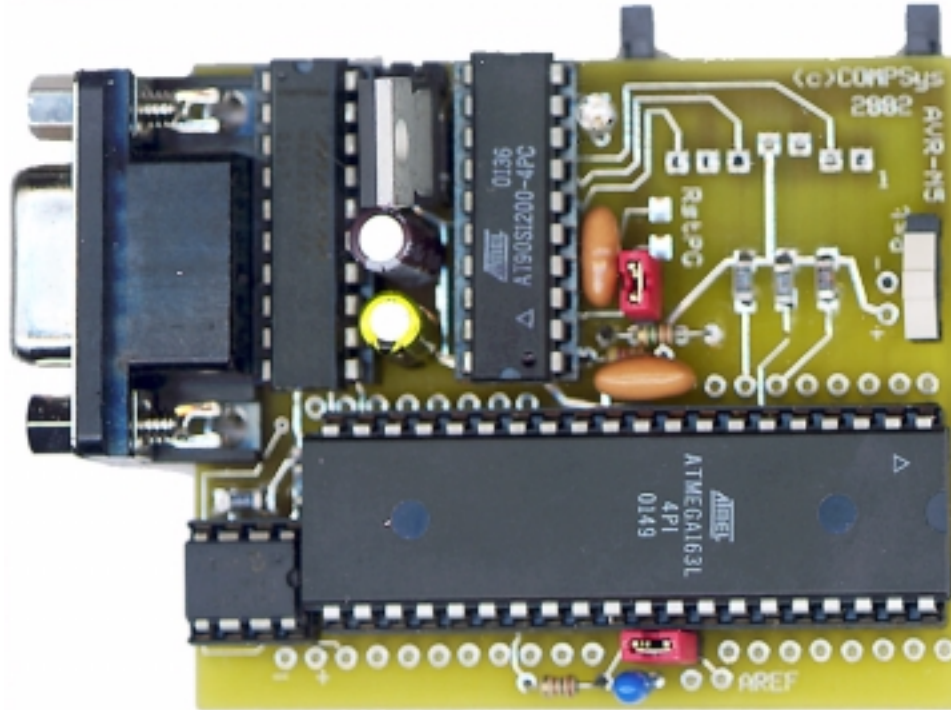


# AVR-M Rev 5 ASSEMBLY



The AVR\_M is a very compact self contained Atmel AVR mcu controller board. It includes an on-board serial programmer (via PC com port) , an I2C eeprom and can use a Mega163, Mega16 or a AT90S8535 directly. Other AVR's can also be used with 40pin carrier boards. All IC's have sockets. AVR's can be programmed using Atmel's serial ISP software and can be run in MCSElec's BascomAVR IDE. An RS232 IC is included. The kit is available as 3.3v or 5v. it includes the pads and a socket for an MMC. SOP8 pads are provided for use with Ramtron's FRAM's eeproms. All pins are brought to header thru holes and can be used as desired. Small size 2.5"x2"

## **IMPORTANT!**

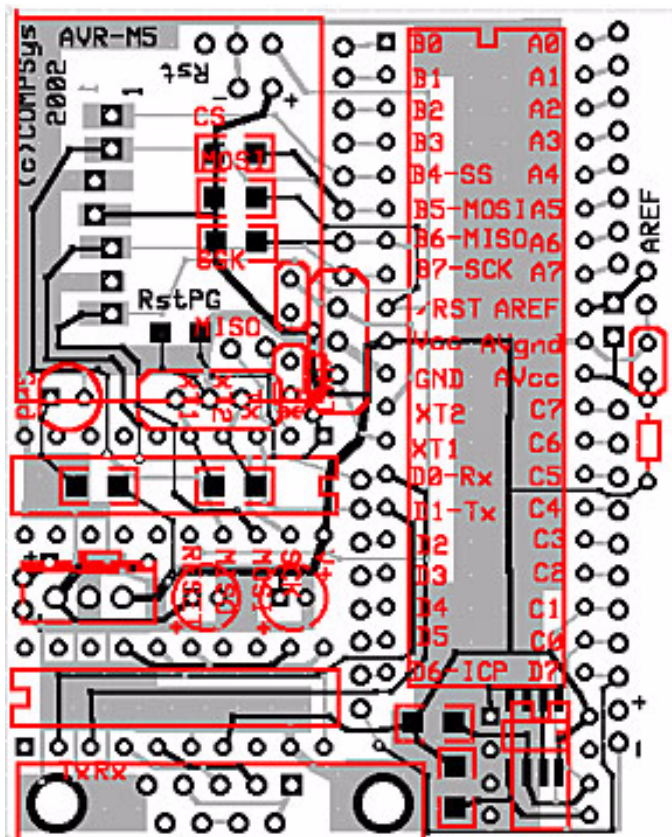
**Please read before proceeding any further.**

It is assumed that you purchased this kit with the knowledge that it will require soldering parts to a printed circuit board and that you have an understanding of the Atmel AVR microcontrollers and how they work. **This assembly will require some very delicate soldering of SMT parts.** if you feel that you do not have the necessary soldering skills, please seek assistance from someone who does. Small mistakes in soldering can result in many frustrating hours of re-doing work. **Double check each component for value , orientation and placement on the pcb before actually soldering it!** Please use a very fine tip (25W max) soldering iron and quality solder such as .022 (or finer) silver-based solder. Other tools required include small tweezers, long nosed pliers, diagonal cutters and a multimeter.

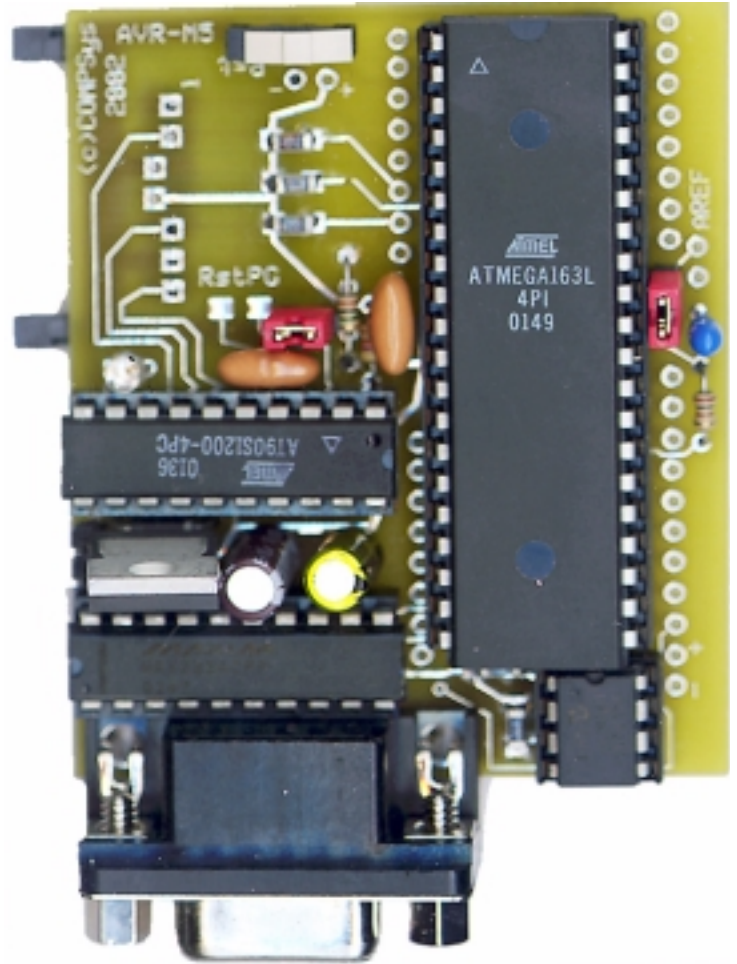
## **Disclaimer and Terms of Agreement**

As with any kit, only the individual parts supplied are guaranteed against defects and not the user assembled unit. All kit parts are purchased from reputable sources such as Digikey Inc, Allied Electronics and Mouser Inc, however, should a kit part be ascertained to be defective it will be replaced at no charge within 30 (thirty) days of the purchase date. Beyond that, COMPSys Workbench and / or the COMPSys developer(s) assume no liability and WILL NOT be held liable nor be held responsible wholly or in part for any damages caused by the construction of and / or use of their products sold .

# PARTS



PCB layout

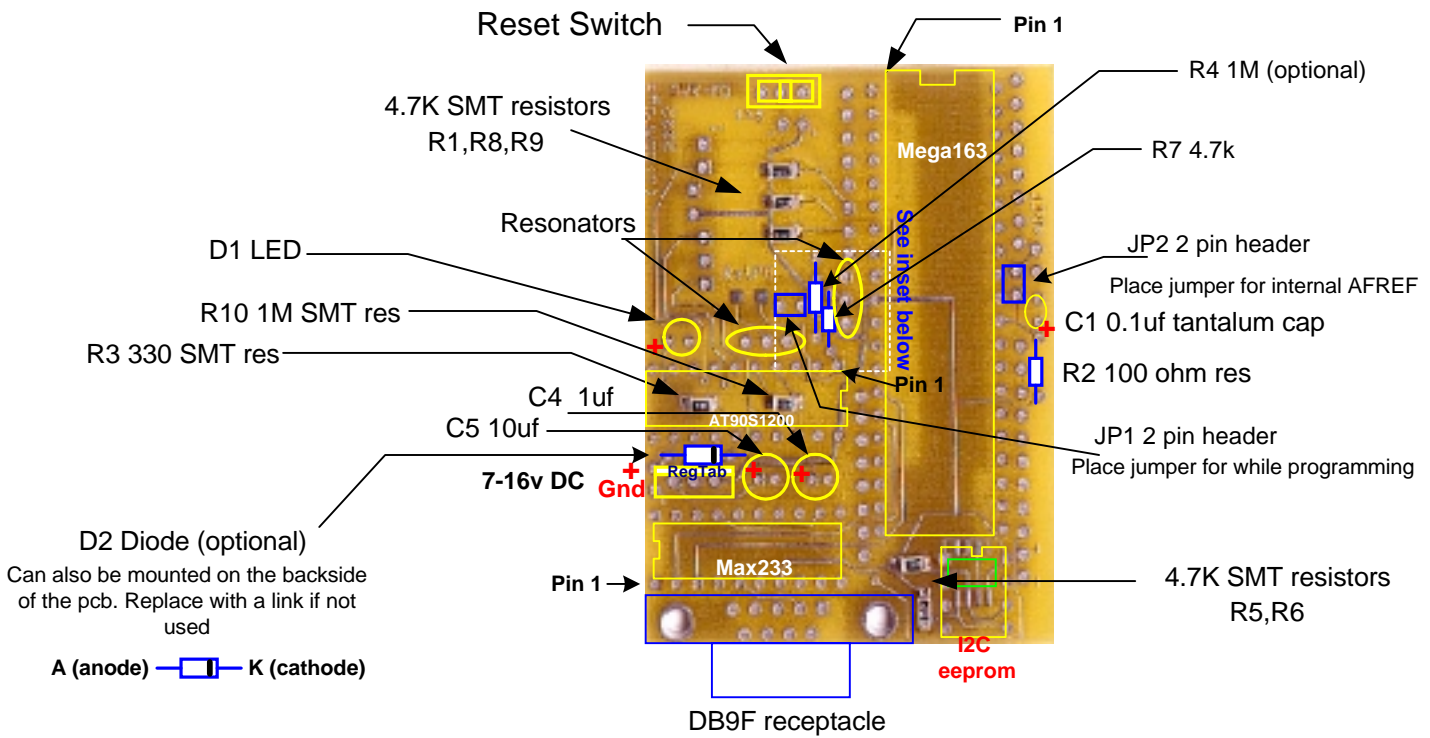


AVR-M Shown assembled

## Parts List

- R1,R5,R6,R8,R9 - 4.7k SMT resistors
- R7 4.7k resistor
- R2 100 resistor
- R3 330 SMT resistor
- R4 1M (optional) resistor
- R10 1M (optional) SMT resistor
- C1 - 0.1uf or 1uf tantalum capacitor
- C2,C2 22pf (optional w/xtal only)
- C4 1uf radial cap
- C5 10uf radial cap
- X1,X2 4Mhz ceramic resonators
- D1 LED
- D2 1N4004 (optional)
- U1 40pin AVR Mega163L
- U2 AVR AT90S1200
- U3 MAX 233 or equiv
- U4 24LC256 or 24LC65 or FM24CL64 FRAM
- 1 - 40 pin DIP socket (U1)
- 2 - 20 pin DIP socket (U2,U3)
- 1 - 8 pin DIP socket (U4)
- 1 - DB9F connector (CN1)
- 1 - MMC connector (CN2)
- 1 - Slide switch or momentary switch
- 2 - 2 straight pin headers w/jumpers
- 1 - 2 pin rt. angled header
- Link wire
- AVR-M pcb

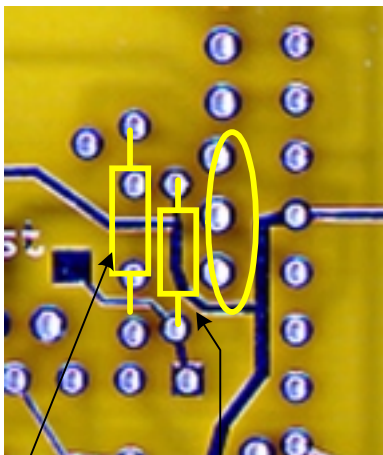
# Parts Layout



## Inset

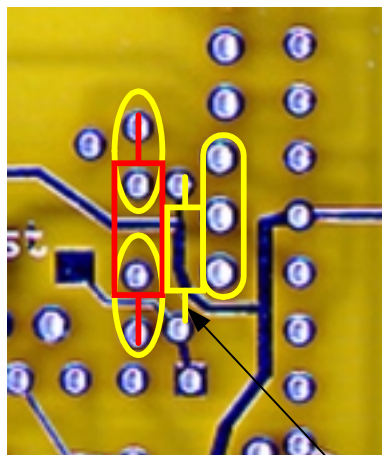
With Resonator

With Crystal and caps

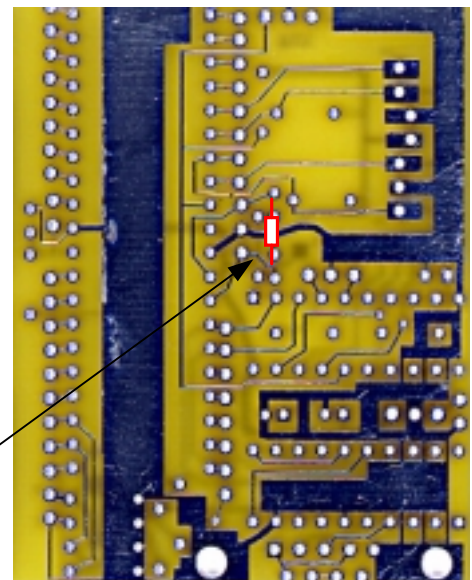


R4 1M

R7 4.7K



If using a xtal with 2 caps it be necessary to tack solder the 1M resistor on the back side of the pcb



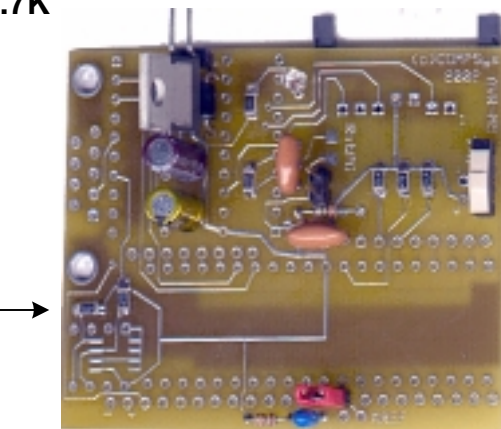
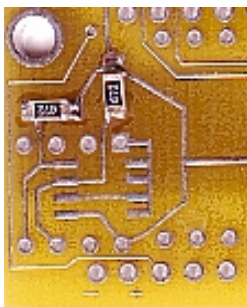
Backside of pcb

# Recommended Assembly Steps

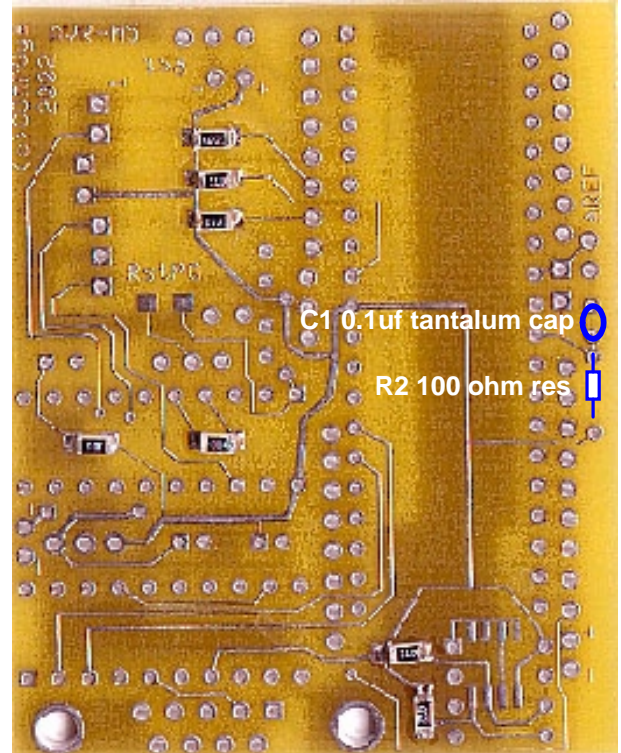
Note: Square pads for IC pins are PIN1 and for other components the Square Pad is +

1. Mount the SMT resistors first. The pcb pads already have a small layer of solder, so in most instances additional solder is not required. But, should it become necessary place only a minute amount on the pad. Hold the SMT in place with tweezers and the briefly apply heat with the soldering iron to each end of the SMT. The number on the SMT for resistors is usually a 3 digit number with the last digit being the multiplier. Example: 472 = 47 x 100 = 4700 = 4.7K

Close-up of the eeprom 4.7K SMT resistors



Assembly shown prior to mounting the IC sockets and DB9F connector

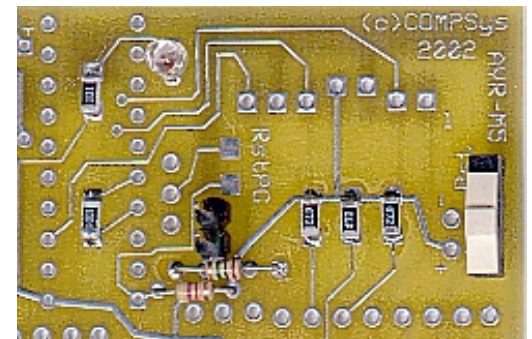


2. Next mount the 3 pin slide switch (or momentary switch). It does not have any special orientation

3. Mount the R10 1M and R7 4.7K resistors (see the previous page for details)

4. Mount the 2 pin header next to the resistors.

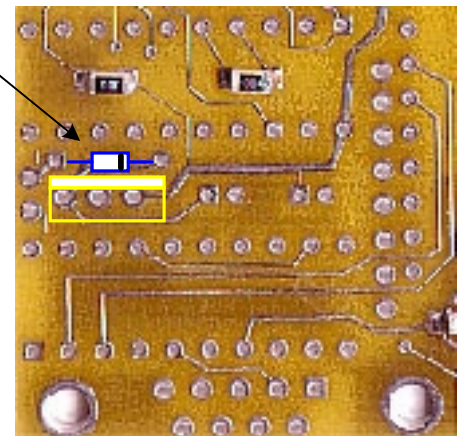
5. With diagonal cutters clip any excess wire on the back side of the pcb. It is important to have the are as flush as possible in order to mount the MMC socket.



6. Mount the optional D2 diode if used or else place an insulated link where the diode belongs. The diode can also be mounted on the bottom side of the pcb if preferred.

A (anode) —  — K (cathode)

D2 reverse voltage protection diode

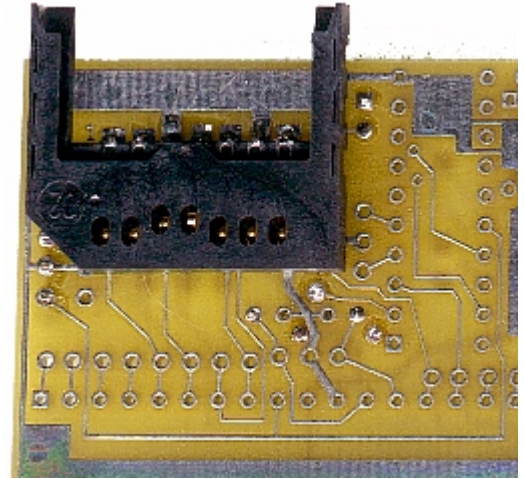


7. Next mount the voltage regulator and the two radial caps C4 1uf and C5 10uf. **Observe polarity and orientation of the regulator.**

8. Next mount the 2 pin jumper, R2 100ohm, and C1 0.1uf (or 1uf) tantalum cap (observe the polarity of the cap, look for the '+' marking)

## Recommended Assembly Steps (cont)

9. Make sure that the surface of the pcb is level and does not have any un-clipped pin tails. You may want to place a piece of clear tape over the area that the MMC will be installed. Next mount the MMC socket on the back side of the pcb, align it as shown in the photo on the right. Place a small amount of solder on each pad and then position the MMC socket over the pads and apply heat to each with the soldering iron. Double check connection with a multimeter between the traces that lead the pads and the small openings on the top of the MMC socket.



10. Next install all remaining IC sockets and the DB9 connector.

11. Before placing any of the ICs in their sockets *and* before applying power please note the '+' and '-' so that you don't accidentally apply power with the connections reversed! Now apply power to the board and check for proper voltages (the LED should light up). If the voltage is not correct double check all your work. **DO NOT INSERT THE ICs IF THE VOLTAGE IS INCORRECT** (either 3.3v or 5v depending on which board you purchased). Check to make sure that the power regulator is oriented the correct way, with its metal tab being next to the AT90S1200 IC and not the Max233 IC.

12. If the power settings are correct, power down and insert the Max233 and AT90S1200 ICs. **MAKE SURE OF CORRECT ORIENTATION**. The AT90S1200's notch (Pin1) faces inward towards the Mega163 IC. The Max233 faces the opposite direction with its notch (pin1) facing outward towards the edge of the board.

13. Apply power and check for any abnormal heating . It is normal for the power regulator to get warm. Place a jumper over the JP1 the 2 pin header close to the AT90S1200's resonator (see drawings on previous pages). Connect a serial RS323 cable between DB9 connector and a Windows PC. In Windows open a terminal program such as HyperTerm and configure its settings for 19200 baud, No parity, 1 stop bit, No handshake. Start the terminal and make sure that the AVR-M board has power applied. In the terminal type an uppercase 'S' and you should see the response 'AVR ISP' displayed. Press an uppercase 'V' and the number '23' should appear. If this checks out, it means that the AT90S1200 and Max233 are working correctly. Power down the AVR-M board and now insert the Mega163, make sure that the notch end is facing towards the top edge of the board. Slide the reset slide switch away from the Mega163. Keep the Windows terminal open and apply power to the AVR-M board a test or diagnostic message should appear. The exact context of the test depends on the test which was pre-loaded in Mega163 when delivered. Refer to any 'readme' files that were sent to you.

## *Installation is complete!*

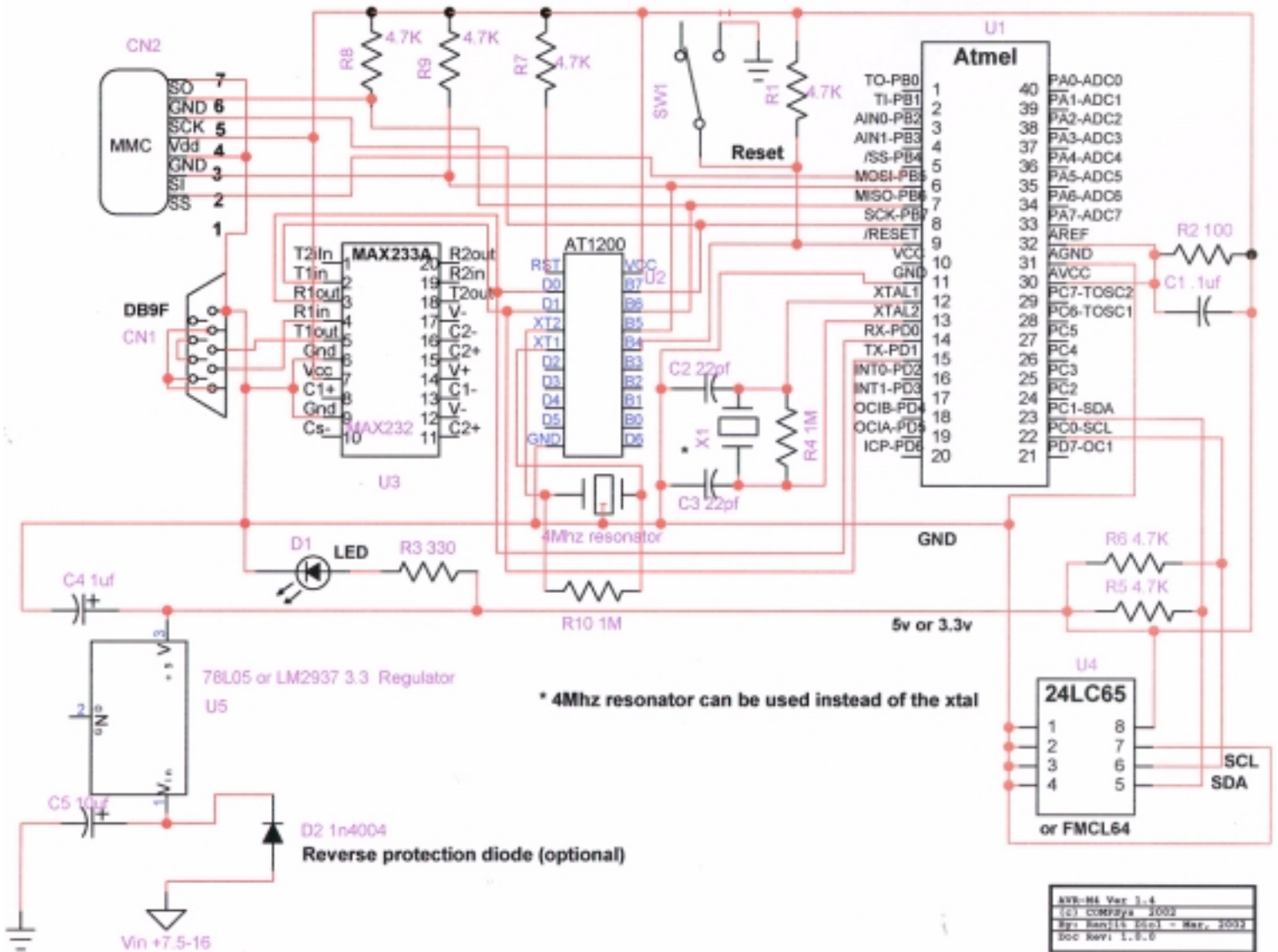
### Common Construction Problems

Over 95% of assembly problems are a result of **improper soldering!** Using a magnifying glass check all solder joints and pcb traces for bridges, missing solder, loose pins, and solder 'splatter'. Check for pieces of wire clippings which may have gotten lodged between pins of traces and are causing a short. Other common mistakes, which can be costly, are misplacement of components, especially IC's which are easy to insert the wrong way.

# AVR-M Schematic Rev 4

## AVR-M4 Controller with serial ICP

AVR 8535,M16,M163,M323



Subject to change and may not reflect the latest pcb design.

**IMPORTANT** Please note: Component labels will not necessarily match with the pcb layout. During assembly, use the labels on the pcb layout and the parts list