Single ROM Prototyping Board Pro 6502 (SRPB-PRO-6502) Instructions

Version 1.2

http://www.arcade-cabinets.com

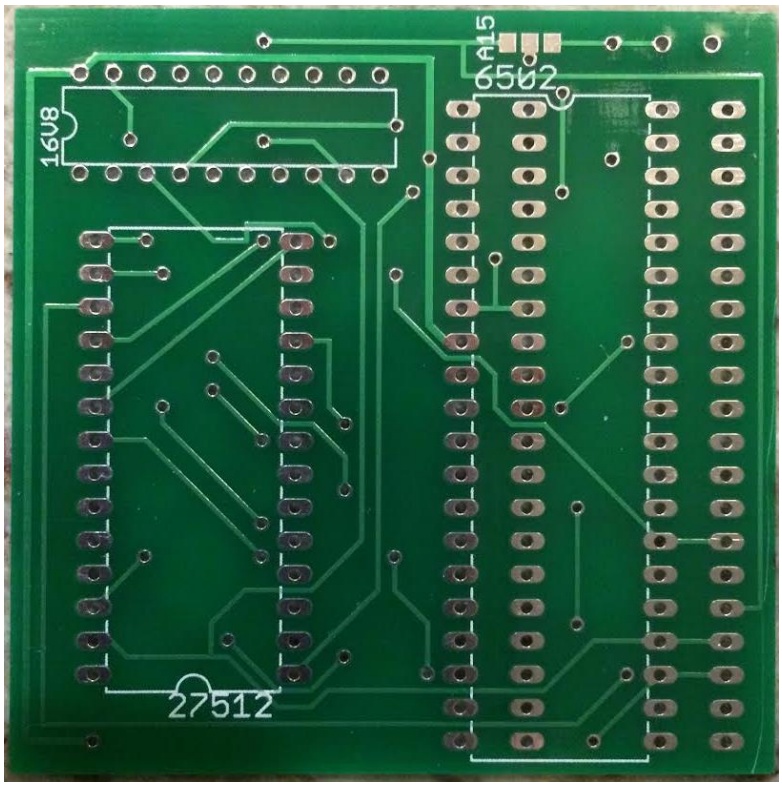

Figure 1 – Image of SRPB-PRO-6502 v1.1 PCB board

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Summary

The Single ROM Prototyping Board Pro (SRPB-PRO-6502) was designed to allow the quick "prototyping" of single Read Only Memory (ROM) replacements or to serve as a general purpose, single ROM solution when pre-fabricated *plug and play* type solutions do not already exist for a specific function or video arcade game.

Said another way, the SRPB-PRO-6502 is an adapter that allows you to quickly and easily convert old boards that contain lots of ROMs, such as those used with video arcade games, to use a single ROM.

There are currently two versions available:

- SRPB-PRO-6502 – Plug and play solution for 6502 based CPU systems.
- SRBP-PRO-Z80 – Plug and play solution for Z80 based CPU systems.

This documentation covers the SRPB-PRO-6502 model

What is Included

1. 1 x SRPB-PRO-6502 adapter board
2. 2 x 20 pin header strips
3. 1 x 20 pin socket
4. 1 x 28 pin socket

5. 1 x 40 pin socket
6. 1 x W27C512 Windbond EEPROM
7. 1 x 8V16 Generic Array Logic chip (GAL)

8. 1 ROM sub assembly including
    - 2 x 14 pin header strips
    - 2 .1uf axial capacitors
    - 1 28 pin ROM socket
    - 1 72LS244 IC
    - 1 20 pin socket

Figure 2 – Image of assembled SRPB-PRO-6502, actual kits are NOT assembled.

History

The computer hardware sometimes referred to as a Printed Circuit Board (PCB) or "board", in many older video arcade games, such as Atari Asteroids, Missile Command, and Tempest, have numerous small, hard to find, and expensive parts known as ROMs (Read Only Memory). Maintaining or repairing these game boards can be difficult and time consuming, even for experienced repair persons. A few video arcade game enthusiasts have created kits containing customer adapter boards that allow specific game boards to use a single ROM, while others have provided instructions for physically *hacking* (altering) specific game boards to use a single ROM. Utilizing a single ROM often increases the reliability of the game board, can sometimes be used to fix non-working boards, and may assist in isolating ROM related issues with non-working boards.

As someone that repairs video arcade game boards for others, I wanted a fairly universal solution to either upgrade game boards permanently to use a single ROM or a way to simply bypass all the game ROMs to isolate ROM related issues. The SRPB-PRO-6502 is my solution to solve both problems.

Potential Uses for the SRPB-PRO-6502

1. As a single, generic adapter to convert a board, including game boards, to use a single ROM on a permanent basis.
2. As a troubleshooting tool to assist in the repair of boards, including game boards, by bypassing the existing ROMs and their sockets, without the need to cut traces or make other permanent modifications to the board.
3. As a quick and easy way of testing or prototyping changes to the software on ROMs, without the need to cut traces or make other permanent modifications to the board.

Features

- Allows users to easily prototype professional and sturdy Single ROM hacks using the existing CPU socket on a PCB main board
- Requires NO permanent board modifications
- Accept a cheap and easy to find 27512 EPROM, a Winbond W27C512 EEPROM is included.

Types of CPU architectures Supported

- 6502 CPU

Caveats to Understand about the SRPB-PRO-6502

The following are a few things to be aware of before buying and using the SRPB-PRO-6502:

There are a few things to be aware of before buying this board

1. You MUST have a soldering iron and solder to assemble the adapter
2. You MUST have a ROM programmer that can program a W27C512 (ex. GQ-4X)
3. You MUST have a programmer than can program a GAL8V16 (ex. TOP2005+)
4. You must have the needed single ROM game code, which you can create yourself or download.
5. You must have the needed .JED file for programming the GAL which you can create yourself or download
6. On games with separate game code, video code and Sound Code, the SRPB-PRO-6502 kit will not be able to single ROM ALL the sections, only 1 section, however many games only have many ROM is the main game code section.

Assembly Instructions

The SRPB-PRO-6502 comes un-assembled. You must assemble before using. Assembly is straight forward, if you follow these steps.

1. Solder the 2 x 20 terminal pins in FIRST. Insert the short side of the pins UNDERNEATH the bottom of the SRPB-PRO-6502 board and solder from the TOP of the board.
2. Using wire clips cut off any extra length of headers on pin 21 and 40 that exposed from the top of the board. This will ensure later on that the 40 pin socket fits without issue.

3. Place the 40 pin CPU socket in the appropriately marked space, ENSURE that you line up the top of the socket with top of the silkscreened CPU image. There will be a divot in the center of the top on the silkscreened image signifying which end is the top. Solder the socket in from the bottom of the PCB board.
4. Place a 20 pin socket labeled 16V8 in the appropriately marked space, ENSURE that you line up the top of the socket with top of the silkscreened CPU image. There will be a divot in the center of the top on the silkscreened image signifying which end is the top. Solder the socket in from the bottom of the PCB board.
5. Solder the A15 address selection jumper so it looks like this

Assemble the ROM sub board

1. Solder in the 2 x 14 terminal pins. Insert the short side of the pins UNDERNEATH the bottom of the SRPB-PRO-6502 rom sub-board and solder from the TOP of the sub-board.
2. Trim the exposed top of the terminal headers for pins 15 and 28, this will ensure later that the 28 pin ERPOM socket will fit securely.
3. Solder in the 28 pin socket
4. Sodler in the 20 pin 74LS244 socket
5. Solder in the 2 .1uf capacitors
6. Insert the 74LS244 into the 20 pin socket
7. Insert the burned 27512 ROM into the 28 pin socket, ensure the ROM is aligned correctly in respect to pin 1.
8. Insert the entire ROM sub-board into the main SRPB-PRO assembly. Make sure the sub board is inserted such that the 27512 ROM pin #1 is correctly aligned with the silkscreened “top” of the ROM on the underlying SRBP board.
9. Solder the ROM sub board into the main SRPB.

Programming

Before installing onto the PCB you must program the SRPB-PRO-6502 with the appropriate .jed image for the GAL8V16 and the EPROM image for the system in question. You either create these files yourself if you have understanding on the underlying system or you can download pre-created files.

You can download pre-created images at

- http://www.arcade-cabinets.com/board_hacks/SRPB-PRO-6502/recipes

You may also create your own .jed and EPROM images for use in theSRPB-PRO-6502 for technical details needed please see the “SPBP-PRO-6502 Theory of Operations guide”

Using an external switch (SRPB-PRO-6502 v1.1+ only)

The SRPB-PRO-6502 which allows you to decide how address line 15 (A15) is provided to the 27512 eprom. Either by directly by the CPU A15 output or via an external switch. This feature allows you to break up the 27512 into 2 distinct 256Kb images and use an external switch to switch between them. This is a cheap manual way to provide a multigame setup, for example swtichign between Tempest and Tempest Tubes.

By default the SRPB-PRO-6502 is NOT configured at all. you MUST configure the jumper one of these two ways for proper operation

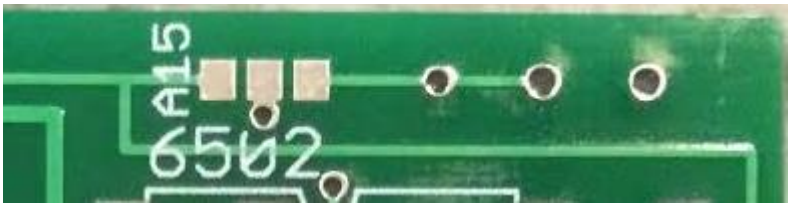
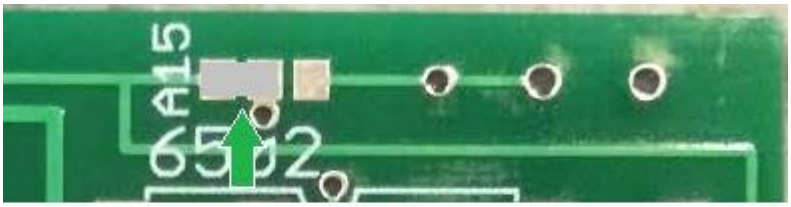


Figure 2 – Image of A15 switch option jumper (SRPB-PRO-6502 v1.1+ ONLY)

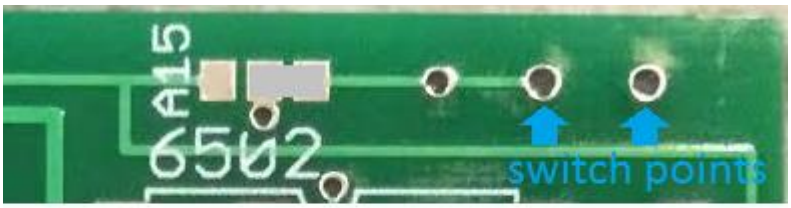
To have the CPU provide address A15 (normal)
Simply bridge the solder jumper from the middle to the left as shown below.



Solder jumper configuration for normal operation

Figure 3 –A15 switch option jumper in normal (non-swtich) operation

To allow the use of the external switch, bridge the solder jumper from the middle to the right as shown. Also install a switch between the two solder points shown in the image below.



Solder jumper configured for switch operation

Figure 4 –A15 switch option jumper in switch operation

Note: when using the switch is imperative that you have installed the 10K Ohm resistor on the back of the circuit board as shown in the picture below. The resistor is not necessary unless you configure the switch option.

Figure 5 –A15 switch option resistor

A15 operation
If the switch connecting the two switch points is open A15 will be high (+5v). If the switch is closed A15 will be GND (0V).

Acknowledgements

Special thank you to many of the great KLOVers that have purchased and supported the board. Additional special thanks to KLOV user "*SCOTT C"* who greatly improved this instruction manual.