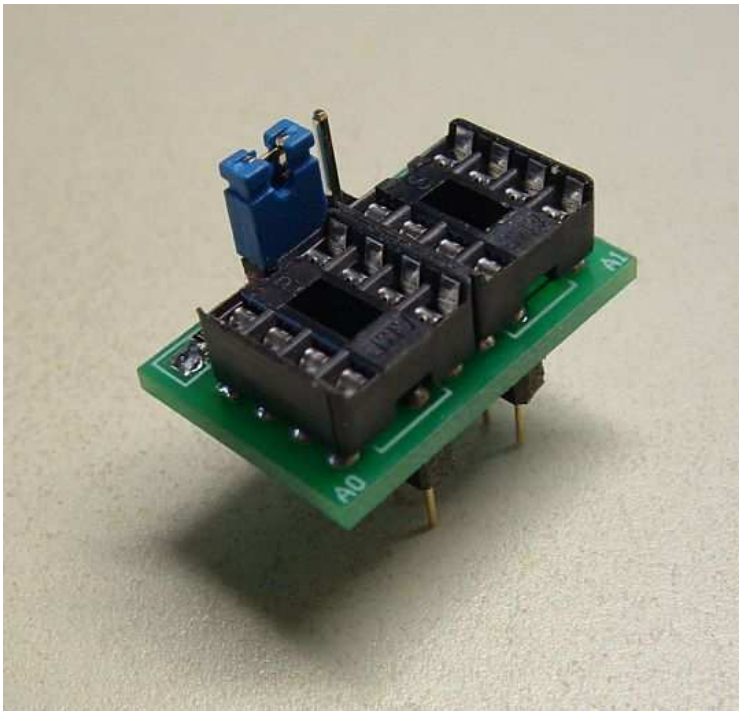
I2C EEPROM Expansion Accessory

SW2EEPROM

Surface mount/through hole kit



By Robert L. Doerr

www.robotworkshop.com

"Our robots will blow you away"™

© 2010

Manual Revision 1.1

NOTE: This optional adapter has been tested in several boards using different configurations with excellent results. Although every effort has been made to ensure the compatibility with the widest range of devices (and the accuracy of the documentation) there are no guarantees expressed or implied that it will work under all circumstances.

Table of contents

INTRODUCTION

The board replaces the DIP version of the EEPROM and will allow a pair of EEPROM chips to be installed instead. It has a three pin header which is used to determine which chip is addressed at address 0 and which one at address 1. By moving a jumper (or connecting a SPST switch) you can toggle between the two chips.

This is very useful since you can have two completely different images available and just swap them with the flip of a switch. It was originally used on a small robot running an OEM BASIC Stamp to keep two entirely different programs loaded and switch between the two without reloading the Stamp every time.

It also has advantages when used with many of the Propeller boards since it is easy to switch between a couple of different emulators without reloading the EEPROM.

This should work on most of the Propeller boards that are currently using a single DIP EEPROM chip for program storage. Boards like the DracBlade, PropRPM, PPDB (Propeller Professional Development Board), Briel PocketTerm, and many others. It may work on the SpinStudio or Propeller Platform depending upon what other things you install on those boards due to physical interference.

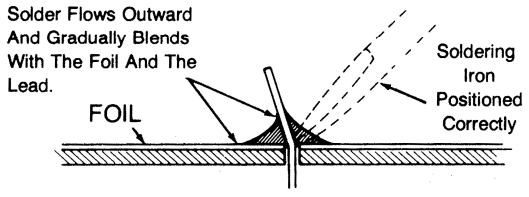
NOTE: Since the Hydra and Hybrid already do some banking with the cartridge this adapter isn't for those particular boards.

CIRCUIT ASSEMBLY

This kit should be built using standard construction methods. The following items are required to build the kit: diagonal cutter, tweezers, soldering iron (pencil type) with very fine tip, a good quality solder (60/40 Rosin core, RoHS, etc.), solder wick, a magnifying glass, and some patience. Follow the instructions carefully and read the entire step before performing each operation. Do not rush. To successfully assemble this kit you must have good soldering skills. A good solder connection will form the electrical connection between two parts, such as a component lead and a circuit board foil. Care also needs to be taken to ensure that there are no solder bridges causing shorts. A bad solder connection could prevent an otherwise well-assembled kit from operating properly.

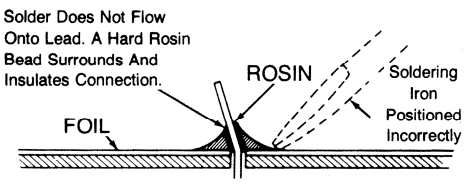
During assembly make sure you keep the soldering iron tip clean. Wipe it often on a wet sponge or cloth; then apply solder to the tip to give the entire tip a wet look. This process is called tinning, and it will protect the tip and enable you to make good connections. When the solder tends to “ball” or does not stick to the tip, the tip needs to be cleaned and retinned.

A GOOD SOLDER CONNECTION

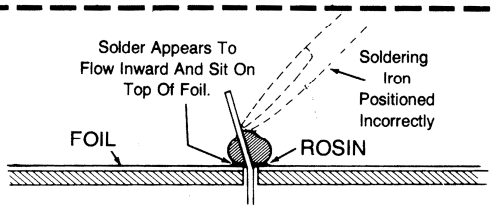


When you heat the lead and the circuit board foil at the same time, the solder will flow evenly onto the lead and the foil. The solder will make a good electrical connection between the lead and the foil.

POOR SOLDER CONNECTIONS



When the lead is not heated sufficiently, the solder will not flow onto the lead as shown above. To correct, reheat the connection and, if necessary, apply a small amount of additional solder to obtain a good connection.



When the foil is not heated sufficiently the solder will blob on the circuit board as shown above. To correct, reheat the connection and, if necessary, apply a small amount of additional solder to obtain a good connection.

The bottom side of the board says “SW2EEPROM” on the lower edge. During construction, components will be mounted on both sides of the board. The order of assembly is important to ensure that the installation of a component doesn't block the installation of another one. After installing each component at the specified location, solder it in place before proceeding to the next. When installing the DIP socket solder each of the two opposing corners first. Then gently press on the center of the socket while warming the solder on each of those corner pins with the soldering iron to make sure the socket is properly seated. Finally solder the rest of the leads on the socket. This method gives the board a much cleaner look than if the leads on the sockets have been folded over to hold it in place before soldering.

NOTE: Make sure that the notch in each socket is located toward the left and that pin one goes into the pad with the square foil.

One of the most important aspects of assembly is the proper alignment of the components. Some people prefer to use a small dot of glue to hold each component in place while soldering. If this works out well for you, by all means use that method. Otherwise the following technique gives excellent results!

Before installing a surface mount component apply a small amount of solder to one of the pads on the PCB where the part is going to be installed. Then while warming the solder on that pad use the tweezers to set the part in place. You can do adjustments while the solder is still molten. If it takes too long, let the solder cool to ensure the part is not damaged by excessive heat. Once cool, the joint can be warmed up again and the alignment can be adjusted until it is perfect. Before soldering any other joints on the part use the magnifying glass to verify that the alignment is ok. Once satisfied just solder the other leads.

- ❑ Install the two .1µf (104) 1206 surface mount caps *on the bottom side of the PCB near the upper edge of the board* at locations **C1** and **C2**. These can be installed in either direction since polarity does not matter.

- ❑ Install the two 10K Ω (103 or 1002) 1206 surface mount resistors *on the top side of the PCB near the upper edge of the board* at locations **R3** and **R4**. These can be installed in either direction since polarity does not matter.

- ❑ Install the two 4-pin (1x4) headers *from the bottom side of the board*. **Insert the larger diameter pins into the holes of the PCB** and then solder from the top of the board. Make sure the headers are flush with the board. Proper alignment is critical to ensure the module will seat properly. You can use one of the 8-pin DIP sockets as a jig during soldering. Once soldered you can trim the leads on the top of the board to help clear the DIP sockets.

- ❑ Install the two 8-pin sockets *on the top side of the board* at locations **A0** and **A1**. The notch should point toward the upper edge of the board matching the silkscreen. Solder these from the bottom. Be careful not to touch the soldering iron against the header while soldering.

NOTE: When installing the headers insert the shorter leads into the PCB. The longer lead is where the configuration jumpers will go.

- ❑ Install the 3-pin (1x3) header *on the top side of the board near the upper edge.* Solder from the bottom side of the board.
- ❑ *OPTIONAL:* For a Pull-up on the SDA line install a 1206 surface mount resistor *on the bottom side of the PCB* at location **R1**. This can be installed in either direction since polarity does not matter.
- ❑ *OPTIONAL:* For a Pull-up on the SCL line install a 1206 surface mount resistor *on the bottom side of the PCB* at location **R2**. This can be installed in either direction since polarity does not matter.
- ❑ Install your choice of I2C EEPROM chips. The notch should point toward the 3-pin header and match the silkscreen on the board.

This concludes the Assembly procedures for the SW2EEPROM adapter. Congratulations! Before proceeding, look over the board and verify the correct location and orientation of all parts. Also check to make sure there are no solder bridges or poor solder joints.

INSTALLATION

Remove your EEPROM memory chip and install in the first 8-pin DIP sockets on the board. Install another I2C EEPROM chip in the second socket. Then, plug this module into the socket that you pulled the original EEPROM chip from. If there are any obstructions you can often get around this by plugging an empty DIP socket (or two) in the socket first then plugging the adapter into that.

OPERATION

Operation should be seamless and your board should work just as before. It is best to power down your board whenever you'd like to switch between the two EEPROM chips. You would normally load one chip with an image, remove power from the board, select the other chip, power up the board, then download another image. After that you can just switch between the two.

NOTE: Instead of the .100" jumper you can use a three pin cable connected to a SPST switch to remotely toggle between the two EEPROM chips.

SPECIFICATIONS

Power: 3.3V or 5v depending upon EEPROM chips used
Memory sockets: 2 (Swaps between Address 0 and Address 1 via jumper)

JUMPER SETTINGS

A0 (Left EEPROM) - Jumper shorting left/center pins
A1 (Right EEPROM) - Jumper shorting right/center pins

CIRCUIT DESCRIPTION

The circuit is very straightforward. Pins 4 through 8 are wired up to the same numbered pin on both sockets and the headers where the adapter plugs into the original socket. Pins 1, 2, and 3 are isolated from the original socket. Pins 2, and 3 on the adapter are tied to ground so the two memory chips will always either be address 0 or 1. Pin 1 on each socket has a 10K pull-up to VCC. The chip has pin 1 shorted to ground with the jumper (or switch) will be set as address 0 leaving the opposite chip to respond at address 1. Since many boards are only using a single EEPROM at address 0 and ignore any other EEPROM chips this makes it easy to bank switch which EEPROM chip will be used.

IN CASE OF DIFFICULTY

PROBLEM	POSSIBLE CAUSE
Board won't power up after Memory upgrade is installed.	1. Check for solder bridges and cold solder joints. 2. Make sure memory selection jumper is installed. 3. Check for bent/folded pins on EEPROM's. 4. Check installation of pull-up resistors at R3 and R4. 5. At least one EEPROM chip installed and selected.
Can't access extra memory or one of the Option ROM's or Erratic operation.	1. Check for solder bridges and cold solder joints. 2. Make sure memory selection jumper is installed. 3. Check for bent/folded pins on EEPROM's. 4. Check installation of pull-up resistors at R3 and R4.

I2C EEPROM PINOUT

Pin #	Mnemonic	Definition	Notes
1	A0	Address Pin 0	Set by position of 3-pin header
2	A1	Address Pin 1	open on socket, low on adapter
3	A2	Address Pin 2	open on socket, low on adapter
4	VSS	Ground	Pass through to socket
5	SDA	Serial Data Input/Output	Pass through to socket
6	SCL	Serial Clock Input	Pass through to socket
7	WP	Write-Protect Pin	Pass through to socket
8	VCC	+V Supply voltage - Usually 3.3V or 5V	Pass through to socket

REPLACEMENT PARTS LIST

Quantity	Description	Location
2	8-pin DIP sockets	A0, A1 (top of PCB)
2	.1µf surface mount capacitors – 1206 package	C1, C2 (bottom of PCB)
2	10K Ω surface mount resistor – 1206 package	R3, R4 (top of PCB)
1	Optional Pull-up for SDA – 1206 package	R1 (bottom of PCB)
1	Optional Pull-up for SCL – 1206 package	R2 (bottom of PCB)
2	4-pin (1x4) header (Gold plated) – Machine Pin	(bottom of PCB)
1	3-pin (1x3) header (Gold plated)	(top of PCB)
1	BLUE (.100") jumper	Chip select
1	Custom PCB (through hole plated) SW2EEPROM	