

Remote Searchlight Signal Driver Card (RSSD)

Many C/MRI users find it preferable to set up every SMINI output port in its standard current sinking configuration, rather than to have some ports configured for current sinking while others are set for current sourcing. One advantage for keeping every SMINI configured identically is to make it easy to swap boards when checking out a system. It also makes setting up spares much easier. Additionally, having all ports configured identically enables a higher level of freedom when shifting devices from one port to another or when adding different device types as you develop your system.

To satisfy the desire to keep all C/MRI outputs configured for standard current sinking, while incorporating 3-lead type searchlight signals, the JLC Remote Searchlight Signal Driver (RSSD) circuit board was created. Each RSSD board implements four of the circuits shown in Fig. 1. Each circuit uses two small signal PNP transistors, which with the required current dropping resistors and yellow adjusting potentiometer, are typically mounted adjacent to the signal. The transistors effectively change the standard current sinking outputs provided by the C/MRI to the required current sourcing outputs required to drive 3-lead LEDs.

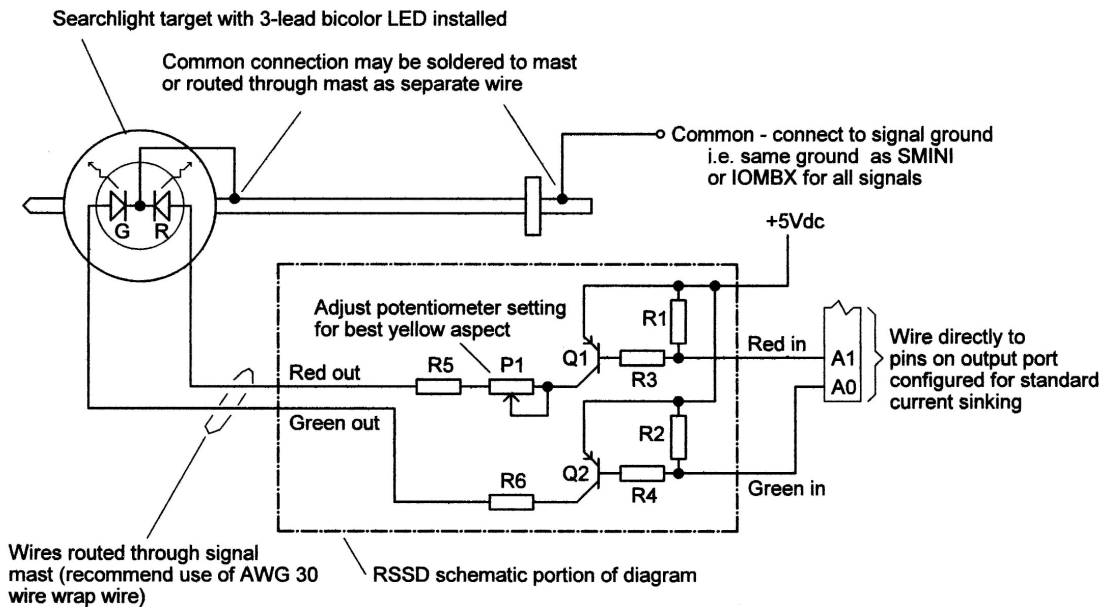


Fig. 1. RSSD schematic and connection diagram

Software activation of A0, i.e. pulling it to ground, turns on the transistor connected to the green LED which turns on the green LED. Software activation of A1, i.e. pulling it to ground, turns on the transistor connected to the red LED which turns on the red LED. When the software activates both A0 and A1 simultaneously, the signal appears yellow. Typically, the resistance in the red LED circuit is made adjustable to achieve the best quality yellow. Having both A0 and A1 remain high, the signal goes dark.

Fig. 2 shows the parts layout for one half of the RSSD, with the other half being identical. In fact, each RSSD board is scored so that it can be snapped into two separate pieces with each piece having identical circuitry for driving two 3-lead LEDs. Using this arrangement, you can use one-half of a board at each site where you want to handle two intermediate block signals, another half

at each 2-headed signal leading into a passing siding and a third half at the frog end for the two single headed signals. Or you can use a full board handling the four LEDs at each complete OS section.

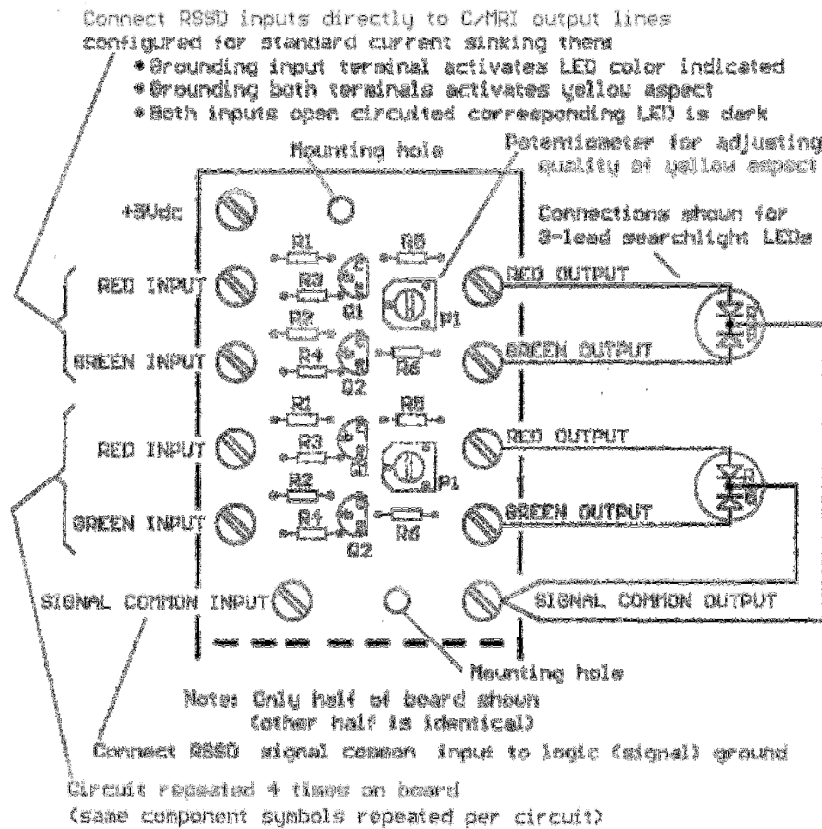


Fig. 2. RSSD parts layout and LED connections

Because each of the four circuits is identical, I have repeated the parts nomenclature from circuit to circuit including the separate potentiometers used to optimize the yellow aspect of each LED individually. The parts list quantities, see Table 1, are for one circuit. Thus, to build up a complete card you need to multiply all the quantities shown by 4 and then add 6 screws and nuts for the card's signal common and power connections.

Table 1. RSSD circuit parts list (in recommended order of assembly)

Qty.	Symbol	Description
4	-	4-40 x 1/4" pan-head machine screws (Digi-Key H142)
4	-	4-40 hex nuts (Digi-Key H216)
2	R1, R2	4.7K Ω resistors [yellow-violet-red]
2	R3, R4	470 Ω resistors [yellow-violet-brown]
1	R5	75 Ω resistor [violet-green-black]
1	R6	150 Ω resistor [brown-green-brown]
1	P1	500 Ω potentiometer (Digi-Key 3306F-501)
2	Q1, Q2	2N4403 PNP small signal transistors (Jameco 38447)

Author's recommendations for suppliers given in parentheses above with part numbers where applicable. Equivalent parts may be substituted. Resistors are 1/4W, 5 percent and color codes are given in brackets.

Ready-to-assemble RSSD printed circuit boards are available from JLC Enterprises at \$8 each, or \$2 per signal LED, and complete kits as well as assembled-and-tested cards are available from EASEE Interfaces. In summary, the primary advantages provided by the RSSD card are:

1. Enables you to drive four 3-lead bicolor LEDs while keeping all your C/MRI outputs in the STANDARD CURRENT SINKING configuration.
2. Provides a neat mounting place for all terminal screws, resistors, and transistors so that they are located right next to each signal for handy wiring terminations.
3. Provides a separate yellow adjustment potentiometer for each searchlight signal LED making it very convenient to always be able to achieve an optimized yellow aspect.

For those interested, the RSSD assembly steps are as follows:

Board orientation. To help avoid errors during assembly, make certain that you orient the board as shown in Fig. 2. All parts are installed from the top, i.e. the component side of the board and all soldering is accomplished on the bottom or the trace side of the board.

Terminal screws. Insert 4-40 screws in each of the terminal holes from the top side and add 4-40 hex nuts on the bottom side, tighten firmly and solder the nuts to the circuit pads.

R1-R6. Match the color code of each resistor to the parts list. Make 90-degree bends in the leads of each resistor so it is centered between its two mounting holes and the leads fit snugly. Insert and solder while holding the part flat against the card, then trim its leads flush with the tops of the solder “tents” on the solder side of the card.

P1. Install this trim potentiometer as in Fig. 2, pushing the three prongs all the way into the holes as you solder.

Q1, Q2. Spread the leads of this transistor slightly to fit the three holes, making sure the center (base) lead goes into the hole closest to input terminal screws and that the flat side of the of each transistor faces the direction shown in Fig. 2. Push in only far enough to fit snugly without stressing the leads. This leaves the bottom surface of the transistor about 1/8-inch above the top surface of the board. Solder and trim.

Cleanup and inspection.

That completes the RSSD card assembly.