

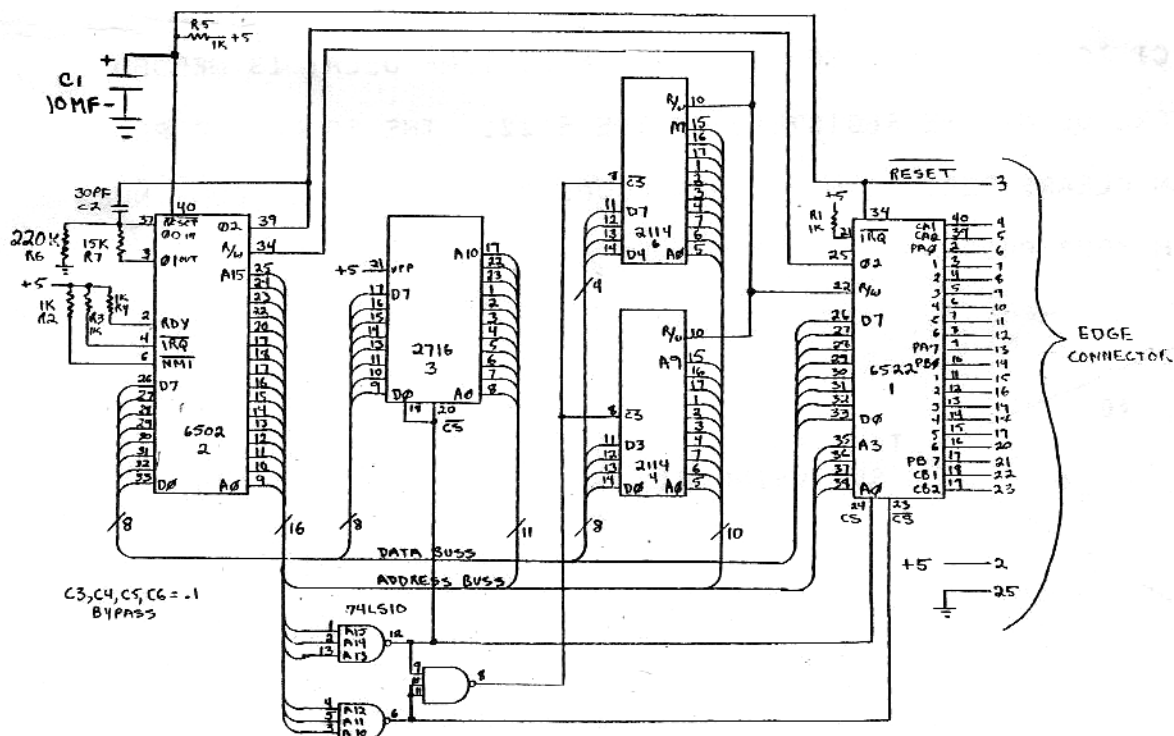


JOHN BELL ENGINEERING

6502 MICROCOMPUTER

THIS IS A SINGLE BOARD COMPUTER USING THE 6502 MICROPROCESSOR. IT WAS DESIGNED FOR USE AS A CONTROL COMPUTER AND INCORPORATES THE 6522 VERSATILE INTERFACE ADAPTER. THE 6522 HAS 2 INPUT/OUTPUT PORTS EACH PORT HAVING 8 PROGRAMMABLE INPUT/OUTPUT LINES AND 2 HANDSHAKING LINES. THE 6522 ALSO HAS TWO 16 BIT TIMERS AND SERIAL SHIFT REGISTER. THERE ARE 16 INTERNAL REGISTERS IN THE 6522 WHICH START AT ADDRESS 1C00 AND END AT 1C0F. A PAIR OF 2114s MAKE UP 1024 BYTES OF RANDOM ACCESS MEMORY STARTING AT ADDRESS 0 AND GOING TO 3FF. THE 2716 MAKES UP 2048 BYTES OF EPROM. THIS MEMORY STARTS AT ADDRESS F800 AND ENDS AT FFFF. ONE OTHER CHIP, A 74LS10, TAKES CARE OF ADDRESSING. THE CLOCK FREQUENCY OF 1 MEGAHERTZ IS CONTROLLED BY ONE CAPACITOR C2 AND TWO RESISTORS R6 AND R7. THIS MICROCOMPUTER RUNS ON A SINGLE 5 VOLT POWER SUPPLY AT APPROXIMATELY 375MA. THE POWER SUPPLY CONNECTIONS, THE I/O PORTS AND THE RESET LINES ARE BROUGHT OFF THE BOARD USING A 50 PIN CARD EDGE CONNECTOR. ON THE FOLLOWING PAGES ARE A SCHEMATIC DIAGRAM, A MEMORY MAP, THE EDGE CONNECTOR PIN-OUT, A 6502 INSTRUCTION SET AND A SIMPLE TEST PROGRAM.

THE TEST PROGRAM PUTS OUT A SERIES OF TONES THROUGH ONE OF THE OUTPUT PORTS OF THE 6522 WHICH CAN BE HEARD BY CONNECTING A 1K RESISTOR IN SERIES WITH A SMALL SPEAKER. DO NOT ATTEMPT TO CONNECT A SPEAKER DIRECTLY TO THE 6522 AS THIS WILL PERMANENTLY DAMAGE THE 6522. WHEN PROGRAMMING THIS COMPUTER IT IS IMPORTANT TO REMEMBER THAT THE 6502 USES MEMORY ADDRESS 100 TO 1FF FOR THE STACK, IT IS ALSO IMPORTANT TO REMEMBER TO PUT THE STARTING ADDRESS OF YOUR PROGRAM IN FFFC AND FFFD SO THAT WHEN THE COMPUTER IS RESET IT WILL START THE PROGRAM AT THE BEGINNING. ANYONE ATTEMPTING TO DO ASSEMBLY LANGUAGE OR MACHINE LANGUAGE PROGRAMMING SHOULD PURCHASE A 6502 PROGRAMMING MANUAL FROM SYNERTEK, MOSTEK OR ROCKWELL. THE TEST PROGRAM SHOULD GIVE BEGINNING PROGRAMMERS AN IDEA OF HOW TO START PROGRAMMING.



PARTS LIST - 80-153 6502 MICROCOMPUTER

CAPACITORS

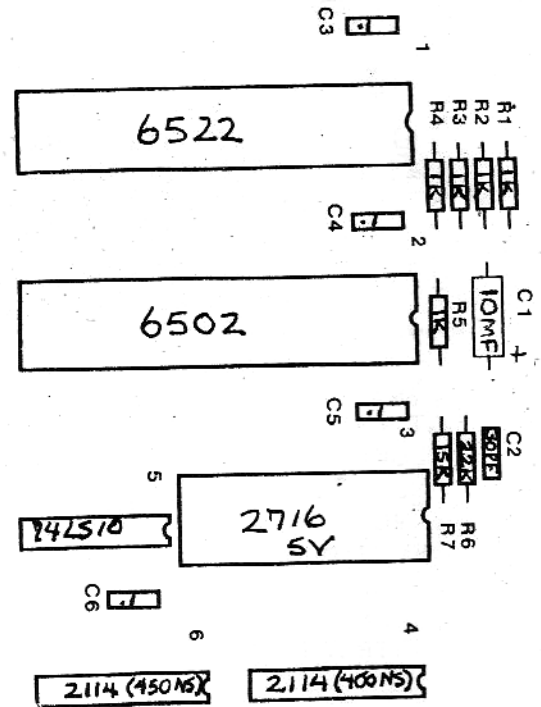
C1 10MF 16V
 C2 30PF SILVER MICA
 C3, C4, C5, C6 .1 DISC
ICS
 U1 6522
 U2 6502
 U3 2716 5VOLT (NOT SUPPLIED)
 U4, U6 2114 (450NS)
 U5 74LS10

SOCKETS

2 40 PIN SOLDER TAIL
 1 24 PIN SOLDER TAIL
 2 18 PIN SOLDER TAIL
 1 14 PIN SOLDER TAIL

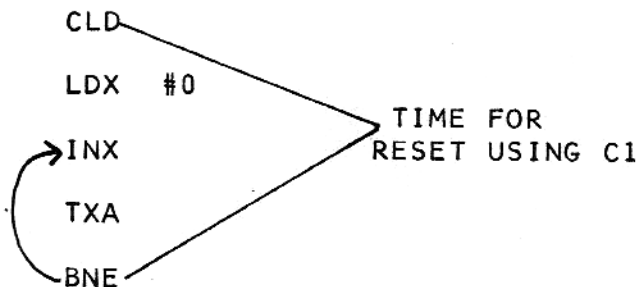
RESISTORS - 1/4 WATT 5%

R1, R2, R3, R4, R5 1K
 R6 220K
 R7 15K
 1 50 PIN WIRE WRAP CONNECTOR
 ELCO #00-6307-050-309-001
 1 80-153 CIRCUIT BOARD



** PLEASE NOTE THAT C1 (10MF 16V CAPACITOR) IS A CHEAP WAY TO DO AUTO RESET. A BETTER RESET CIRCUIT IS SHOWN IN THE FOLLOWING DOCUMENTATION. IF THIS CIRCUIT IS USED, REMOVE C1.

IF C1 IS USED FOR AUTO RESET, A SMALL TIME DELAY IS NEEDED BEFORE USING THE REGISTERS OF THE 6522. THE FOLLOWING PROGRAM CLEARS DECIMAL MODE THEN LOOPS 256 TIMES THEN CONTINUES WITH YOUR PROGRAM.



tone sequencer

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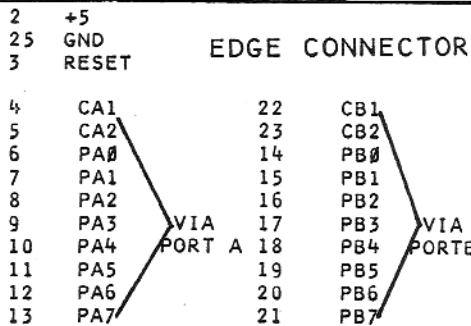
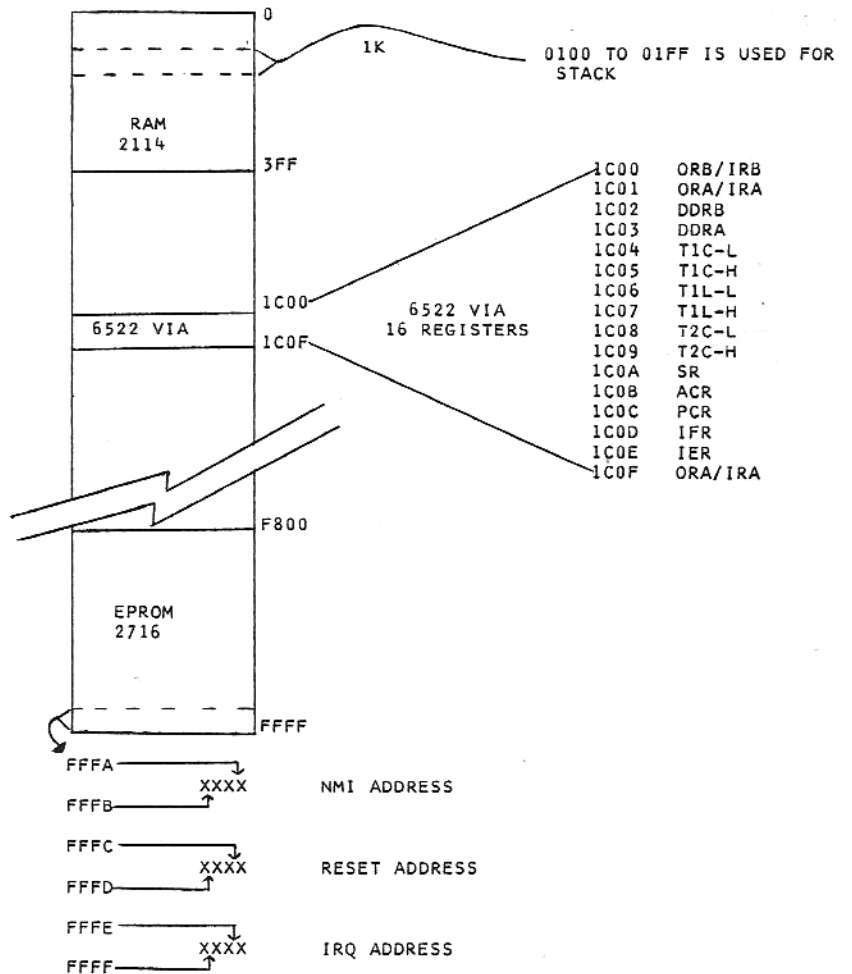
F800- D8      CLD
F801- A9 FF   LDA  #$FF
F803- 8D 03 1C STA  $1C03
F806- 85 00   STA  $00
F808- A9 05   LDA  #$05
F80A- 85 01   STA  $01
F80C- 85 02   STA  $02
F80E- 20 00 F9 JSR  $F900
F811- E6 01   INC  $01
F813- A5 01   LDA  $01
F815- D0 F7   BNE  $F80E
F817- C6 02   DEC  $02
F819- A5 02   LDA  $02
F81B- D0 F1   BNE  $F80E
F81D- EA      NOP
F81E- A9 7F   LDA  #$7F
F820- 85 00   STA  $00
F822- 85 01   STA  $01
F824- 20 00 F9 JSR  $F900
F827- A9 8F   LDA  #$8F
F829- 85 01   STA  $01
F82B- 20 00 F9 JSR  $F900
F82E- A9 9F   LDA  #$9F
F830- 85 01   STA  $01
F832- 20 00 F9 JSR  $F900
F835- E6 02   INC  $02
F837- A5 02   LDA  $02
F839- C9 04   CMP  #$04
F83B- D0 E1   BNE  $F81E
F83D- 4C 00 F8 JMP  $F800
F840- D8      CLD
F841- A9 00   LDA  #$00
F843- 8D 40 02 STA  $0240
F846- EE 40 02 INC  $0240
F849- AD 40 02 LDA  $0240
F84C- D0 F8   BNE  $F846
F84E- 4C 00 F8 JMP  $F800
F851- FF     ???
F852- FF     ???
F853- FF     ???
FFFC- 40 F8  RESET VECTOR
    
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tone generator

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F900- A6 00   LDX  $00
F902- A4 01   LDY  $01
F904- A9 00   LDA  #$00
F906- 8D 01 1C STA  $1C01
F909- C8      INY
F90A- D0 FD   BNE  $F909
F90C- A4 01   LDY  $01
F90E- A9 FF   LDA  #$FF
F910- 8D 01 1C STA  $1C01
F913- C8      INY
F914- D0 FD   BNE  $F913
F916- E8      INX
F917- D0 E9   BNE  $F902
F919- 60      RTS
    
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MEMORY MAP - 6502 MICROCOMPUTER



C1 IS A CHEAP WAY TO DO AUTO RESET. A BETTER RESET CIRCUIT IS SHOWN HERE IF THIS CIRCUIT IS USED REMOVE C1.

