Pantera Electronics Headlight / Motor Controller Installation Manual

BRAKE

See warning on page 9 about limit switch set-up.

Features and Benefits

> Separates lift motor operation from headlight operation, this *reduces the operating current to half of the original design.*

> Removes high current from the headlight switch on console, by *electronically controlling the headlights, parking lights and side marker lights,* this preserves the headlight switch life.

> Removes high current from the headlight high / low beam switch on the steering column by electronically controlling the headlight low and high beams, this preserves the high / low beam switch life.

> Removes high current from the *headlight mechanism LIMIT switches,* this preserves the limit switch life. This is an unique feature to the Pantera Electronics Headlight / Motor Controller.

> Dynamic brake for repeatable headlight positioning. The HMC applies a electronic brake function when commanded to stop the headlight motion. The brake functions in both UP and Down travel.

> On-board electrical *arc suppression device for motor brushes*, this extends motor life and reduces electrical noise.

> To improve quad HID headlight operation there is an on-board setting to change the function of the low / high beam switch. HID headlights have a warm-up delay before full brightness is attained, this causes a period of low light level when switching from high to low beam. To compensate for this, the function of the high / low beam switch can be altered to keep the low beam headlights ON after switching to the high beam headlights.

> Keep originality by transparent operation through factory Pantera switch and hidden installation.

> On-board LED diagnostic indicators for ease of installation.

> **(HMC with fog/Driving Light option)** Adds a control output for fog or driving lights. An additional small switch can control the fog/driving lights by using the control on the HMC.

Additional things you will need:

Note: From this point to the end of this document "HMC" will refer to the Headlight / Motor Controller.

In the Electrical Installation below, note the quick disconnect terminals and wire required for the installation. Those are not included with the HMC, but can be purchased at most automotive stores and hardware suppliers. A crimping tool will be needed to crimp the terminals. Decide the location and method for the HMC and purchase the fasteners for mounting. Read through the Electrical Installation to determine the wire size (AWG) and color. The wire colors listed match the wire colors used in the harness, but other colors can be substituted.

> ## IMPORTANT
> The motor and lift mechanism is assumed to be operating correctly and the motor gearbox has been up-graded with the brass gear replacement, cleaned and lubricated.
> The horizontal tube bearing points have been lubricated and the nylon sleeves in good condition.   See page 4.
> This maintenance is a must for proper operation in addition to the HMC. If the motor gear box locks from a broken PLASTIC gear, then the HMC will be over-loaded and stop functioning.

Mechanical Installation:

Do not mount HMC on any location on the floor of the Pantera where water can come in contact. Do not mount HMC under the A/C blower, condensation can leak from the housing.
Mounting of the HMC is at the discretion of the owner, there are (4), 1/8 holes in the corners of the HMC for #4 screws or wire ties. In the example images, wire tie wraps are used to mount the HMC on a wire harness in the 1971/72 Pantera and screws are used to mount the HMC on the relay compartment door in the 1973/74 Pantera. These locations were chosen to allow direct connection of the relay wires to the HMC. Make sure that the proper side of the HMC that connects to the relay is in close proximity to the relay. The HMC is marked with "YELLOW" and "BROWN" connections would be closest to the relay.
Note: If installing the HMC with a Pantera-Electronics fuse panel see Image 14.

> ## CAUTION
> Factory windshields are notorious for water leaks. The water collects in the gasket relief and slowly drips from the inside of the gasket area and falls vertically. If this water contacts the HMC it will cause failure of the electronics and may cause the HMC to operate in a erratic unpredictable manor including damage to the headlight lift motor.
> Seal all leaks and verify that water cannot contact the HMC in the selected mounting location.

Electrical Installation

Disconnect the Battery by removing the negative (-) or ground cable from the battery terminal.

The HMC utilizes 0.25" quick disconnect tabs, the same style as used on the Pantera. Common quick disconnect terminals are compatible with the HMC and are available in 2 wire size range, 20-18 AWG (red) smaller size and 16-14 AWG (blue) larger size, both of these can be purchased at automotive and hardware stores. Terminals are crimped to the wires and routed from the headlight switch and to the HMC and from the HMC to the fuse block. The wiring is the same on 1971 through 1974 Panteras electrically but wire routing is different.

> ### *IMPORTANT*
> When mounting the HMC with screws through the 4 mounting holes, and 1/4" long spacers to raise the board from the mounting surface. Do not mount the HMC board tightly to the surface.
> When mounting the HMC with screws do NOT mount on an uneven surface. The HMC should not be curved or warped as the screws are tightened.

Under The Hood Wiring

Identify the up and down limit switches and the color of the wires, it should be in the factory configuration, if not correct it.   [Image 1]

Remove the BROWN and YELLOW wires at the limit switches near the lift motor/mechanism. Push the rubber insulator over the exposed terminal and add a wire tie wrap to keep the insulator in place. If the original insulator is missing use insulation from another source or black electrical tape.
These connections cannot be left exposed and touch the chassis or each other, this will destroy the HMC.

The condition of the limit switches and proper adjustment of the limit switches is important. If the limit switches are worn or damaged replacement or repair is necessary.

Attach a BLACK 18 AWG wire to the limit switch that had the YELLOW wire connected by crimping a 0.25" female quick disconnect RED terminal and installing it to the limit switch connector. The other end of that wire should be connected to the chassis ground, by crimping on a ring tongue RED terminal and installing in one of the screws that mount the limit switch. Connect a BLACK 18 AWG wire in the same manor for the limit switch that had the BROWN wire connected to it.   [Images 3, 4, 5, 6]
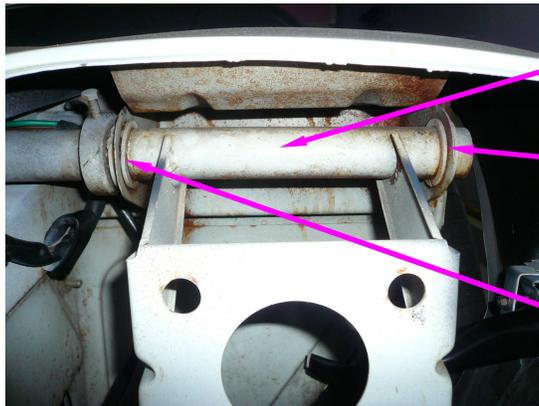
Horizontal pivot tube

Nylon Sleeve, Use silicone grease to lubricate here.

Nylon Sleeve, Use silicone grease to lubricate here.

This is the "DOWN" limit switch, it has the GREEN wire.

This is the "UP" limit switch, it has the GREY wire.

This is the correct factory wiring for the headlight lift motor.
It must be wired in this configuration for the HMC to operate properly.

If it is not wired to this configuration then an over-load condition and stop HMC from functioning.

YELLOW wire with *male* quick disconnect to the motor wire.

BROWN wire with *female* quick disconnect to tab on motor housing.

[Image 2]
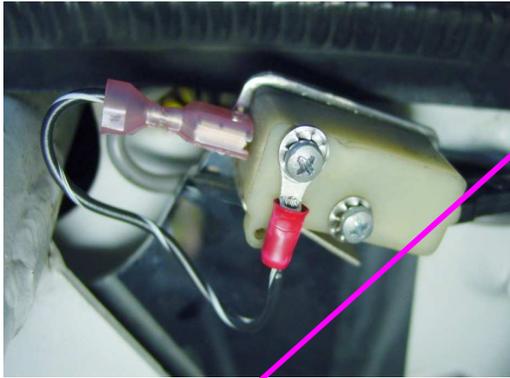
UP" limit switch is forward of the horizontal tube.

Factory connection is a GREY and YELLOW wire connected to this limit switch.

Remove the YELLOW wire connected to this switch.

[Image 3]
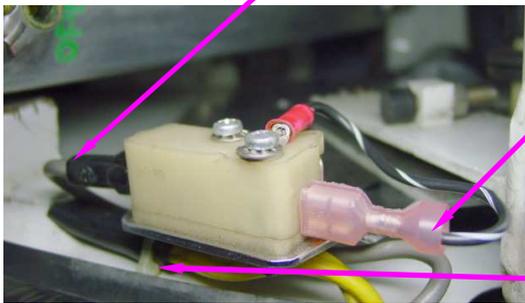
Add a new wire to the terminal where the YELLOW wire was and connect to chassis ground. In the picture the mounting screw for the limit switch was used for chassis ground

Note the wire tie on the yellow wire to hold the insulator in place.   [Image 4]
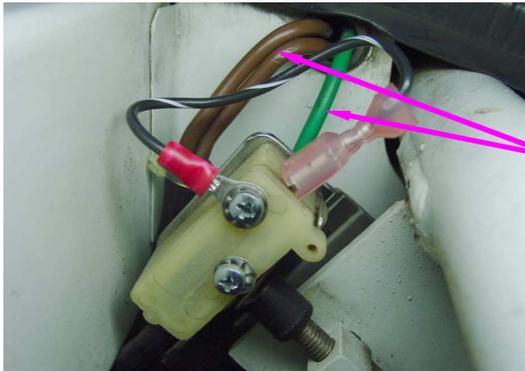
"DOWN" limit switch is rearward of the horizontal tube.

Factory connection is a GREEN and BROWN wire connected to this limit switch.

Remove the BROWN wire connected to this switch.

[Image 5]
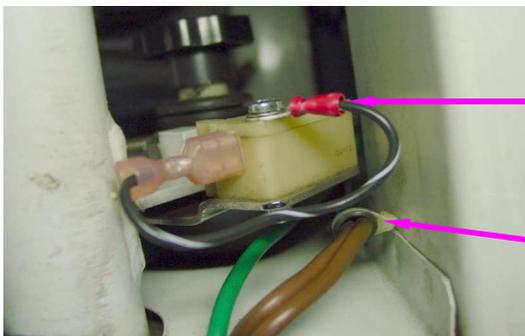
Add a new wire to the terminal where the BROWN wire was and connect to chassis ground. In the picture the mounting screw for the limit switch was used for chassis ground

Note the wire tie on the BROWN wire to hold the insulator in place.

[Image 6]

Relay Wires from the Relay

Disconnect the motor control relay wires and connect them to the HMC marked with the respective colors RED, GREEN, GREY, RED/BLACK (stripe), BROWN, YELLOW, BLACK.

Headlight Wires Behind the Console:

1) Disconnect the PINK harness wire from the back of the headlight switch.

2) Crimp a BLUE piggyback quick disconnect terminal to add a PINK 12 AWG wire and connect to the terminal 4 on the switch where the PINK harness wire was located.

3) Connect the original PINK harness wire to the added PINK 12 AWG wire with the piggy back terminal on switch terminal 4.   [page 11]

4) Crimp a BLUE quick disconnect to the added PINK 12 AWG wire and connect to the HMC labeled "HDLT-SW" "PINK".

If planning to use the HID option of low beam ON and high beam ON at the same time, check the current consumption of the HID power supplies. The PINK wire in the factory harness was sized to supply 12 amps for 1 pair of headlights. If the HID headlights/power supplies consume more than 12 amps then a larger wire or an additional wire from a different source will be needed to supply the additional current. (See step 20 in the power-up and test section)

Note: 1971 and 1972 Panteras - If the HMC is mounted in the same position as in this manual, the wires will only be several inches long.

Note: 1973 and 1974 Panteras - If the HMC is mounted in the same position as in this manual, then the harness will be several feet long, group the 6 wires into a cable using plastic electrical tape every few inches to make a wire harness, then feed the harness from the HMC to the fuse panel.

IMPORTANT -- Check the wiring to the headlight lift motor it must be in the factory configuration, if not correct it. *It must be wired in this configuration for the HMC to operate properly. If it is not wired to this configuration then permanent damage to the HMC will result.*   [Page 4]
When the YELLOW wire is (-) and the BROWN wire is (+) the headlights move up. When the YELLOW wire is (+) and the BROWN wire is (-) the headlights move down. Verify this before proceeding using a 12V or 18V battery from a cordless drill and 2 wires.

Fuse Panel to HMC Wiring   [Image 7]

1. Crimp a FEMALE quick disconnect BLUE terminal to an ORANGE 14 AWG wire to and connect to the tab marked "ORANGE" (PARK) on the HMC board.

2. Crimp a FEMALE quick disconnect BLUE terminal to a GREY 14 AWG wire to and connect to the tab marked "GREY" (LOW) on the HMC board.

3. Crimp a FEMALE quick disconnect BLUE terminal to a GREEN/BLACK 14 AWG wire to and connect to the tab marked "GREEN/BLK" (HIGH) on the HMC board.

4. Crimp a FEMALE quick disconnect RED terminal to a ORANGE wire 18 AWG to and connect to the tab marked "ORANGE" (PARK) on the HMC board.

5. Crimp a FEMALE quick disconnect RED terminal to a GREY 18 AWG wire to and connect to the tab marked "GREY" (LOW) on the HMC board.

6. Crimp a FEMALE quick disconnect RED terminal to a GREEN 18 AWG wire to and connect to the tab marked "GREEN/BLK" (HIGH) on the HMC board.

7. Crimp a FEMALE quick disconnect BLUE terminal to the ORANGE 14 AWG wire from the HMC. Examine the back of the fuse panel, FUSE #3 should have an ORANGE wire, remove the original wire and replace with the ORANGE 14 AWG wire from the HMC. Use the same procedure with the GREY 14 AWG wire to FUSE #5 and the GREEN/BLK wire to FUSE #2.

8. Crimp a MALE quick disconnect RED terminal to the ORANGE 18 AWG wire from the HMC and connect to the ORANGE wire that was originally connected to the fuse block. Use the same procedure with the GREY 18 AWG and GREEN/BLACK 18 AWG wires removed from the fuse block

There is a wire identification pictures on page 20 to aid in finding the correct wires.

These instructions are for the Fog/Driving Light option:

9. *If using the FOG/DRIVING output,* add a BLUE 14 AWG wire with a FEMALE quick disconnect to the terminal to the HMC marked "BLUE, FUSE-7" and the other end with a FEMALE quick disconnect to a +12 volt source. This can be the (+) battery terminal or to the fuse panel Fuse #7 terminal, using a double male/female adapter or a piggy back quick disconnect terminal.

10. Crimp a FEMALE quick disconnect BLUE terminal to a BLUE 14 AWG wire and connect to the tab labeled "FOG LITE" on the HMC board. Connect the other end of the wire to the (+) of each of the fog/driving lights, maximum (2) at 5 amps each.   [Image 7/FOG]

11. Crimp a FEMALE quick disconnect RED terminal to a GREEN 18 AWG wire and connect to the tab labeled "FOG-SW" on the HMC board. Connect the other end of the wire to one terminal of the FOG/DRIVING light switch.
Connect a PINK 18 AWG wire to the remaining FOG/DRIVING light switch and connect to Fuse # 3 or 4.   [Image 14]

Note: Any normally open switch can be used for the fog/driving light switch since it requires low current to operate the HMC control.

It is advised if not connected to the fuse panel that a fuse be connected between the BLUE, FUSE-7 tab and the (+) power source.   [Image 7/FOG]

Power-up and Test

Note: The LED indicators are located relative to the associated terminal for that function.   [Image 13]

1. In the original factory operation, the ignition switch did not have to be "ON" for the headlights to operate. The Pantera Electronics design requires the ignition switch to be "ON" (accessories or ignition) before both the motor and headlights will operate. This still allows leaving the headlights UP and turning off the ignition (headlight housings stay up) to replace a headlight.

Important: Check the wiring on the headlight lift motor and make sure it is correct to the factory configuration.   [Image 2]

2. In order to test the limit switches, disconnecting the YELLOW motor wire is necessary. Disconnect the YELLOW wire that was removed from the relay and connected to the HMC in the earlier steps of the installation. *This wire should not touch anything during the following testing procedure.*

3. Manually move headlights "UP" by turning the knob on the headlight motor mechanism in the CLOCKWISE direction. Move the headlight housings far enough to completely disengage the "DOWN" limit switch adjustment screw.

4. Re-connect battery cable. At this point the headlight housings should *NOT* move.

5. Observe the HMC, NONE of the indicator lights should be illuminated. If any are illuminated re-check the wiring make sure that the instructions were followed properly. Another possibility is that your Pantera has been altered from the original factory connections. (consultation may need to be considered before continuing testing procedure.)

6. Turn on ignition switch, "PWR" GREEN indicator should be illuminated, the "UP" limit switch RED indicator and "DOWN" limit switch GREEN indicator should be illuminated.

7. Press the "UP" limit switch until the clicking sound is heard, this should also de-activate the "UP", RED indicator. The "UP' limit switch is a normally-closed type and the indicator detects closed contacts, so the indicator operates inverse from the switch actuation.

8. Press the "DOWN" limit switch until the clicking sound is heard, this should also de-activate the "DOWN", GREEN indicator. The "DOWN" limit switch is a normally-closed type and the indicator detects closed contacts, so the indicator operates inverse from the switch actuation.

It is imperative that the limit switches activate _before_ the mechanical limits are reached in both "UP" and "DOWN" positions.
If the limit switches are not activated and the mechanical end stop is impacted the drive motor may not be shut "OFF".

This will result in an over-load condition and stop the HMC from functioning.

9. Turn ON the headlight switch to HEADLIGHTS, 2nd position of the rocker switch, the "SW" AMBER indicator should be active. The parking lights and side marker lights should be illuminated.

10. Turn on headlight switch, momentarily touch the YELLOW wire to the terminal marked YELLOW. (this will cause a spark, so be ready, don't touch anything else) Make sure the headlight housings move upward and *not downward*. This verifies that the wiring has not been modified from the original design which could cause the headlights to move in the opposite direction or down. If the headlight housings were to move in the opposite direction the limit switches would *not* **stop the motor and damage to the motor, limit switches and HMC board is possible.**

11. If the motor moved the headlights up, turn off the ignition and discount the battery. Connect the YELLOW wire.

12. Make sure the ignition switch is OFF and re-connect the battery.

13. Turn the ignition switch ON, the headlight housings should return the DOWN position. The "UP" RED indicator should be illuminated and the DOWN indicator should not be illuminated.

14. Turn ON the headlight switch to PARKING lights only, mid-position of the rocker switch. The "PARK" YELLOW indicator should be illuminated and the parking lights and side marker lights should be illuminated.

15. Turn ON headlight switch to HEADLIGHTS, 2nd position of the rocker switch. The drive motor should raise the headlight housings with the headlights off. When the headlights are in the UP position the headlights should turn ON and the parking lights and side marker lights should also be illuminated. **The headlights will not illuminate until the headlights are in the UP position, that means the RED indicator for UP is not illuminated.**

16. Move the high/low beam dimmer switch to the low beam position, the "LOW" GREEN indicator should be active.

17. Move the high/low beam dimmer switch to the high beam position, the "HIGH" BLUE indicator should be active.

18. Turn OFF the headlight switch, note that the headlights should not be illuminated as the drive motor moves the headlight housings to the DOWN position. Also the "PARK" YELLOW indicator and side marker lights should not be illuminated.

19. Turn the ignition switch OFF, the indicators should not be illuminated.

(Fog / Driving light option only)

20. Turn ON the FOG switch both fog lights should be illuminated.

Make sure power is supplied to the tab labeled "FUSE #7" if the fog lights do not illuminate.

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21. Selection of low beam operation is selectable by a jumper plug on the HMC. This option is to maintain the low beam lights ON even when the high beam lights are ON. This is not the factory function of the high/low beam switch but the jumper plug allows this function. HID headlights have a warm-up delay before full brightness is attained, this causes a period of low light level when switching from high to low beam. To compensate for this, the function of the high / low beam switch can be altered to keep the low beam headlights ON after switching to the high beam headlights.
Approximately in the center of the HMC there is a moveable jumper plug and text that indicates the position as "HID". The HMC is shipped with the jumper plug in the standard operation position, if the HID operation is desired then pull the jumper plug from the standard position and replace in the HID position. The jumper plug must occupy 2 adjacent pins to function properly.   [Image 12]

22. Testing completed.

PINK wire from harness to switch terminal (4)

Orange wire

7   HEADLIGHT SWITCH   1

Red wire

8   6   4

White wire   PINK 12 AWG piggyback terminal

Pantera Electronics   Rev. 04/24/2023

Mounting Hole   Mounting Hole

Yellow motor wire from relay

Brown motor wire from relay   12 AWG wire

Red/Black stripe from relay   14 AWG wire

Black wire from relay   14 AWG wire

UP limit switch from relay   14 AWG wire

DOWN limit switch from relay   18 AWG wire

Small red wire from relay   18 AWG wire

                                      18 AWG wire

Mounting Hole   Mounting Hole

Red female terminal
for 22-18 AWG wire

Red male terminal
for 22-18 AWG wire

Blue female terminal
for 16-14 AWG wire

Blue male terminal
for 16-14 AWG wire

AWG = Gauge/size of wire   Factory wires in harness

FUSE BOX

GREEN
ORANGE
NOT USED
GREY
PINK
PINK
GREEN
RED
BLUE

HMC connections to Pantera chassis wiring.   [Image 7]

11

Optional fog light drive connect to fog lights

Connection for +12V power input for fog lights

To headlight switch 3 wire junction 12 AWG wire

To fuse # 2 GREEN/BLK wire

To fuse # 5 GREY wire

To fuse # 3 ORANGE wire

2 Fuse wire previously connected to the fuse panel

Fuse # 5 wire previously connected to the fuse panel

Fuse # 3 wire previously connected to the fuse panel

Pull the relay wire harness out of the relay box and position the wires toward the fuse panel.

Connect all wires that were connected to the relay to these terminals.

Use small tie-wraps to retain the HMC to the harness
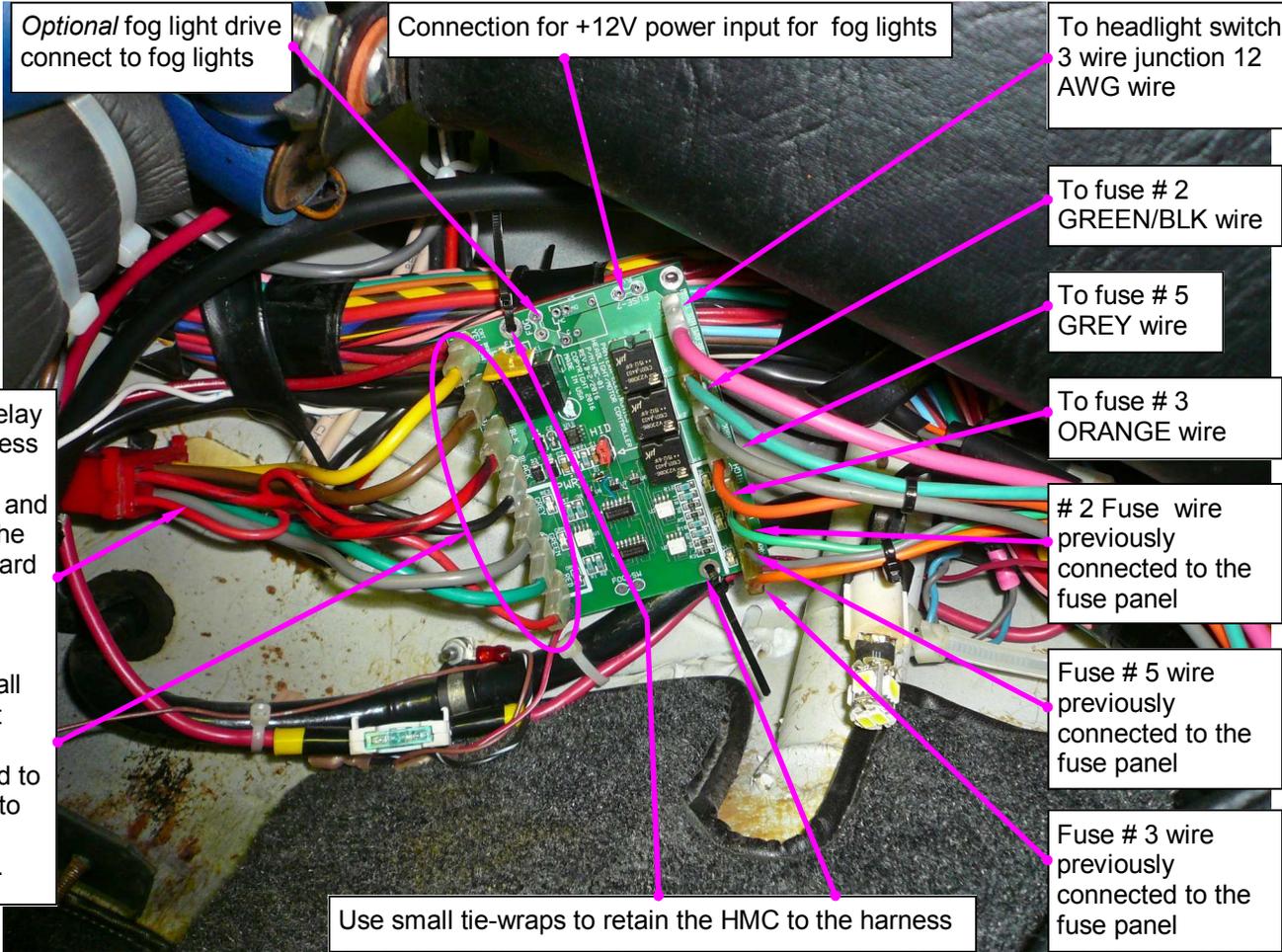
HMC installed in passenger side behind glove compartment in a 1972 Pantera. Relay wires reach without modification. See page 19.   [Image 8]

In a 1973/74 installation, the turn signal relay must be relocated.
The turn signal relay must be moved down approximately 1 inch. Leave room between the HMC and the turn signal relay for the wire terminals that extend below the HMC.   [Image 9]

Use 4 screws and 4 spacers ¼ " long in the mounting holes to mount the HMC. DO NOT bend the HMC board by tightening to a severely bent plate. Use small rubber grommets if necessary to act as a compliant spacer.
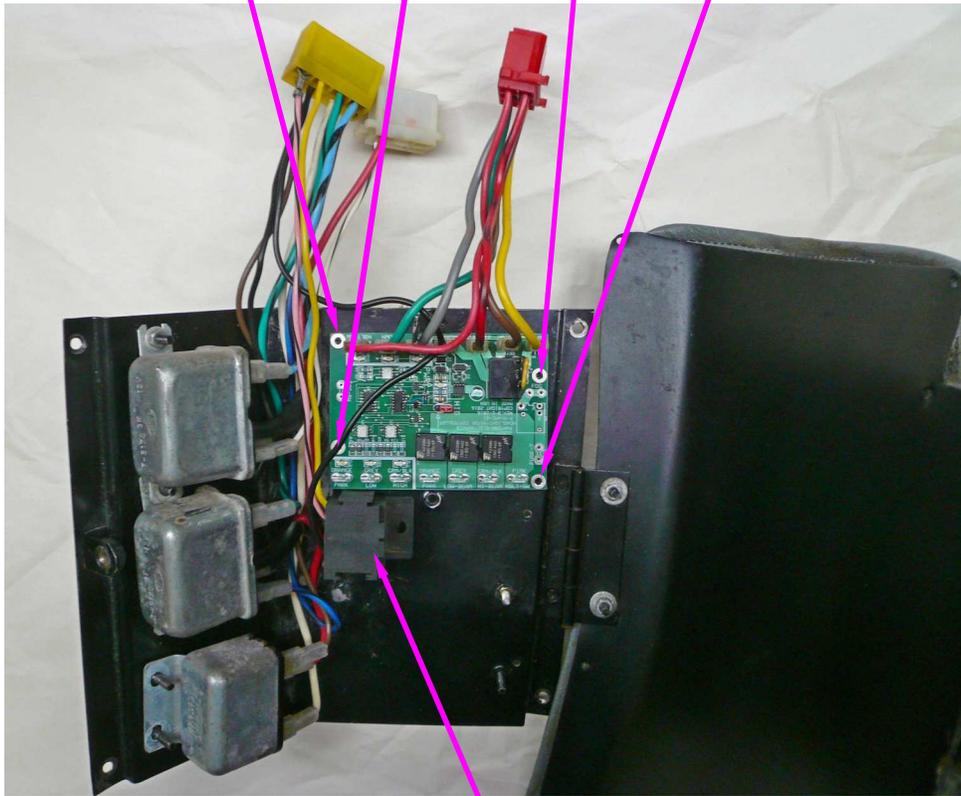
Turn signal relay moved to the lower position. A new hole must be drilled for the screw. The black wire might have to be made longer.

HMC board

Rubber grommets act as a compliant spacer.

HMC installed in driver side in relay box in 1973/74 Pantera.   [Image 10]

Fuse # 3 wire previously connected to the fuse panel.

Fuse # 5 wire previously connected to the fuse panel.

Fuse # 2 wire previously connected to the fuse panel.

To fuse # 3 Orange wire

To fuse # 5 Grey wire

To fuse # 2 Green black wire

To headlight switch 3 wire junction 12 AWG wire

Connection for +12V power input for fog lights.

Optional fog light drive connect to fog lights

All wires previously connected to the relay.
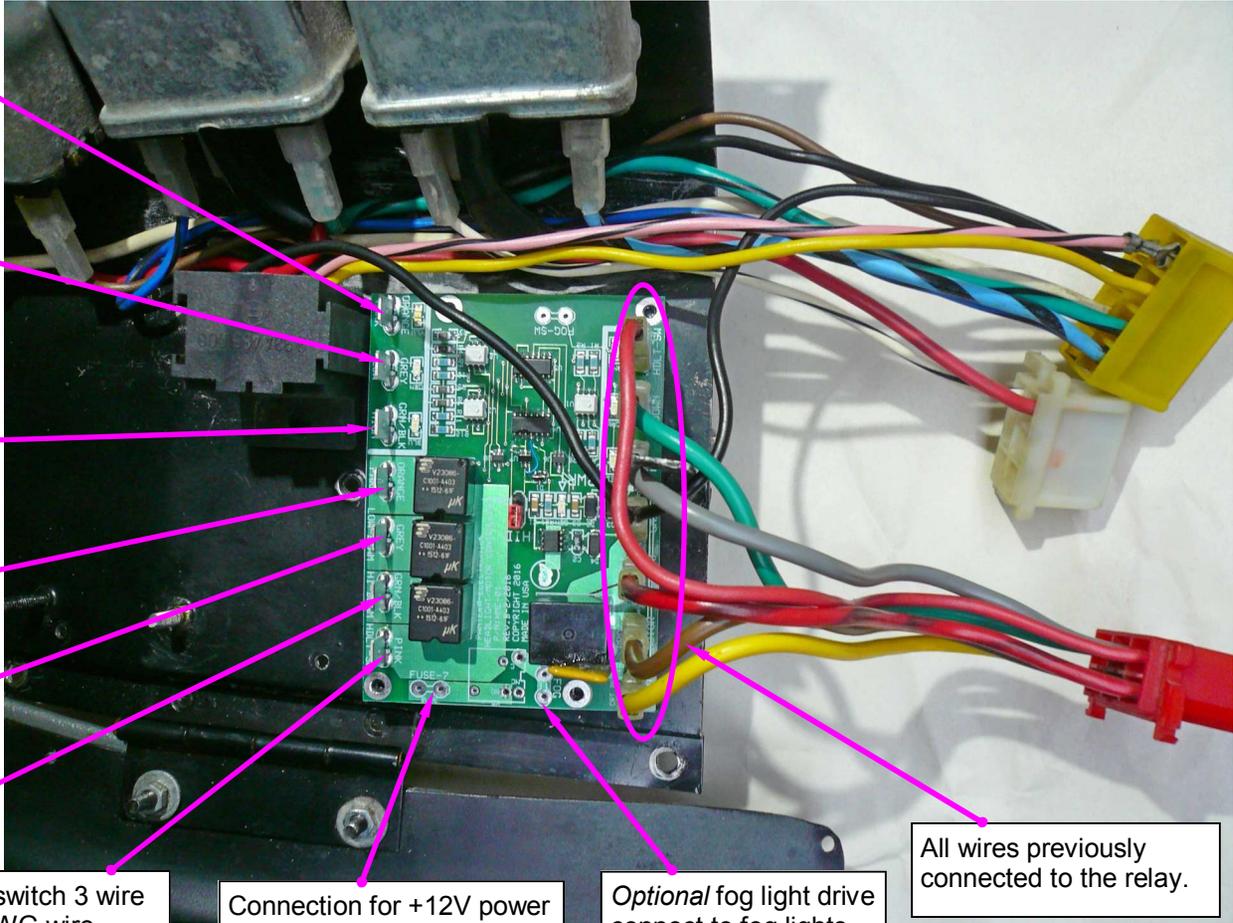
Connections to the fuse block in a 1972 Pantera   [Image 11]

Fuse # 2
High Beam
Green wire

Fuse # 3
Parking lights
Orange wire

Fuse # 5
Low Beam
Grey wire
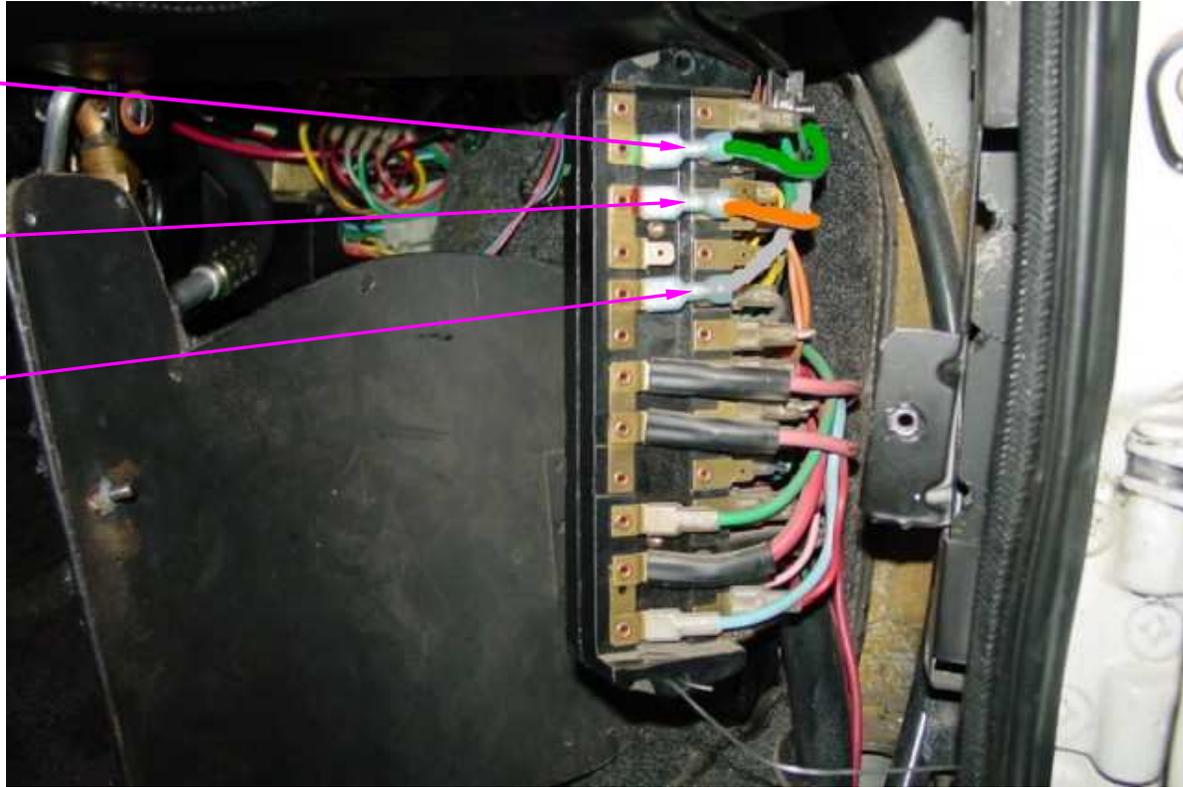
Standard headlight jumper plug position
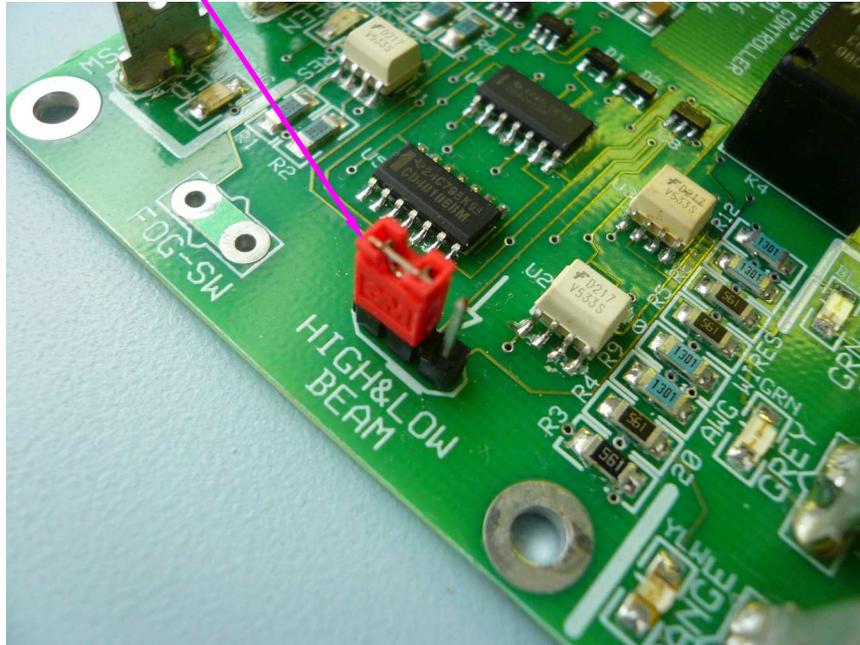
Headlight jumper plug position for both beams "ON".
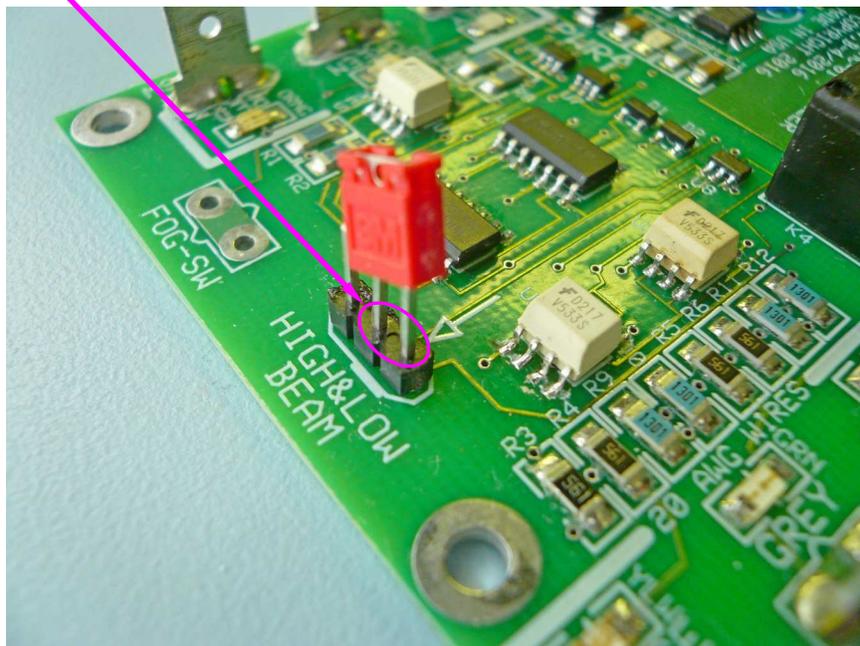
Yellow LED "ON" indicates headlight switch is in parking light position.

Green LED "ON" indicates low beam switch position.

Blue LED "ON" indicates high beam switch position
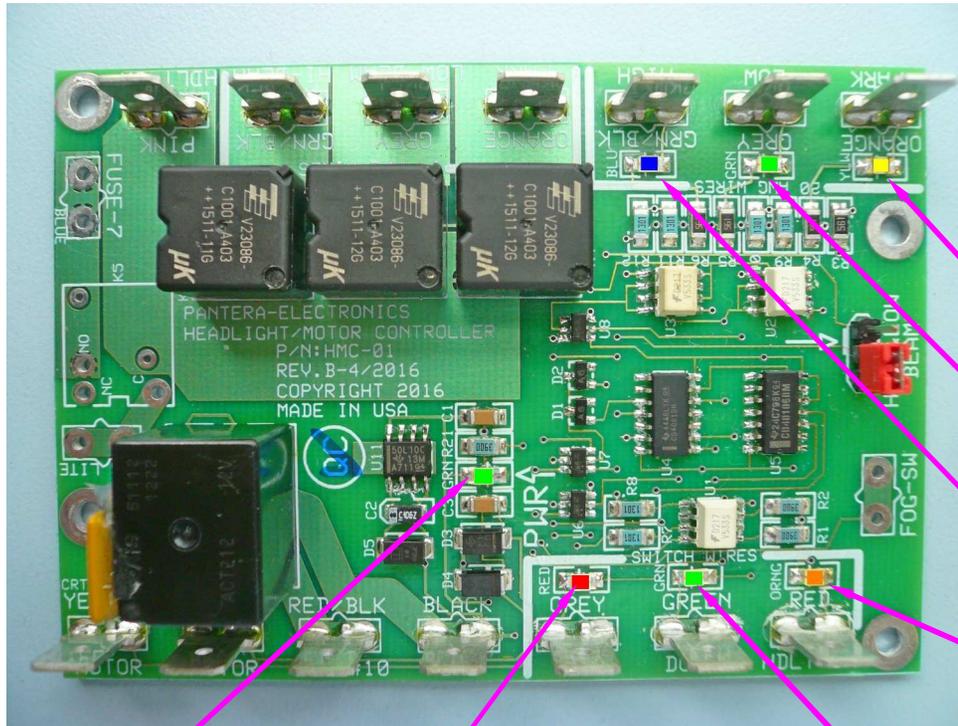
Green "PWR" LED "ON" indicates ignition switch is "ON" HMC is operational.

Up Limit Switch. Red LED "OFF" indicates headlight housing up.

Down limit switch. Green LED "OFF" indicates headlight housing down. *Headlights enabled only when lit.*

Orange LED indicates Headlight switch in Headlight "ON" position.

If connecting the Headlight/Motor Controller to a Pantera-Electronics ATO Fuse Panel note:

This tab is labeled GRN/BLK connects with a 14 AWG wire to the Headlight /Motor Controller tab labeled GREEN, HIGH.

This tab is labeled ORNG connects with a 14 AWG wire to the Headlight /Motor Controller tab labeled ORANGE, PARK.

This tab is labeled GREY connects with a 14 AWG wire to the Headlight /Motor Controller tab labeled GREY, LOW.

Connect to any tab for the Fog / Driving light switch.

The color label may not be correct but the function will be, so connecting to any tab within the group is OK.

The groups are defined by the *colored* lines around the tabs in this picture and the *white* lines on the fuse panel.

NOTE: It's important to keep this installation manual for future reference since revisions to the product change the contents of the installation manual.

Disclaimer

The products from Pantera Electronics have been design and manufactured with the best quality components known to the engineer. The installation instructions have been written to assist the owner in the proper use and installation of the products. Pantera Electronics can not be held responsible or held liable for the interpretation or incorrect implementation of the products.

Wire Identification - Note the angle and width of the black stripes

Wire Identification - High Beam Headlight Wires

High beam, Drivers side, 12 AWG wire, narrow black stripe

High beam, Passenger side, 12 AWG wire, no stripe

High beam 12 Volt supply, 12 AWG wire, wide black stripe

High beam indicator light, 18 AWG wire, narrow black stripe
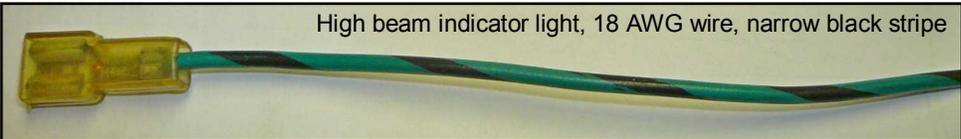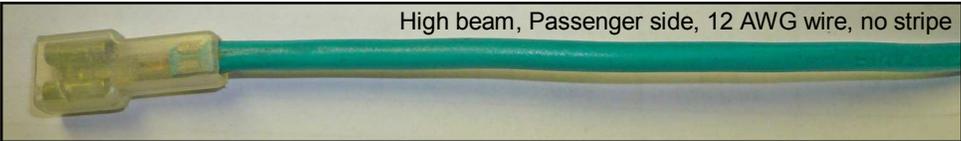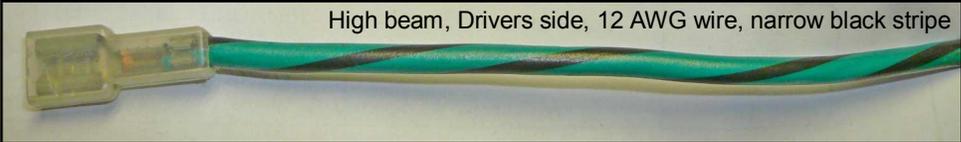
Wire Identification - Low Beam Headlight Wires

Low beam 12 Volt supply, 12 AWG wire, no stripe

Low beam, Passenger side, 12 AWG wire, no stripe

Low beam, Drivers side, 12 AWG wire, wide black stripe