

JMADM3A-001
JMPrecision ADM3A Reproduction Assembly Manual

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Revision 1

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Introduction

Section 1 of this manual is intended as a brief guide on how to assemble the supplied bare JM ADM-3A PCB. It is not intended to teach the builder how to assemble circuit boards or how it should be used.

The builder must have the ability to assemble electronic circuit boards and also understand the correct handling precautions for electronic components. JMPrecision is Not able to assist in individual build projects.

This board is a close reproduction of the original ADM-3A pcb although some changes have been made where original parts were not available or where additional connectivity was required.

IMPORTANT!

Please read this entire guide before starting assembly of the board and pay particular attention to APPENDIX A (Errata).

JM Precision does NOT accept any responsibility for any damage or loss resulting from the use of this device.

Please be sure that you are confident to correctly build and install this device before proceeding.

The original ADM-3A manual should be used for information on how to set up and connect this device once it is completed.

Section 1 - Assembling the board

To assemble the board refer to the component list and the ADM-3A original manual (available for download from the JMPrecision web site).

The component types and values are also shown on the pcb silk screen.

The component list is a generic list and the components should be obtained from whichever source the builder prefers.

Although not shown in the Bill of Materials it is strongly recommended that sockets are used for the all the IC's.

| JM Fluke 9010A Memory Accessory Bill of Materials | | |
|--|---|--|
| Reference | Component | Qty |
| BR1 | Bridge Rectifier 4A 400V | Bridge Rectifier 4A 400V 5.08mm Pitch |
| BR2 | Bridge Rectifier 4A 400V | Bridge Rectifier 4A 400V 5.08mm Pitch |
| CP11 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP12 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP14 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP17 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP18 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP19 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP20 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP22 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP24 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP25 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP26 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP27 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP28 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP29 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP38 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP39 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP6 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP7 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP8 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP9 | Capacitor 100nF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP1 | Capacitor 100pF Disk Ceramic | Capacitor Disk ceramic 10mm pitch |
| CP10 | Capacitor 100uF 16V Axil Cap | Capacitor 100uF 16V 19x6mm Axil Cap |
| CP13 | Capacitor 100uF 16V Axil Cap | Capacitor 100uF 16V 19x6mm Axil Cap |
| CP15 | Capacitor 100uF 16V Axil Cap | Capacitor 100uF 16V 19x6mm Axil Cap |
| CP16 | Capacitor 100uF 16V Axil Cap | Capacitor 100uF 16V 19x6mm Axil Cap |
| CP21 | Capacitor 100uF 16V Axil Cap | Capacitor 100uF 16V 19x6mm Axil Cap |
| CP23 | Capacitor 100uF 16V Axil Cap | Capacitor 100uF 16V 19x6mm Axil Cap |
| CP3 | Capacitor 100uF 16V Axil Cap | Capacitor 100uF 16V 19x6mm Axil Cap |
| CP4 | Capacitor 10uF 16V Axil Cap | Capacitor 100uF 16V 19x6mm Axil Cap |
| CP2 | Capacitor 30uF 16V Axil Cap | Capacitor 30uF 16V 19x6mm Axil Cap |
| CP34 | Capacitor Electrolytic 10000uF 35V Radial | Capacitor 18mm dia x 7-25mm Pitch Radial |
| CP36 | Capacitor Electrolytic 10000uF 35V Radial | Capacitor 18mm dia x 7-25mm Pitch Radial |
| CP30 | Capacitor Electrolytic 22000uF 16V | Capacitor 25mm x 10mm pit Pol |
| CP41 | Capacitor Electrolytic 3500uF 35V Axil | Capacitor Electrolytic 3500uF 35V 52x26mm Axil |
| C35 | Capacitor Tantulum 0.33uF 16V | Capacitor Tantulum 0.33uF 16V Pitch 4mm |
| CP31 | Capacitor Tantulum 0.33uF 16V | Capacitor Tantulum 0.33uF 16V Pitch 4mm |
| CP32 | Capacitor Tantulum 0.33uF 16V | Capacitor Tantulum 0.33uF 16V Pitch 4mm |
| CP33 | Capacitor Tantulum 0.33uF 16V | Capacitor Tantulum 0.33uF 16V Pitch 4mm |
| CP42 | Capacitor Tantulum 0.33uF 16V | Capacitor Tantulum 0.33uF 16V Pitch 4mm |
| C40 | Capacitor Tantulum 2.2uF 16V | Capacitor Tantulum 2.2uF 16V Pitch 4mm |
| CP5 | Capacitor Tantulum 2.2uF 16V | Capacitor Tantulum 2.2uF 16V Pitch 4mm |
| C37 | Capacitor Tantulum 2.2uF 35V | Capacitor Tantulum 2.2uF 35V Pitch 4mm |
| CP43 | Capacitor Tantulum 2.2uF 35V | Capacitor Tantulum 2.2uF 35V Pitch 4mm |
| conJ1 | Connector D type 25 way 90 degree | Connector D type 25 way 90 degree |

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| | | |
|---------|-----------------------------------|---|
| conJ2 | Connector D type 25 way 90 degree | Connector D type 25 way 90 degree |
| XTAL1 | Crystal 10.8864MHz | Crystal 10.8864MHz |
| FONTSEL | DIL Switch 1 Way | DIL Switch 1 Way 2.54mm Pitch |
| 6 POSN | DIL Switch 6 Way | DIL Switch 6 Way 2.54mm Pitch |
| BIT | DIL Switch 6 Way | DIL Switch 6 Way 2.54mm Pitch |
| 1800 | DIL Switch 7 Way | DIL Switch 7 Way 2.54mm Pitch |
| 7 POSN | DIL Switch 7 Way | DIL Switch 7 Way 2.54mm Pitch |
| AUTO NL | DIL Switch 7 Way | DIL Switch 7 Way 2.54mm Pitch |
| CR19 | Diode IN4001 1A 50V | Diode Silicon Rectifier DO-41 |
| CR1 | Diode IN4148 | Diode Silicon Rectifier |
| CR16 | Diode IN4148 | Diode Silicon Rectifier |
| CR17 | Diode IN4148 | Diode Silicon Rectifier |
| CR18 | Diode IN4148 | Diode Silicon Rectifier |
| CR7 | Diode IN4148 | Diode Silicon Rectifier |
| ZD1 | Diode Zenner 4V7 1W | Zener Diode 4.7V 1W |
| ZD2 | Diode Zenner 5V1 1W | Zener Diode 5.1V 1W |
| Hs1 | Heatsink 50x35x11 25.4mm pitch | Heatsink 50x35x11 25.4mm pitch |
| Hs2 | Heatsink 50x35x11 25.4mm pitch | Heatsink 50x35x11 25.4mm pitch |
| Hs3 | Heatsink 50x35x11 25.4mm pitch | Heatsink 50x35x11 25.4mm pitch |
| Hs4 | Heatsink 50x35x11 25.4mm pitch | Heatsink 50x35x11 25.4mm pitch |
| Hs5 | Heatsink 50x35x11 25.4mm pitch | Heatsink 50x35x11 25.4mm pitch |
| Hs6 | Heatsink TO-39 | Heatsink TO-39 (Fitted to Reg4) |
| Hs7 | Heatsink TO-39 | Heatsink TO-39 (Fitted to Reg5) |
| C1 | IC 74LS00 | Quad 2 input NAND |
| C4 | IC 74LS00 | Quad 2 input NAND |
| D2 | IC 74LS00 | Quad 2 input NAND |
| D7 | IC 74LS00 | Quad 2 input NAND |
| E6 | IC 74LS00 | Quad 2 input NAND |
| F8 | IC 74LS00 | Quad 2 input NAND |
| H4 | IC 74LS00 | Quad 2 input NAND |
| J9 | IC 74LS00 | Quad 2 input NAND |
| K10 | IC 74LS00 | Quad 2 input NAND |
| K16 | IC 74LS00 | Quad 2 input NAND |
| E1 | IC 74LS01 | Quad 2 input NAND with open collector outputs |
| B8 | IC 74LS02 | Quad 2 input NOR |
| C5 | IC 74LS02 | Quad 2 input NOR |
| F7 | IC 74LS02 | Quad 2 input NOR |
| H3 | IC 74LS02 | Quad 2 input NOR |
| L12 | IC 74LS02 | Quad 2 input NOR |
| B7 | IC 74LS04 | Hex Inverter |
| C13 | IC 74LS04 | Hex Inverter |
| C16 | IC 74LS04 | Hex Inverter |
| D3 | IC 74LS04 | Hex Inverter |
| D5 | IC 74LS04 | Hex Inverter |
| F9 | IC 74LS04 | Hex Inverter |
| H6 | IC 74LS04 | Hex Inverter |
| K1 | IC 74LS04 | Hex Inverter |
| K11 | IC 74LS04 | Hex Inverter |
| L16 | IC 74LS04 | Hex Inverter |
| B4 | IC 74LS08 | Quad 2 input AND |
| C3 | IC 74LS08 | Quad 2 input AND |
| D8 | IC 74LS08 | Quad 2 input AND |
| E3 | IC 74LS08 | Quad 2 input AND |
| F2 | IC 74LS08 | Quad 2 input AND |
| H5 | IC 74LS08 | Quad 2 input AND |
| H8 | IC 74LS08 | Quad 2 input AND |
| J10 | IC 74LS08 | Quad 2 input AND |
| J5 | IC 74LS08 | Quad 2 input AND |

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| | | |
|-----|------------|------------------------------|
| K7 | IC 74LS08 | Quad 2 input AND |
| C6 | IC 74LS10 | Triple 3 input NAND |
| C9 | IC 74LS10 | Triple 3 input NAND |
| F10 | IC 74LS10 | Triple 3 input NAND |
| F3 | IC 74LS10 | Triple 3 input NAND |
| J1 | IC 74LS10 | Triple 3 input NAND |
| L10 | IC 74LS10 | Triple 3 input NAND |
| B5 | IC 74LS11 | Triple 3 input AND |
| E7 | IC 74LS11 | Triple 3 input AND |
| C8 | IC 74LS112 | Dual JK FlipFlop |
| E8 | IC 74LS112 | Dual JK FlipFlop |
| B10 | IC 74LS113 | Dual JK FlipFlop |
| B3 | IC 74LS113 | Dual JK FlipFlop |
| B9 | IC 74LS113 | Dual JK FlipFlop |
| E2 | IC 74LS113 | Dual JK FlipFlop |
| E5 | IC 74LS113 | Dual JK FlipFlop |
| F6 | IC 74LS113 | Dual JK FlipFlop |
| H2 | IC 74LS113 | Dual JK FlipFlop |
| D1 | IC 74LS123 | Dual Retrigger. Monostable |
| C15 | IC 74LS125 | Quad inverter with enable |
| B6 | IC 74LS13 | Dual Schmitt 4i/p NAND |
| L9 | IC 74LS151 | 1 of 8 Data Selector |
| L8 | IC 74LS154 | 4 to 16 line Decoder |
| E12 | IC 74LS157 | 4 x 1 of 2 Data Sel. |
| F12 | IC 74LS157 | 4 x 1 of 2 Data Sel. |
| F13 | IC 74LS157 | 4 x 1 of 2 Data Sel. |
| F14 | IC 74LS157 | 4 x 1 of 2 Data Sel. |
| F15 | IC 74LS157 | 4 x 1 of 2 Data Sel. |
| F16 | IC 74LS157 | 4 x 1 of 2 Data Sel. |
| K12 | IC 74LS157 | 4 x 1 of 2 Data Sel. |
| K6 | IC 74LS157 | 4 x 1 of 2 Data Sel. |
| L6 | IC 74LS157 | 4 x 1 of 2 Data Sel. |
| C10 | IC 74LS161 | 4-bit Binary counter |
| C11 | IC 74LS161 | 4-bit Binary counter |
| C14 | IC 74LS161 | 4-bit Binary counter |
| D10 | IC 74LS161 | 4-bit Binary counter |
| D14 | IC 74LS161 | 4-bit Binary counter |
| D15 | IC 74LS161 | 4-bit Binary counter |
| K15 | IC 74LS161 | 4-bit Binary counter |
| L1 | IC 74LS161 | 4-bit Binary counter |
| L2 | IC 74LS161 | 4-bit Binary counter |
| L3 | IC 74LS161 | 4-bit Binary counter |
| K14 | IC 74LS166 | 8-bit Par/ser Shift Reg. |
| K13 | IC 74LS175 | Quad D-type FlipFlop |
| K4 | IC 74LS175 | Quad D-type FlipFlop |
| L13 | IC 74LS175 | Quad D-type FlipFlop |
| L4 | IC 74LS175 | Quad D-type FlipFlop |
| E13 | IC 74LS193 | U/D Binary counter |
| E16 | IC 74LS193 | U/D Binary counter |
| F11 | IC 74LS193 | U/D Binary counter |
| F1 | IC 74LS195 | 4-bit Par. Shift Reg. |
| C12 | IC 74LS20 | Dual 4 input NAND |
| D9 | IC 74LS20 | Dual 4 input NAND |
| K3 | IC 74LS20 | Dual 4 input NAND |
| H1 | IC 74LS25 | Dual 4 input NOR with strobe |
| D6 | IC 74LS27 | Triple 3 input NOR |
| J3 | IC 74LS27 | Triple 3 input NOR |
| J4 | IC 74LS27 | Triple 3 input NOR |

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| | | |
|-------|----------------------|---|
| J6 | IC 74LS27 | Triple 3 input NOR |
| J7 | IC 74LS27 | Triple 3 input NOR |
| J8 | IC 74LS27 | Triple 3 input NOR |
| D11 | IC 74LS283 | 4-bit Full Adder |
| D12 | IC 74LS283 | 4-bit Full Adder |
| E11 | IC 74LS283 | 4-bit Full Adder |
| B11 | IC 74LS293 | 4-bit Binary counter |
| K9 | IC 74LS293 | 4-bit Binary counter |
| L7 | IC 74LS293 | 4-bit Binary counter |
| D13 | IC 74LS32 | Quad 2 input OR |
| D4 | IC 74LS32 | Quad 2 input OR |
| E9 | IC 74LS32 | Quad 2 input OR |
| F5 | IC 74LS32 | Quad 2 input OR |
| H7 | IC 74LS32 | Quad 2 input OR |
| J2 | IC 74LS42 | BCD-Decimal decoder |
| H9 | IC 74LS51 | Dual 2-Wide 2-Input, 2-Wide 3-Input AND-OR-INVERT |
| B12 | IC 74LS74 | Dual D TYPE flip flop |
| B13 | IC 74LS74 | Dual D TYPE flip flop |
| B2 | IC 74LS74 | Dual D TYPE flip flop |
| D16 | IC 74LS74 | Dual D TYPE flip flop |
| E4 | IC 74LS74 | Dual D TYPE flip flop |
| F4 | IC 74LS74 | Dual D TYPE flip flop |
| K2 | IC 74LS74 | Dual D TYPE flip flop |
| K8 | IC 74LS74 | Dual D TYPE flip flop |
| E10 | IC 74LS85 | 4-bit Comparator |
| E14 | IC 74LS85 | 4-bit Comparator |
| E15 | IC 74LS85 | 4-bit Comparator |
| C7 | IC 74LS86 | Quad 2 input XOR |
| H10 | IC 74LS86 | Quad 2 input XOR |
| L11 | IC 74LS86 | Quad 2 input XOR |
| REGA | IC 7805 | Voltage Regulator 7805 +5V 1A TO220 |
| REGB | IC 7805 | Voltage Regulator 7805 +5V 1A TO220 |
| REGC | IC 7805 | Voltage Regulator 7805 +5V 1A TO220 |
| Reg4 | IC 7812 | Voltage Regulator 7812 +12V 0.5A TO-39 |
| Vrge4 | IC 7815 | Voltage Regulator 7815 +12V 1A TO-220 |
| Reg5 | IC 7912 | Voltage Regulator 7912 -12V 0.5A TO-39 |
| L15 | IC EPROM M2716 (16K) | IC EPROM 16K - Requires Character Set Code |
| H11 | IC Intel 2102A SRAM | 1024bit Static RAM 350nS |
| H12 | IC Intel 2102A SRAM | 1024bit Static RAM 350nS |
| H13A | IC Intel 2102A SRAM | 1024bit Static RAM 350nS |
| H13B | IC Intel 2102A SRAM | 1024bit Static RAM 350nS |
| H14 | IC Intel 2102A SRAM | 1024bit Static RAM 350nS |
| H15 | IC Intel 2102A SRAM | 1024bit Static RAM 350nS |
| H16 | IC Intel 2102A SRAM | 1024bit Static RAM 350nS |
| J11 | IC Intel 2102A SRAM | 1024bit Static RAM 350nS |
| J12 | IC Intel 2102A SRAM | 1024bit Static RAM 350nS |
| J13A | IC Intel 2102A SRAM | 1024bit Static RAM 350nS |
| J13B | IC Intel 2102A SRAM | 1024bit Static RAM 350nS |
| J14 | IC Intel 2102A SRAM | 1024bit Static RAM 350nS |
| J15 | IC Intel 2102A SRAM | 1024bit Static RAM 350nS |
| J16 | IC Intel 2102A SRAM | 1024bit Static RAM 350nS |
| A5 | IC MC1488 | Quad Line Driver |
| A9 | IC MC1488 | Quad Line Driver |
| A10 | IC MC1489 | Quad Line Transceiver |
| A6 | IC MC1489 | Quad Line Transceiver |
| OP1 | IC MCT2 | OPTO Coupler 6 pin DIL |
| OP2 | IC MCT2 | OPTO Coupler 6 pin DIL |
| k5 | IC TR1602 | USART RS232 Transceiver |

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| | | |
|---------|---------------------------------------|--|
| R49 | NOT FITTED (Current Loop) | NOT FITTED |
| R50 | NOT FITTED (Current Loop) | NOT FITTED |
| Opt3 | NOT FITTED (Option 3) | NOT FITTED |
| SW_opt6 | NOT FITTED (Option 6) | NOT FITTED |
| con5 | OPTION - Only fitted for keyboard pcb | 32PIN Header 2.54mm Pitch |
| R40 | Resistor 100R 0.5W 5% | Resistor 0.5W |
| R18 | Resistor 10k 0.5W 5% | Resistor 0.5W |
| R42 | Resistor 10k 0.5W 5% | Resistor 0.5W |
| R47 | Resistor 10k 0.5W 5% | Resistor 0.5W |
| R12 | Resistor 18k 0.5W 5% | Resistor 0.5W |
| R1 | Resistor 1k 0.5W 5% | Resistor 0.5W |
| R15 | Resistor 1k 0.5W 5% | Resistor 0.5W |
| R16 | Resistor 1k 0.5W 5% | Resistor 0.5W |
| R24 | Resistor 1k 0.5W 5% | Resistor 0.5W |
| R25 | Resistor 1k 0.5W 5% | Resistor 0.5W |
| R3 | Resistor 1k 0.5W 5% | Resistor 0.5W |
| R43 | Resistor 1k 0.5W 5% | Resistor 0.5W |
| R44 | Resistor 1k 0.5W 5% | Resistor 0.5W |
| R5 | Resistor 1R 3W | Resistor 3W |
| R11 | Resistor 200R 0.5W 5% | Resistor 0.5W |
| R13 | Resistor 240R 0.5W 5% | Resistor 0.5W |
| R46 | Resistor 240R 0.5W 5% | Resistor 0.5W |
| R2 | Resistor 270R 0.5W 5% | Resistor 0.5W |
| R39 | Resistor 270R 0.5W 5% | Resistor 0.5W |
| R9 | Resistor 2R 3W | Resistor 3W |
| R17 | Resistor 39k 0.5W 5% | Resistor 0.5W |
| R27 | Resistor 470R 0.5W 5% | Resistor 0.5W |
| R19 | Resistor 4k7 0.5W 5% | Resistor 0.5W |
| R23 | Resistor 4k7 0.5W 5% | Resistor 0.5W |
| R41 | Resistor 51R 1W | Resistor 1W |
| R10 | Resistor 7R5 0.5W 5% | Resistor 0.5W |
| R48 | Resistor SIL 240R | 5 resistors with common 6 pin |
| R14 | Resistor SIL 4k7 | 5 resistors with common 6 pin |
| R20 | Resistor SIL 4k7 | 5 resistors with common 6 pin |
| R21 | Resistor SIL 5k1 | 5 resistors with common 6 pin |
| R4 | Resistor SIL 5k1 | 5 resistors with common 6 pin |
| R6 | Resistor SIL 5k1 | 5 resistors with common 6 pin |
| R7 | Resistor SIL 5k1 | 5 resistors with common 6 pin |
| R8 | Resistor SIL 5k1 | 5 resistors with common 6 pin |
| 4PIN | Socket FCC-68 4 way thru hole | 4 way Pin Header |
| Q1 | Transistor 2N3904 | General Purpose NPN Bipolar Transistor TO-92 |
| Q2 | Transistor 2N3905 | General Purpose PNP Bipolar Transistor TO-92 |
| Q3 | Transistor 2N5986 | Transistor PNP 12A To225 |
| BRU1 | W02M Bridge Rectifier 200V 1A | Bridge rectifier round 9mm package |
| BRU2 | W02M Bridge Rectifier 200V 1A | Bridge rectifier round 9mm package |
| BRU3 | W02M Bridge Rectifier 200V 1A | Bridge rectifier round 9mm package |
| 5PIN | 5WP | 5 way Pin Header |
| JP5 | 3Way SIL 5-08mm | 3Way SIL 5-08mm |
| JP7 | 12 Way 3Row 4Col x 5-08mm | 12 Way 3Row 4Col x 5-08mm |
| P3-J3 | 5way 5.08mm SIL Round Pad | 5 way Pin Header |
| PL1 | 5WP | 5 way Pin Header |
| R4-J4 | 5way 5.08mm SIL Round Pad | 5 way Pin Header |

APPENDIX A (Errata)

This section details any modifications which must be made to the pcb in order for it to work.

Please report any issues found which are not included in this guide but please note that JMPrecision does NOT guarantee the accuracy of this information.

Be sure that the version of this guide matches the version of the board you are assembling as most errors are removed from later revisions.

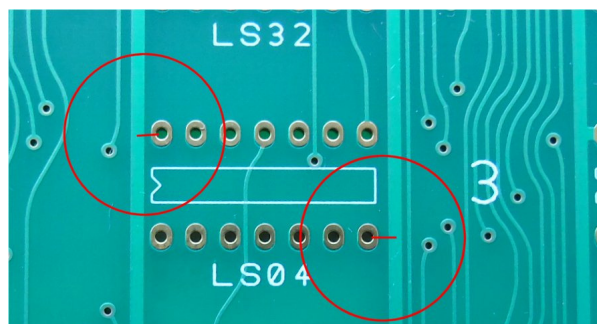
Modification 1

IC D3 requires jumpers to connect the VDD and Vss pins to the +5V and 0V rails respectively.

This can be done either by fitting wire jumpers to the adjacent IC as in the image below.



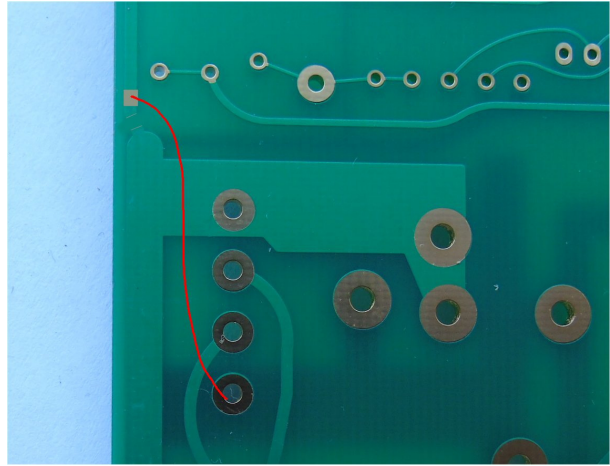
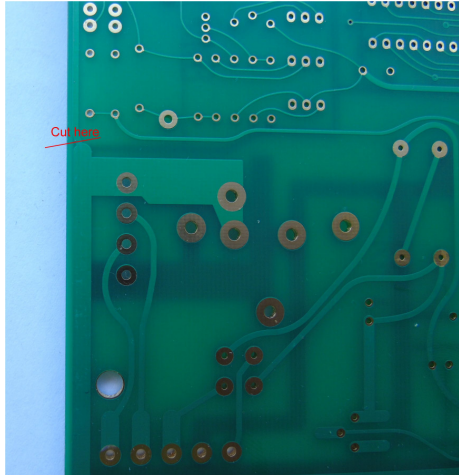
A better way to do this is to remove a small area of solder mask from the power rails adjacent to the VDD and Vss pins of D3 and fit short lengths of fine copper wire which can be passed through the IC socket holes. The ends of these wires are then soldered to the rails and will then be soldered to the D3 pins when the device is fitted. This will of course need to be done prior to fitting D3 or its socket.



Modification 2

Refer to the images below and cut the track on the rear of the pcb where indicated. This area is on the rear of the pcb close to BR2.

Remove a small area of the solder mask where shown and fit a wire link between this track and 0V pin of BR2.



CAUTION!

This modification **MUST** be made before connecting the board to any external device.

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APPENDIX B (Keyboard Connector con5 – Option 8)

This pcb includes an additional connector to allow third party and custom keyboards to be connected. The builder is responsible for finding a suitable keyboard and layout.

The table below shows the connections on con5.
(pin 1 is the pin at the left side of the connector).

| Con5 Pin | Signal |
|----------|--------------|
| 1 | ROW0 |
| 2 | ROW1 |
| 3 | ROW4 |
| 4 | ROW3 |
| 5 | ROW2 |
| 6 | ROW6 |
| 7 | ROW5 |
| 8 | ROW7 |
| 9 | ROW8 |
| 10 | ROWF |
| 11 | ROWA |
| 12 | ROWC |
| 13 | ROWB |
| 14 | ROWD |
| 15 | COL1 |
| 16 | ROW9 |
| 17 | COL0 |
| 18 | ROWE |
| 19 | COL2 |
| 20 | COL3 |
| 21 | COL6 |
| 22 | COL4 |
| 23 | COL5 |
| 24 | COL7 |
| 25 | N0148 (Ctrl) |
| 26 | LO |
| 27 | N0143 (His) |
| 28 | BREAK |
| 29 | SHIFTEN |
| 30 | N0245 (Rept) |
| 31 | N0137 (Clr) |

APPENDIX C (Monitor Connector)

This pcb includes an additional connector to allow third party and monitors to be connected. The builder is responsible for finding a suitable monitor.

The table below shows the connections on the VGA connector.
Pin 1 is indicated by a circle on the silk screen.

| Connector | Signal |
|-----------|-----------------|
| 1 | Vertical Sync |
| 2 | Horizontal Sync |
| 3 | Power Out |
| 4 | Video |
| 5 | 0V |