# Auxiliary Lighting Board

## GCL1-A

The Auxiliary Lighting Board (ALB) was designed to significantly reduce the labor needed for lighting installations in new and conversion vehicle projects. Instead of spending hours salvaging an old electrical relay system from a donor vehicle, the ALB can simplify this installation process. The ALB uses solid-state MOSFETs for switching a vehicle's headlights, taillights, running lights, brake lights, turn signals and wipers.

**KEY USER FEATURES:**

- Fast installation – saves up to 50% of labor cost
- Adjustable power-off delay for headlights & taillights
- No relays or other external electrical components required
- Low power - consumes < 0.5 mA when the vehicle is turned off
- When windshield wipers are turned on, the head and tail lights come on automatically

**Board Dimensions**

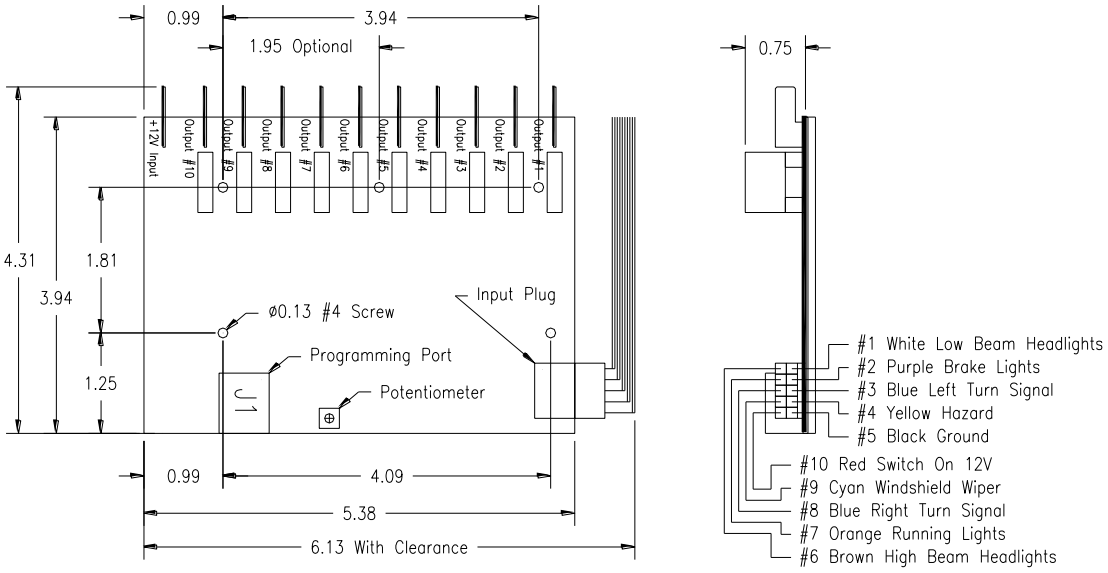



Figure 1

*Note: The J1 port is used for factory programming only.*

Rev. 0

# System Diagram

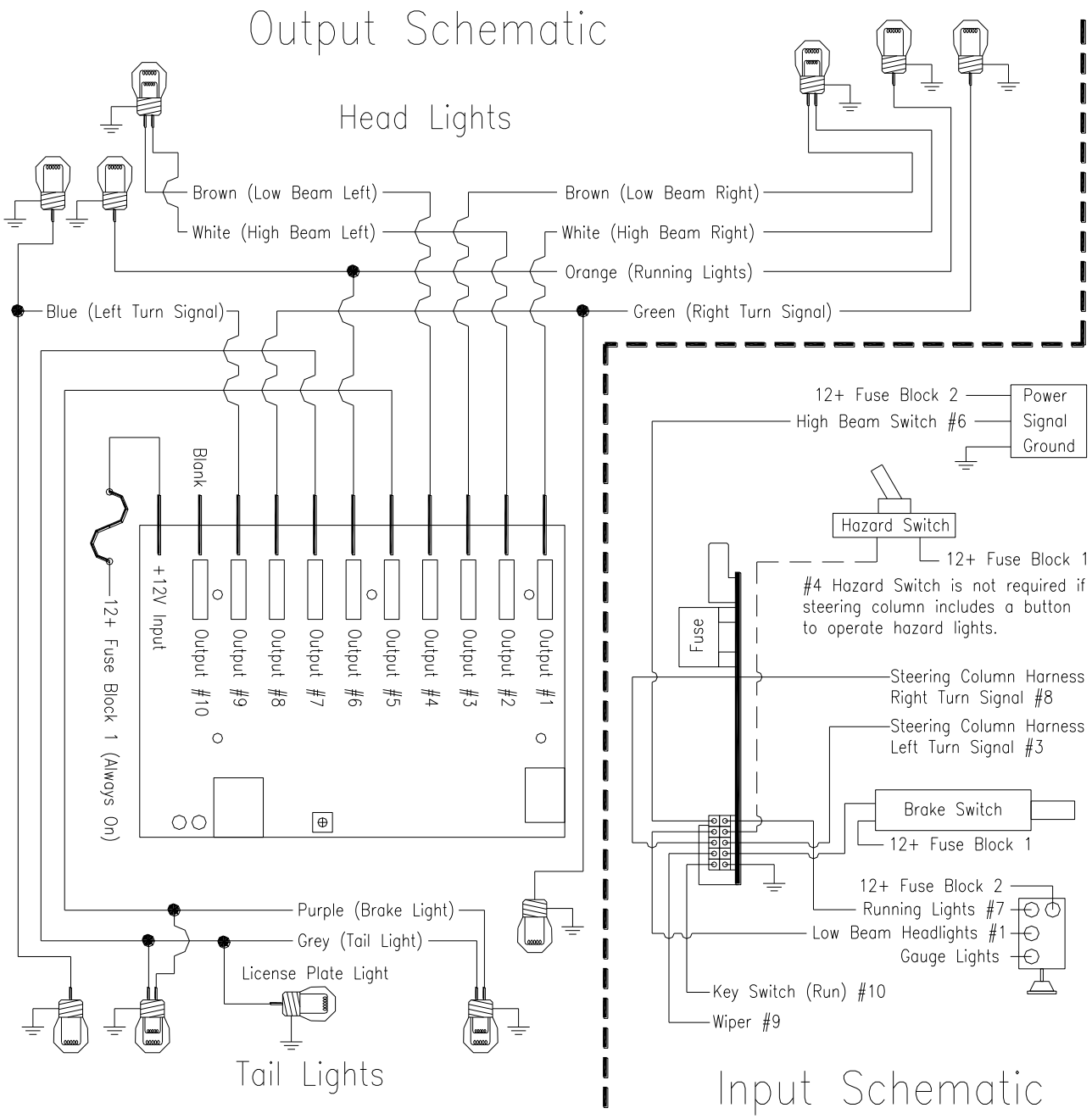



Figure 2

*Note: "Fuse Block 1" and "Fuse Block 2" connections are shown above in Figure 2. Fuse Block 1 is connected directly to the 12V auxiliary battery. This fuse block is considered "always-on" (it supplies 12VDC power all the time). Fuse Block 2 is connected to the ignition key switch and is powered only when this switch is turned on.*

| Output Legend | | | |
|---|---|---|---|
| **Output Description** | **Wire** | **Fuse** | **Pin** |
| High Beam Left Headlight | 16 AWG | 10 amp | 1 |
| High Beam Right Headlight | 16 AWG | 10 amp | 2 |
| Low Beam Left Headlight | 16 AWG | 10 amp | 3 |
| Low Beam Right Headlight | 16 AWG | 10 amp | 4 |
| Brake Lights (L & R) | 20 AWG | 5 amp | 5 |
| Front Running Lights (L & R) | 20 AWG | 5 amp | 6 |
| Tail Lights (L & R) | 20 AWG | 5 amp | 7 |
| Turn Signal Right ( F & R) | 20 AWG | 5 amp | 8 |
| Turn Signal Left (F & R) | 20 AWG | 5 amp | 9 |
| Blank (for future expansion) | - | - | 10 |

| Input Legend | | |
|---|---|---|
| **Input Description** | **Wire** | **Pin** |
| Low Beam Head | 20 AWG | 1 |
| Brake Lights | 20 AWG | 2 |
| Left Turn Signal | 20 AWG | 3 |
| Hazard Signals | 20 AWG | 4 |
| Ground | 20 AWG | 5 |
| High Beam Head | 20 AWG | 6 |
| Running Lights | 20 AWG | 7 |
| Right Turn Signal | 20 AWG | 8 |
| Windshield Wipers | 20 AWG | 9 |
| Switch On +12V | 20 AWG | 10 |
| Aux. Battery +12V | 10 AWG | |
| *NOTE: Positive logic: +12V = active; Ground or Open = inactive.* | | |

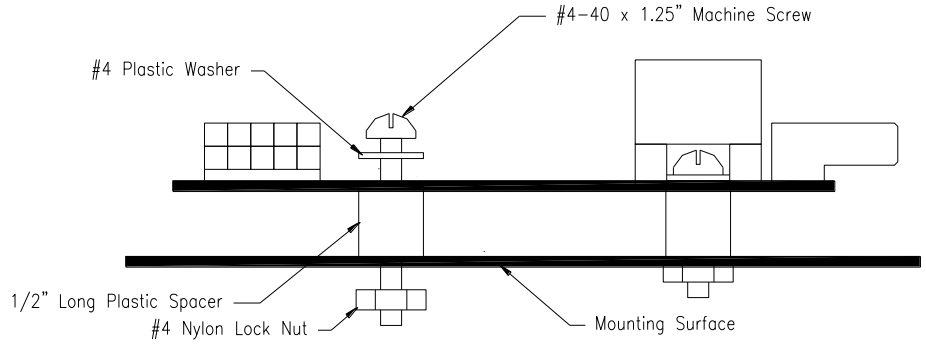
**OUTPUT**

| Lights or Function Selected | O1 | O2 | O3 | O4 | O5 | O6 | O7 | O8 | O9 | O10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Running lights (amber lenses in front & red lenses in rear) | - | - | - | - | - | On | On | - | - | - |
| Low Beam Headlights | - | - | On | On | - | On | On | - | - | - |
| High Beam Headlights | On | On | - | - | - | On | On | - | - | - |
| Turn Signal Left (amber lenses) | - | - | - | - | - | - | - | | On | - |
| Turn Signal Right (amber lenses) | - | - | - | - | - | - | - | On | | - |
| Hazard Lights (amber lenses in front & red lenses in rear) | - | - | - | - | - | - | - | *On | *On | - |
| Brake lights (red lenses in rear) | - | - | - | - | On | - | - | - | - | - |
| Windshield Wipers | **On | **On | **On | **On | - | On | On | - | - | - |

*These will be operable regardless of key switch activation
** Either low beams or high beams can be on (low beam is the default) if light switch is not activated when wipers are engaged.

## Installation Instructions

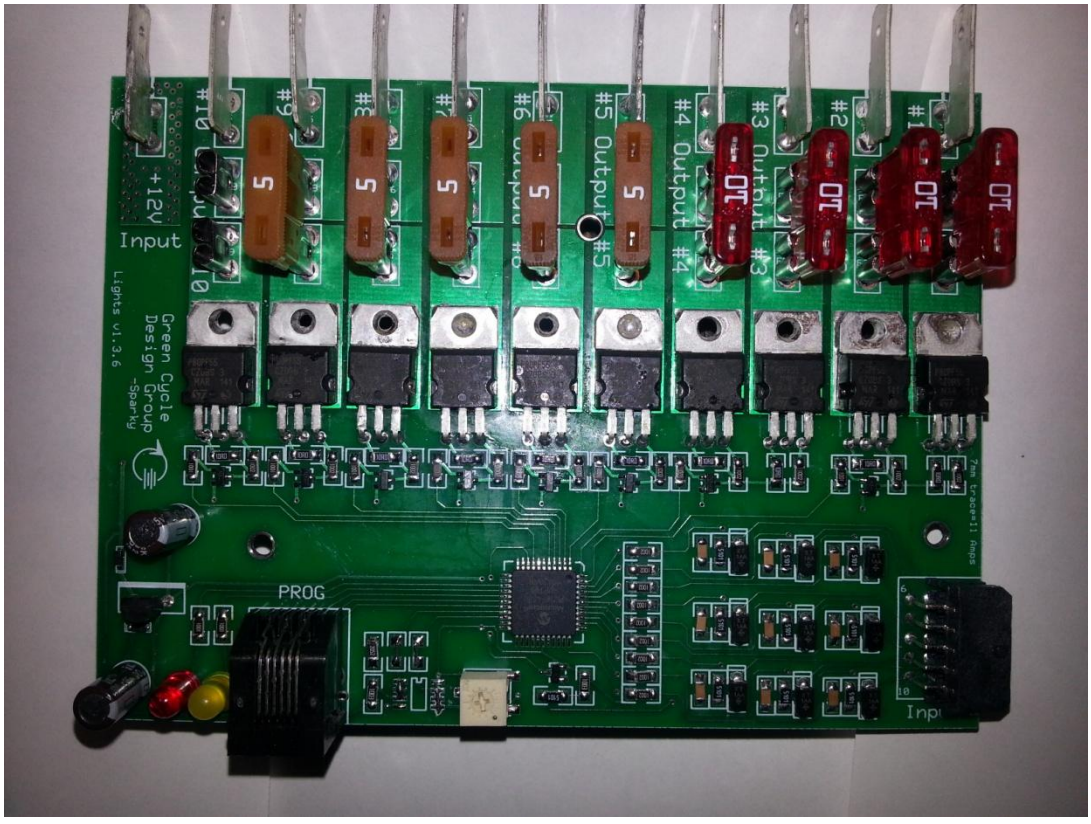
1. Determine a location to mount the Auxiliary Lighting Board unit. Make sure this location can be accessed by the owner should a fuse blow. Check for obstructions such as other wiring harnesses or structural members which can make mounting or accessing the unit difficult.
2. Drilling the mounting holes in the vehicle requires a 1/8" bit. Position the board and with a marker, mark hole locations. Use a center punch and hammer to locate the center of each mark. Drill the holes *NOTE: Do not drill any holes in the circuit board as this may damage it and will automatically void the warranty.*
3. Use four #4 screws with plastic washers (provided) for mounting the board to the vehicle.




4. Disconnect the auxiliary 12 volt battery before connecting the input and output wires.

5. Using the Input Schematic shown above, connect the Ground wire first.
6. From the Input Schematic, connect the “Key Switch (Run)” wire.
7. Consulting the Output Schematic, connect the “+12V Input” to the 40 amp circuit breaker (provided). Connect the copper colored circuit breaker stud to the auxiliary battery positive post. Connect the silver circuit breaker stud to the circuit board “+12V Input”.
8. Using a multi-meter, confirm all input wires and label accordingly.
9. Connect all of the input wires according to the wiring schematic above.
10. Connect all of the output wires according to the wiring schematic above.
    *NOTE: When connecting the 12V auxiliary battery, all wires and circuits <u>may</u> become energized and care should be taken to prevent a short circuit, resulting in possible injury.*
11. Connect the 12 V auxiliary battery and begin testing the lighting board circuit to insure all circuits are working properly. Below is a good order to do the testing – check off each operation after it has been tested. This order will help as some outputs may require multiple inputs.

| | | | | | |
|---|---|---|---|---|---|
| | Left Turn Signal (F&R) | | Tail Lights | | Hazard Lights |
| | Right Turn Signal (F&R) | | Brake Lights | | Windshield Wiper |
| | Running Lights (Front) | | | | |




Auxiliary Lighting Board Image

**<u>Special Features</u>**

1. A single-turn potentiometer is used to increase or decrease the amount of time exterior lights stay on after the ignition key switch has been turned off. This allows low beam headlights and tail lights to remain on to light the way after the driver exits the vehicle. The factory setting is approximately 30 seconds, but can be user adjusted by turning the potentiometer counter clockwise (CCW) for less duration and clockwise (CW) to increases the duration (The headlight duration range can be adjusted by the user from zero seconds to about three minutes total). *Note: This is a single turn potentiometer, do NOT over rotate.*

2. The Auxiliary Lighting Board is designed to protect itself (and the vehicle) should the 12V auxiliary battery voltage drop below 10.3V. At this low battery voltage, none of the board's outputs can be activated. Once the 12V auxiliary battery is charged back up to 11.5V or greater – full functionality is restored.
3. The ALB was designed for low power operation. In Sleep Mode (vehicle turned off), the ALB power consumption is <0.5mA.
4. The ALB was designed to automatically switch on the low beam headlights and taillights whenever the Windshield Wipers are active.

**Tools Required**

1. Hammer
2. Center punch
3. Screwdriver (Phillips and/or flat)
4. Pliers
5. Drill
6. 1/8" drill bit
7. Wire cutting tool and crimper

**Materials supplied**

(1) 10-pin wire harness with 36" pigtail
(2) 10ga-yellow insulated female terminal ends
(5) 16ga-blue insulated female terminal ends
(6) 20ga-red insulated female terminal ends
(4) #4-40 x 1.25" machine screws
(4) plastic washers
(4) ½" long plastic spacers
(4) #4-40 nylon lock nuts
(1) 40 amp auto reset circuit breaker (*Advance Auto* part no. - CBC-40HB-RP)

**Materials not supplied**

10 AWG wire (red) to connect 12V battery to ALB always on input
16 AWG wire (in different colors) for connecting to outputs #1, #2, #3, #4
20 AWG wire (in different colors) for connecting to inputs #5 through #9

**Customer Support**

This datasheet has been written to provide owners and installers with necessary information about the operation and installation of the Auxiliary Lighting Board. The team at Green Cycle has completed dozens of gas-to-electric vehicle conversions and ground-up Battery Powered Vehicle (BPV) designs. We know first-hand the challenges of installing electric vehicle components. Dealing with incomplete or non-existent information from other suppliers is frustrating so we hope you find this information useful in getting your project completed.

We want to hear from you should you have any technical questions (or just want to give us feedback on our products). Send us an email at support@greencycledesigngroup.com .

**12 Month Limited Warranty**

Green Cycle Design Group, LLC warrants to the consumer that all Green Cycle products will be free from defects in material and workmanship for a period of twelve (12) months from date of the original purchase. Products that fail within this 12 month warranty period will be repaired or replaced at Green Cycle's option to the consumer, when it is determined by Green Cycle Design Group, LLC the product failed due to defects in material or workmanship. This warranty is limited to the repair or replacement of parts in the Green Cycle products. In no event shall this warranty exceed the original purchase price of the Green Cycle products nor shall Green Cycle Design Group, LLC be responsible for special, incidental or consequential damages or costs incurred due to the failure of this product. Warranty claims to Green Cycle must be transportation prepaid and accompanied with dated proof-of-purchase. This warranty applies only to the original purchaser of product and is non-transferable. All implied warranties shall be limited in duration to the said 12 month warranty period. Breaking the instrument seal, modifying the circuit boards, improper use or installation, accident, water damage, abuse, unauthorized repairs or alterations voids this warranty. Green Cycle Design Group, LLC disclaims any liability for consequential damages due to breach of any written or implied warranty on all products manufactured by Green Cycle Design Group, LLC.