Improving Your Pantera's Vision with Frog Eyes

By Jon Haas
Harleysville, PA

This headlight upgrade and design change embodies both mechanical and electrical changes to the Pantera headlight system, without addressing both the upgrade would be incomplete. There have been fixes and adjustments suggested in the past by various sources but after a study of the construction it is apparent that a design modification would be the best approach. The solutions in this article go beyond headlight operation, this upgrade will also improve durability and reliability of the controls as well.

The goals in this upgrade are the following:

1) Stable headlight position in the up position to eliminate mechanical vibration and repeatable headlight position for proper headlight beam alignment.

2) Reliable electronic motor control for the headlight mechanism.

3) Improve reliability and extend the life of the headlight/parking lights console switch, high/low beam steering column switch and the limit switches for headlight mechanism.

4) Improve light output and light pattern from the original sealed beam headlights.

5) All modifications should be "concours compatible".

Jon Haas
Chassis number: *THPNMK03613*

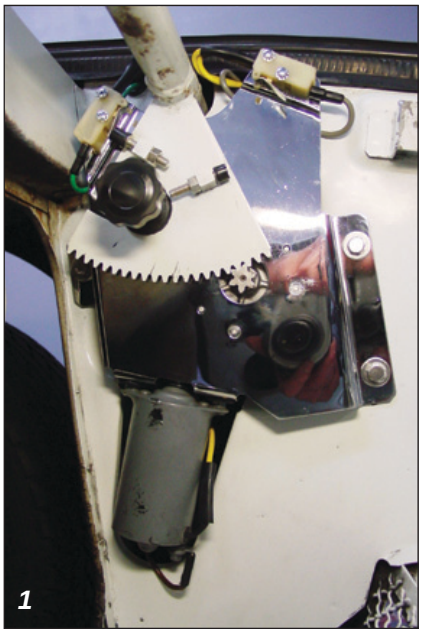
Maintenance of Pantera Headlight Components

In addition to the modifications, verifying that the existing components are working properly is an important step toward a successful upgrade. The motor and gear box assembly will not be modified but needs to be disassembled and inspected. The motor and gearbox to lift the headlights shares the same mechanism as the window lift motors, and as many Pantera owners know, there is a plastic gear that is used to drive a metal worm gear. Since the plastic gears are over 30 years old and are lubricated with a petroleum based lubricant, they crack and eventually break. The gear should be replaced with a brass gear that is available from many of the Pantera shops. During the disassembly of the gear box and mechanism, a thorough cleaning and lubricating is in order. The gear replacement is important, but the details of this procedure will not be covered in this article.

There are two limit switches for the maximum up position and maximum down position which are the feedback switches to control the motor. Disassembly of the switches to verify that the contacts are in good condition is important as they are retained in the upgrade. The limit switches can be subject to water and dirt that may compromise repeatable and reliable operation. The contacts should have bright metal surfaces as well as the connection tab that the wire connector attaches to. Disassemble these switches by removing the mounting screws and cover for cleaning. **(Figure 1.)**

Headlight Housing Position Stability

The original design did not incorporate a hard stop or a "damping rest" for the headlight mechanism in the up position. There is a rubber

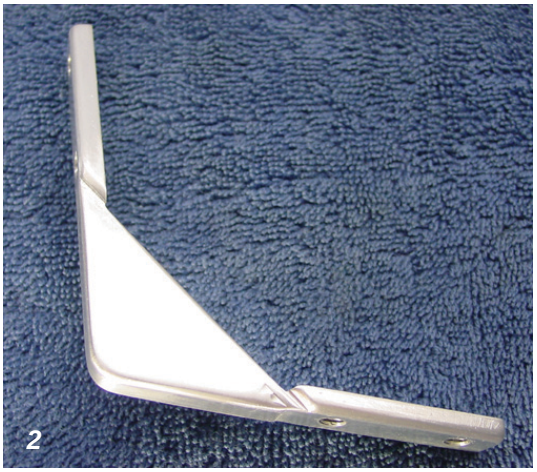


1

grommet or plug that is used as a stop in the down position, which will be used in this upgrade and it is important that it is still present and in good condition. The gear box is used to maintain position of the headlight housing in the up position, in the down position rubber bumpers in the fender sheet metal are the stops. Since the up position relies on the gear box for final position, any "play" or backlash in the gears within the mechanism is transmitted back to the headlight housing. In addition, the headlight housing acts as a lever in conjunction with the tube that extends across the front of the car and amplifies the backlash. The second form of amplification occurs when the headlight housing is the fulcrum point and the headlight light beam is the lever, the final point that the light beam illuminates is some distance away so movement is great. I have noticed that not all Pantera's have the problem of vibrating headlight housings. When I examine the headlight setup I find that this is due to the bottom lip of the housing rests on the inside or the edge of the fender sheet metal acting as a stop. If the headlights are properly adjusted and centered in the fender cutout, the headlights will vibrate when driving.

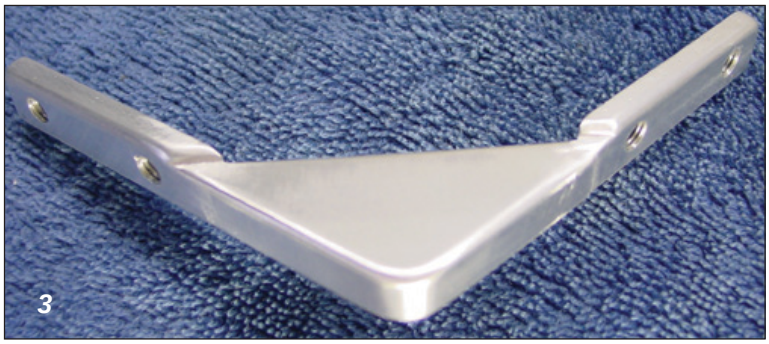
Improved Mechanical Design

The goal of this modification to the headlight housing is to provide a stop that will reliably dampen the headlight housing and maintain tension. Stop brackets fabricated from aluminum stock are installed from the bottom side of the headlight housing. **(Figure 2)**

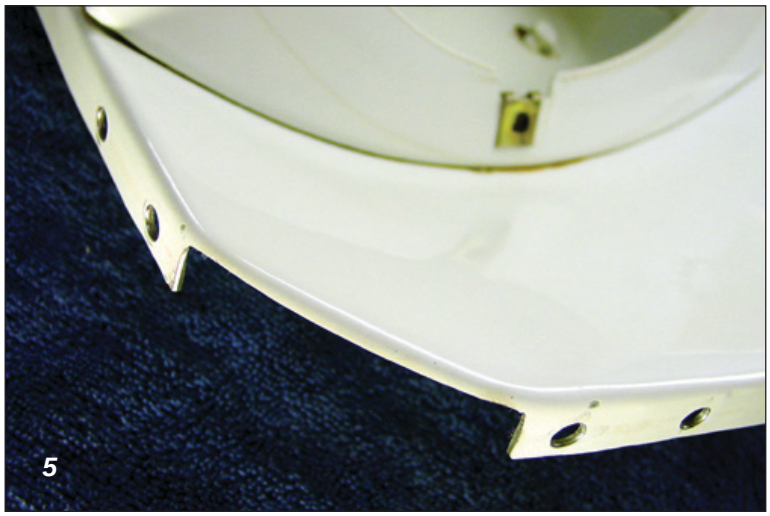


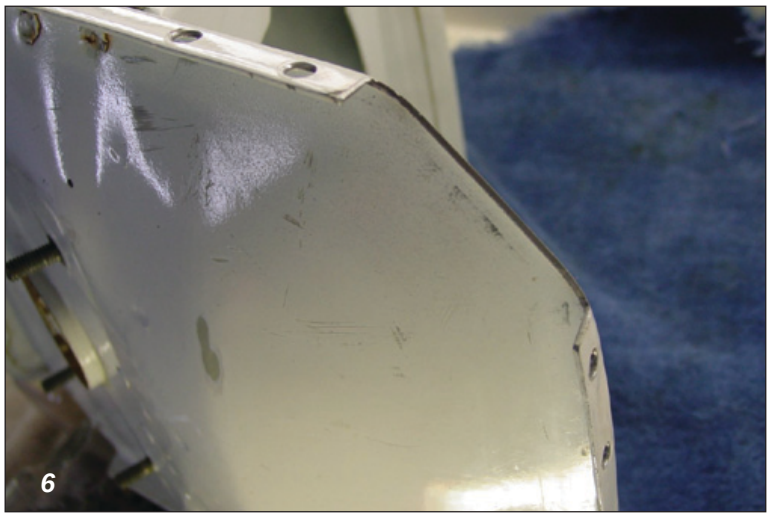
2

These are designed to contact the backside of the rubber bumper that are currently the stops for the headlight housing when closing. The stop brackets are polished and mounting holes are tapped for four screws that retain the stop in place through the edge of the headlight housing. **(Figure 3)** The headlight housing must be modified to allow the stop to protrude from the corner of the headlight housing. The headlight housing is sawed, filed and sanded for a finished edge and drilled for the four screws. **(Figure 4) (Figure 5) (Figure 6)** Since the stop brackets are polished aluminum and hidden when the headlights are closed, I chose not to paint them as well as the stainless steel screws. **(Figure 7) (Figure 8)** Painting of the headlight


3


4


5


6


7


8


9

housing was due to the handling during machining and fitting of the stop brackets, but only to the top surface in front of the headlight and the edges, not critical as this is not visible when the headlights are closed. **(Figure 9)** After reassembly of the headlight housings to the fender, alignment of the stop bracket to the rubber bumpers is important to assure proper contact. The headlight housing should fit inside of the fender cutouts without interference after tightening the four retaining nuts on the back of the headlight housings. Examine the nylon bushings that are used on the tube that extends horizontally across the car, they should be free and lubricated with a silicon based lubricant suitable for nylon.

Electrical Modification and Design

Note the original headlight operation sequence is as follows: With the ignition switch in the "accessories on" position, moving the headlight switch to the "on" position activates the headlights and relay which activates the headlight motor. These three devices are activated at the same instant creating a peak current

Continued on page 32

demand. When a motor starts, it can typically consume ten times the running current or more, until the inertia of the motor and mechanism attains running speed. The filaments in the headlights have a very low resistance when cold and increase in resistance when hot. The motor causes a voltage drop to be much greater than during the actual movement during traversing up or down and the headlights consume high current until full brightness is achieved. When the voltage drops due to the high current demand, the voltage will be less than what is required to hold the relay closed, this will stop the motor regardless of the position of the headlight housing. The relay may not re-close due to the low voltage after the headlights are on. To add to the failure, the heat generated from the headlights may discolor or damage the paint on the top of the housings if left in this partial open position. Turning "off" the headlights will lower the current and the relay will close and finish the travel, but in the down position. This failure mode is more prominent when operating the headlights while the engine is off or idling, which is typically when the battery voltage is the lowest.

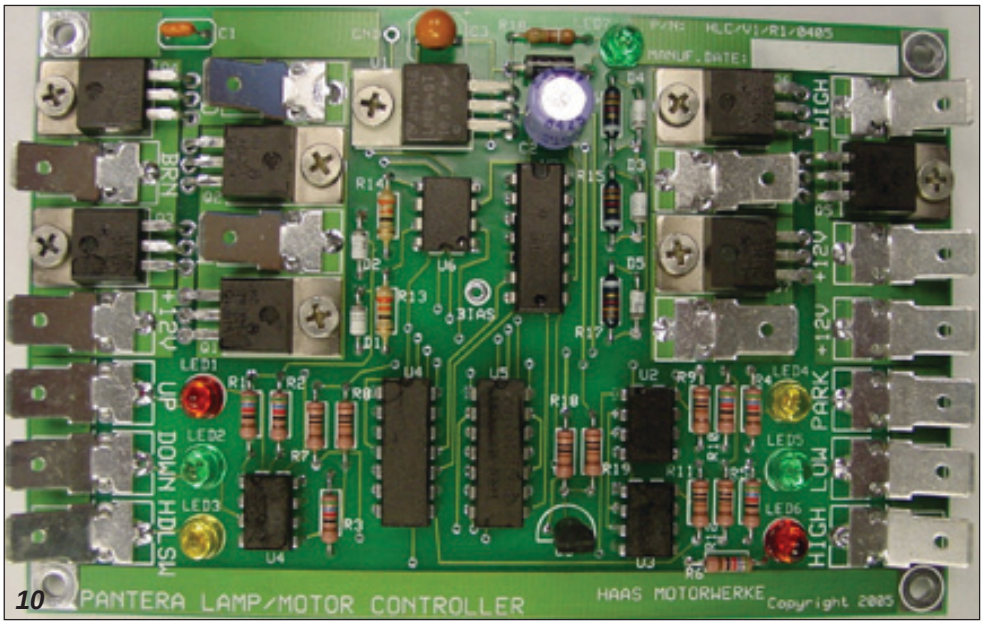
Headlight sequence modification:

One possible solution would be to rewire the lighting system with heavier wire and use a different relay with a lower coil voltage. Then the voltage drop would be less allowing proper function, but still the peak current is very high with all loads simultaneously activated. In fact, the peak current is higher with heavier wire due to the lower resistance in the total circuit.

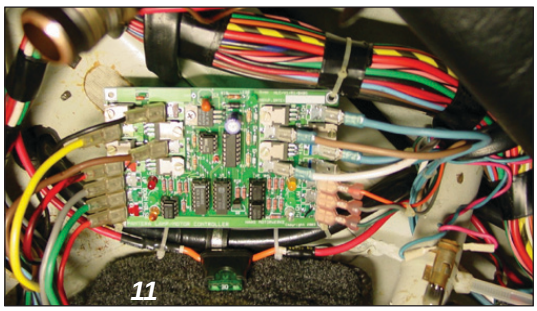
A much better approach is to add a sequence type electronic controller to activate the headlights and motor. In addition to solving the headlight motor control, the problem of the headlight switch life will be addressed as well. The design of the electronic sequencing controller has the capability to directly operate the headlight motor, headlights and parking lights while minimizing the current requirements of the headlight switch. The physical size of the controller and the wiring is compatible with the Pantera's stock electrical wiring for both Pre-L and L model Panteras. Instead adding an array of relays the controller consists of integrated circuits and power semiconductor devices to control the motor and lights. This improves efficiency and size, both are important to improving the Pantera's electrical system. LED indicators are labeled on the controller to verify proper switch operation to the controller, a valuable aid to installation. The LED's indicate; the headlight switch for parking and headlights, the dimmer switch for low and high beam and the headlight mechanism limit switches for up and down position. Standard Faston connector tabs for connections to the controller board are the same that are present throughout the Pantera's electrical system. **(Figure 10)** Wiring is straight forward, the controller was designed to not require any cutting of the original wiring only to add wiring. While the original switches function the same, the controller modifies the sequence of operation and the result is identical with the exception, if the parking lights are left on and the ignition is turned off, the parking lights will automatically turn off as well. This assures that the lights cannot be left on accidentally discharging the battery.

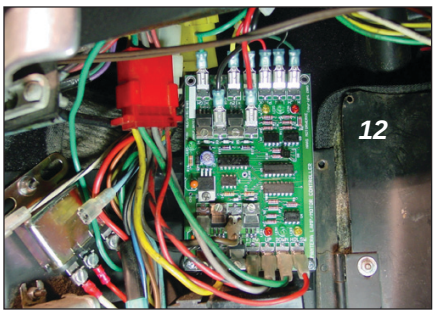
Installation

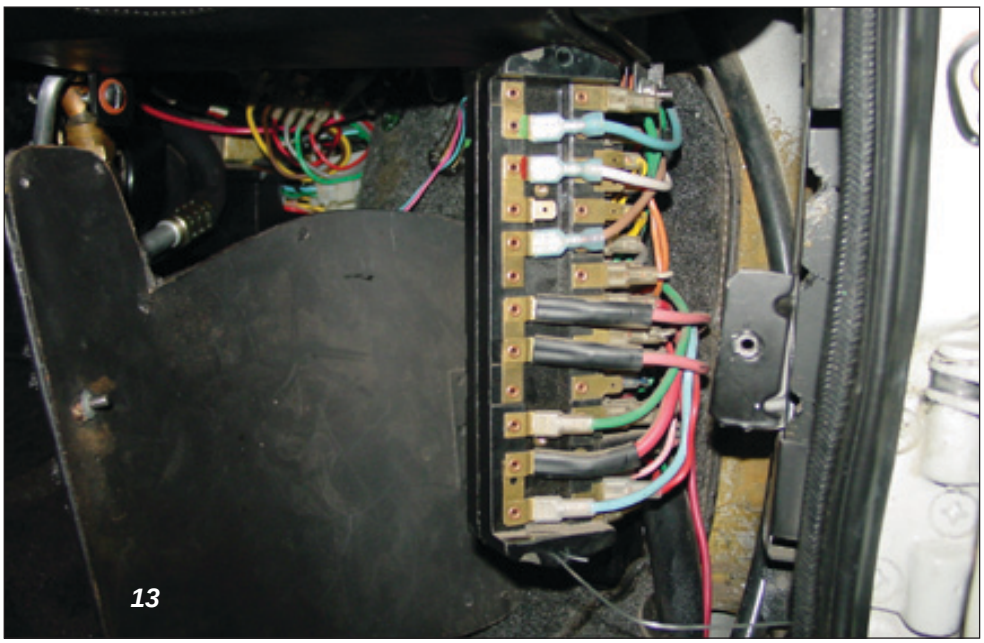
Installation in Pre-L and L models is similar with the exception of the controller board mounting location. The controller should be mounted close to the headlight motor relay in order to use the existing connections without adding wire. In the case of the 1971 to 1972 Pre-L, the electrical box that contains the headlight motor relay is on the passenger side, so the controller board is mounted behind the glove box with a couple of plastic wire ties to existing wire cables as support. **(Figure 11)** In the case of the 1973 to 1974 L models, the headlight motor relay is located in the vertical relay compartment on the drivers side. The controller board is mounted to the back side of the door using two screws and spacers. **(Figure 12)** Note in both cases that the headlight motor relay wires are able to reach the controller board and the original connectors mate without changes. Additional lengths of wire connect the board to the headlight switch and to the fuse panel with mating connectors. **(Figure 13)**



10


11


12

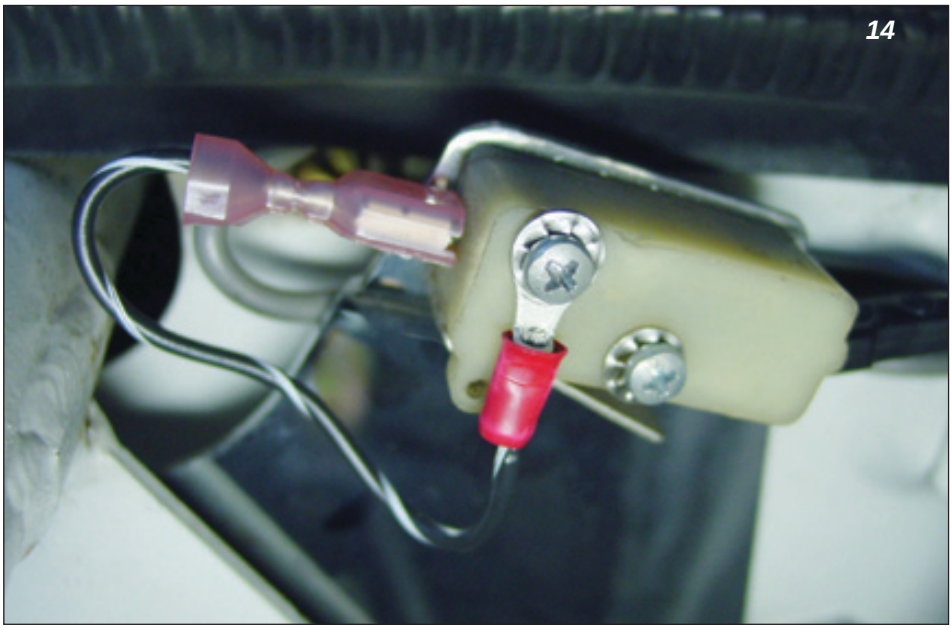

13

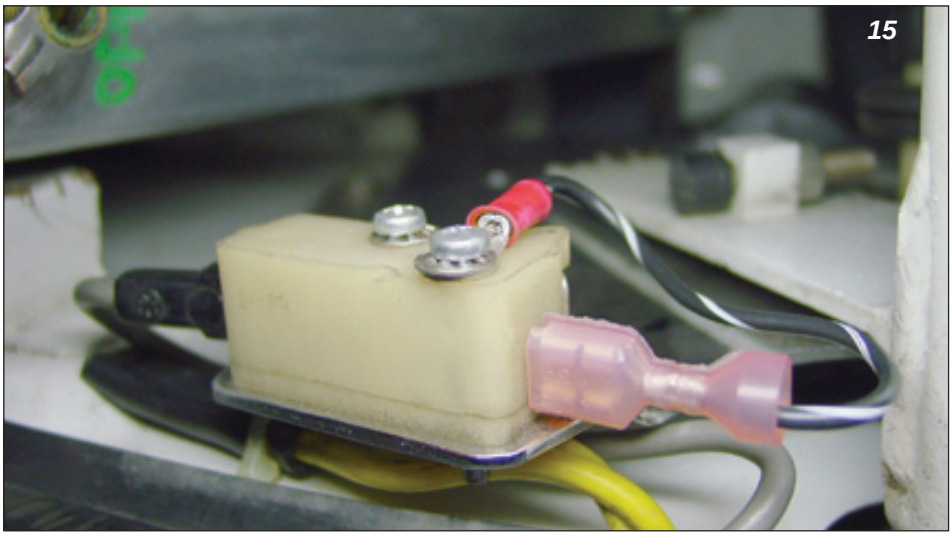
The wiring change to the limit switches allows separation of motor control and headlight operation and is straight forward as well. Disconnection of one wire on each limit switch and the addition of a jumper from the limit switch to the chassis is all that is required and common to both Pre-L and L models. **(Figure 14) (Figure 15) (Figure 16) (Figure 17)**

From the controller board mounting position the indicators can be checked for proper operation of the switches and it can be assumed that the controller will function properly. **(Figure 18)**

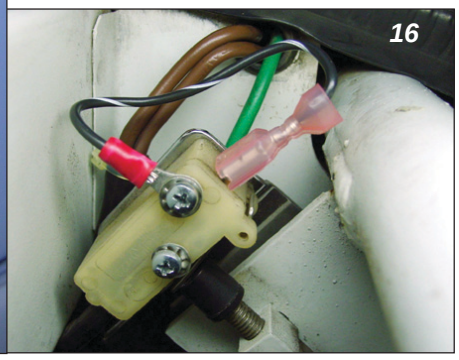
Headlight Selection

In addition to the mechanical and electrical improvements, optics and modern lamp filament technologies can be considered as part of the lighting upgrade. I chose 7 inch diameter Hela head lamps that incorporate an improved flat lens design with a removable lamp socket for a wide selection of H4 bulbs.**(Figure 20) (Figure 21)** The H4 bulb I selected was a halogen lamp with 30% Xenon gas which tends to provide a brighter and "whiter" light than without the Xenon gas. Other Xenon gas percentages and lamp technologies are available in the H4 bulb

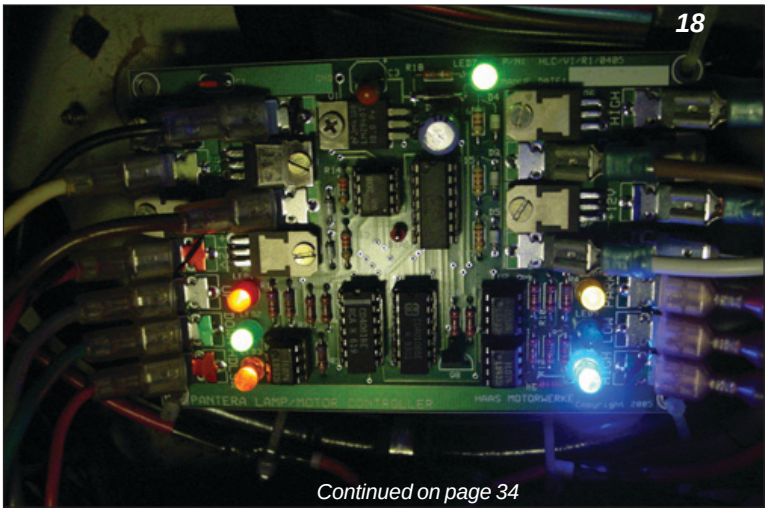

14

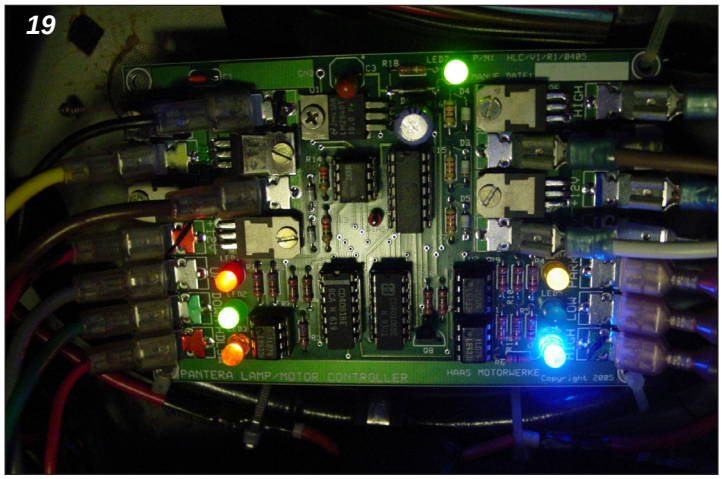

15


21


16


17


18


19

Continued on page 34

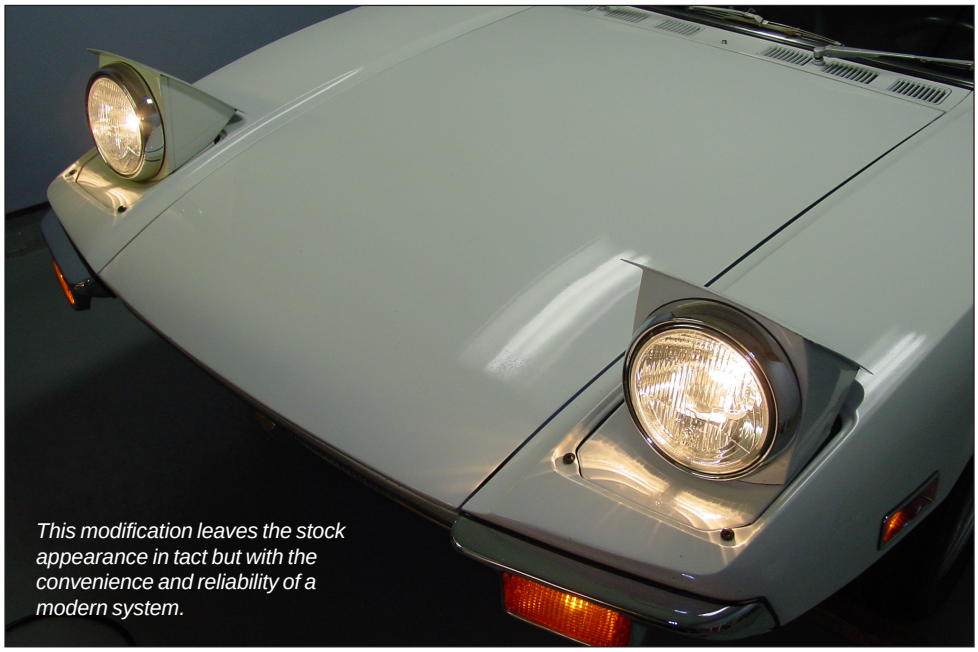
configuration. These headlights are a vast improvement over the original sealed beam headlights and still retain the original look of the car. Installation is as simple as replacing any standard 7 inch headlight, no modifications are required and they produce more light and a better light pattern for the same power than the original head lamps.

Adjustment of the limit switch in the up position for proper end travel until the aluminum stop rests firmly on the back side of the rubber bumpers.

Both left and right headlight housing must be checked as the design does not allow for separate adjustment of left and right headlight housings. Adjustment of the limit switch for the down position in order to completely close both headlight housings is accomplished as previously stated. Note that after installation the new stops are not detectable and a concours quality appearance prevails.

After headlight beam alignment using the garage door as a grid, a road test is always in order whenever modifications are performed to the Pantera. This electronic controller has been in operation for over a year and installed in both Pre-L and L model Pantera's without failure, demonstrating electronics as a viable upgrade while maintaining a concours quality Panteras.

Jon Haas



This modification leaves the stock appearance in tact but with the convenience and reliability of a modern system.

FIRST CALL! Monterey 2006 festa DeTomaso

■ If you would like to be part of DeTomaso history, please mark August 18-20th on your calendar. Pantera International invites you to attend and participate in our celebration of the 35th annivesary of the introduction of the Pantera to the United States. The anniversary will be celebrated at the world famous Concorso Italiano on Friday, August 18, 2006 along with a special reunion of all push-button Panteras.

■ Event schedule:

■ Concorso Italiano: August 18, 2006

■ Monterey Historic Races: August 19, 2006 where Pantera International will host a private trackside luncheon catered by the gourmet's delight; Tarpy's Roadhouse of Monterey. Private Pantera corral.

■ Pebble Beach Concours: August 20, 2006

■ RM, Rosso & Steele, Christies' Auctions: All days

■ Club accommodations will be in the quaint and scenic town of Seaside, steps to the beach and a short distance to the Concorso Italiano.

■ We will offer our guests very reasonable rates and a complimentary barbecue. Tom Tjaarda is also expected to stay with us again. All guests registered with Pantera International will receive a special free souvenir.

Last year, we were sold out and this year, we expect even a larger turnout. To secure your room and make advance reservations, please call us at: 760-731-8301

This is the DeTomaso event of the year, don't miss it!

Pantera International www.pantera.net