**Tektronix 4052/4054 opcode Decoding table (gray cells 6800 unused, red on 4052/4054&A, 4052A/4054A ONLY=blue + green 6800 16-bit ext)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MSB \ LSB | \_0 | \_1 | \_2 | \_3 | \_4 | \_5 | \_6 | \_7 | \_8 | \_9 | \_A | \_B | \_C | \_D | \_E | \_F |
| 0\_ | [**TEST**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [NOP](http://www.8bit-era.cz/6800.html#NOP-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | **NOP** ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**SFA**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | **LDAG D** ([DIR](http://www.8bit-era.cz/6800.html#INH-desc)) | **LDAG X** ([DIR](http://www.8bit-era.cz/6800.html#INH-desc)) | [TAP](http://www.8bit-era.cz/6800.html#TAP-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [TPA](http://www.8bit-era.cz/6800.html#TPA-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [INX](http://www.8bit-era.cz/6800.html#INX-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [DEX](http://www.8bit-era.cz/6800.html#DEX-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [CLV](http://www.8bit-era.cz/6800.html#CLV-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [SEV](http://www.8bit-era.cz/6800.html#SEV-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [CLC](http://www.8bit-era.cz/6800.html#CLC-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [SEC](http://www.8bit-era.cz/6800.html#SEC-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [CLI](http://www.8bit-era.cz/6800.html#CLI-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [SEI](http://www.8bit-era.cz/6800.html#SEI-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) |
| 1\_ | [**SBA**](http://www.8bit-era.cz/6800.html#SBA-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [CBA](http://www.8bit-era.cz/6800.html#CBA-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**TAPX**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**TPAX**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**ADXI I**](http://www.8bit-era.cz/6800.html#NOP-INH)(IMM) | [**ASPI I**](http://www.8bit-era.cz/6800.html#NOP-INH)(IMM) | [**TAB**](http://www.8bit-era.cz/6800.html#TAB-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**TBA**](http://www.8bit-era.cz/6800.html#TBA-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**SDA**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [DAA](http://www.8bit-era.cz/6800.html#DAA-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**LDXX**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**ABA**](http://www.8bit-era.cz/6800.html#ABA-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [**LDAX**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**LDBX**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | **STAX**  ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**JMPAX**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) |
| 2\_ | [BRA](http://www.8bit-era.cz/6800.html#BRA-REL) ([REL](http://www.8bit-era.cz/6800.html#REL-desc)) | [**SDB**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [BHI](http://www.8bit-era.cz/6800.html#BHI-REL) ([REL](http://www.8bit-era.cz/6800.html#REL-desc)) | [BLS](http://www.8bit-era.cz/6800.html#BLS-REL) ([REL](http://www.8bit-era.cz/6800.html#REL-desc)) | [BCC](http://www.8bit-era.cz/6800.html#BCC-REL) ([REL](http://www.8bit-era.cz/6800.html#REL-desc)) | [BCS](http://www.8bit-era.cz/6800.html#BCS-REL) ([REL](http://www.8bit-era.cz/6800.html#REL-desc)) | [BNE](http://www.8bit-era.cz/6800.html#BNE-REL) ([REL](http://www.8bit-era.cz/6800.html#REL-desc)) | [BEQ](http://www.8bit-era.cz/6800.html#BEQ-REL) ([REL](http://www.8bit-era.cz/6800.html#REL-desc)) | [BVC](http://www.8bit-era.cz/6800.html#BVC-REL) ([REL](http://www.8bit-era.cz/6800.html#REL-desc)) | [BVS](http://www.8bit-era.cz/6800.html#BVS-REL) ([REL](http://www.8bit-era.cz/6800.html#REL-desc)) | [BPL](http://www.8bit-era.cz/6800.html#BPL-REL) ([REL](http://www.8bit-era.cz/6800.html#REL-desc)) | [BMI](http://www.8bit-era.cz/6800.html#BMI-REL) ([REL](http://www.8bit-era.cz/6800.html#REL-desc)) | [BGE](http://www.8bit-era.cz/6800.html#BGE-REL) ([REL](http://www.8bit-era.cz/6800.html#REL-desc)) | [BLT](http://www.8bit-era.cz/6800.html#BLT-REL) ([REL](http://www.8bit-era.cz/6800.html#REL-desc)) | [BGT](http://www.8bit-era.cz/6800.html#BGT-REL) ([REL](http://www.8bit-era.cz/6800.html#REL-desc)) | [BLE](http://www.8bit-era.cz/6800.html#BLE-REL) ([REL](http://www.8bit-era.cz/6800.html#REL-desc)) |
| 3\_ | [TSX](http://www.8bit-era.cz/6800.html#TSX-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [INS](http://www.8bit-era.cz/6800.html#INS-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**PUL A**](http://www.8bit-era.cz/6800.html#PUL-A-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [**PUL B**](http://www.8bit-era.cz/6800.html#PUL-B-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [DES](http://www.8bit-era.cz/6800.html#DES-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [TXS](http://www.8bit-era.cz/6800.html#TXS-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [PSH A](http://www.8bit-era.cz/6800.html#PSH-A-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [PSH B](http://www.8bit-era.cz/6800.html#PSH-B-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | **JMPIN** ([EXT](http://www.8bit-era.cz/6800.html#INH-desc)) | [RTS](http://www.8bit-era.cz/6800.html#RTS-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | **FPSH D** (DIR) | [**RTI**](http://www.8bit-era.cz/6800.html#RTI-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | **FPSH X** (IDX) | **FPSH** (EXT) | [**WAI**](http://www.8bit-era.cz/6800.html#WAI-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**SWI**](http://www.8bit-era.cz/6800.html#SWI-INH) ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) |
| 4\_ | [NEG A](http://www.8bit-era.cz/6800.html#NEG-A-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | **FPSH I** (IMM\*) | **FPUL D** (DIR) | [**COM A**](http://www.8bit-era.cz/6800.html#COM-A-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [LSR A](http://www.8bit-era.cz/6800.html#LSR-A-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | **FPUL X** ([IDX](http://www.8bit-era.cz/6800.html#INH-desc)) | [ROR A](http://www.8bit-era.cz/6800.html#ROR-A-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [ASR A](http://www.8bit-era.cz/6800.html#ASR-A-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [**ASL A**](http://www.8bit-era.cz/6800.html#ASL-A-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [ROL A](http://www.8bit-era.cz/6800.html#ROL-A-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [**DEC A**](http://www.8bit-era.cz/6800.html#DEC-A-ACC)([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | **FPUL** ([EXT](http://www.8bit-era.cz/6800.html#INH-desc)) | [**INC A**](http://www.8bit-era.cz/6800.html#INC-A-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [TST A](http://www.8bit-era.cz/6800.html#TST-A-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [**FDUP**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**CLR A**](http://www.8bit-era.cz/6800.html#CLR-A-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) |
| 5\_ | [NEG B](http://www.8bit-era.cz/6800.html#NEG-B-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [**FSWAP**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**FADD**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**COM B**](http://www.8bit-era.cz/6800.html#COM-B-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [LSR B](http://www.8bit-era.cz/6800.html#LSR-B-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [**FSUB**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [ROR B](http://www.8bit-era.cz/6800.html#ROR-B-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [ASR B](http://www.8bit-era.cz/6800.html#ASR-B-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [**ASL B**](http://www.8bit-era.cz/6800.html#ASL-B-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [ROL B](http://www.8bit-era.cz/6800.html#ROL-B-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [**DEC B**](http://www.8bit-era.cz/6800.html#DEC-B-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [**FMUL**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**INC B**](http://www.8bit-era.cz/6800.html#INC-B-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [TST B](http://www.8bit-era.cz/6800.html#TST-B-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) | [**FDIV**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**CLR B**](http://www.8bit-era.cz/6800.html#CLR-B-ACC) ([ACC](http://www.8bit-era.cz/6800.html#ACC-desc)) |
| 6\_ | [NEG](http://www.8bit-era.cz/6800.html#NEG-IDX) X ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | **FNRM** ([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**PSHRET**](http://www.8bit-era.cz/6800.html#NOP-INH)([DIR](http://www.8bit-era.cz/6800.html#INH-desc)) | [**COM**](http://www.8bit-era.cz/6800.html#COM-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [LSR](http://www.8bit-era.cz/6800.html#LSR-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [**RTRN**](http://www.8bit-era.cz/6800.html#NOP-INH)([DIR](http://www.8bit-era.cz/6800.html#INH-desc)) | [ROR](http://www.8bit-era.cz/6800.html#ROR-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [ASR](http://www.8bit-era.cz/6800.html#ASR-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [**ASL**](http://www.8bit-era.cz/6800.html#ASL-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [ROL](http://www.8bit-era.cz/6800.html#ROL-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [**DEC**](http://www.8bit-era.cz/6800.html#DEC-IDX)([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [**PSHX**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**INC**](http://www.8bit-era.cz/6800.html#INC-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [TST](http://www.8bit-era.cz/6800.html#TST-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [JMP](http://www.8bit-era.cz/6800.html#JMP-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [**CLR**](http://www.8bit-era.cz/6800.html#CLR-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) |
| 7\_ | [NEG](http://www.8bit-era.cz/6800.html#NEG-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [**STRK**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**VECT**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**COM**](http://www.8bit-era.cz/6800.html#COM-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [LSR](http://www.8bit-era.cz/6800.html#LSR-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [**PULX**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [ROR](http://www.8bit-era.cz/6800.html#ROR-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [ASR](http://www.8bit-era.cz/6800.html#ASR-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [**ASL**](http://www.8bit-era.cz/6800.html#ASL-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [ROL](http://www.8bit-era.cz/6800.html#ROL-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [**DEC**](http://www.8bit-era.cz/6800.html#DEC-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [**STAG D**](http://www.8bit-era.cz/6800.html#NOP-INH)([DIR](http://www.8bit-era.cz/6800.html#INH-desc)) | [**INC**](http://www.8bit-era.cz/6800.html#INC-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [TST](http://www.8bit-era.cz/6800.html#TST-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [JMP](http://www.8bit-era.cz/6800.html#JMP-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [**CLR**](http://www.8bit-era.cz/6800.html#CLR-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) |
| 8\_ | [**SUB A**](http://www.8bit-era.cz/6800.html#SUB-A-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [CMP A](http://www.8bit-era.cz/6800.html#CMP-A-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [SBC A](http://www.8bit-era.cz/6800.html#SBC-A-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [**STAG X**](http://www.8bit-era.cz/6800.html#NOP-INH)([IDX](http://www.8bit-era.cz/6800.html#INH-desc)) | [AND A](http://www.8bit-era.cz/6800.html#AND-A-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [BIT A](http://www.8bit-era.cz/6800.html#BIT-A-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [**LDA A**](http://www.8bit-era.cz/6800.html#LDA-A-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [**ADDG D**](http://www.8bit-era.cz/6800.html#NOP-INH)(DIR) | [EOR A](http://www.8bit-era.cz/6800.html#EOR-A-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [ADC A](http://www.8bit-era.cz/6800.html#ADC-A-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [ORA A](http://www.8bit-era.cz/6800.html#ORA-A-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [**ADD A**](http://www.8bit-era.cz/6800.html#ADD-A-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [CPX A](http://www.8bit-era.cz/6800.html#CPX-A-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [BSR](http://www.8bit-era.cz/6800.html#BSR-REL) ([REL](http://www.8bit-era.cz/6800.html#REL-desc)) | [LDS](http://www.8bit-era.cz/6800.html#LDS-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [**ADDG X**](http://www.8bit-era.cz/6800.html#NOP-INH)([IDX](http://www.8bit-era.cz/6800.html#INH-desc)) |
| 9\_ | [**SUB A**](http://www.8bit-era.cz/6800.html#SUB-A-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [CMP A](http://www.8bit-era.cz/6800.html#CMP-A-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [SBC A](http://www.8bit-era.cz/6800.html#SBC-A-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [**SUBD G**](http://www.8bit-era.cz/6800.html#NOP-INH)([DIR](http://www.8bit-era.cz/6800.html#INH-desc)) | [AND A](http://www.8bit-era.cz/6800.html#AND-A-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [BIT A](http://www.8bit-era.cz/6800.html#BIT-A-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [**LDA A**](http://www.8bit-era.cz/6800.html#LDA-A-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [STA A](http://www.8bit-era.cz/6800.html#STA-A-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [EOR A](http://www.8bit-era.cz/6800.html#EOR-A-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [ADC A](http://www.8bit-era.cz/6800.html#ADC-A-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [ORA A](http://www.8bit-era.cz/6800.html#ORA-A-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [**ADD A**](http://www.8bit-era.cz/6800.html#ADD-A-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [CPX A](http://www.8bit-era.cz/6800.html#CPX-A-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [**SUBD X**](http://www.8bit-era.cz/6800.html#NOP-INH)([IDX](http://www.8bit-era.cz/6800.html#INH-desc)) | [LDS](http://www.8bit-era.cz/6800.html#LDS-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [STS](http://www.8bit-era.cz/6800.html#STS-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) |
| A\_ | [**SUB A**](http://www.8bit-era.cz/6800.html#SUB-A-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [CMP A](http://www.8bit-era.cz/6800.html#CMP-A-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [SBC A](http://www.8bit-era.cz/6800.html#SBC-A-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [**INXSTX**](http://www.8bit-era.cz/6800.html#NOP-INH)([DIR](http://www.8bit-era.cz/6800.html#INH-desc)) | [AND A](http://www.8bit-era.cz/6800.html#AND-A-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [BIT A](http://www.8bit-era.cz/6800.html#BIT-A-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [**LDA A**](http://www.8bit-era.cz/6800.html#LDA-A-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [STA A](http://www.8bit-era.cz/6800.html#STA-A-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [EOR A](http://www.8bit-era.cz/6800.html#EOR-A-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [ADC A](http://www.8bit-era.cz/6800.html#ADC-A-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [ORA A](http://www.8bit-era.cz/6800.html#ORA-A-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [**ADD A**](http://www.8bit-era.cz/6800.html#ADD-A-IDX)([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [CPX A](http://www.8bit-era.cz/6800.html#CPX-A-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [JSR](http://www.8bit-era.cz/6800.html#JSR-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [LDS](http://www.8bit-era.cz/6800.html#LDS-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [STS](http://www.8bit-era.cz/6800.html#STS-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) |
| B\_ | [**SUB A**](http://www.8bit-era.cz/6800.html#SUB-A-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [CMP A](http://www.8bit-era.cz/6800.html#CMP-A-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [SBC A](http://www.8bit-era.cz/6800.html#SBC-A-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [**LDAG**](http://www.8bit-era.cz/6800.html#NOP-INH)([EXT](http://www.8bit-era.cz/6800.html#INH-desc)) | [AND A](http://www.8bit-era.cz/6800.html#AND-A-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [BIT A](http://www.8bit-era.cz/6800.html#BIT-A-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [**LDA A**](http://www.8bit-era.cz/6800.html#LDA-A-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [STA A](http://www.8bit-era.cz/6800.html#STA-A-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [EOR A](http://www.8bit-era.cz/6800.html#EOR-A-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [ADC A](http://www.8bit-era.cz/6800.html#ADC-A-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [ORA A](http://www.8bit-era.cz/6800.html#ORA-A-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [**ADD A**](http://www.8bit-era.cz/6800.html#ADD-A-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [CPX A](http://www.8bit-era.cz/6800.html#CPX-A-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [JSR](http://www.8bit-era.cz/6800.html#JSR-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [LDS](http://www.8bit-era.cz/6800.html#LDS-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [STS](http://www.8bit-era.cz/6800.html#STS-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) |
| C\_ | [**SUB B**](http://www.8bit-era.cz/6800.html#SUB-B-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [CMP B](http://www.8bit-era.cz/6800.html#CMP-B-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [SBC B](http://www.8bit-era.cz/6800.html#SBC-B-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [**STAG**](http://www.8bit-era.cz/6800.html#NOP-INH)([EXT](http://www.8bit-era.cz/6800.html#INH-desc)) | [AND B](http://www.8bit-era.cz/6800.html#AND-B-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [BIT B](http://www.8bit-era.cz/6800.html#BIT-B-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [**LDA B**](http://www.8bit-era.cz/6800.html#LDA-B-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | **C7-**[**ESC**](http://www.8bit-era.cz/6800.html#NOP-INH) | [EOR B](http://www.8bit-era.cz/6800.html#EOR-B-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [ADC B](http://www.8bit-era.cz/6800.html#ADC-B-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [ORA B](http://www.8bit-era.cz/6800.html#ORA-B-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [**ADD B**](http://www.8bit-era.cz/6800.html#ADD-B-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) | [**ADAX**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**WADGX**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [LDX](http://www.8bit-era.cz/6800.html#LDX-IMM) ([IMM](http://www.8bit-era.cz/6800.html#IMM-desc)) |  |
| D\_ | [**SUB B**](http://www.8bit-era.cz/6800.html#SUB-B-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [CMP B](http://www.8bit-era.cz/6800.html#CMP-B-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [SBC B](http://www.8bit-era.cz/6800.html#SBC-B-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [**LDAG**](http://www.8bit-era.cz/6800.html#NOP-INH) **I** ([EXT](http://www.8bit-era.cz/6800.html#INH-desc)) | [AND B](http://www.8bit-era.cz/6800.html#AND-B-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [BIT B](http://www.8bit-era.cz/6800.html#BIT-B-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [**LDA B**](http://www.8bit-era.cz/6800.html#LDA-B-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [STA B](http://www.8bit-era.cz/6800.html#STA-B-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [EOR B](http://www.8bit-era.cz/6800.html#EOR-B-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [ADC B](http://www.8bit-era.cz/6800.html#ADC-B-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [ORA B](http://www.8bit-era.cz/6800.html#ORA-B-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [**ADD B**](http://www.8bit-era.cz/6800.html#ADD-B-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [**SBUG**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**CBUG**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [LDX](http://www.8bit-era.cz/6800.html#LDX-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) | [STX](http://www.8bit-era.cz/6800.html#STX-DIR) ([DIR](http://www.8bit-era.cz/6800.html#DIR-desc)) |
| E\_ | [**SUB B**](http://www.8bit-era.cz/6800.html#SUB-B-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [CMP B](http://www.8bit-era.cz/6800.html#CMP-B-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [SBC B](http://www.8bit-era.cz/6800.html#SBC-B-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [**MOVLR**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [AND B](http://www.8bit-era.cz/6800.html#AND-B-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [BIT B](http://www.8bit-era.cz/6800.html#BIT-B-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [**LDA B**](http://www.8bit-era.cz/6800.html#LDA-B-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [STA B](http://www.8bit-era.cz/6800.html#STA-B-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [EOR B](http://www.8bit-era.cz/6800.html#EOR-B-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [ADC B](http://www.8bit-era.cz/6800.html#ADC-B-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [ORA B](http://www.8bit-era.cz/6800.html#ORA-B-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [**ADD B**](http://www.8bit-era.cz/6800.html#ADD-B-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [**MOVRL**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**WADX**](http://www.8bit-era.cz/6800.html#NOP-INH)([EXTI](http://www.8bit-era.cz/6800.html#INH-desc)) | [LDX](http://www.8bit-era.cz/6800.html#LDX-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) | [STX](http://www.8bit-era.cz/6800.html#STX-IDX) ([IDX](http://www.8bit-era.cz/6800.html#IDX-desc)) |
| F\_ | [**SUB B**](http://www.8bit-era.cz/6800.html#SUB-B-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [CMP B](http://www.8bit-era.cz/6800.html#CMP-B-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [SBC B](http://www.8bit-era.cz/6800.html#SBC-B-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [**CPCH**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [AND B](http://www.8bit-era.cz/6800.html#AND-B-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [BIT B](http://www.8bit-era.cz/6800.html#BIT-B-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [**LDA B**](http://www.8bit-era.cz/6800.html#LDA-B-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [STA B](http://www.8bit-era.cz/6800.html#STA-B-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [EOR B](http://www.8bit-era.cz/6800.html#EOR-B-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [ADC B](http://www.8bit-era.cz/6800.html#ADC-B-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [ORA B](http://www.8bit-era.cz/6800.html#ORA-B-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [**ADD B**](http://www.8bit-era.cz/6800.html#ADD-B-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [**FC-ESC**](http://www.8bit-era.cz/6800.html#NOP-INH) | [**PCH**](http://www.8bit-era.cz/6800.html#NOP-INH)([IMM](http://www.8bit-era.cz/6800.html#INH-desc)) | [LDX](http://www.8bit-era.cz/6800.html#LDX-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) | [STX](http://www.8bit-era.cz/6800.html#STX-EXT) ([EXT](http://www.8bit-era.cz/6800.html#EXT-desc)) |
| **FC\_** | [**PSHG**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**PULG**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**ADDG**](http://www.8bit-era.cz/6800.html#NOP-INH) **I** ([EXTI](http://www.8bit-era.cz/6800.html#INH-desc)) | [**ADDG**](http://www.8bit-era.cz/6800.html#NOP-INH)([EXT](http://www.8bit-era.cz/6800.html#INH-desc)) | [**SUBG**](http://www.8bit-era.cz/6800.html#NOP-INH) **I** ([EXTI](http://www.8bit-era.cz/6800.html#INH-desc)) | [**SUBG**](http://www.8bit-era.cz/6800.html#NOP-INH)([EXT](http://www.8bit-era.cz/6800.html#INH-desc)) | [**CMPGX**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**CMPSYM**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**LDAGX**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**STAGX**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) |  |  |  |  |  |  |
| **C7\_** | [**TGX**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**TXG**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**CLRGH**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**IFLOAT**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**FIXRND**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**TMULT**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**BUFIN**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**BUFOUT**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**SEABNK**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**DEVIN**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) | [**DEVOUT**](http://www.8bit-era.cz/6800.html#NOP-INH)([INH](http://www.8bit-era.cz/6800.html#INH-desc)) |  |  |  |  |  |

**Abbreviations:**

**4052/4054 and 4052A/4054A Addressing modes (same as 6800):**

**ACC** - Accumulator

In accumulator addressing, either accumulator A or accumulator B is specified. These are 1- byte instructions.  
**Ex: ABA** adds the contents of accumulators and stores the result in accumulator A

**IMM** - Immediate

In immediate addressing, operand is located immediately after the opcode in the second byte of the instruction in program memory (except LDS and LDX where the operand is in the second and third bytes of the instruction). These are 2-byte or 3-byte instructions.  
**Ex: LDAA #$25** loads the number (25)H into accumulator A

**DIR** - Direct

In direct addressing, the address of the operand is contained in the second byte of the instruction. Direct addressing allows the user to directly address the lowest 256 bytes of the memory, i.e, locations 0 through 255. Enhanced execution times are achieved by storing data in these locations. These are 2-byte instructions.  
**Ex: LDAA $25** loads the contents of the memory address (25)H into accumulator A

**EXT** - Extended

In extended addressing, the address contained in the second byte of the instruction is used as the higher eight bits of the address of the operand. The third byte of the instruction is used as the lower eight bits of the address for the operand. This is an absolute address in the memory. These are 3-byte instructions.  
**Ex: LDAA $1000** loads the contents of the memory address (1000)H into accumulator A

**IDX** - Indexed

In indexed addressing, the address contained in the second byte of the instruction is added to the index register’s lowest eight bits. The carry is then added to the higher order eight bits of the index register. This result is then used to address memory. The modified address is held in a temporary address register so there is no change to the index register. These are 2-byte instructions.  
**Ex: LDX #$1000** or **LDAA $10,X**  
Initially, LDX #$1000 instruction loads 1000H to the index register (X) using immediate addressing. Then LDAA $10,X instruction, using indexed addressing, loads the contents of memory address (10)H + X = 1010H into accumulator A.

**INH** - Implied (Inherent)

In the implied addressing mode, the instruction gives the address inherently (i.e., stack pointer, index register, etc.). Inherent instructions are used when

no operands need to be fetched. These are 1-byte instructions.  
**Ex: INX** increases the contents of the Index register by one. The address information is "inherent" in the instruction itself.  
**INCA** increases the contents of the accumulator A by one.  
**DECB** decreases the contents of the accumulator B by one.

**REL** - Relative

The relative addressing mode is used with most of the branching instructions on the 6802 microprocessor. The first byte of the instruction is the opcode. The second byte of the instruction is called the *offset*. The offset is interpreted as a *signed 7-bit number*. If the MSB (most significant bit) of the offset is 0, the number is positive, which indicates a forward branch. If the MSB of the offset is 1, the number is negative, which indicates a backward branch. This allows the user to address data in a range of -126 to +129 bytes of the present instruction. These are 2-byte instructions.

**Ex:**

PC Hex Label Instruction

0009 2004 BRA 0FH

**Data Space - A 0x0000-FFFF 56KB of DRAM + 8KB of DATA ROM**

**Fetch Space - B 0x0000-FFFF 48KB of BASIC ROM at 0x4000-0xFFFF plus 16KB of bank switched BASIC or option ROM Pack at 0x0000**

**6800, 4052/4054 &A and 4052A/4054A only registers:**

* **ACCA** Accumulator A = AL (6800 compatible)
  + **Extended to 16-bits AE = AH and AL**
* **ACCG is 16-bit extension of A where A is low order 8-bits**
* **ACCB** Accumulator B=BL (6800 compatible)
* **Extended to 16-bits BE = BH and BL**
* **ACCX is Accumulator ACCA or ACCB**
* **X** Index register XH and XL
* **PC** Program Counter PCH and PCL
* **SP** Stack Pointer SPH and SPL
* **CC** Status register

**CC status register:**

1. **C** Carry/Borrow status
2. **V** Two’s complement / overflow indicator
3. **Z** Zero status
4. **N** Sign/Negative status
5. **I**  Interrupt Mask status
6. **H** Half carry
7. **D** Data Space Indicator (1 🡪 A)
8. **F** Fetch Space Indicator (1 🡪 B)

**Symbols in the STATUSES column:**

* **(blank)** operation does not affect status
* **x** operation affects status
* **0** flag is cleared by the operation
* **1** flag is set by the operation

**data8** 8-bit immediate data

**data16** 16-bit immediate data

**addr8** 8-bit direct address

**addr16** 16-bit extended address

**disp** 8-bit signed address displacement

**[(HI)](http://www.8bit-era.cz/6800.html" \l "HI-desc)** bits 15-8 from 16bit value

**[(LO)](http://www.8bit-era.cz/6800.html" \l "LO-desc)** bits 7-0 from 16bit value

**[...]** content of ...

**[[...]]** implied addressing (content of [content of ...])

**∧** Logical AND

**∨** Logical OR

**⊻** Logical Exclusive-OR

**←** Data is transferred in the direction of the arrow

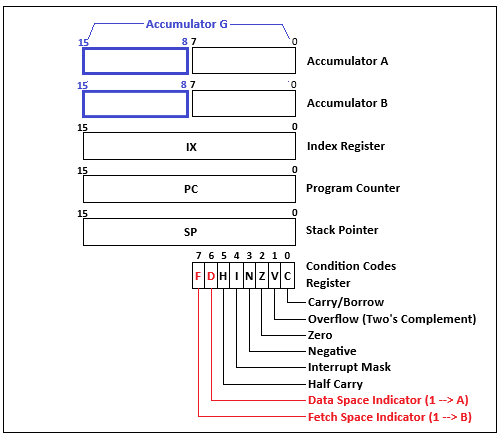


Figure - 4052/4054 and 4052A/4054A Registers

**Opcodes added for the 4052/4054**ADAX Add A to Index RegisterADXI Add to Index Register. ImmediateASPI Add to Stack Pointer ImmediateCBUG Clear Debug Interrupt VectorsCPCH Call Code in Patch SpaceCPX Compare Index RegisterFADD Floating Point AddFDIV Floating Point DivideFDUP Duplicate Floating PointFMUL Floating Point MultiplyFNRM Normalize Floating PointFPSH Push Floating PointFPUL Pull Floating PointFSUB Floating Point SubtractFSWP Swap Floating PointJMPAX Jump Double-IndexedJMPIN Jump IndirectLDAX Load A Register. Double-IndexedLDBX Load B Register. Double-IndexedLDXX Load X Register. Double-IndexedMOVLR Block Move Low to HighMOVRL Block Move Low to HighNEG Negate (2's complement)PCH Jump to Code in Patch SpacePSHRET Push Return Address on . Special StackPSHX Push X on the StackPULX Pull X from the StackRTRN Return Via the Special StackSBUG Set Debug Interrupt VectorsSDA Set Data Space to ASDB Set Data Space to BSFA Set Fetch Space to ASTAX Store B Register. Double- IndexedSTRK Compute StrokeTAP A --> CC Not including Space BitsTAPX A --> CC Including Space BitsTEST Microcode RestartTPA CC --> A Not including. Space BitsTPAX CC --> A Including Space BitsVECT Compute VectorWADX Add Memory to Index

**Opcodes added to 4052A/4054A**ADDG Add to G AccumulatorBUFIN Read a buffer from the GPIBBUFOUT Write a buffer to the GPIBCLRGH Clear High Byte of GCMPGX Compare G and XCMPSYM Compare Name in a Symbol Table RecordDEVIN Read a buffer from an I/O. Device

DEVOUT Write a buffer to an I/O DeviceFIXRND Round a Float to an IntegerIFLOAT Convert an Integer to a FloatINXSTX Increment Index Register and. Store ItLDAG Load G AccumulatorLDAGX Load G Accumulator. Double-Indexed

PSHG Push G on the StackPULG Pull G from the StackSEABNK Search for a CALL name in a. ROM bankSTAG Store G AccumulatorSTAGX Store G Accumulator. Double-IndexedSUBG Subtract from G AccumulatorTGX Transfer G to the Index RegisterTMULT Multiply a 6-byte Integer by 10TXG Transfer the Index Register to GWADGX Add G to Index Extended**16-bit Extensions to 6800 instructions for 4052A/4054A**[ABA](#ABA) Add 16-bit BE to 16-bit AE[ADD](#ADD) Add 8-bit value to AE or BE[ASL](#ASL) Arithmetic Shift Left AE or BE[CLR](#CLR) Clear AE or BE[COM](#COM) Complement AE or BE[DEC](#DEC) Decrement AE or BE[INC](#INC) Increment AE or BE[LDA](#LDA) Load AE or BE from Memory[PUL](#PUL) Pull Data from Stack to AE | BE [RTI](#RTI) Return from Interrupt[SBA](#SBA) Subtract BE from AE[SUB](#SUB) Subtract Memory from AE | BE [SWI](#SWI) Software Interrupt [TAB](#TAB) Transfer AE to BE[TBA](#TBA) Transfer BE to AE [WAI](#WAI) Wait for Interrupt

**6800 instructions**[ABA](#ABA) ADD B to A[ADC](#ADC) ADD Memory contents + Carry

to Accumulator

[ADD](#ADD) ADD Memory contents to

Accumulator

[AND](#AND) Memory contents AND the

Accumulator to the Accumulator

[ASL](#ASL) Arithmetic Shift Left. Bit 0 set 0 (multiplying by two)

[ASR](#ASR) Arithmetic Shift Right. Bit 7 stays the same

[BCC](#BCC) Branch if Carry Clear

[BCS](#BCS) Branch if Carry Set

[BEQ](#BEQ) Branch if Equal to zero

[BGE](#BGE) Branch if Greater or Equal to zero

[BGT](#BGT) Branch if Greater than zero

[BHI](#BHI) Branch if Accumulator contents

higher than comparand

[BIT](#BIT) Memory contents AND the

Accumulator, only Status is affected

[BLE](#BLE) Branch if Less than or Equal zero

[BLS](#BLS) Branch if Accumulator contents

less than or same as comparand

[BLT](#BLT) Branch if Less Than zero

[BMI](#BMI) Branch if Minus

[BNE](#BNE) Branch if Not Equal zero

[BPL](#BPL) Branch if Plus

[BRA](#BRA) Unconditional branch relative to

present Program Counter contents

[BSR](#BSR) Unconditional branch to Subroutine located relative to PC contents

[BVC](#BVC) Branch if overflow clear

[BVS](#BVS) Branch if overflow set

[CBA](#CBA) Compare A AND B. Only status is . affected

[CLC](#CLC) Clear the Carry flag

[CLI](#CLI) Clear the Interrupt flag to enable

Interrupts

[CLR](#CLR) Clear ACC, Memory or Overflow

[CLV](#CLV) Clear overflow flag

[CMP](#CMP) Compare Memory contents AND

Accumulator. Only Status affected

[COM](#COM) Complement ACC or Memory

[CPX](#CPX) Compare Memory contents to X

[DAA](#DAA) Decimal Adjust Accumulator A

[DEC](#DEC) Decrement Accumulator or Memory

[DES](#DES) Decrement Stack Pointer

[DEX](#DEX) Decrement Index register X

[EOR](#EOR) Memory Exclusive OR Accumulator

[INC](#INC) Increment Accumulator or Memory

[INS](#INS) Increment the Stack Pointer

[INX](#INX) Increment the Index Register X

[JMP](#JMP) Jump

[JSR](#JSR) Jump to Subroutine

[LDA](#LDA) Load Accumulator from Memory

[LDS](#LDS) Load the Stack Pointer

[LDX](#LDX) Load the Index Register X

[LSR](#LSR) Logical Shift Right . Bit7 set to zero.(dividing by two)

[NEG](#NEG) NEGATE the Accumulator or . Memory

[NOP](#NOP) No operation

[ORA](#ORA) OR the Accumulator

[PSH](#PSH) Push Accumulator onto the Stack

[PUL](#PUL) Pull Data from Stack to . Accumulator

[ROL](#ROL) Rotate Left through Carry

[ROR](#RTI) Rotate Right through Carry

[RTI](#RTI) Return from Interrupt

[RTS](#RTS) Return from Subroutine

[SBA](#SBA) Subtract B from A

[SBC](#SBC) Subtract Memory and Carry flag . from Accumulator

[SEC](#SEC) Set the Carry flag

[SEI](#SEI) Set the Interrupt flag

[SEV](#SEV) Set the Overflow flag

[STA](#STA) Store Accumulator in Memory

[STS](#STS) Store Stack Pointer

[STX](#STX) Store Index Register X

[SUB](#SUB) SUBTRACT Memory contents . from Accumulator

[SWI](#SWI) Software Interrupt

[TAB](#TAB) Transfer A to B

[TAP](#TAP) Transfer A to Status Register

[TBA](#TBA) Transfer B to A

[TPA](#TPA) Transfer Status Register to A

[TST](#TST) Test the Accumulator

[TSX](#TSX) Move Stack Pointer to X and INC

[TXS](#TXS) Move X to Stack Pointer and DEC

[WAI](#WAI) Wait for Interrupt

6800 OPCODE DETAILS

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MNEMO | SYNTAX | MODE | BYTES | CODE | CYCLES | C | Z | S | O | Ac | I | SYMBOLIC OPERATION | DESCRIPTION |
| ABA | ABA | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $1B | 2 | x | x | x | x | x | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] + [[B](http://www.8bit-era.cz/6800.html#B-reg)]  For 4052A & 4054A: [AE] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [AE] + [BE] | Add [B](http://www.8bit-era.cz/6800.html#B-reg) to [A](http://www.8bit-era.cz/6800.html#A-reg)  Condition Codes based on low byte of A-same as 6800 |
| ADC | ADC [A](http://www.8bit-era.cz/6800.html" \l "A-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $89 | 2 | x | x | x | x | x | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] + [data8](http://www.8bit-era.cz/6800.html#data8-desc) + C | Add contents of Memory + Carry Flag to Accumulator |
| ADC [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $99 | 3 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] + [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] + C |
| ADC [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $A9 | 5 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] + [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] + C |
| ADC [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $B9 | 4 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] + [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] + C |
| ADC [B](http://www.8bit-era.cz/6800.html" \l "B-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $C9 | 2 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] + [data8](http://www.8bit-era.cz/6800.html#data8-desc) + C |
| ADC [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $D9 | 3 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] + [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] + C |
| ADC [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $E9 | 5 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] + [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] + C |
| ADC [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $F9 | 4 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] + [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] + C |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ADD | ADD [A](http://www.8bit-era.cz/6800.html" \l "A-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $8B | 2 | x | x | x | x | x | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] + [data8](http://www.8bit-era.cz/6800.html#data8-desc)  For 4052A & 4054A: [[A](http://www.8bit-era.cz/6800.html#A-reg)L] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)L] + data8 [AH] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)H] + C | Add Memory contents to the Accumulator  Condition Codes based on low byte of A - same as 6800 |
| ADD [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $9B | 3 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] + [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)]  For 4052A & 4054A: [[A](http://www.8bit-era.cz/6800.html#A-reg)L] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)L] + [addr8] [AH] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)H] + C |
| ADD [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $AB | 5 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] + [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]]  For 4052A & 4054A: [[A](http://www.8bit-era.cz/6800.html#A-reg)L] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)L] + [X] [AH] [←](http://www.8bit-era.cz/6800.html#transfer-desc) Trash bits |
| ADD [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $BB | 4 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] + [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)]  For 4052A & 4054A: [[A](http://www.8bit-era.cz/6800.html#A-reg)L] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)L] + [addr16] [AH] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)H] + C |
| ADD [B](http://www.8bit-era.cz/6800.html" \l "B-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $CB | 2 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] + [data8](http://www.8bit-era.cz/6800.html#data8-desc)  For 4052A & 4054A: [BL] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [BL] + [data8] [BH] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [BH] + C |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ADD [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $DB | 3 |  |  |  |  |  |  | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] + [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)]  For 4052A & 4054A: [BL] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [BL] + [addr8] [BH] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [BH] + C |  |
| ADD [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $EB | 5 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] + [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]]  For 4052A & 4054A: [BL] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [BL] + [data8 + [X]} [BH] [←](http://www.8bit-era.cz/6800.html#transfer-desc) Trashed bits |
| ADD [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $FB | 4 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] + [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)]  For 4052A & 4054A: [BL] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [BL] + [addr16] [BH] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [BH] + C |
| AND | AND [A](http://www.8bit-era.cz/6800.html" \l "A-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $84 | 2 | - | x | x | 0 | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] [∧](http://www.8bit-era.cz/6800.html#AND-desc) [data8](http://www.8bit-era.cz/6800.html#data8-desc) | Memory contents AND the Accumulator to the Accumulator |
| AND [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $94 | 3 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] [∧](http://www.8bit-era.cz/6800.html#AND-desc) [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] |
| AND [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $A4 | 5 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] [∧](http://www.8bit-era.cz/6800.html#AND-desc) [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] |
| AND [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $B4 | 4 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] [∧](http://www.8bit-era.cz/6800.html#AND-desc) [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] |
| AND [B](http://www.8bit-era.cz/6800.html" \l "B-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $C4 | 2 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] [∧](http://www.8bit-era.cz/6800.html#AND-desc) [data8](http://www.8bit-era.cz/6800.html#data8-desc) |
| AND [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $D4 | 3 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] [∧](http://www.8bit-era.cz/6800.html#AND-desc) [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] |
| AND [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $E4 | 5 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] [∧](http://www.8bit-era.cz/6800.html#AND-desc) [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] |
| AND [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $F4 | 4 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] [∧](http://www.8bit-era.cz/6800.html#AND-desc) [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] |
| ASL | ASL [A](http://www.8bit-era.cz/6800.html" \l "A-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $48 | 2 | x | x | x | x | - | - | C ← 76543210 ← 0  For 4052A & 4054A:  C ← 16-bit ACCX ← 0 | Arithmetic Shift Left. Bit 0 is set to 0. (multiplying by two)  Condition Codes based on low byte - same as 6800 |
| ASL [B](http://www.8bit-era.cz/6800.html" \l "B-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $58 | 2 |
| ASL [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $68 | 7 |
| ASL [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $78 | 6 |
| ASR | ASR [A](http://www.8bit-era.cz/6800.html" \l "A-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $47 | 2 | x | x | x | x | - | - | 76543210 → C | Arithmetic Shift Right. Bit 7 stays the same. |
| ASR [B](http://www.8bit-era.cz/6800.html" \l "B-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $57 | 2 |
| ASR [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $67 | 7 |
| ASR [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $77 | 6 |
| BCC | BCC [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) | [REL](http://www.8bit-era.cz/6800.html#REL-desc) | 2 | $24 | 4 | - | - | - | - | - | - | (C == 0) ? {[[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] + [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) + 2} | Branch if carry clear |
| BCS | BCS [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) | [REL](http://www.8bit-era.cz/6800.html#REL-desc) | 2 | $25 | 4 | - | - | - | - | - | - | (C == 1) ? {[[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] + [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) + 2} | Branch if carry set |
| BEQ | BEQ [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) | [REL](http://www.8bit-era.cz/6800.html#REL-desc) | 2 | $27 | 4 | - | - | - | - | - | - | (Z == 1) ? {[[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] + [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) + 2} | Branch if equal to zero |
| BGE | BGE [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) | [REL](http://www.8bit-era.cz/6800.html#REL-desc) | 2 | $2C | 4 | - | - | - | - | - | - | (S [⊻](http://www.8bit-era.cz/6800.html#XOR-desc) O == 0) ? {[[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] + [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) + 2} | Branch if greater than or equal to zero |
| BGT | BGT [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) | [REL](http://www.8bit-era.cz/6800.html#REL-desc) | 2 | $2E | 4 | - | - | - | - | - | - | (Z [∨](http://www.8bit-era.cz/6800.html#OR-desc) (S [⊻](http://www.8bit-era.cz/6800.html#XOR-desc) O) == 0) ? {[[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] + [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) + 2} | Branch if greater than zero |
| BHI | BHI [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) | [REL](http://www.8bit-era.cz/6800.html#REL-desc) | 2 | $22 | 4 | - | - | - | - | - | - | (C [∨](http://www.8bit-era.cz/6800.html#OR-desc) Z == 0) ? {[[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] + [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) + 2} | Branch if Accumulator contents higher than comparand |
| BIT | BIT [A](http://www.8bit-era.cz/6800.html" \l "A-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $85 | 2 | - | x | x | 0 | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [∧](http://www.8bit-era.cz/6800.html#AND-desc) [data8](http://www.8bit-era.cz/6800.html#data8-desc) | Memory contents AND the Accumulator, but only Status register is affected. |
| BIT [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $95 | 3 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [∧](http://www.8bit-era.cz/6800.html#AND-desc) [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] |
| BIT [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $A5 | 5 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [∧](http://www.8bit-era.cz/6800.html#AND-desc) [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] |
| BIT [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $B5 | 4 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [∧](http://www.8bit-era.cz/6800.html#AND-desc) [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] |
| BIT [B](http://www.8bit-era.cz/6800.html" \l "B-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $C5 | 2 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [∧](http://www.8bit-era.cz/6800.html#AND-desc) [data8](http://www.8bit-era.cz/6800.html#data8-desc) |
| BIT [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $D5 | 3 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [∧](http://www.8bit-era.cz/6800.html#AND-desc) [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] |
| BIT [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $E5 | 5 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [∧](http://www.8bit-era.cz/6800.html#AND-desc) [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] |
| BIT [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $F5 | 4 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [∧](http://www.8bit-era.cz/6800.html#AND-desc) [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] |
| BLE | BLE [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) | [REL](http://www.8bit-era.cz/6800.html#REL-desc) | 2 | $2F | 4 | - | - | - | - | - | - | (Z [∨](http://www.8bit-era.cz/6800.html#OR-desc) (S [⊻](http://www.8bit-era.cz/6800.html#XOR-desc) O) == 1) ? {[[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] + [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) + 2} | Branch if less than or equal to zero |
| BLS | BLS [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) | [REL](http://www.8bit-era.cz/6800.html#REL-desc) | 2 | $23 | 4 | - | - | - | - | - | - | (C [∨](http://www.8bit-era.cz/6800.html#OR-desc) Z == 1) ? {[[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] + [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) + 2} | Branch if Accumulator contents less than or same as comparand |
| BLT | BLT [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) | [REL](http://www.8bit-era.cz/6800.html#REL-desc) | 2 | $2D | 4 | - | - | - | - | - | - | (S [⊻](http://www.8bit-era.cz/6800.html#XOR-desc) O == 1) ? {[[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] + [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) + 2} | Branch if less than zero |
| BMI | BMI [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) | [REL](http://www.8bit-era.cz/6800.html#REL-desc) | 2 | $2B | 4 | - | - | - | - | - | - | (S == 1) ? {[[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] + [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) + 2} | Branch if minus |
| BNE | BNE [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) | [REL](http://www.8bit-era.cz/6800.html#REL-desc) | 2 | $26 | 4 | - | - | - | - | - | - | (Z == 0) ? {[[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] + [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) + 2} | Branch if not equal to zero |
| BPL | BPL [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) | [REL](http://www.8bit-era.cz/6800.html#REL-desc) | 2 | $2A | 4 | - | - | - | - | - | - | (S == 0) ? {[[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] + [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) + 2} | Branch if plus |
| BRA | BRA [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) | [REL](http://www.8bit-era.cz/6800.html#REL-desc) | 2 | $20 | 4 | - | - | - | - | - | - | [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] + [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) + 2 | Unconditional branch relative to present Program Counter contents. |
| BSR | BSR [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) | [REL](http://www.8bit-era.cz/6800.html#REL-desc) | 2 | $8D | 8 | - | - | - | - | - | - | [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 1] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 2, [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] + [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) + 2 | Unconditional branch to subroutine located relative to present Program Counter contents. |
| BVC | BVC [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) | [REL](http://www.8bit-era.cz/6800.html#REL-desc) | 2 | $28 | 4 | - | - | - | - | - | - | (O == 0) ? {[[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] + [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) + 2} | Branch if overflow clear |
| BVS | BVS [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) | [REL](http://www.8bit-era.cz/6800.html#REL-desc) | 2 | $29 | 4 | - | - | - | - | - | - | (O == 1) ? {[[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] + [disp](http://www.8bit-era.cz/6800.html" \l "disp-desc) + 2} | Branch if overflow set |
| CBA | CBA | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $11 | 2 | x | x | x | x | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] - [[B](http://www.8bit-era.cz/6800.html#B-reg)] | Compare contents of Accumulators [A](http://www.8bit-era.cz/6800.html#A-reg) and [B](http://www.8bit-era.cz/6800.html#B-reg). Only the Status register is affected. |
| CLC | CLC | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $0C | 2 | 0 | - | - | - | - | - | C [←](http://www.8bit-era.cz/6800.html#transfer-desc) 0 | Clear the Carry Flag |
| CLI | CLI | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $0E | 2 | - | - | - | - | - | 0 | I [←](http://www.8bit-era.cz/6800.html#transfer-desc) 0 | Clear the Interrupt flag to enable interrupts |
| CLR | CLR [A](http://www.8bit-era.cz/6800.html" \l "A-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $4F | 2 | 0 | 1 | 0 | 0 | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) 0  For 4052A & 4054A:  [AE]← 0 | Clear the Accumulator  Condition Codes based on low byte - same as 6800 |
| CLR [B](http://www.8bit-era.cz/6800.html" \l "B-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $5F | 2 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) 0  For 4052A & 4054A:  [BE] ← 0 |
| CLR [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $6F | 7 | [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc) 0 | Clear the Memory location |
| CLR [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $7F | 6 | [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) 0 |
| CLV | CLV | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $0A | 2 | - | - | - | 0 | - | - | O [←](http://www.8bit-era.cz/6800.html#transfer-desc) 0 | Clear the Overflow flag |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CMP | CMP [A](http://www.8bit-era.cz/6800.html" \l "A-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $81 | 2 | x | x | x | x | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] - [data8](http://www.8bit-era.cz/6800.html#data8-desc) | Compare the contents of Memory and Accumulator. Only the Status register is affected. |
| CMP [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $91 | 3 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] - [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] |
| CMP [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $A1 | 5 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] - [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] |
| CMP [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $B1 | 4 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] - [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] |
| CMP [B](http://www.8bit-era.cz/6800.html" \l "B-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $C1 | 2 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] - [data8](http://www.8bit-era.cz/6800.html#data8-desc) |
| CMP [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $D1 | 3 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] - [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] |
| CMP [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $E1 | 5 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] - [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] |
| CMP [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $F1 | 4 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] - [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] |
| COM | COM [A](http://www.8bit-era.cz/6800.html" \l "A-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $43 | 2 | 1 | x | x | 0 | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) $FF - [[A](http://www.8bit-era.cz/6800.html#A-reg)]  For 4052A & 4054A:  [[A](http://www.8bit-era.cz/6800.html#A-reg)E] [←](http://www.8bit-era.cz/6800.html#transfer-desc) $FFFF - [[A](http://www.8bit-era.cz/6800.html#A-reg)E] | Complement the Accumulator  Condition Codes based on low byte - same as 6800 |
| COM [B](http://www.8bit-era.cz/6800.html" \l "B-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $53 | 2 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) $FF - [[B](http://www.8bit-era.cz/6800.html#B-reg)]  For 4052A & 4054A:  [BE] [←](http://www.8bit-era.cz/6800.html#transfer-desc) $FFFF - [BE] |
| COM [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $63 | 7 | [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc) $FF - [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] | Complement the Memory Location |
| COM [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $73 | 6 | [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) $FF - [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] |
| CPX | CPX [addr8](http://www.8bit-era.cz/6800.html" \l "addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $9C | 4 | - | x | x | x | - | - | [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] - [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)], [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] - [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc) + 1] | Compare the contents of Memory to the Index Register [X](http://www.8bit-era.cz/6800.html#X-reg) |
| CPX [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $AC | 6 | [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] - [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]], [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] - [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)] + 1] |
| CPX #[data16](http://www.8bit-era.cz/6800.html" \l "data16-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 3 | $8C | 3 | [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] - [data16](http://www.8bit-era.cz/6800.html#data16-desc)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc), [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] - [data16](http://www.8bit-era.cz/6800.html#data16-desc)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc) |
| CPX [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $BC | 5 | [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] - [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] - [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] |
| DAA | DAA | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $19 | 2 | x | x | x | x | - | - |  | Decimal Adjust Accumulator [A](http://www.8bit-era.cz/6800.html#A-reg) |
| DEC | DEC [A](http://www.8bit-era.cz/6800.html" \l "A-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $4A | 2 | - | x | x | x | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] – 1  For 4052A & 4054A:  [[A](http://www.8bit-era.cz/6800.html#A-reg)E] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)E] – 1 | Decrement the Accumulator  Condition Codes based on low byte - same as 6800 |
| DEC [B](http://www.8bit-era.cz/6800.html" \l "B-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $5A | 2 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] – 1  For 4052A & 4054A:  [BE] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [BE] – 1 |
| DEC [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $6A | 7 | [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] - 1 | Decrement the Memory Location |
| DEC [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $7A | 6 | [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] - 1 |
| DES | DES | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $34 | 4 | - | - | - | - | - | - | [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 1 | Decrement the Stack Pointer |
| DEX | DEX | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $09 | 4 | - | x | - | - | - | - | [[X](http://www.8bit-era.cz/6800.html#X-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)] - 1 | Decrement the Index Register [X](http://www.8bit-era.cz/6800.html#X-reg) |
| EOR | EOR [A](http://www.8bit-era.cz/6800.html" \l "A-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $88 | 2 | - | x | x | 0 | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] [⊻](http://www.8bit-era.cz/6800.html#XOR-desc) [data8](http://www.8bit-era.cz/6800.html#data8-desc) | Memory contents EXLCLUSIVE OR the Accumulator |
| EOR [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $98 | 3 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] [⊻](http://www.8bit-era.cz/6800.html#XOR-desc) [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] |
| EOR [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $A8 | 5 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] [⊻](http://www.8bit-era.cz/6800.html#XOR-desc) [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] |
| EOR [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $B8 | 4 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] [⊻](http://www.8bit-era.cz/6800.html#XOR-desc) [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] |
| EOR [B](http://www.8bit-era.cz/6800.html" \l "B-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $C8 | 2 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] [⊻](http://www.8bit-era.cz/6800.html#XOR-desc) [data8](http://www.8bit-era.cz/6800.html#data8-desc) |
| EOR [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $D8 | 3 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] [⊻](http://www.8bit-era.cz/6800.html#XOR-desc) [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] |
| EOR [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $E8 | 5 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] [⊻](http://www.8bit-era.cz/6800.html#XOR-desc) [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] |
| EOR [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $F8 | 4 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] [⊻](http://www.8bit-era.cz/6800.html#XOR-desc) [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] |
| INC | INC [A](http://www.8bit-era.cz/6800.html" \l "A-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $4C | 2 | - | x | x | x | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] + 1  For 4052A & 4054A:  [[A](http://www.8bit-era.cz/6800.html#A-reg)E] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)E] + 1 | Increment the Accumulator  Condition Codes based on low byte - same as 6800 |
| INC [B](http://www.8bit-era.cz/6800.html" \l "B-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $5C | 2 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] + 1  For 4052A & 4054A:  [[B](http://www.8bit-era.cz/6800.html#A-reg)E] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#A-reg)E] + 1 |
| INC [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $6C | 7 | [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] + 1 | Increment the Memory Location |
| INC [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $7C | 6 | [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] + 1 |
| INS | INS | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $31 | 4 | - | - | - | - | - | - | [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 1 | Increment the Stack Pointer |
| INX | INX | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $08 | 4 | - | x | - | - | - | - | [[X](http://www.8bit-era.cz/6800.html#X-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)] + 1 | Increment the Index Register [X](http://www.8bit-era.cz/6800.html#X-reg) |
| JMP | JMP [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $6E | 4 | - | - | - | - | - | - | [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)] | Jump |
| JMP [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $7E | 3 | [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) |
| JSR | JSR [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $AD | 8 | - | - | - | - | - | - | [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 1] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 2, [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)] | Jump to Subroutine |
| JSR [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $BD | 9 | [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 1] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 2, [[PC](http://www.8bit-era.cz/6800.html#PC-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) |
| LDA | LDA [A](http://www.8bit-era.cz/6800.html" \l "A-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $86 | 2 | - | x | x | 0 | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [data8](http://www.8bit-era.cz/6800.html#data8-desc)  For 4052A & 4054A:  [[A](http://www.8bit-era.cz/6800.html#A-reg)L] [←](http://www.8bit-era.cz/6800.html#transfer-desc) data8  [AH] [←](http://www.8bit-era.cz/6800.html#transfer-desc)0 | Load Accumulator from Memory  Condition Codes based on low byte - same as 6800 |
| LDA [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $96 | 3 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)]  For 4052A & 4054A:  [[A](http://www.8bit-era.cz/6800.html#A-reg)L] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [addr8]  [AH] [←](http://www.8bit-era.cz/6800.html#transfer-desc)0 |
| LDA [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $A6 | 5 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]]  For 4052A & 4054A:  [[A](http://www.8bit-era.cz/6800.html#A-reg)L] [←](http://www.8bit-era.cz/6800.html#transfer-desc) data8  [AH] [←](http://www.8bit-era.cz/6800.html#transfer-desc)Trash bits |
| LDA [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $B6 | 4 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)]  For 4052A & 4054A:  [[A](http://www.8bit-era.cz/6800.html#A-reg)L] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [addr16]  [AH] [←](http://www.8bit-era.cz/6800.html#transfer-desc)0 |
| LDA [B](http://www.8bit-era.cz/6800.html" \l "B-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $C6 | 2 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [data8](http://www.8bit-era.cz/6800.html#data8-desc)  For 4052A & 4054A:  [[B](http://www.8bit-era.cz/6800.html#A-reg)L] [←](http://www.8bit-era.cz/6800.html#transfer-desc) data8  [BH] [←](http://www.8bit-era.cz/6800.html#transfer-desc)0 |
| LDA [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $D6 | 3 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)]  For 4052A & 4054A:  [[B](http://www.8bit-era.cz/6800.html#A-reg)L] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [addr8]  [BH] [←](http://www.8bit-era.cz/6800.html#transfer-desc)0 |
| LDA [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $E6 | 5 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]]  For 4052A & 4054A:  [BL] [←](http://www.8bit-era.cz/6800.html#transfer-desc) data8  [BH] [←](http://www.8bit-era.cz/6800.html#transfer-desc)Trash bits |
| LDA [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $F6 | 4 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)]  For 4052A & 4054A:  [BL] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [addr16]  [BH] [←](http://www.8bit-era.cz/6800.html#transfer-desc)0 |
| LDS | LDS [addr8](http://www.8bit-era.cz/6800.html" \l "addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $9E | 4 | - | x | x | 0 | - | - | [[SP](http://www.8bit-era.cz/6800.html#SP-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)], [[SP](http://www.8bit-era.cz/6800.html#SP-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc) + 1] | Load the Stack Pointer |
| LDS [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $AE | 6 | [[SP](http://www.8bit-era.cz/6800.html#SP-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]], [[SP](http://www.8bit-era.cz/6800.html#SP-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)] + 1] |
| LDS #[data16](http://www.8bit-era.cz/6800.html" \l "data16-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 3 | $8E | 3 | [[SP](http://www.8bit-era.cz/6800.html#SP-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [data16](http://www.8bit-era.cz/6800.html#data16-desc)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc), [[SP](http://www.8bit-era.cz/6800.html#SP-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [data16](http://www.8bit-era.cz/6800.html#data16-desc)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc) |
| LDS [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $BE | 5 | [[SP](http://www.8bit-era.cz/6800.html#SP-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[SP](http://www.8bit-era.cz/6800.html#SP-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] |
| LDX | LDX [addr8](http://www.8bit-era.cz/6800.html" \l "addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $DE | 4 | - | x | x | 0 | - | - | [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)], [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc) + 1] | Load the Index Register |
| LDX [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $EE | 6 | [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]], [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)] + 1] |
| LDX #[data16](http://www.8bit-era.cz/6800.html" \l "data16-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 3 | $CE | 3 | [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [data16](http://www.8bit-era.cz/6800.html#data16-desc)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc), [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [data16](http://www.8bit-era.cz/6800.html#data16-desc)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc) |
| LDX [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $FE | 5 | [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] |
| LSR | LSR [A](http://www.8bit-era.cz/6800.html" \l "A-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $44 | 2 | x | x | 0 | x | - | - | 0 → 76543210 → C | Logical Shift Right. Bit 7 is set to 0. (dividing by two) |
| LSR [B](http://www.8bit-era.cz/6800.html" \l "B-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $54 | 2 |
| LSR [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $64 | 7 |
| LSR [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $74 | 6 |
| NEG | NEG [A](http://www.8bit-era.cz/6800.html" \l "A-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $40 | 2 | x | x | x | x | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) 0 - [[A](http://www.8bit-era.cz/6800.html#A-reg)] | Negate the Accumulator |
| NEG [B](http://www.8bit-era.cz/6800.html" \l "B-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $50 | 2 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) 0 - [[B](http://www.8bit-era.cz/6800.html#B-reg)] |
| NEG [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $60 | 7 | [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc) 0 - [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] | Negate the Memory Location |
| NEG [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $70 | 6 | [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) 0 - [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] |
| NOP | NOP | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $01 | 2 | - | - | - | - | - | - |  | No Operation |
| ORA | ORA [A](http://www.8bit-era.cz/6800.html" \l "A-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $8A | 2 | - | x | x | 0 | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] [∨](http://www.8bit-era.cz/6800.html#OR-desc) [data8](http://www.8bit-era.cz/6800.html#data8-desc) | OR the Accumulator |
| ORA [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $9A | 3 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] [∨](http://www.8bit-era.cz/6800.html#OR-desc) [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] |
| ORA [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $AA | 5 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] [∨](http://www.8bit-era.cz/6800.html#OR-desc) [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] |
| ORA [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $BA | 4 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] [∨](http://www.8bit-era.cz/6800.html#OR-desc) [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] |
| ORA [B](http://www.8bit-era.cz/6800.html" \l "B-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $CA | 2 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] [∨](http://www.8bit-era.cz/6800.html#OR-desc) [data8](http://www.8bit-era.cz/6800.html#data8-desc) |
| ORA [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $DA | 3 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] [∨](http://www.8bit-era.cz/6800.html#OR-desc) [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] |
| ORA [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $EA | 5 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] [∨](http://www.8bit-era.cz/6800.html#OR-desc) [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] |
| ORA [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $FA | 4 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] [∨](http://www.8bit-era.cz/6800.html#OR-desc) [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] |
| PSH | PSH [A](http://www.8bit-era.cz/6800.html" \l "A-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $36 | 4 | - | - | - | - | - | - | [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)], [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 1 | Push Accumulator onto the Stack |
| PSH [B](http://www.8bit-era.cz/6800.html" \l "B-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $37 | 4 | [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)], [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 1 |
| PUL | PUL [A](http://www.8bit-era.cz/6800.html" \l "A-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $32 | 4 | - | - | - | - | - | - | [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 1, [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)]]  For 4052A & 4054A:  [[A](http://www.8bit-era.cz/6800.html#A-reg)L] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)+1]],  [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 1  [[A](http://www.8bit-era.cz/6800.html#A-reg)H] [←](http://www.8bit-era.cz/6800.html#transfer-desc) Trash bits | Pull Data from Stack to Accumulator  Condition Codes based on low byte - same as 6800 |
| PUL [B](http://www.8bit-era.cz/6800.html" \l "B-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $33 | 4 | [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 1, [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)]]  For 4052A & 4054A:  [BL] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)+1]],  [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 1  [BH] [←](http://www.8bit-era.cz/6800.html#transfer-desc) Trash bits |
| ROL | ROL [A](http://www.8bit-era.cz/6800.html" \l "A-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $49 | 2 | x | x | x | x | - | - | C ← 76543210 ← C | Rotate left through Carry. |
| ROL [B](http://www.8bit-era.cz/6800.html" \l "B-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $59 | 2 |
| ROL [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $69 | 7 |
| ROL [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $79 | 6 |
| ROR | ROR [A](http://www.8bit-era.cz/6800.html" \l "A-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $46 | 2 | x | x | x | x | - | - | C → 76543210 → C | Rotate right through Carry. |
| ROR [B](http://www.8bit-era.cz/6800.html" \l "B-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $56 | 2 |
| ROR [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $66 | 7 |
| ROR [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $76 | 6 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RTI | RTI | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $3B | 10 | x | x | x | x | x | x | [[SR](http://www.8bit-era.cz/6800.html#SR-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 1], [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 2], [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 3], [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 4], [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 5], [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 6], [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 7], [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 7  For 4052A & 4054A: [[SR](http://www.8bit-era.cz/6800.html#SR-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 1], [[B](http://www.8bit-era.cz/6800.html#B-reg)L] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 2], [[A](http://www.8bit-era.cz/6800.html#A-reg)L] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 3], [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 4], [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 5], [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 6], [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 7], [[B](http://www.8bit-era.cz/6800.html#B-reg)H] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 8], [BL] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 9], (ignored) [AH] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 10], (G reg) [[A](http://www.8bit-era.cz/6800.html#A-reg)L] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 11], (ignored) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 11 | Return from interrupt. Put registers from Stack and increment Stack Pointer.  For 4052A & 4054A:  RTI pops 11 bytes (6800 popped only 7) to restore the hardware registers to the state they were before an interrupt occurred (or SWI [ODT only] or WAI [not used in 4052 or 4054]).  When the interrupt occurred, Status Register CC was pushed onto the stack and then the D and F bits in CC were set to 1  (1 --> Fetch B and Data A). |
| RTS | RTS | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $39 | 5 | - | - | - | - | - | - | [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 1], [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 2], [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 2 | Return from subroutine. Pull [PC](http://www.8bit-era.cz/6800.html#PC-reg) from top of Stack and increment Stack Pointer. |
| SBA | SBA | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $10 | 2 | x | x | x | x | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] - [[B](http://www.8bit-era.cz/6800.html#B-reg)]  For 4052A & 4054A:  [[A](http://www.8bit-era.cz/6800.html#A-reg)E] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)E] - [[B](http://www.8bit-era.cz/6800.html#B-reg)E] | Subtract contents of Accumulator [B](http://www.8bit-era.cz/6800.html#B-reg) from those of Accumulator [A](http://www.8bit-era.cz/6800.html#A-reg).  Condition Codes based on low byte of A only - same as 6800 |
| SBC | SBC [A](http://www.8bit-era.cz/6800.html" \l "A-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $82 | 2 | x | x | x | x | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] - [data8](http://www.8bit-era.cz/6800.html#data8-desc) - C | Subtract Mem and Carry Flag from Accumulator |
| SBC [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $92 | 3 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] - [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] - C |
| SBC [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $A2 | 5 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] - [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] - C |
| SBC [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $B2 | 4 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] - [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] - C |
| SBC [B](http://www.8bit-era.cz/6800.html" \l "B-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $C2 | 2 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] - [data8](http://www.8bit-era.cz/6800.html#data8-desc) - C |
| SBC [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $D2 | 3 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] - [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] - C |
| SBC [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $E2 | 5 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] - [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] - C |
| SBC [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $F2 | 4 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] - [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] - C |
| SEC | SEC | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $0D | 2 | 1 | - | - | - | - | - | C [←](http://www.8bit-era.cz/6800.html#transfer-desc) 1 | Set the Carry Flag |
| SEI | SEI | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $0F | 2 | - | - | - | - | - | 1 | I [←](http://www.8bit-era.cz/6800.html#transfer-desc) 1 | Set the Interrupt Flag to disable interrupts |
| SEV | SEV | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $0B | 2 | - | - | - | 1 | - | - | O [←](http://www.8bit-era.cz/6800.html#transfer-desc) 1 | Set the Overflow Flag |
| STA | STA [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $97 | 4 | - | x | x | 0 | - | - | [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] | Store Accumulator in Memory |
| STA [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $A7 | 6 | [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] |
| STA [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $B7 | 5 | [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] |
| STA [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $D7 | 4 | [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] |
| STA [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $E7 | 6 | [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] |
| STA [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $F7 | 5 | [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] |
| STS | STS [addr8](http://www.8bit-era.cz/6800.html" \l "addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $9F | 5 | - | x | x | 0 | - | - | [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc) + 1] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] | Store the Stack Pointer |
| STS [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $AF | 7 | [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)] + 1] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] |
| STS [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $BF | 6 | [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] |
| STX | STX [addr8](http://www.8bit-era.cz/6800.html" \l "addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $DF | 5 | - | x | x | 0 | - | - | [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc) + 1] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] | Store the Index Register [X](http://www.8bit-era.cz/6800.html#X-reg) |
| STX [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $EF | 7 | [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)] + 1] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] |
| STX [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $FF | 6 | [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SUB | SUB [A](http://www.8bit-era.cz/6800.html" \l "A-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $80 | 2 | x | x | x | x | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] - [data8](http://www.8bit-era.cz/6800.html#data8-desc)  For 4052A & 4054A:  [[A](http://www.8bit-era.cz/6800.html#A-reg)E] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)E] - [data8](http://www.8bit-era.cz/6800.html#data8-desc) | Subtract Memory contents from Accumulator  Condition Codes based on low byte of A or B only - same as 6800 |
| SUB [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $90 | 3 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] - [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)]  For 4052A & 4054A:  [[A](http://www.8bit-era.cz/6800.html#A-reg)E] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)E] – [[addr8](http://www.8bit-era.cz/6800.html#data8-desc)] |
| SUB [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $A0 | 5 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] - [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]]  For 4052A & 4054A:  [[A](http://www.8bit-era.cz/6800.html#A-reg)L] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)L] – [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [X]]  [AH] [←](http://www.8bit-era.cz/6800.html#transfer-desc) Trash bits |
| SUB [A](http://www.8bit-era.cz/6800.html" \l "A-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $B0 | 4 | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] - [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)]  For 4052A & 4054A:  [[A](http://www.8bit-era.cz/6800.html#A-reg)E] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)E] – [addr16] |
| SUB [B](http://www.8bit-era.cz/6800.html" \l "B-reg) #[data8](http://www.8bit-era.cz/6800.html#data8-desc) | [IMM](http://www.8bit-era.cz/6800.html#IMM-desc) | 2 | $C0 | 2 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] - [data8](http://www.8bit-era.cz/6800.html#data8-desc)  For 4052A & 4054A:  [BE] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [BE] - [data8](http://www.8bit-era.cz/6800.html#data8-desc) |
| SUB [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr8](http://www.8bit-era.cz/6800.html#addr8-desc) | [DIR](http://www.8bit-era.cz/6800.html#DIR-desc) | 2 | $D0 | 3 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] - [[addr8](http://www.8bit-era.cz/6800.html#addr8-desc)]  For 4052A & 4054A:  [BE] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [BE] – [[addr8](http://www.8bit-era.cz/6800.html#data8-desc)] |
| SUB [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [data8](http://www.8bit-era.cz/6800.html#data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $E0 | 5 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] - [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]]  For 4052A & 4054A:  [BL] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [BL] – [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [X]]  [BH] [←](http://www.8bit-era.cz/6800.html#transfer-desc) Trash bits |
| SUB [B](http://www.8bit-era.cz/6800.html" \l "B-reg) [addr16](http://www.8bit-era.cz/6800.html#addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $F0 | 4 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)] - [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)]  For 4052A & 4054A:  [BE] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [BE] – [addr16] |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SWI | SWI | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $3F | 12 | - | - | - | - | - | 1 | [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 1] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 2] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 3] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 4] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 5] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 6] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SR](http://www.8bit-era.cz/6800.html#SR-reg)], [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 7, [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [$FFFA], [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [$FFFB]  For 4052A & 4054A:  [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc)[[A](http://www.8bit-era.cz/6800.html#A-reg)L],  [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 1] [←](http://www.8bit-era.cz/6800.html#transfer-desc)[[A](http://www.8bit-era.cz/6800.html#A-reg)H], (G register)  [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 2][←](http://www.8bit-era.cz/6800.html#transfer-desc)[BL],  [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 3][←](http://www.8bit-era.cz/6800.html#transfer-desc)[BH],  [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 4][←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 5] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 6] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 7] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 8] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)L], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 9] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)L], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 10] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SR](http://www.8bit-era.cz/6800.html#SR-reg)], [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] – 11 | Software Interrupt: push registers onto Stack, decrement Stack Pointer, and jump to interrupt subroutine.  For 4052A & 4054A:  RTI pops 11 bytes (6800 popped only 7) to restore the hardware registers to the state they were before an interrupt occurred (or SWI [ODT only] or WAI [not used in 4052 or 4054]).  When the interrupt occurred, Status Register CC was pushed onto the stack and then the D and F bits in CC were set to 1  (1 --> Fetch B and Data A). |
| TAB | TAB | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $16 | 2 | - | x | x | 0 | - | - | [[B](http://www.8bit-era.cz/6800.html#B-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)]  For 4052A & 4054A:  [[B](http://www.8bit-era.cz/6800.html#B-reg)E] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)E] | Transfer [A](http://www.8bit-era.cz/6800.html#A-reg) to [B](http://www.8bit-era.cz/6800.html#B-reg)  Condition Codes based on low byte of B only - same as 6800 |
| TAP | TAP | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $06 | 2 | x | x | x | x | x | - | [[SR](http://www.8bit-era.cz/6800.html#SR-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)] | Transfer [A](http://www.8bit-era.cz/6800.html#A-reg) to Status Register |
| TBA | TBA | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $17 | 2 | - | x | x | 0 | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)]  For 4052A & 4054A:  [AE] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [BE] | Transfer [B](http://www.8bit-era.cz/6800.html#B-reg) to [A](http://www.8bit-era.cz/6800.html#A-reg)  Condition Codes based on low byte of A only - same as 6800 |
| TPA | TPA | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $07 | 2 | - | - | - | - | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SR](http://www.8bit-era.cz/6800.html#SR-reg)] | Transfer Status Register to [A](http://www.8bit-era.cz/6800.html#A-reg) |
| TST | TST [A](http://www.8bit-era.cz/6800.html" \l "A-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $4D | 2 | 0 | x | x | 0 | - | - | [[A](http://www.8bit-era.cz/6800.html#A-reg)] - 0 | Test the Accumulator |
| TST [B](http://www.8bit-era.cz/6800.html" \l "B-reg) | [ACC](http://www.8bit-era.cz/6800.html#ACC-desc) | 1 | $5D | 2 | [[B](http://www.8bit-era.cz/6800.html#B-reg)] - 0 |
| TST [data8](http://www.8bit-era.cz/6800.html" \l "data8-desc),[X](http://www.8bit-era.cz/6800.html#X-reg) | [IDX](http://www.8bit-era.cz/6800.html#IDX-desc) | 2 | $6D | 7 | [[data8](http://www.8bit-era.cz/6800.html#data8-desc) + [[X](http://www.8bit-era.cz/6800.html#X-reg)]] - 0 | Test the Memory Location |
| TST [addr16](http://www.8bit-era.cz/6800.html" \l "addr16-desc) | [EXT](http://www.8bit-era.cz/6800.html#EXT-desc) | 3 | $7D | 6 | [[addr16](http://www.8bit-era.cz/6800.html#addr16-desc)] - 0 |
| TSX | TSX | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $30 | 4 | - | - | - | - | - | - | [[X](http://www.8bit-era.cz/6800.html#X-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] + 1 | Move Stack Pointer contents to Index register and increment. |
| TXS | TXS | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $35 | 4 | - | - | - | - | - | - | [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)] - 1 | Move Index register contents to Stack Pointer and decrement. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| WAI | WAI | [INH](http://www.8bit-era.cz/6800.html#INH-desc) | 1 | $3E | 9 | - | - | - | - | - | 1 | [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 1] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 2] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 3] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 4] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 5] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 6] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SR](http://www.8bit-era.cz/6800.html#SR-reg)], [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] – 7  For 4052A & 4054A:  [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)]] [←](http://www.8bit-era.cz/6800.html#transfer-desc)[[A](http://www.8bit-era.cz/6800.html#A-reg)L],  [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 1] [←](http://www.8bit-era.cz/6800.html#transfer-desc)[[A](http://www.8bit-era.cz/6800.html#A-reg)H], (G register)  [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 2][←](http://www.8bit-era.cz/6800.html#transfer-desc)[BL],  [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 3][←](http://www.8bit-era.cz/6800.html#transfer-desc)[BH],  [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 4][←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 5] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[PC](http://www.8bit-era.cz/6800.html#PC-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 6] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)[(LO)](http://www.8bit-era.cz/6800.html#LO-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 7] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[X](http://www.8bit-era.cz/6800.html#X-reg)[(HI)](http://www.8bit-era.cz/6800.html#HI-desc)], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 8] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[A](http://www.8bit-era.cz/6800.html#A-reg)L], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 9] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[B](http://www.8bit-era.cz/6800.html#B-reg)L], [[[SP](http://www.8bit-era.cz/6800.html#SP-reg)] - 10] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SR](http://www.8bit-era.cz/6800.html#SR-reg)], [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] [←](http://www.8bit-era.cz/6800.html#transfer-desc) [[SP](http://www.8bit-era.cz/6800.html#SP-reg)] – 11 | Push registers onto Stack, decrement Stack Pointer, end wait for interrupt. If [I] = 1 when WAI is executed, a non-maskable interrupt is required to exit the Wait state. Otherwise, [I] [←](http://www.8bit-era.cz/6800.html#transfer-desc) 1 when the interrupt occurs.  For 4052A & 4054A:  RTI pops 11 bytes (6800 popped only 7) to restore the hardware registers to the state they were before an interrupt occurred (or SWI [ODT only] or WAI [not used in 4052 or 4054]).  When the interrupt occurred, Status Register CC was pushed onto the stack and then the D and F bits in CC were set to 1  (1 --> Fetch B and Data A). |