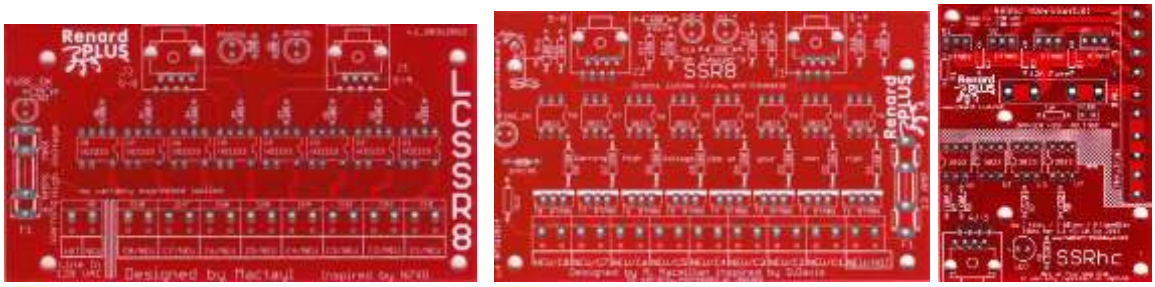
Renard Plus AC SSR Family – LCSSR8, SSR8, & SSRhc



Jul 2017

Board Versions
LCSSR8: v.2_04292013,
SSR8: v.4_07262014,
SSRHC: v1.0

Document Rev 1.3

Renard-Plus, Salem, Oregon 97302

Published 2017. Printed in United States

We wish to also thank the Do It Yourself Community for the inspiration it has given us in the development of this product.

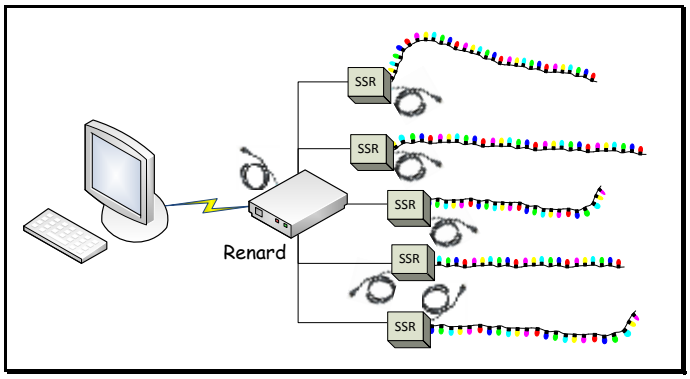
Table of Contents

1. Introduction to Renard

Renard is the name of a “do-it-yourself” (DIY), computer-controlled, PIC-based dimmer light control concept. It also refers to a family of dimming controllers that have been designed and built based on this concept.

The Renard design concept was originally described by Phil Short in the Simple PIC-Based 8-Port Dimmer 'How-To' on the http://computerchristmas.com website. Since then there have been many enhancements and new designs based on this hardware. There have been many contributors to advancing Renard technology including M. Macmillan, D. Davis, P. Rogers, T. Straub, D. Haberle, A. Williams and others

Renard controllers typically rely on a separate computer running a light sequencing program to send real-time sequences of controller commands to sequence the lights. The computer communicates with the Renard via RS232, RS485, or wireless (depending on the design) and the Renard controls the lights either through built-in power control (power is output directly to the lights), or via separate “SSRs” (solid state relays supply the power when commanded by the controller).



Example Renard configuration for SSR

Output of the Renard can be either control signals (to an SSR as is documented in this document), direct AC line voltage (110, 100/220, or 220), or DC voltage depending on the design.

Renard is a DIY hobbyist effort and there is a vast amount of products and related peripherals to select from including the Renard Plus Strip Controller. To obtain a specific design, there might be “buy a parts kit and/or blank PCB” offering at a site (such as from www.renard-plus.com), “etch it yourself” files for true DIY, or coop/group buys for kits and PCBs also in forums (like DIYChristmas.org).

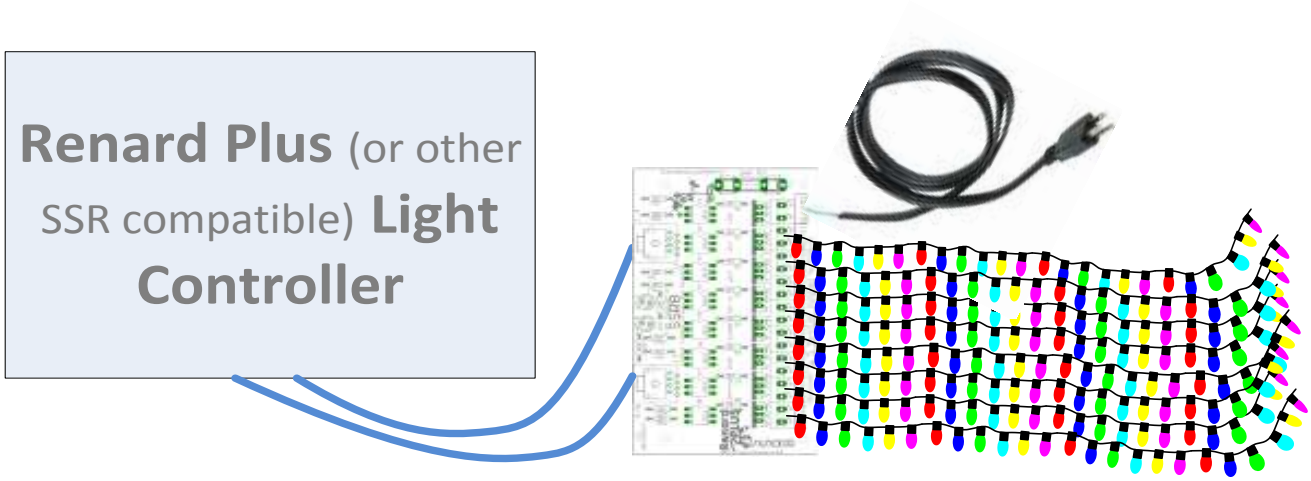
2. Overview of Renard Plus AC SSR Family

This guide covers the Renard Plus LCSSR8, SSR8, and SSRhc. These boards are designed to take SSR control signals, including dimming control, from a Renard designed for SSR operation, and output line level AC (alternating current) to directly power lights/and light strings. The SSR is the board that actually controls the power to the lights as directed by the Renard controller. Each SSR board controls either 4 channels (SSRhc) or 8 channels (typically taking in TWO SSR outputs from the Renard controller), but each design has different output current capabilities.

The LCSSR8 (LC stands for “Lower Current”) is a simpler to build and lower cost SSR designed for lower current AC loads like LEDs or limited mini-incandescent strings by using a VO2223a opto coupler / power phototriac for the power output.

The SSR8 is a more traditional optocoupler and triac output SSR designed for medium AC loads like incandescent lights (C7 / C9, halogen spots, etc.).

The SSRhc (“hc” stands for “High Current”) is like the SSR8 but has half the outputs (4 channels) and features heavier copper traces, and higher power triacs for heavy current situations.



Feature	**LCSSR8** Detail
Name	**Renard Plus LCSSR8 Low Current**
Target use	AC line level light control “solid state relay”
Channel Count	8 VO2223a phototriac outputs
Power input	110v or 220v line level AC
Power output	Yes – AC out: 8 channels @ 1A max each Total across all channels = 6A max
Dimmable?	YES – based on controller capability
Status Indicators?	YES – Fuse OK, Channels 1-4 and/or Channels 5-8 power
Channel Indicators?	NO
Control Input	YES – Standard Renard SSR control (RJ45) X 2
Daisy-chain output	No
Wireless	Not Applicable
On board programming	Not Applicable

Feature	**SSR8** Detail
Name	**Renard Plus SSR8**
Target use	AC line level light control “solid state relay”
Channel Count	8 triac controlled outputs
Power input	110v or 220v line level AC
Power output	Yes - AC out: 8 channels @ 3A max each Total across all channels = 10A max
Dimmable?	YES – based on controller capability
Status Indicators?	YES – Channels 1-4 PWR, Channels 5-8 PWR, FUSE_OK
Channel Indicators?	NO
Control Input	YES – Standard Renard SSR control (RJ45) X 2
Daisy-chain output	No
Wireless	Not Applicable
On board programming	Not Applicable

Feature	**SSRhc** Detail
Name	**Renard Plus SSRhc High Current**
Target use	AC line level light control “solid state relay”
Channel Count	4 triac controlled outputs
Power input	110v or 220v line level AC
Power output	Yes – direct line level AC out – 4 channels @ >6A max each (with heat sync), or total across all channels of 12.5A max
Dimmable?	YES – based on controller capability
Status Indicators?	YES – channels 1-4
Channel Indicators?	NO
Control Input	YES – Standard Renard SSR control (RJ45) X 2
Daisy-chain output	No
Wireless	Not Applicable
On board programming	Not Applicable

3. Assembly Instructions

This section covers the construction of the Renard Plus SSR boards. The assembly task is approached as a learning exercise for new builders, so that they can develop proficiency and self-confidence. The project itself is quite simple and if you follow the steps *carefully*, you should have a working board when you are done. Additional information and guides on techniques and tools can be found in the "Tools and Parts ID Guide" at:
www.renard-plus.com/files/Tools_and_Parts_ID_Guide.pdf

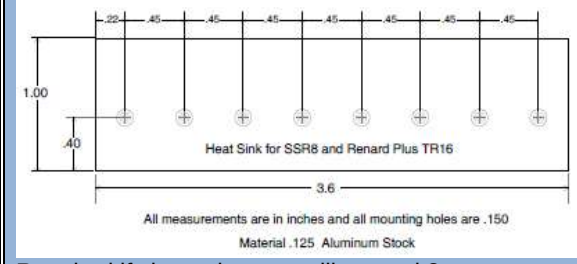
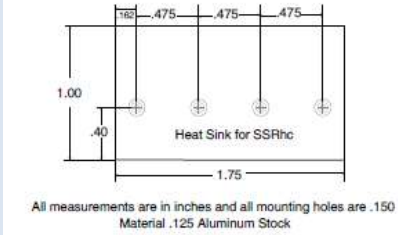
3.1 Renard Plus SSR Combined BOM / Parts List

The following is a combined Bill Of Materials for building the Renard Plus SSR family of boards. The link to the Mouser projects are:
SSRhc: http://www.mouser.com/ProjectManager/ProjectDetail.aspx?AccessID=30353324d6
LCSSR8: http://www.mouser.com/ProjectManager/ProjectDetail.aspx?AccessID=3a9c839322
SSR8: http://www.mouser.com/ProjectManager/ProjectDetail.aspx?AccessID=80863603d6

Picture	Description	Mouser P/N	LCSSR8		SSR8		SSRhc	
			Designator	Qty	Designator	Qty	Designator	Qty
	For **120VAC**: 180 ohm resistor 1/4 watt	291-180-RC			R1-R8	8	R1-R4	4
	For **220VAC**: 330 ohm resistor 1/4 watt	291-330-RC			R1-R8	8	R1-R4	4
	680 ohm resistor 1/8 watt	299-680-RC	R1 – R10	10				
	680 ohm resistor 1/4 watt	660-CF1/4C681J			R9-R18	10	R5-R8	5
	27K ohm resistor 1/4 watt	291-27K-RC	R12	1	R19	1		
	1N4148 Diode	512-1N4148	D1	1	1N4148	1		
	Terminal Blocks 5.08MM PCB	571-7969492	C1-C8, Line in	9			AC	1
	Terminal Blocks 5.08MM PCB	571-2828372			C1 – C8, NEU/HOT	9	P1, P2, P4, P5	4
	Modular Jacks 8 PCB TOP ENTRY	571-5556416-1	J1, J2	2	J1, J2	2	RJ45	1
	8 pin IC socket (optional)	517-4808-3004-CP	M1-M8	8 Opt				
	Optocoupler / phototriac VO2223A	782-VO2223A	U1-U8	8				
	6 pin IC sockets (optional)	571-1-2199298-1			M1-M8	8 Opt	M1-M4	4 Opt

Picture	Description	Mouser P/N	LCSSR8		SSR8		SSRhc	
			Designator	Qty	Designator	Qty	Designator	Qty
	Triac Output Optocouplers MOC3023	859-MOC3023			M1-M8	8	M1-M4	4
	Triac 8AMP snubberless	511-BTA08-600SW			T1-T8	8	Q1-Q4	4
	Red 5 MM LED	78-TLHR5401	POWER1, POWER2,	2	CH1-4, CH5-8,	3	LED	1
	Green 5 MM LED	78-TLHG5401	Fuse_OK	1	Fuse_OK	1		
	Fuse Clips and Holders PC FUSE CLIP 5 MM	576-05200001N	F1	2	F1	2		
	5mm x 20mm Medium Time Delay Fuse 125VAC 6Amp	504-GMC-6	F1	1				
	5mm x 20mm Medium Time Delay Fuse 125VAC 12.5Amp	693-0034.3128.TR			F1	1		
	Fuse Clips and Holders PC FUSE CLIP 5 MM	534-3517					Fuse	2
	5mm x 20mm Medium Time Delay Fuse 125VAC 12Amp	693-0034.3128.TR					12A Fuse	1
	Fuse Cover (optional)	534-3527C	F1	1 Opt	F1	1 Opt	F1	1 Opt
	Neon Blub (Optional)	606-2ML					NEON	1 Opt
	100K ¼ watt for neon bulb	291-100K-RC					R10	1 Opt

Heatsink (See template on: www.renard-plus.com)

LCSSR8	SSR8	SSRHC
	 Required if channel output will exceed 2 amps.	

Enclosure (recommended)

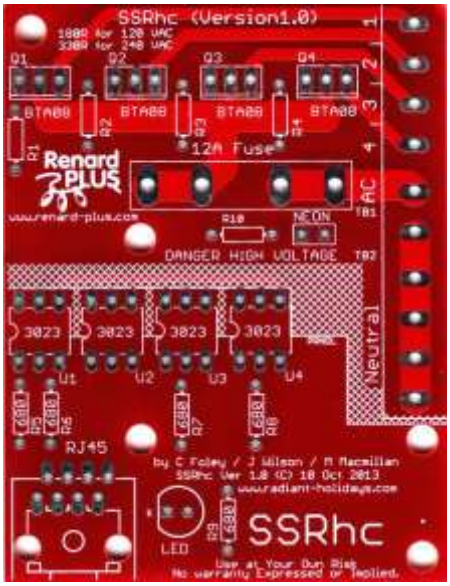
	LCSSR8	SSR8	SSRHC
	CG500	CG500	TA200

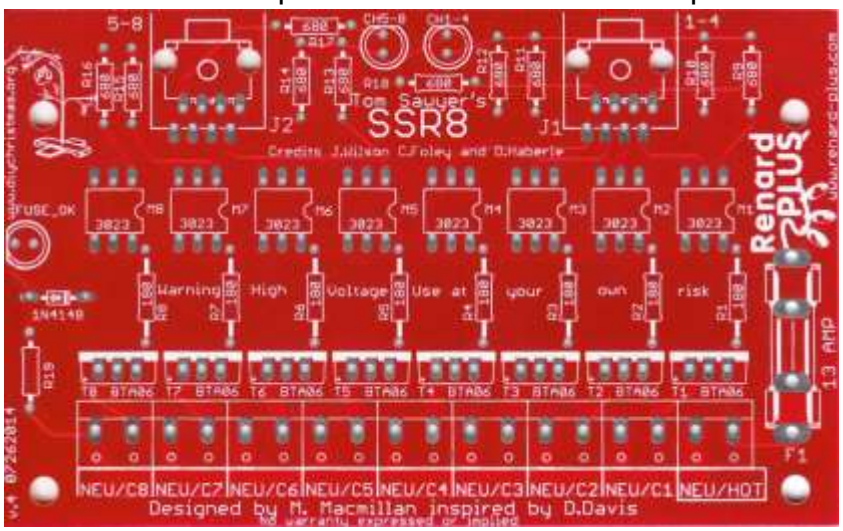
3.2 Parts Assembly

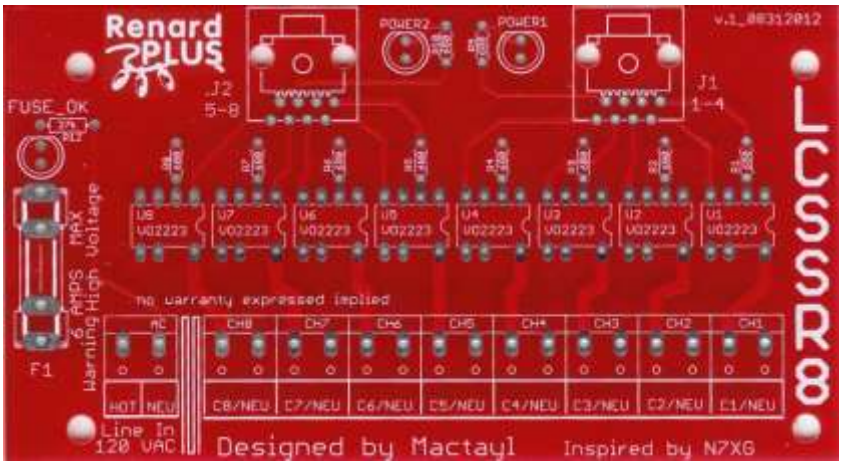
Renard Plus SSR board are very simple boards to assemble and test. It is easiest if you follow these instructions, checking off steps as they are performed. This will lead you through the assembly installing components from shortest/smallest to tallest.

3.2.1 First Things First

1. Begin by inspecting the PCBs to look for any defects such as cracks or breaks. The holes on the board should be open on both sides. Then inspect and sort out the various parts for the board.

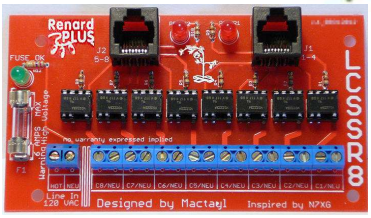






2. Next inspect and sort out the various parts for the board. Make sure you understand which parts are which, and things like resistor codes and component orientation. A separate document on these concepts is available at:
   www.renard-plus.com/files/Tools_and_Parts_ID_Guide.pdf
   and on other resource sites like Wikipedia.
3. Follow the assembly guide for the appropriate board as follows in the next sections.

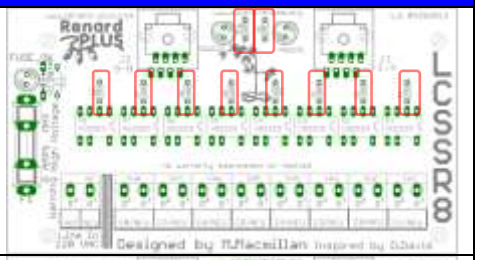
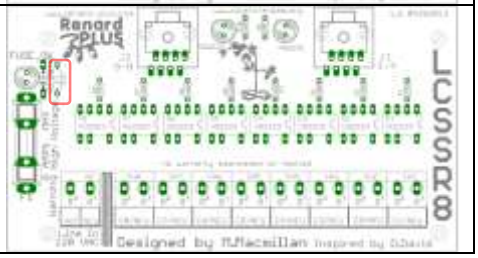
3.3 LCSSR8 Assembly Guide



This section covers the assembly of the LCSSR8 board.

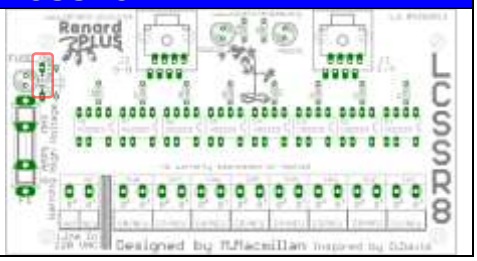
3.3.1 LCSSR8 Install Resistors

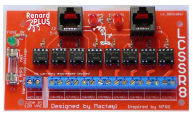
Resistors do not have a specific orientation and can be installed either direction. The VALUE is important and that is indicated by the colored strips. See the Tools and Parts ID document on www.renard-plus.com for details.

Step	Instructions	LCSSR8
1 ☐	Install 10 of 680 ohm resistors (blue-gray-brown) at locations R1-R10. Solder and clip leads.	
2 ☐	Install 1 of 27K ohm resistors (red-violet-orange) at location R12. Solder and clip leads.	

3.3.2 LCSSR8 Diode

Note: diodes have a specific orientation. The diode has a band on one end and should be installed matching the silkscreen on the board. 

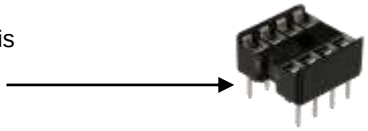
Step	Instructions	LCSSR8
3 ☐	Install the small glass diode 1N4148 at location D1 following the orientation shown on the silkscreen. As illustrated to the right, the band would be closer to the fuse.	



3.3.3 LCSSR8 Install IC Sockets

Even though sockets are optional we strongly recommend that sockets be used on all of the IC's. This allows easier testing, debug and repair down the road. Sockets should be installed with the Pin 1 of the socket aligned to the square solder pad on the PCB. The silkscreen also indicates a notch on the socket outline that the notch on the socket should match. If you get a socket backwards, it will work, but later you will need to be careful to install the IC properly per the board indication of pin 1, not the socket. See diagram below.

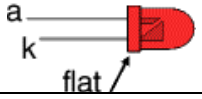
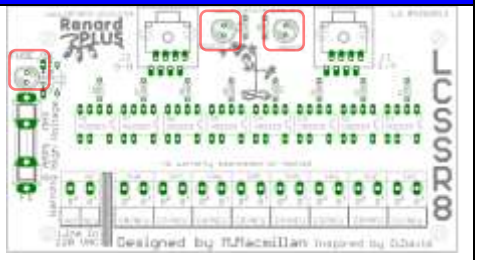
Pin 1 of the IC socket is on the end, closest to the notch.

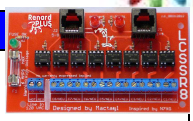
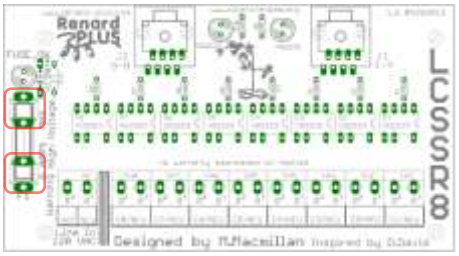
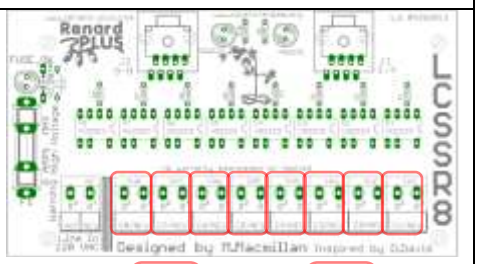
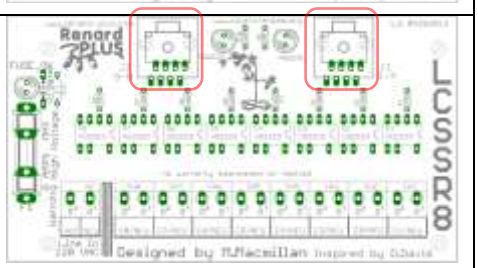


Step	Instructions	LCSSR8
4 ☐	Install the eight 8 pin IC socket at location M1 – M8. Solder. *Note: it is a good idea to remove pin 7 from the socket to match the omitted pin on the VO2223A part in order to improve spark/short resistance of the high voltage AC present on this chip when operating.*	

3.3.4 LCSSR8 Install Misc. Parts

looking at an LED you will notice a flat spot on one LED's (light emitting diodes) must be installed according to the silk screen pattern on the board. In side of the LED:

Step	Instructions	LCSSR8
5 ☐	Install the 3 red LED's at location CH1-4 and CH5-8, and FUSE_OK. Solder and clip leads. *Note: These parts have a specific orientation. The flat side of the LED is negative and goes toward the flat side on the silkscreen. The negative lead goes in the upper hole as illustrated to the right.*  	

Step	Instructions	LCSSR8
6 ☐	Install the 2 fuse clips at location F1, and F2. Solder. Install Fuses at F1 and F2. Fuses do NOT get soldered. *Note: The fuses can be used to align the fuse clips for soldering as long as you do not overheat them.* 	 
7 ☐	Install 9 terminal blocks at locations “Line-in”, C1 – C8. Solder. *Note: The terminal blocks must be oriented facing outward.*	
8 ☐	Install the two RJ45 modular jacks at location J1 and J2. Be careful as the pins are somewhat close together making alignment difficult. Once the pins are lined up, pop the jack onto the board. Solder. *Note: Please inspect the jacks BEFORE installing to make sure all the pins and wires inside the connector look straight and nothing is out of place.*	

3.3.5 LCCSS8 Preliminary Test

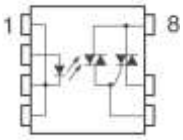
At this point the board is complete except for the IC chips. It is a good idea to gently clean off any final soldering residue and then visually inspect the board and check to make sure there are no solder bridges between the solder pads, and that the solder joints are all a good quality. If you are going to do any electrical checks, now is a good time to do so. **Remember there is LIVE AC on the board when plugged into the wall so be careful!** It may be a good idea to check computer control from your Renard to catch any problems BEFORE the VO2223a parts are installed. You should see low voltage (i.e. around 5V) at the R1-R8 resistors going to the VO2223A sockets.

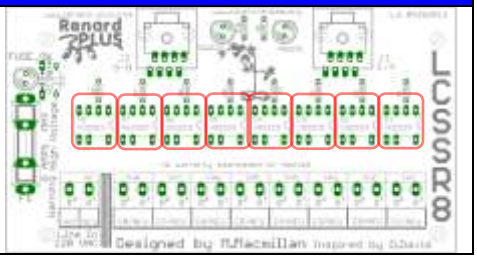
3.3.6 LCSSR8 Install IC's

Note: Before handling any IC, touch the bottom of the board or use a conductive wrist-strap attached to the board.

IC's pins are numbered from 1 to the number of pins counter clockwise with pin 1 being just to the right of either a notch or dimple on the IC.

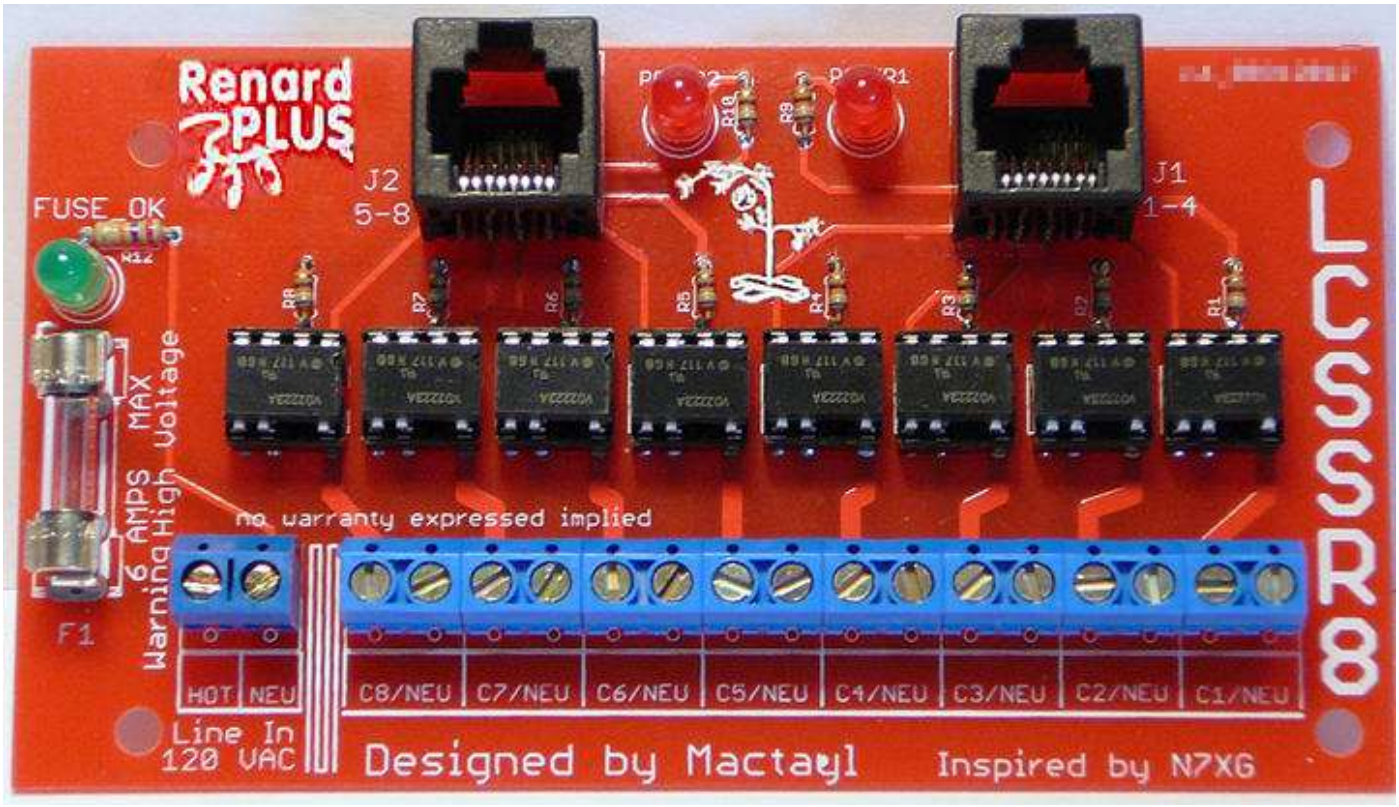
Pin 1 of the IC socket is on the end, closest to the notch.



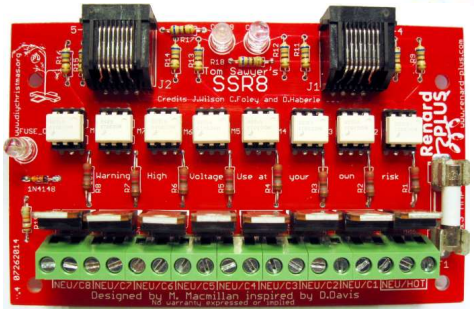
Step	Instructions	LCSSR8
9 ☐	Install the eight 8 pin VO2223a opto phototriacs in the sockets at M1-M8. *Note: Pin one goes toward the pin one / notch on the silkscreen. That is toward the right edge of the board as shown.*	

3.3.7 Picture of Finished LCSSR8 Board

Note: Your actual board silkscreen will likely vary slightly from this picture. Your board should match more closely to the drawing in the "First Things First" section.



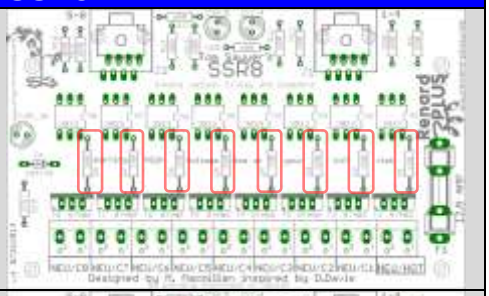
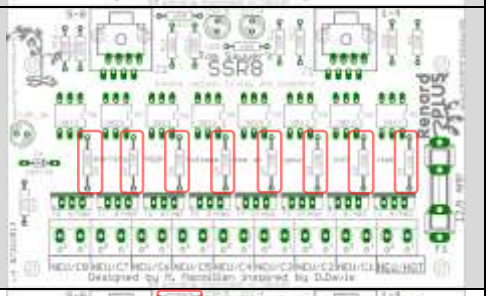
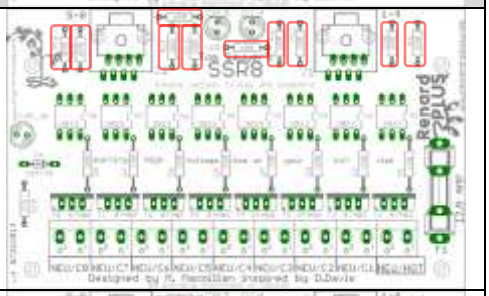
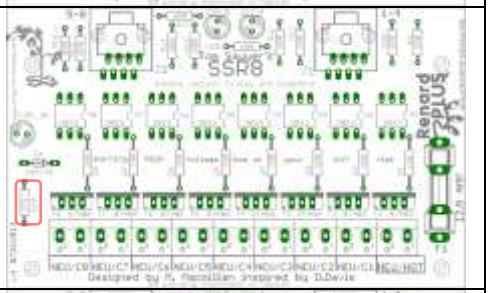
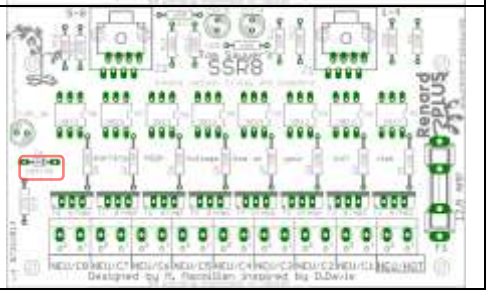
3.4 SSR8 Assembly Guide



This section covers the assembly of the SSR8 boards.

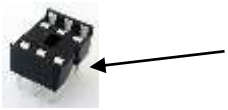
3.4.1 SSR8 Install Resistors and diode

Resistors do not have a specific orientation and can be installed either direction. The VALUE is important and that is indicated by the colored strips. See the Tools and Parts ID document on www.renard-plus.com for details.

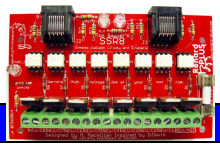
Step	Instructions	SSR8
1a ☐	**For <u>120VAC</u> operation:** Install 8 of 180 ohm resistors (brown-gray-brown) at locations R1-R8. Solder and clip leads. --- OR ---	
1b ☐	**For <u>220VAC</u> operation:** Install 8 of 330 ohm resistors (orange-orange-brown) at locations R1-R8. Solder and clip leads.	
2 ☐	Install 10 of 680 ohm resistors (blue-gray-brown) at locations R9-R18. Solder and clip leads.	
3 ☐	Install 27K ohm resistors (red-violet-orange) at location R19. Solder and clip leads.	
4 ☐	Install 1N4148 diode at location 1N4148	

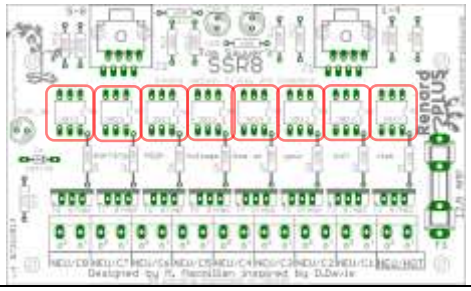
3.4.2 SSR8 Install IC Sockets

Even though sockets are optional we strongly recommend that sockets be used on all of the IC's. This allows easier testing, debug and repair down the road. Sockets should be installed with the Pin 1 of the socket aligned to the square solder pad on the PCB. The silkscreen also indicates a notch on the socket outline that the notch on the socket should match. If you get a socket backwards, it will work, but later you will need to be careful to install the IC properly per the board indication of pin 1, not the socket. See diagram below.

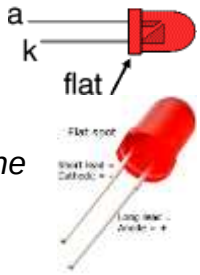
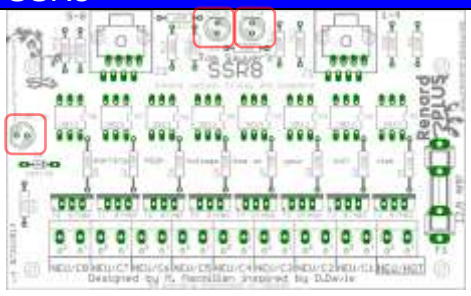
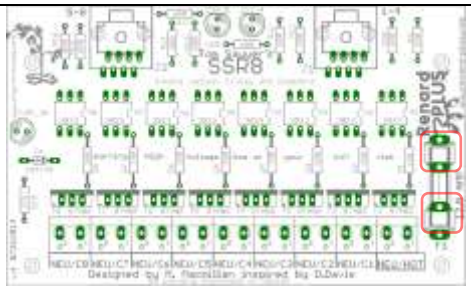


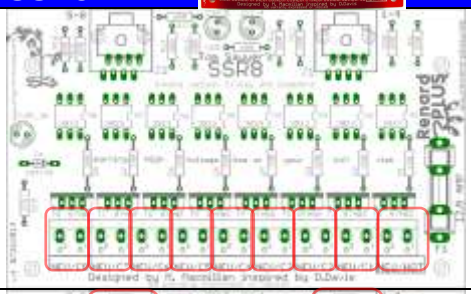
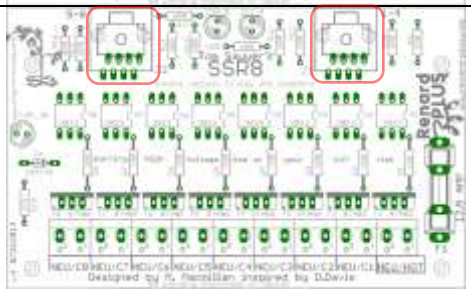
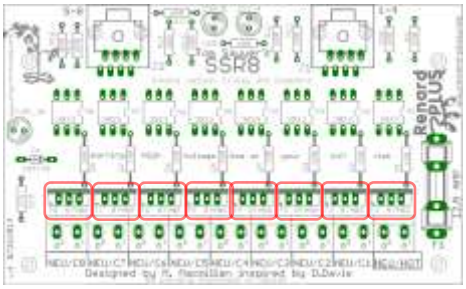
Pin 1 of the IC socket is on the end, closest to the notch.



Step	Instructions	SSR8
5 ☐	Install the eight 6 pin IC socket at location M1 – M8. Solder. *Note: The notch goes to the right as shown on the silkscreen. It is OK if a socket is soldered in backwards; just remember to put the component in the correct way.*	

3.4.3 SSR8 Install Misc. Parts

Step	Instructions	SSR8
6 ☐	Install the 2 red LED's at location CH1-4, CH5-8 and Green LED at FUSE_OK. Solder and clip leads. *Note: These parts have a specific orientation. The flat side of the LED is negative and goes toward the flat side on the silkscreen (in the upper hole as shown).* 	
7 ☐	Install the 2 fuse <u>clips</u> at location F1. Solder. Snap fuse into clips at F1. Fuses do NOT get soldered into the clips! *Note: The fuses can be used to align the fuse clips for soldering as long as you do not overheat them.* 	

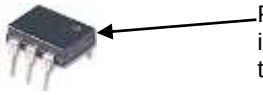
Step	Instructions	SSR8
8 ☐	Install the nine terminal blocks at locations C1 – C8, and “NEU/HOT”. Solder. *Note: The terminal blocks must be oriented facing outward.*	
9 ☐	Install the two RJ45 modular jacks at location J1 and J2. Be careful as the pins are somewhat close together making alignment difficult. Once the pins are lined up, pop the jack onto the board. Solder. *Note: Please inspect the jacks BEFORE installing to make sure all the pins and wires inside the connector look straight and nothing is out of place.*	
10 ☐	Install the 8 Triacs in locations T1 – T8. Solder and clip leads. *Note: These parts have a specific orientation. The tab side of the Triac should be towards the thicker black line on the part silkscreen outline towards the center of the board. If you will be adding the optional heat sink for the triacs, you will want to do so BEFORE soldering the triacs in place. A heat sink makes a great triac installation tool to keep the triacs straight for soldering.*	

3.4.4 SSR8 Preliminary Test

At this point the board is complete except for the IC chips. It is a good idea to gently clean off any final soldering residue and then visually inspect the board and check to make sure there are no solder bridges between the solder pads, and that the solder joints are all a good quality. If you are going to do any electrical checks, now is a good time to do so. Remember there is LIVE AC on the board when plugged into the wall so be careful! It may be a good idea to check computer control from your Renard to catch any problems BEFORE the MOCs parts are installed. You should see around 5V at the resistors (R9-R16) going to the MOC sockets when a channel is on.

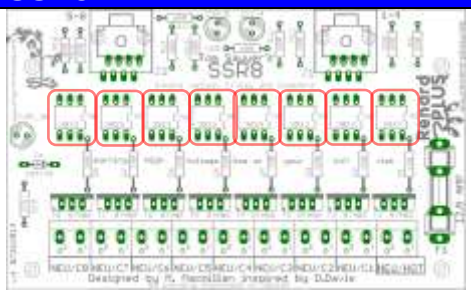
3.4.5 SSR8 Install IC's

IC's pins are numbered from 1 to the number of pins counter clockwise with pin 1 being just to the right of either a notch or dimple on the IC.



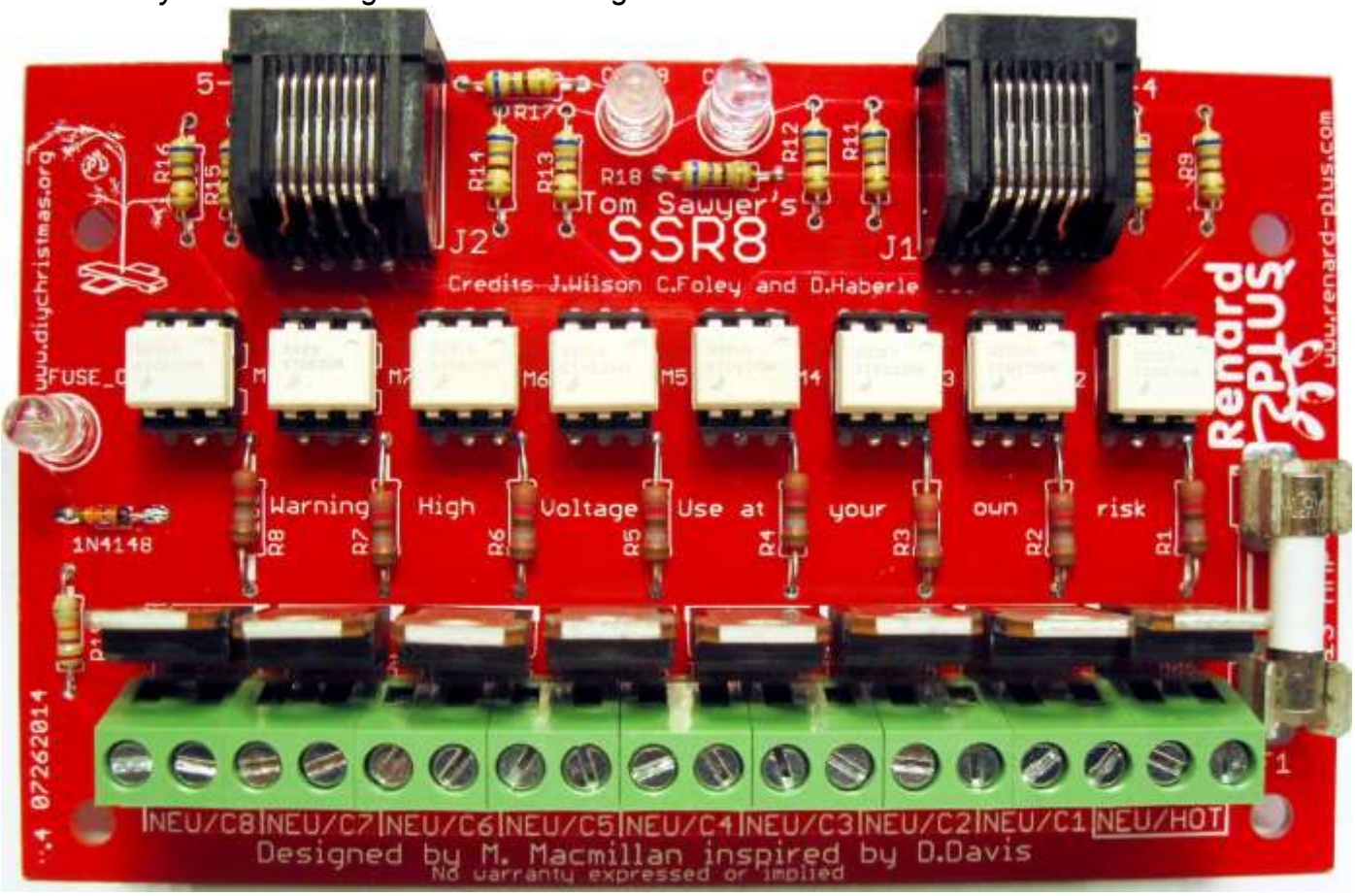
Pin 1 of the IC socket is on the end, closest to the notch.

Note: Before handling any IC, touch the bottom of the board or use a conductive wrist-strap attached to the board.

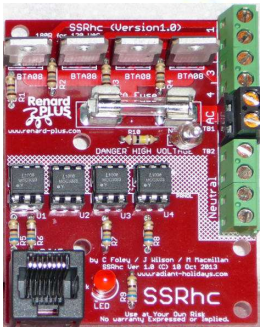
Step	Instructions	SSR8
11 ☐	Install eight of the 6 pin **MOC3023** optocouplers at M1 – M8. *Note: Pin one goes toward the pin one / notch on the silkscreen. That is toward the right edge as shown. Some MOC parts indicate pin 1 with a dot which goes toward the notch on the silkscreen.* 	

3.4.6 Picture of Finished SSR8 Board

Note: Your actual board silkscreen will likely vary from this picture. Your board should match more closely to the drawing in the "First Things First" section.



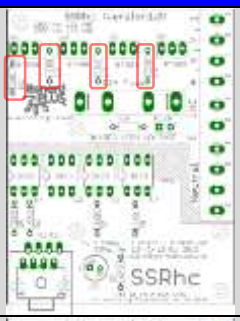
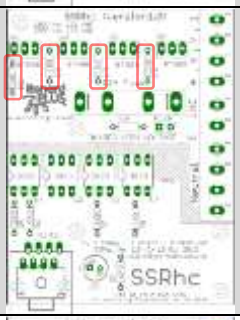
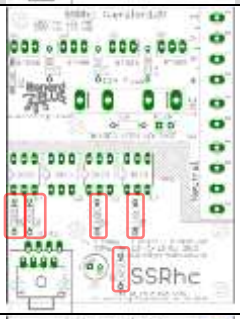
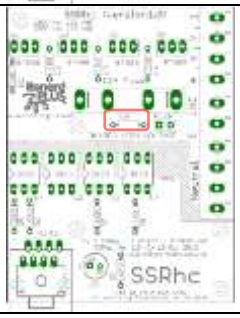
3.5 SSRhc Assembly Guide

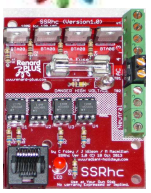


This section covers the assembly of the SSRhc board.

3.5.1 SSRhc Install Resistors

Resistors do not have a specific orientation and can be installed either direction. The VALUE is important and that is indicated by the colored strips. See the Tools and Parts ID document on www.renard-plus.com for details.

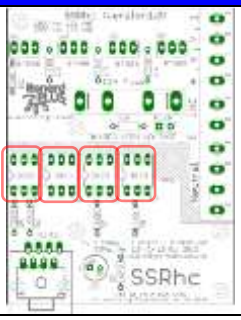
Step	Instructions	SSRHC
1a ☐	For 120VAC operation: Install 4 of 180 ohm resistors (brown-gray-brown) at locations R1-R4. Solder and clip leads. --- OR ---	
1b ☐	For 220VAC operation: Install 4 of 330 ohm resistors (orange-orange-brown) at locations R1-R4. Solder and clip leads.	
2 ☐	Install 5 of 680 ohm resistors (blue-gray-brown) at locations R9-R18. Solder and clip leads.	
3 ☐ **Option**	If you will be using the OPTIONAL neon “power on” indicator in Step 11, install R10 100K ohm resistor (Brown-Black-Yellow). Solder and clip leads	



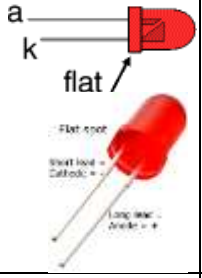
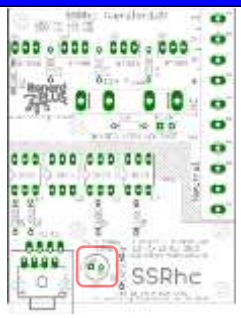
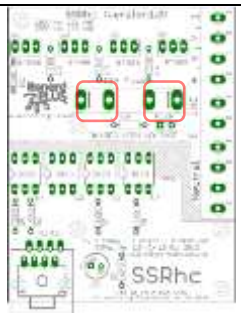
3.5.1 SSRhc Install IC Sockets

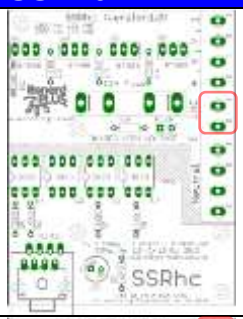
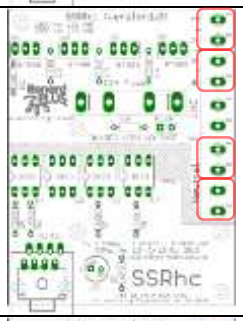
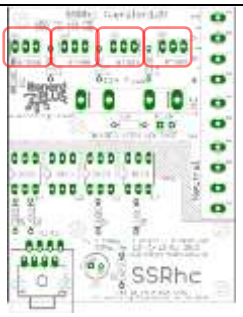
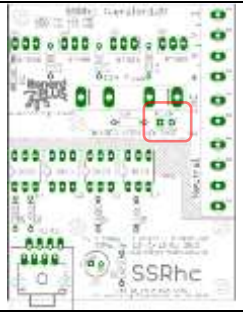
Even though sockets are optional we strongly recommend that sockets be used on all of the IC's. This allows easier testing, debug and repair down the road. Sockets should be installed with the Pin 1 of the socket aligned to the square solder pad on the PCB. The silkscreen also indicates a notch on the socket outline that the notch on the socket should match. If you get a socket backwards, it will work, but later you will need to be careful to install the IC properly per the board indication of pin 1, not the socket. See diagram below.

Pin 1 of the IC socket is on the end, closest to the notch.

Step	Instructions	SSRhc
4 ☐	Install the four 6 pin IC socket at location M1 – M4. Solder. *Note: The notch goes to the left as shown on the silkscreen. It is OK if a socket is soldered in backwards; just remember to put the component in the correct way.*	

3.5.1 SSRHC Install Misc. Parts

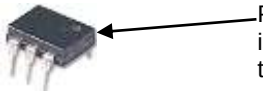
Step	Instructions	SSRhc
5 ☐	Install the 1 red LED's at location LED. Solder and clip leads. *Note: These parts have a specific orientation. The flat side of the LED is negative and goes toward the flat side on the silkscreen (in the upper hole as shown).* 	
6 ☐	Install the 2 fuse clips at location Fuse. Solder. Install Fuse into clips. Fuses do NOT get soldered into the clips! *Note: The fuses can be used to align the fuse clips for soldering as long as you do not overheat them.* 	

Step	Instructions	SSRhc
7 ☐	Install the ONE terminal blocks at locations AC as indicated. Solder. *Note: The terminal blocks must be oriented facing outward.*	
8 ☐	Install the four terminal blocks at locations indicated. Solder. *Note: The terminal blocks must be oriented facing outward.*	
9 ☐	Install the one RJ45 modular jacks at location RJ45. Be careful as the pins are somewhat close together making alignment difficult. Once the pins are lined up, pop the jack onto the board. Solder. *Note: Please inspect the jacks BEFORE installing to make sure all the pins and wires inside the connector look straight and nothing is out of place.*	
10☐	Install the 4 Triacs in locations Q1 – Q4. Solder and clip leads. *Note: These parts have a specific orientation. The tab side of the Triac should be towards the thicker black line on the part silkscreen outline towards the center of the board. If you will be adding the optional heat sink for the triacs, you will want to do so BEFORE soldering the triacs in place. A heat sink makes a great triac installation tool to keep the triacs straight for soldering. DO NOT OVERHEAT when soldering!*	
11☐ **Option**	Install the OPTIONAL neon bulb at location marked NEON. Solder and clip leads. *Note: This part does not have a specific orientation.*	

At this point the board is complete except for the IC chips. It is a good idea to gently clean off any final soldering residue and then visually inspect the board and check to make sure there are no solder bridges between the solder pads, and that the solder joints are all a good quality. If you are going to do any electrical checks, now is a good time to do so. Remember there is LIVE AC on the board when plugged into the wall so be careful! It may be a good idea to check computer control from your Renard to catch any problems BEFORE the MOCs parts are installed. You should see around 5V at the R5-R8 resistors going to the MOC sockets when a channel is on.

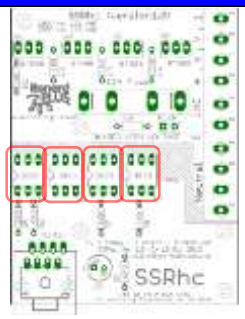
3.5.1 SSRhc Install IC's

IC's pins are numbered from 1 to the number of pins counter clockwise with pin 1 being just to the right of either a notch or dimple on the IC.

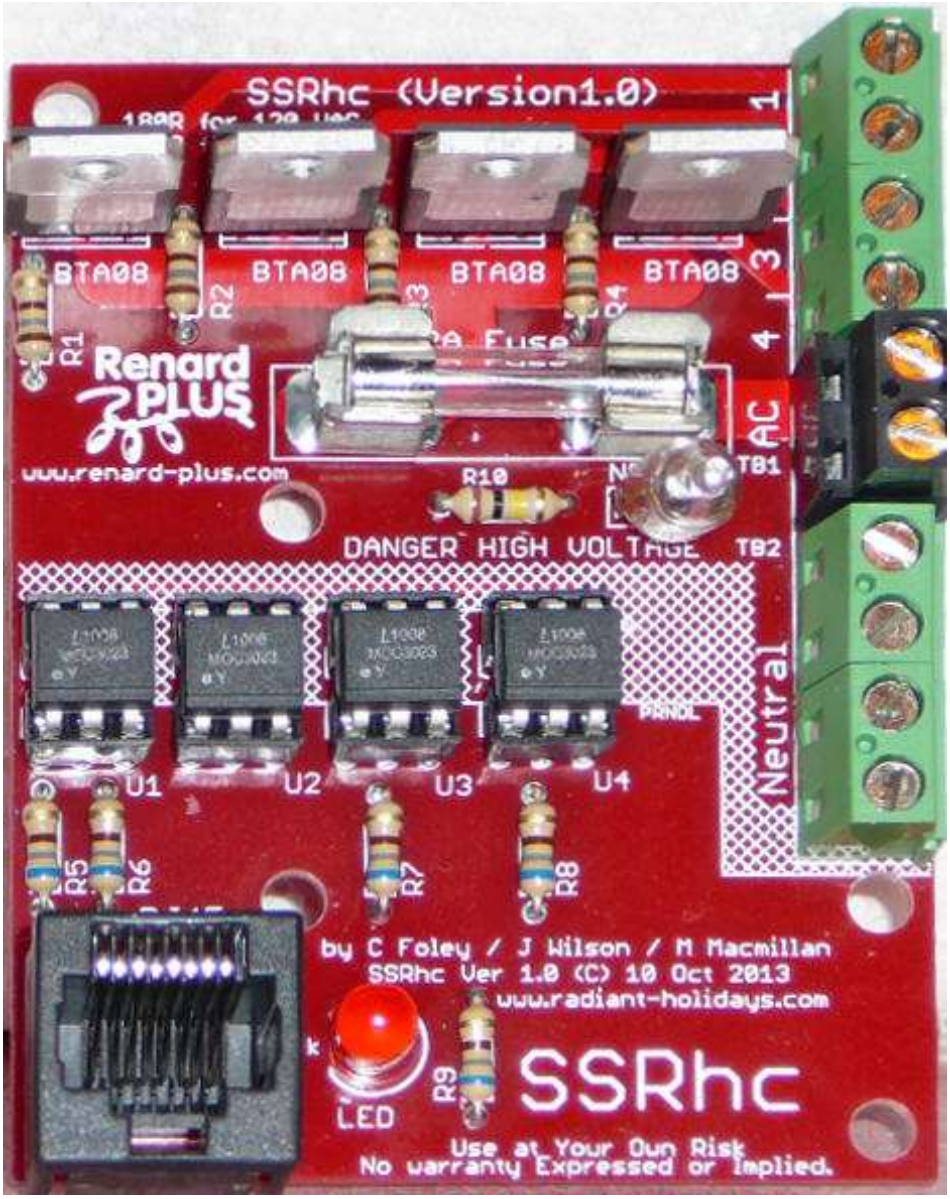


Pin 1 of the IC socket is on the end, closest to the notch.

Note: Before handling any IC, touch the bottom of the board or use a conductive wrist-strap attached to the board.

Step	Instructions	SSR8
12 ☐	Install four of the 6 pin **MOC3023** optocouplers at U1 – U4. *Note: Pin one goes toward the pin one / notch on the silkscreen. That is toward the left edge as shown.* *Some MOC parts indicate pin 1 with a dot which goes toward the notch on the silkscreen.* 	

3.5.1 Picture of Finished SSRhc Board



3.6 Connecting a Renard

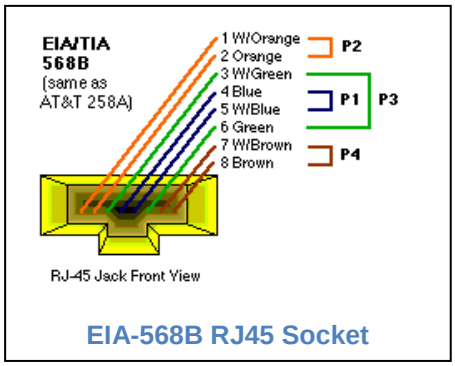
A Renard light controller board will normally contain 2 RJ45 connectors that are used to receive data and pass data to the next controller. On controllers designed for SSR operation, there will also be RJ45 connectors to drive SSRs.

The data wiring of a Renard-Plus controller is the same as other Renard boards including the Renard SS series so you can follow the same cabling requirements.

3.6.1 RJ45 Wiring

A standard CAT5 (or better) RJ45 network cable can be used to connect the Renard controller to:

1. **SSRs (as we need for the SSRs discussed in this document). The SSR will have TWO RJ45 connectors (4 channels per connector) and those connect to two of the Renard controller outputs FOR SSRs.**
2. Your PC RS485 adapter.
3. Another Renard controller for daisy chain operation.



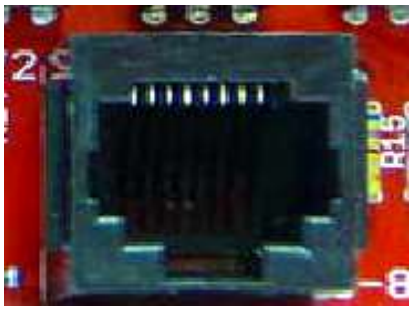
EIA-568B RJ45 Socket

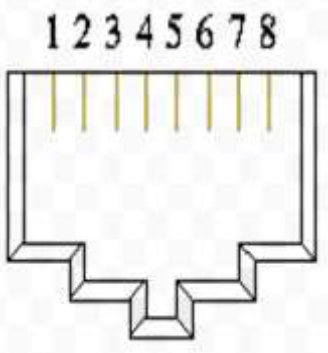
The cable must be a straight thru style and NOT a cross-over type cable. Just check and make sure that the pins on one end of the cable connect to the same pin on the other end of the cable (the wire colors in the connector are a way to tell- look for the same color pattern on both connectors).

This is an example of a data cable wired to the EIA-568B standard. There are eight pins, numbered from left to right, looking at the jack.

3.6.2 SSR Connection

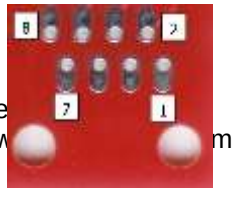
Renard Plus controllers that support external Solid State Relay boards (SSRs) use RJ45s for the wiring between the controller and the SSR. Although it is the same connector (RJ45 and CAT5 network) used for communications to the board from the computer cabling (when equipped), the pinout for the SSR connections is VERY different. The following is the typical pinout of the FEMALE RJ45 SSR connector on a board (looking in the connector where the cable plugs in):





1 – Vcc (+5)
2 – Channel 1 (negative true)
3 – Vcc (+5)
4 – Channel 2 (negative true)
5 – No connect
6 – Channel 3 (negative true)
7 – Gnd
8 – Channel 4 (negative true)

For SSR connection, the term “negative true” means that when the signal is low/ground, the SSR channel will be on. So, for example, if you gnd RJ45 pin 6 to the SSR, channel 3 on the SSR should turn on.



The RJ-45 connector pins viewed on the back side of a board are numbered as shown. Note: though the RJ-45 connector side the pins are in-line, the actual

pins to the connector on the board are staggered. Yes, confusing but that is how they are designed. Just be aware of this if you need to measure or play with the pins on a board.

Special Note for Strip Controller: With the Renard Plus Strip Controller and the RGB DCSSR, because they are both designed for 3 channel operation for RGB, pin 8 is a “no connect” on the SSR outputs of the controller. This matches the three channel operation of the RGB DCSSR. If you were to plug in a typical 4 channel SSR into the 3 channel Strip Controller, the 4th channel on the SSR will not be controllable and will always be off. Additionally, if you plug the RGB DCSSR into a typical Renard controller you will be able to control the missing 4th output. You will need to keep this in mind with you sequencing that there will be a channel or channels that you cannot control.

3.6.3 Test Procedure

The data wiring of this board is the same as other Renard boards. Standard non-crossover CAT5 network cables can be used to connect to the SSRs, other controllers, and/or the PC. Connect your Renard Plus to your PC using a standard CAT5 cable from the controller RX jack to a RS485 connection on your PC. Attach at least one set of dimmable lights to the SSR. Program a Vixen sequence to turn on/off each of the channels on the controller and run it. We would suggest that each channel is turned on for 4 or 5 seconds. Observe that the connected channel responds as programmed. Next, do a full load test by attaching lights to the rest of the SSR outputs and observe all lights are being controlled. Next, change the sequence from on/off to slow ramp up/downs to verify dimming.

Congratulations, with a successful test, you have completed your build of your Renard Plus controller/SSR and are ready for the wonderful world of light animation sequencing! Blink On!!

4. Notes

Use this page for YOUR notes about the boards.