

Mid Year Headlight Restoration Guide

Queen City NCRS - March, 2011

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We did this as a seminar for our Queen City NCRS Club to help our member with their cars. We had a good group of people and reviewed this document along with actual work on replacing one of the headlights.



We also had many of the manuals to show where to get information.

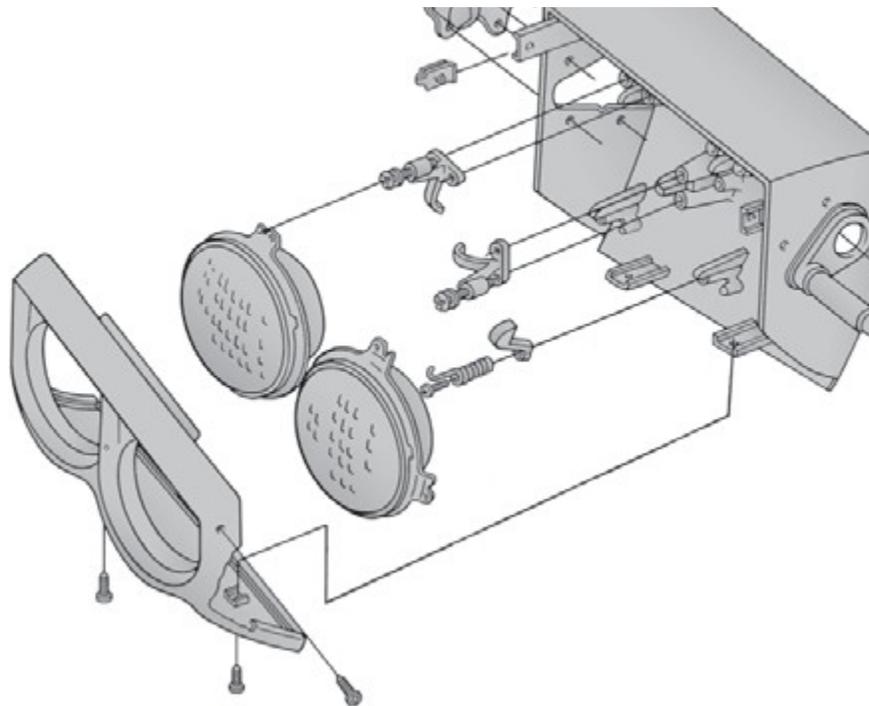


Disassembly Steps

Remove Hood for better clearance to work under nose of car. Optional, but recommended.

Removal of Headlight trim and bulbs

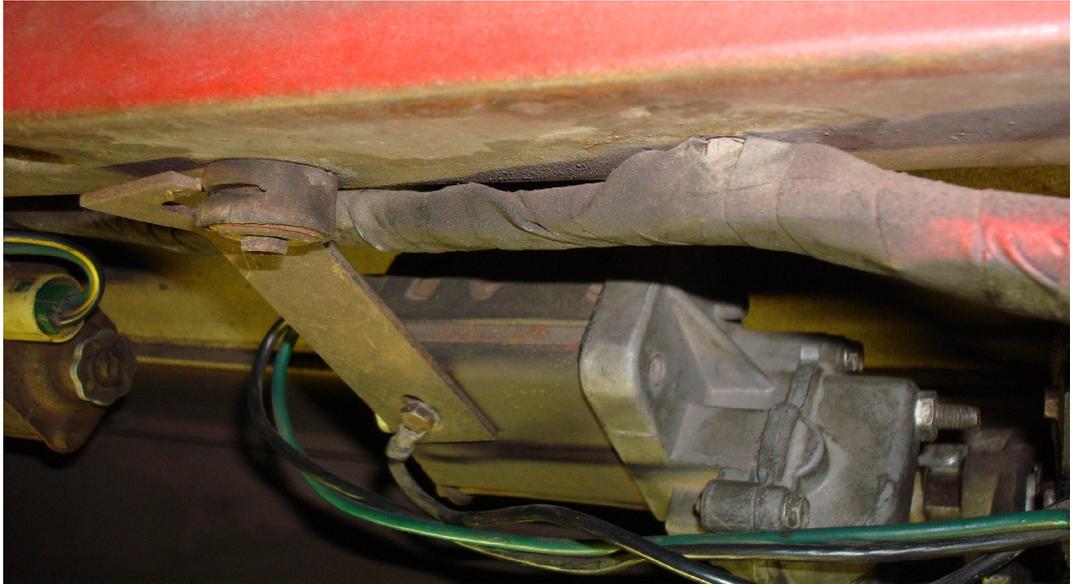
1. Open Headlight Buckets
2. Remove Headlight Bezels by removing 4 screws for each side and pulling off bezel.
3. Remove Headlight bulbs by removing headlight bulb ring, small screws and spring.
4. You don't need to remove or adjust the headlight adjustment screws.
5. Remove headlight bulbs from wiring harness connector and remove bulbs and the cups



No need to remove headlight adjustment brackets (we replaced our adjustments brackets)
Note, the removal of the headlight buckets will be done after the motors are removed.

Removing headlight motors

1. Slightly open headlight buckets to remove pressure on motor
2. Remove wires from, motor and micro switch (indicates buckets are in down position)
3. Remove Headlight Motor Brace (under front valance of car)
Brace supports headlight assembly with rubber grommet
Ground wire is attached to brace and screw to Headlight Motor



Remove sprint clip holding motor to headlight bucket mechanism
Motor will now slide out, shaft fits into headlight bucket mechanism

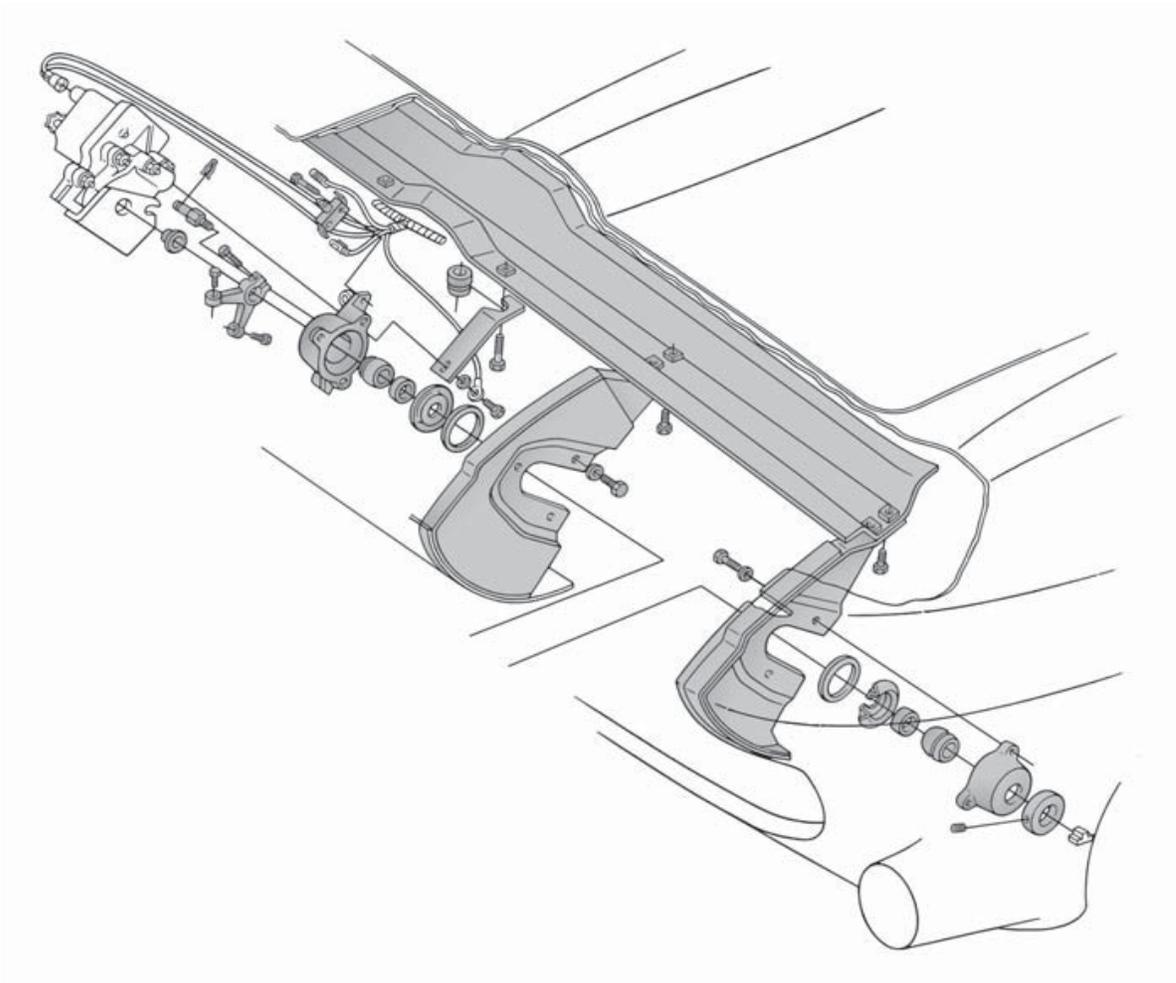


Remove both wires from micro switch by pulling straight away.

Removing Headlight Housings

Removing Headlight Housing Buckets

1. Recommend masking tape along edges of headlight buckets and valance to prevent damage to paint during disassembly
2. Remove Y-Stop, Loosen clamp screw, spread clamp (being very careful not to split too far or it will bread). Carefully work off of shaft.
3. Unplug headlight wiring harness (outboard side of headlight assembly)
4. Loosen outboard stop collar set screw with 1/8" allen wrench
5. Remove stop collar from outboard shaft (collar will not go over wiring connector at end of harness, see later)
6. Loosen Pivot Support screws, 3 inner, 3 outer.
Must rotate bucket to align hole in bucket to access screws.
7. Slide inner pivot housing away from reinforcement support plate.
8. Slide outer pivot housing away from reinforcement support plate.
9. Headlight Housing Assembly will now come out of the car pushing to rear of car, then angling to remove from front valance.





Removing the support brace from the radiator support to the front valance will provide more room and help ensure not scratching your headlight housing and or valance paint.

BOTH THE HEADLIGHT MOTORS AND THE HEADLIGHT HOUSING ASSEMBLY ARE SUCCESSFULLY REMOVED FROM THE CAR.

Disassembly of Headlight Housing

Headlight Housing is out of car, we will further disassemble the components from the housing

1. Remove the outer pivot housing, washer and felt seal.
2. Remove the wiring harness connector from the end of the harness by carefully inserting a small screw driver or pick to release each wire connector from the plastic coupler.



You can see that it's quite dirty with 47 years of use

3. Outboard stop collar can be removed from shaft and wires.
4. Harness will now pull out from the inner side of the housing.
5. We had to heat the shaft and pivot ball to remove that was frozen to shaft.
6. Remove the inner and outer pivot shafts by removing 3 screws. This is not necessary, but we removed them to better clean them up.

We marked the wires for reassembly, but the color codes should match up. Since we replaced all the wiring harnesses we tested our connections before reinstalling the harness connector. There was a tan wire, a black wire (bottom terminal) and a black with green stripe (early '64). The bucket harness from Eagle Wire Products has a green wire (late '64) that matched up with the black with green strip wire. Eagle Wire can provide the correct color wire for the early '64 if specified.

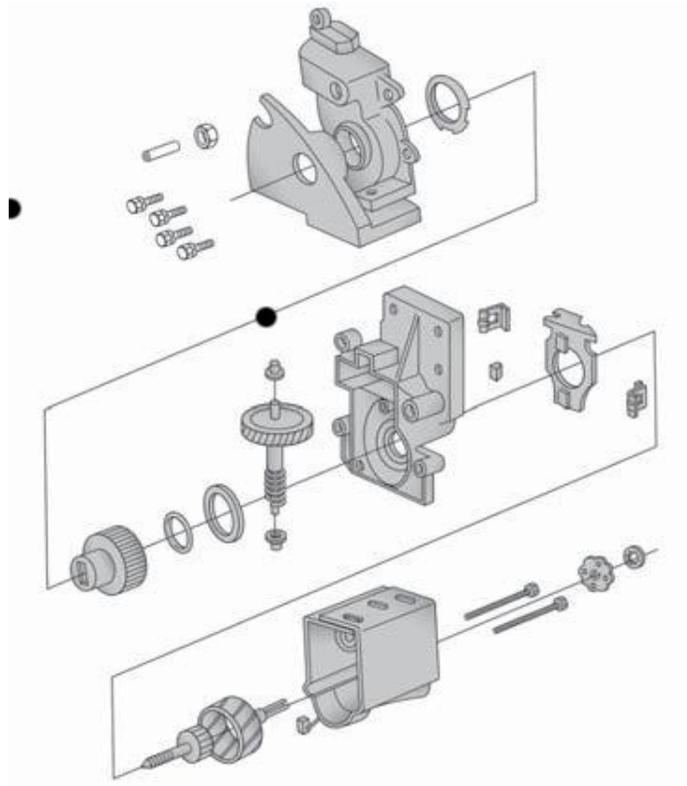
Example of headlight assembly removed from car and layout in an exploded view



▲
Outboard , Pivot Housing, bucket wiring harness, outboard stop collar and
outboard pivot ball.

▲
Inboard components
pivot ball
pivot housing
stop Y
Motor assembly

Disassembly of the headlight gear & motor assembly



Disassemble Headlight Gear Assembly

1. Two larger slotted screws to remove the mounting bracket from the front gear cover plate



2. Four hex bolts to remove the front plate covering the gears



3. Gears will now come out, inspect teeth of motor gear (normally worn when hitting Y stops as motor does not turn off when hitting stops)



Disassembly Headlight Motor

1. Remove retainer and hand Wheel from back side of motor casing.
2. Two long bolts from the outside end of the motor to remove the armature plate



This will expose the brushes and the armature of the motor.

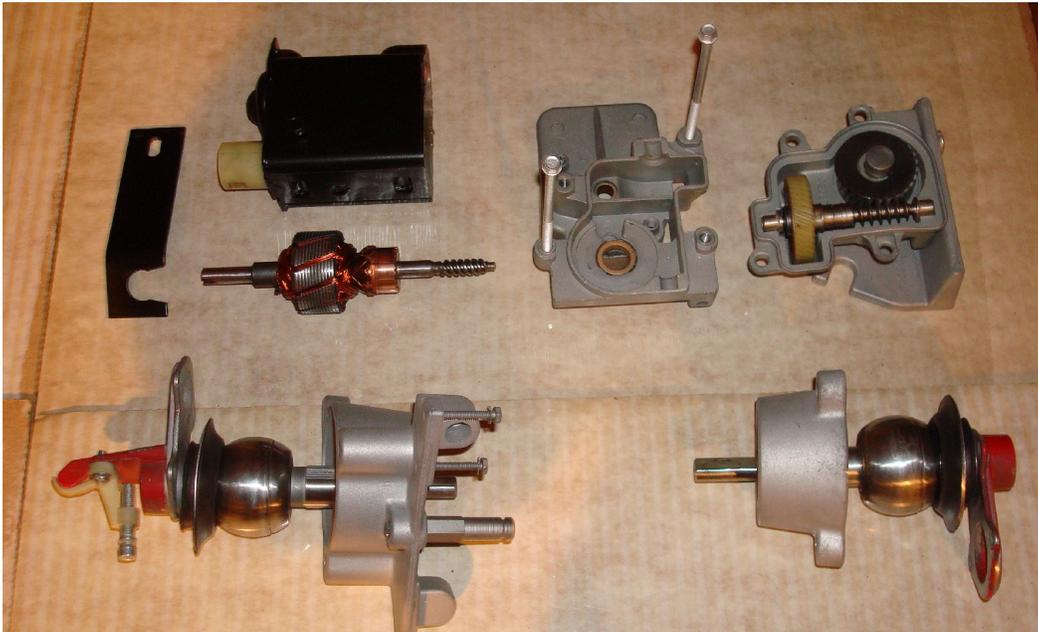
3. Remove small springs holding tension on brushes
4. Slide clips holding brush assembly board and slide unit out being careful not to break brush wire that is fasten to housing
5. All remaining motor components will now come our of housing.

Exploded view of Motor and Gear Cases



Clean up and restoration of headlight components

1. The motor cases, mounting brackets and support straps, etc. were bead blasted
2. Retaining cups and most bolts were Cadmium plated (DM Plating)
3. Support rods and motor support brackets were painted.
4. Motor cases were painted natural steel color to protect (may loose judging points)
5. Replacement parts ordered from Paragon Corvette Reproductions in Michigan
6. New wiring harnesses from Eagle Wire Products in Springfield, OH



Sample of cleaned up parts.

List of parts ordered from Paragon Reproductions, Inc.

Description	Part number	Quantity	Unit Amount	Total Amount	Discount cost
Pod Spring	2640K	4	\$2.00	\$8.00	\$6.80
Support Bracket Grommet	4717K	1	\$7.00	\$7.00	\$6.30
motor wheel retainers	6627K	1	\$2.00	\$2.00	\$1.70
Drive gear nylon washer	12211	2	\$4.00	\$8.00	\$7.20
spaces washer	12210K	2	\$4.00	\$8.00	\$7.20
micro switch	256	2	\$10.00	\$20.00	\$18.00
Headlamp repair seal kit	1175-RBK	1	\$19.00	\$19.00	\$16.15
Y Stop Arm Kit	3520K	1	\$34.00	\$34.00	\$30.60
Motor pivot shaft bushing	1967	1	\$4.00	\$4.00	\$3.40
Headlamp to lower support bolt kit	1790K-2	1	\$3.00	\$3.00	\$2.55
Bezel Screws	6693K	1	\$4.00	\$4.00	\$3.40
Headlamp insulator kit	1179K	1	\$6.00	\$6.00	\$5.40
Headlamp plastic support kit	7212K	2	\$13.00	\$26.00	\$22.10
plug kit	12147K	1	\$2.00	\$2.00	\$1.70
Headlamp motor gear	1555	2	\$26.00	\$52.00	\$44.20
Subtotal				\$203.00	\$176.70

New Parts



Wiring harnesses from Eagle Wire Products, Springfield, OH (937) 206-4321

Front Light Harness, EPHL6465	\$155.00
Headlight Bucket Harness Extension, EPHL6367EX	40.00
Total without discount	\$195.00

Cadmium Plating – DM Plating, Dayton, OH (937) 228-2963

Small shop that does work for the Air Force Base in Dayton, Ohio

Issues with Some of the Parts

Paragon

(part number, description, issue)

1967 - Motor pivot shaft bushing – wrong color for 1964, reused old bushings

12147K - Headlight Housing Plug, wrong color (black), cleaned and reused transparent white

6627K – Motor Hand Wheel Retainer, not configured as original, reused original

3520K - Y Stop Arm Bolts, not configured as original, plated and reused original

1175-RBK – Headlight rebuild kit- felt washers had wrong diameter hold and did not compress sufficiently. Held up rotation of headlight housing.

Eagle Wiring

Headlight Housing extension harness, incorrect color for the low beam wire. It should be black with light green strip, it was green. (Per Spencer Rose, late model '64s and '65's have light green wire, He can build a harness with the black/light green strip if requested.) This car is a March 16,9164 build date per the serial number and a March 20th Trim Tag code - C20.

Front light wiring harness. The old harness in car had a green connector plug for headlight motor, new harness has black plug. (Per Spencer Rose, the only manufacturer, Packard, they now only produce a black connector plug. No other manufacturers for any other colors known)

Assembly of Headlight Motors

Headlight Motor Assembly

Process is basically the reverse on the disassembly. Be sure to use a white type of grease, (we use Lubriplate) to lubricate the bushings for the shaft of the armature, the gears and other surfaces. Note that Duke Williams recommends a full synthetic NGLI #2 "general purpose" grease, which should be available at most parts stores. The synthetic base oil will not evaporate as fast as a conventional base oil.

1. Armature inserted into motor housing being careful with the brush assembly that is soldered to the housing.
2. Install the brushes, springs and using the clips, slide the assembly down into the case over the commutator being careful not to scratch the brushes or the commutator.
3. Mount the back gear case cover using the two long bolts connect these together. The Hand Wheel is installed over the shaft on the motor case and the retainer is installed to hold it on. Run bench test shown below.
4. Gears with washers are installed into the gear case, using plenty of grease, but don't pack the entire housing.
5. The front gear cover is installed with the 4 small hex bolts.
6. Adjust end clearance with set screw to provide just enough clearance to turn freely, test for freely turning.
7. May rerun bench test again as below.
8. Motor bracket is installed with 2 slotted screws.

Bench Testing Procedure: used a 12 volt supply to test the motors. Ground the battery to the case and the electrical terminals are used to turn the motor in both direction, one terminal to open and the other terminal to close headlight housing.

Assembly of Headlight Housing

Note, the right and the left side headlight housing have different components, be sure to sort the components correctly.

1. Both the inboard and outboard shafts can be installed with the 4 small flat head screws.
2. We installed the headlight adjustment brackets, and retainer springs that you may not have removed.
3. The headlight harness is inserted through the outboard shaft. Outboard retainer must be inserted over the wires before the connector plug is installed on the wires.
4. Install the large flat washer onto the rubber seat and slip onto both inboard and outboard shaft with the metal washer facing toward the headlight housing.
5. The pivot balls can be inserted over both shafts.
6. Both inner and outer pivot housings can be place on the shafts leaving space to slide onto the valance where they will be on the outer side of the reinforcement support plate.
7. The outside stop collar can be placed over the outer shaft and loosely tighten. Final tighten must be done after assembly in in car and headlight bucket is aligned.
8. Install wiring harness connector to three wires coming out of outboard shaft. Note that collar must be over wires before connector is installed.
9. This unit is ready to be installed in the car and the Y-Stop bracket will be installed after the unit is in the car.



Headlight bucket components laid out ready to reinstall

Installing Headlight Housing assembly into front valance of car



1. Masking tape edges of headlight housing to prevent chipping paint if not already completed.
2. Carefully insert headlight housing at an angle into opening in valance.



3. Slip into slots in valance support, keeping the rubber seal with its metal washer on the outside side of the reinforcement support plate (both sides)
4. Slide both pivot housing toward reinforcement support plates and align holes in housing with bolt holes in valance support. Note: the 3 holes are not symmetrical and it only fits in one position.
5. From inside the headlight housing, align large hole in housing to insert bolt through housing and into hole in the reinforcement support plate and loosely secure pivot housing.
6. Rotate headlight housing to align remaining holes to insert and lightly tighten remaining bolts.
7. Tighten all six bolts while aligning headlight housing with front valance of car. Note space between housing and valance is even on all side and aligns with the valance.
8. Slide the collar stop tight against the outside of the ball and tighten allen screw.

Note: We discovered that using wood door shims covered with masking tape helped in holding the headlight housing aligned while installing the color and Y-stop. We used a socket and tapped the Y-stop to ensure it was tight and held the headlight housing for any side to side movement. See picture below.



9. Install the Y stop by aligning the center of the fluted section of the shaft with the mark on the Y Stop. Be sure that they Y Stop will move back and forth between the open stop and the close stop. It is very difficult to see the alignment mark, so trial and error may work best.
10. Tighten bolt holding y-stop on shaft.
11. Adjust the Y stop screws and the alignment on the shaft to get the headlight housing to open and close with the proper alignment to the valance.
12. Connect the housing wiring harness to the front light harness
13. Test that headlight housing rotates easily
14. Adjust alignment until satisfied.

Installing Headlight Motors

1. Slide motor onto shaft which may require turning the hand wheel to align the shaft on the end of the motor assembly to align with the shaft on the headlight housing assembly.
2. Install brace from motor case to valance, attaching ground wire to this bracket where it attaches to motor.
3. Install spring clip
4. Plug in wiring harness to motor and to micro switch.
5. Test that headlight assembly opens and closes and is aligned with valance. Readjust as necessary.



Tools Required

¼” drive socket set

¼” socket

5/16 socket

3/8” socket

7/16” socket

½’- 9/16” open end and box wrench

3/8’- 7/16” open end and box wrench

1/8” Allen wrench

Needle nose pliers

6-32 tap and die (re-threaders may be preferred)

8-32 tap and die

10-32 tap and die

¼ -20 tap and die

Tap wrench

Die wrench

Small screwdriver

Torch to heat bushing for removal

Hammer

Painters tape

Wooden Door Shims

Lubriplate