AB	N-----Z-	STY Store index Y to memory	STY ZP STY Addr STY ZP,X	84 - 8C -- 94 -	----- ----- -----	TYA Transfer index Y to accumulator	TYA	98	N-----Z-
PLD Pull direct page register from stack	PLD	2B	N-----Z-	STZ Store zero to memory	• STZ ZP • STZ ZP,X • STZ Addr • STZ Addr,X	64 - 74 - 9C -- 9E --	----- ----- ----- -----	TYX Transfer index Y to index X	TYX	BB	N-----Z-
PLP Pull processor status register from stack	PLP	28	NVMXDIZC	TAX Transfer accumulator to index X	TAX	AA	N-----Z-	WDM Reserved for future expansion	WDM	42	-----
PLX Pull index X from stack	• PLX	FA	N-----Z-	TAY Transfer accumulator to index Y	TAY	A8	N-----Z-	XBA Exchange B and A 8-bit accumulators	XBA	EB	N-----Z-
PLY Pull index Y from stack	• PLY	7A	N-----Z-					XCE Exchange carry and emulation flags	XCE	FB	--MX---CE
REP Reset processor status register bits	REP #Imm	C2 -	NVMXDIZC								
ROL Rotate left one bit (Memory or Accumulator)	ROL ZP ROL A ROL Addr ROL ZP,X ROL Addr,X	26 - 2A 2E -- 36 - 3E --	N-----ZC N-----ZC N-----ZC N-----ZC N-----ZC								
ROR Rotate right one bit (Memory or Accumulator)	ROR ZP ROR A ROR Addr ROR ZP,X ROR Addr,X	66 - 6A 6E -- 66 - 7E --	N-----ZC N-----ZC N-----ZC N-----ZC N-----ZC								
RTI Return from interrupt	RTI	40	NVMXDIZC								
RTL Return from subroutine long	RTL	6B	-----								

