

6502 Machine Language Hex Codes

| Opcode | Definition | Immediate | Accumulator | Zero Page | Zero Page,X | Zero Page,Y | Absolute | Absolute,X | Absolute,Y | Indirect Abs. | (Zero Page,X) | (Zero Page),Y | Implied | Relative | Affects Flags |
|------------|---------------------------------|-----------|-------------|-----------|-------------|-------------|----------|------------|------------|---------------|---------------|---------------|---------|----------|---------------|
| ADC | Add with Carry | 69 | | 65 | 75 | | 6D | 7D | 79 | | 61 | 71 | | | N,V,Z,C |
| AND | Bitwise AND with Accumulator | 29 | | 25 | 35 | | 2D | 3D | 39 | | 21 | 31 | | | N,Z |
| ASL | Arithmetic Shift Left | | 0A | 06 | 16 | | 0E | 1E | | | | | | | N,Z,C |
| BCC | Branch on Carry Clear | | | | | | | | | | | | | 90 | |
| BCS | Branch on Carry Set | | | | | | | | | | | | | B0 | |
| BEQ | Branch on Equal | | | | | | | | | | | | | F0 | |
| BIT | Test Bits | | | 24 | | | 2C | | | | | | | | N,V,Z |
| BMI | Branch on Minus | | | | | | | | | | | | | 30 | |
| BNE | Branch on Not Equal | | | | | | | | | | | | | D0 | |
| BPL | Branch on Plus | | | | | | | | | | | | | 10 | |
| BRK | Break | | | | | | | | | | | | 00 | | B |
| BVC | Branch on Overflow Clear | | | | | | | | | | | | | 50 | |
| BVS | Branch on Overflow Set | | | | | | | | | | | | | 70 | |
| CLC | Clear Carry | | | | | | | | | | | | 18 | | C |
| CLD | Clear Decimal | | | | | | | | | | | | D8 | | D |
| CLI | Clear Interrupt | | | | | | | | | | | | 58 | | I |
| CLV | Clear Overflow | | | | | | | | | | | | B8 | | V |
| CMP | Compare Accumulator | C9 | | C5 | D5 | | CD | DD | D9 | | C1 | D1 | | | N,Z,C |
| CPX | Compare X Register | E0 | | E4 | | | EC | | | | | | | | N,Z,C |
| CPY | Compare Y Register | C0 | | C4 | | | CC | | | | | | | | N,Z,C |
| DEC | Decrement Memory | | | C6 | D6 | | CE | DE | | | | | | | N,Z |
| DEX | Decrement X | | | | | | | | | | | | CA | | N,Z |
| DEY | Decrement Y | | | | | | | | | | | | 88 | | N,Z |
| EOR | Bitwise Exclusive OR | 49 | | 45 | 55 | | 4D | 5D | 59 | | 41 | 51 | | | N,Z |
| INC | Increment Memory | | | E6 | F6 | | EE | FE | | | | | | | N,Z |
| INX | Increment X | | | | | | | | | | | | E8 | | N,Z |
| INY | Increment Y | | | | | | | | | | | | C8 | | N,Z |
| JMP | Jump | | | | | | 4C | | | 6C | | | | | |
| JSR | Jump to Subroutine | | | | | | 20 | | | | | | | | |
| LDA | Load Accumulator | A9 | | A5 | B5 | | AD | BD | B9 | | A1 | B1 | | | N,Z |
| LDX | Load X Register | A2 | | A6 | | B6 | AE | | BE | | | | | | N,Z |
| LDY | Load Y Register | A0 | | A4 | B4 | | AC | BC | | | | | | | N,Z |
| LSR | Logical Shift Right | | 4A | 46 | 56 | | 4E | 5E | | | | | | | N,Z,C |
| NOP | No Operation | | | | | | | | | | | | EA | | |
| ORA | Bitwise OR with Accumulator | 09 | | 05 | 15 | | 0D | 1D | 19 | | 01 | 11 | | | N,Z |
| PHA | Push Accumulator to Stack | | | | | | | | | | | | 48 | | |
| PHP | Push Processor Status to Stack | | | | | | | | | | | | 08 | | |
| PLA | Pull Accumulator off Stack | | | | | | | | | | | | 68 | | N,Z |
| PLP | Pull Processor Status off Stack | | | | | | | | | | | | 28 | | ALL |
| ROL | Rotate Left | | 2A | 26 | 36 | | 2E | 3E | | | | | | | N,Z,C |
| ROR | Rotate Right | | 6A | 66 | 76 | | 6E | 7E | | | | | | | N,Z,C |
| RTI | Return from Interrupt | | | | | | | | | | | | 40 | | ALL |
| RTS | Return from Subroutine | | | | | | | | | | | | 60 | | |
| SBC | Subtract with Carry | E9 | | E5 | F5 | | ED | FD | F9 | | E1 | F1 | | | N,V,Z,C |
| SEC | Set Carry | | | | | | | | | | | | 38 | | C |
| SED | Set Decimal | | | | | | | | | | | | F8 | | D |
| SEI | Set Interrupt | | | | | | | | | | | | 78 | | I |
| STA | Store Accumulator | | | 85 | 95 | | 8D | 9D | 99 | | 81 | 91 | | | |
| STX | Store X Register | | | 86 | | 96 | 8E | | | | | | | | |
| STY | Store Y Register | | | 84 | 94 | | 8C | | | | | | | | |
| TAX | Transfer A to X | | | | | | | | | | | | AA | | N,Z |
| TAY | Transfer A to Y | | | | | | | | | | | | A8 | | N,Z |
| TSX | Transfer Stack Pointer to X | | | | | | | | | | | | BA | | |
| TXA | Transfer X to A | | | | | | | | | | | | 8A | | N,Z |
| TXS | Transfer X to Stack Pointer | | | | | | | | | | | | 9A | | |
| TYA | Transfer Y to A | | | | | | | | | | | | 98 | | N,Z |

Gray 2 – System Memory

Sky blue 10 – 8-bit Registers (Accumulator/X/Y)

Orange 1 – CPU Status Register

Red 2 – Stack/Stack Pointer

Green 2 – Program Counter

Magenta 10 – 16-bit Registers (AB, CD, EF, etc.)