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## GTS AERO MIRROR CONVERSION

Andy Evangelidis - 928 Owners Club

This is a step-by-step procedure for converting the stock '78-'91 exterior side mirrors to the newer 1992-1995 GTS aero mirrors. The newer GTS aero mirror design was the factory's first departure from the standard flag design which dated back to the 1978 model year Porsche lineup.

The GTS aero mirror is much lighter in weight than its predecessor thanks mostly to its ABS construction rather than the older cast metal housing. Many of the internal components of the GTS mirrors are similar to the older design. However several changes have improved the design.

The procedure details installation on a 1991 928 S4. Older models may slightly vary in installation. As always, exercise care when handling electrical components and when manipulating freshly painted surfaces. Safety goggles must be worn when handling glass.

### I Disclaimers and Warnings

All risk and responsibility associated with any aspect of the procedure, information, or statements contained within this article lie with the reader. Neither the authors nor the 928 Owners Club are responsible for any consequence, specifically any injury or damage, that results from the use or misuse of the procedure, information, and statements contained herein.

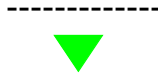
This article addresses only the conversion process of the side-view mirrors. It is not a replacement for the diagnosis and servicing procedures detailed in the factory service manuals. If the mirrors are non-functional prior to this procedure other steps may be necessary to troubleshoot the electrical system before proceeding with this conversion.

This procedure involves electrical wiring, lead soldering and various technical procedures that may require experience or additional help from another person. In addition, the side-view mirrors are considered a safety component of the vehicle and therefore extreme care must be exercised in the conversion process. Damage to the vehicle's electrical system may result if this procedure is not correctly followed. As always, consult the factory service manuals for additional information.



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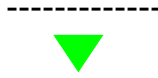


## II Parts Check List

The GTS aero mirror conversion requires the parts listed below which may be obtained individually or in kit form through the "big three" 928 supply houses (e.g. 928 International, 928 Specialists, Devek.) If parts are individually packaged and labeled keep them in their corresponding packaging to ease locating them. Prior to commencing this procedure verify that all required parts are in your possession.

**Table 1: Parts List**

Quantity	Part #	Description
1	965 731 243 00	LH Mirror Housing
1	965 731 244 00	RH Mirror Housing
1	928 731 241 00	LH Mirror Mount
1	928 731 242 00	RH Mirror Mount
1	965 731 245 01	LH Housing Frame
1	965 731 246 01	RH Housing Frame
2 <sup>a</sup>	928 624 901 00	Drive Motor Assembly
1	965 731 035 00	LH Mirror Plate Glass
1	965 731 038 01	RH Mirror Plate Glass (Convex)
1	965 731 143 00	LH Housing Gasket
1	965 731 144 00	RH Housing Gasket
1	928 731 247 00	LH Mirror Mount Gasket
1	928 731 248 00	RH Mirror Mount Gasket
2	965 731 257 00	Guide Tube
2	965 731 259 00	Guide Tube Spring
2	965 731 347 00	Adjusting Split Washer (Upper)
2	965 731 345 00	Adjusting Split Washer (Lower)
2 <sup>a</sup>	999 218 019 02	Allen Bolt with Plastic Washer
2 <sup>a</sup>	999 703 137 40	Protection Cap (Fits Allen Bolt Head)
2 <sup>a</sup>	928 531 235 03	Threaded Barrel Piece
6 <sup>a</sup>	900 278 013 02	Mounting Screw (Fits Drive Motor Assembly)
6	999 919 109 02	Mounting Screw (Fits Housing Frame)
2	928 612 615 00	Wire Connector Plug-Large (Female)

**Table 1: Parts List**

Quantity	Part #	Description
2	928 612 515 01	Wire Connector Plug-Large (Male)
2	964 612 516 00	Wire Connector Plug-Small (Female)
2	964 612 616 00	Wire Connector Plug-Small (Male)
30	999 652 711 10	Miniature Wire Connector (Female)
15	999 652 710 10	Miniature Wire Connector (Male)

- a. Denotes original hardware on car that may or may not be re-used depending upon model year of vehicle

### III Preparation

The mirror housings and mirror mounts are shipped from the factory pre-primed and paint-ready. A light sanding of these parts with fine water paper prior to painting will eliminate any rough spots and imperfections. Find the paint color and code from the driver's side door jamb and have your body shop paint these parts using a base coat/clear coat process. If the paint color code label has been removed and you are unaware of the correct color code, remove the gas filler door and have an auto body paint supplier scan it in order to accurately match the color of your car.

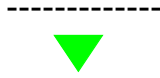
It is strongly suggested that all painted parts be fully cured (7-10 days) prior to handling and installation to prevent marring of the surfaces.

Installation time may vary but expect approximately 10-12 hours of assembly time.

### IV Tools Required

The following tools will be required for this procedure:

- Putty Knife (To remove mirror glass on older models only)
- Metric Socket Set
- Metric Allen Keys
- Torx Socket Set
- Phillips Screwdriver No.2
- Flat Screwdriver (Small)
- Miniature flat pocket screwdriver
- DSUB Electrical Wire Connector hand crimping tool (For new miniature wire connectors)
- DSUB Wire Connector extraction tool (To extract wire connectors from connector plugs)
- Amp Part No.305183 or equivalent Multi-Purpose extraction tool]
- Rubbing Compound (To remove high spots from painted door surfaces)
- Rubber Gloves (To Assemble Mirrors)
- Bench Vise (To Assemble Mirrors)
- Safety Goggles
- Electrical Tape (To protect mirror edges during assembly)
- Clean Rags



- Small Foot Stool (To save your back while wiring mirrors on car)
- A lot of Patience!

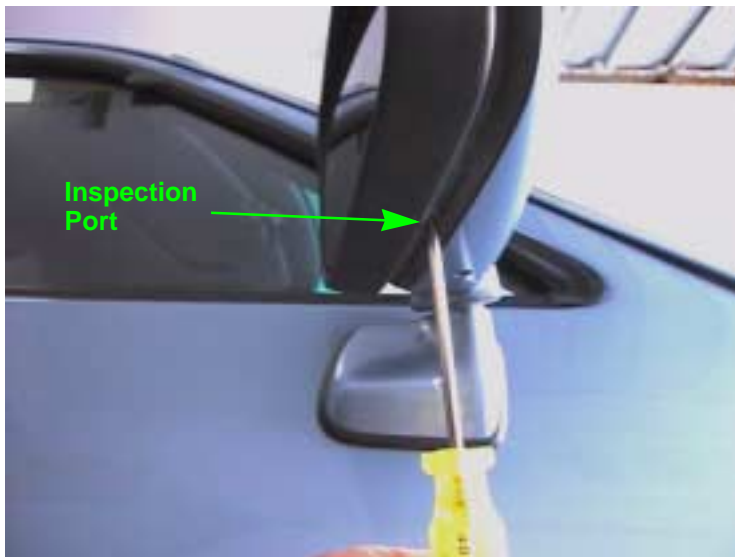
## V Removing Old Mirrors

The installation process mentioned below refers to the disassembly and re-installation of the driver's side mirror assembly. The process for the passenger side mirror is identical to that of the driver's side with the exception of the outdoor temperature sensor and alternate mirror wiring colors. (Refer to "Wiring Diagrams" on page 14 or factory service manuals for the correct combination.)

1. Remove spare tire and disconnect ground strap from battery.
2. Rotate old mirror housing on car outwards to access mirror glass.
3. Remove the mirror glass.

For older cars, using a putty knife, carefully pry off the mirror glass from the backing plate with even pressure around the perimeter of the glass.

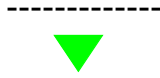
For newer cars push the bottom of the mirror glass inwards into the mirror housing while looking through the inspection port on the underside of the mirror housing. (See *Figure 1*.) If a black plastic



**FIGURE 1**

**Releasing Mirror Glass**

locking ring with four flat serrations is visible through the inspection port, use a small flat screwdriver to gently lift the ring outwards. Then rotate counter-clockwise out of the locking gate until stop. (Note that in some cases minor force may be required to rotate the locking ring as dust and road debris may be lodged in the grooves). Using your fingers, gently remove the mirror glass from the motor assembly and disconnect mirror heater wires from the glass.



4. With electrical tape secure a clean rag onto the door surface to protect it during disassembly of the mirror.
5. Remove the three (3) screws that secure the backing plate to the mirror housing with an 8-mm socket.  
*See Figure 2.*

**FIGURE 2****Backing Plate Removal**

6. Unplug both wire connector plugs. (*See Figure 3.*)

Note that newer vehicles may be equipped with an outdoor temperature sensor in the driver's side mirror housing. If present, unplug the 2-wire connector plug and remove the sensor from the mirror.

7. Wire Connectors: (Using old motors) If you've purchased the components for this conversion separately and you decide to use the motors from your old mirrors, you may do so without having to install the new motors that possess the newer miniature wire connectors. Your older motors can only be reused with the new GTS Mirror glass if the new-type locking ring system was used to remove the old glass. Also, bear in mind that the newer GTS mirrors have less space for the older "flat" connector plugs due to the curvature of the housings. Should you wish to re-use the older wire connector plugs, use the extraction tool and remove each wire from its plug. (*See Figure 4.*)

Wire Connectors: (Using new motors) If you've purchased the complete GTS mirror kit the harness wires must be cut as close as possible to the old wire connectors so that the newer miniature wire connectors (included in kit) can be crimped on later in the procedure.

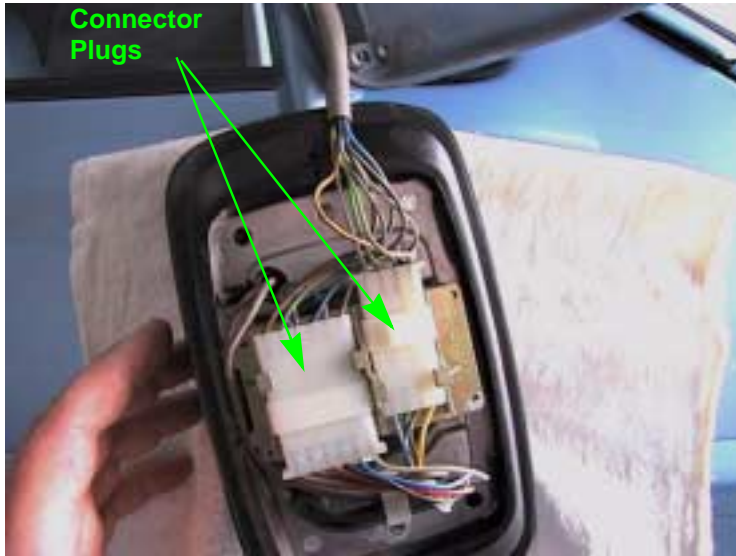
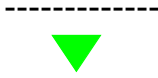


FIGURE 3

Connector Plug Detail

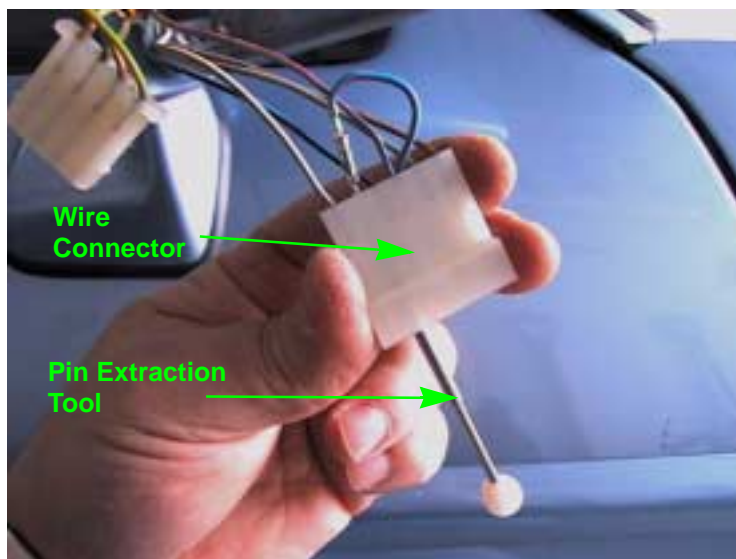
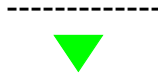


FIGURE 4

Pin Removal Detail

8. Rotate the mirror housing further to expose the cap protecting the Allen bolt that fastens the housing to the door. Using a miniature flat pocket screwdriver, pry out the cap to expose the Allen bolt. Using a 4-mm Allen key or socket, unscrew the bolt from the mirror mount. (See Figure 5.)

Note: Early vehicles may possess a z-type flange in place of the newer threaded barrel system. If so, retain these parts for re-assembly, as the threaded barrel may not fit older cars.

**FIGURE 5****Mirror Removal**

9. Pull out the Allen bolt and lift the mirror assembly out of the door cavity. Thread the wiring harness out through the mirror housing guide tube. If necessary the mirror assembly can be left resting on the door against the clean rag previously taped to the door.
10. Remove the mirror mount gasket from the door. Using a wet cloth, lightly rub the door area that was covered by the mirror mount gasket in order to remove dirt. Dry and wipe clean using a chamois and if necessary, apply rubbing compound to the area in order to remove high spots on paint left by the old mirror mount gasket. After compounding is complete, apply a coat of wax and buff to shine.

## **VI Bench Assembling New Mirrors**

11. Prepare a suitable work area on your workbench and lay down a soft terry cloth towel or several clean rags to protect the painted components during assembly.
12. Install the outdoor temperature sensor into the socket opening of the driver's side housing frame. (See *Figure 6.*)
13. Install the motor assembly onto the housing frame using three mounting screws (900 278 013 02.) Thread the motor's wiring bundle through the channel groove on the housing frame beneath the motor assembly. (See *Figure 7.*)
14. Install the housing frame and motor assembly into the painted mirror housing using three mounting screws (999 919 109 02.) (See *Figure 8.*)



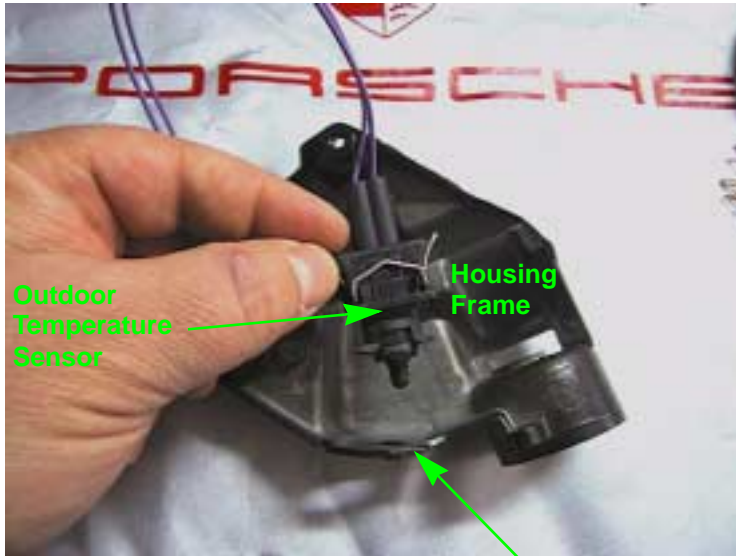
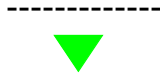
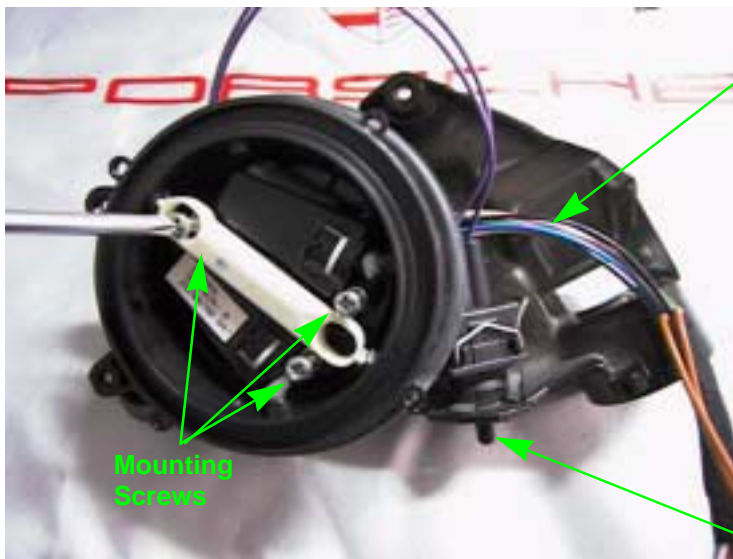


FIGURE 6

Temperature Sensor  
Installation

Sensor Socket Opening



Wiring  
Bundle

FIGURE 7

Motor Assembly  
Installation

Mounting  
Screws

Outdoor  
Temperature  
Sensor

15. Install the housing gasket onto the mirror housing using a small amount of petroleum jelly (e.g. Vaseline) as a temporary adhesive. Mate the dimple on the gasket with the opening in the housing.
16. Using a bench vise and a 3/8" socket drive extension, assemble the guide tube, the adjusting beveled split washers and the guide tube spring through the mirror mount and onto the mirror housing. Note the correct orientation of the beveled split washers when assembling the guide tube and guide tube spring; The washers and spring mate with the corresponding chamfer in the housing frame. (See Figure 9.)



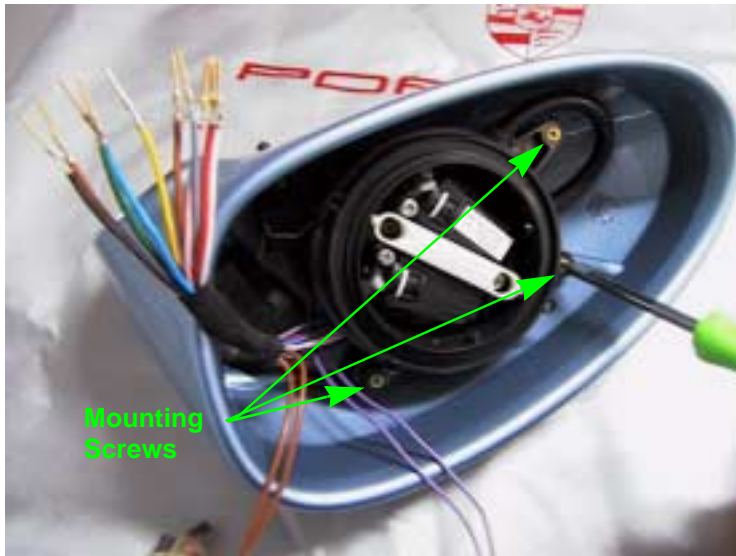
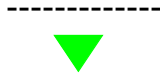


FIGURE 8

Mirror Housing  
Installation



Upper Split Washer

Guide Tube  
Spring

FIGURE 9

Guide Tube Component  
Assembly

Lower Split Washer

Guide Tube

While pushing down on Mirror housing, rotate it so that the guide tube flanges rest and lock onto the flat round surface of the housing frame socket. (See Figure 10.)

A considerable amount of downward linear force is required to compress the guide tube spring and to rotate the guide tube flanges on the surface of the housing frame socket. Exercise extreme caution when performing this procedure so as not to scratch or gouge painted surfaces. Wear rubber gloves to better grip the painted Mirror housing. (See Figure 11.)

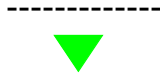


FIGURE 10

Guide Tube Assembly

3/8" Socket  
Extension

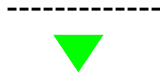
FIGURE 11

Guide Tube Assembly

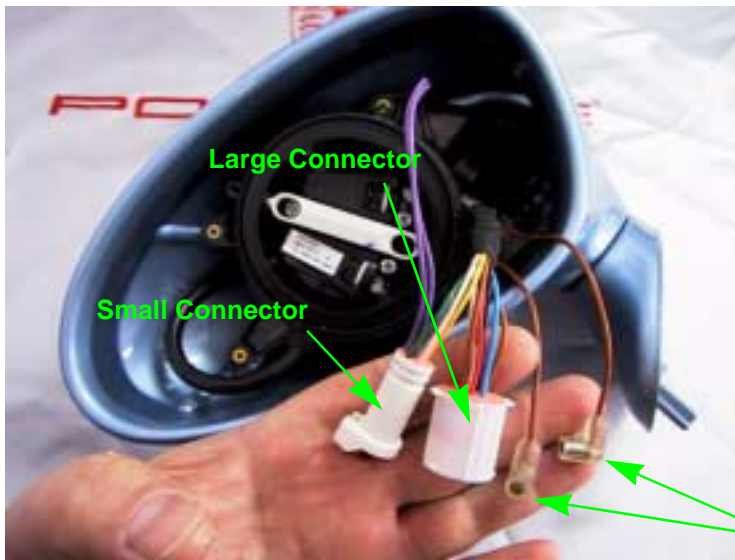
3/8" Socket  
Extension

## VII Mirror Wiring

17. Wire the large female connector plug (928 612 615 00.) Guide the motor drive and heater wires (with factory-installed miniature wire connectors) through the pink rubber grommet into the plug. Refer to the "Mirror" side of Table 3, "Wiring Diagram - Driver's Side, Large Connector."
18. Push in the red wire retainer while holding wires inside connector plug until a "click" is heard and the retainer locks wires in place. Lightly pull on wires to verify that all is secure.



19. Wire the small female connector plug (964 612 516 00.) Guide seat memory wires (with factory-installed miniature wire connectors) through the pink rubber grommet into the socket designations shown in the "Mirror" side of Table 4, "Wiring Diagram - Driver's Side, Small Connector."
20. Push in the red wire retainer while holding wires inside connector plug until a "click" is heard and the retainer locks wires in place. Lightly pull on wires to verify that all is secure.
21. If vehicle is equipped with an outside temperature sensor, guide the two violet wires from the sensor through the pink rubber grommet into the socket designations shown in the "Temp Sensor" side of Table 4, "Wiring Diagram - Driver's Side, Small Connector."



**FIGURE 12**

**Driver Side Connector  
Detail**

**Mirror  
Heater  
Wires**

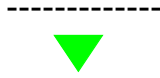
22. Wire the passenger side mirror connectors. Refer to Table 5, "Wiring Diagram - Passenger's Side, Large Connector." and Table 6, "Wiring Diagram - Passenger's Side, Small Connector."

## VIII Installing New Mirrors

23. Prior to assembly, protect the leading edges of the mirror housings with electrical tape.
24. Install the mirror mount gasket onto the mirror mount.

Before installation the gasket must be prepared. Soak the gasket in warm-to-hot water for a few minutes. This allows the gasket to stretch during assembly. Once it's pliable, remove the gasket from the water and gently stretch it about ½" using three fingers on each side.

Thread the car wiring harness through the guide tube into the mirror assembly and install the assembled unit onto the door in reverse sequence of disassembly. Secure the mirror with the Allen bolt



and plastic washer. If using old Allen bolts, reapply a small amount of Loctite on the bolt in the same area. *Do not overtighten the bolt as warping of the door panel may result.*

In some cases the painted high spots left over from the old mirror mount gasket may be slightly visible once the new mirror assembly has been installed. If this is the case, prior to securing the Allen bolt, move the assembly around so as to cover as much of the painted high spots as possible.

25. Install the new protection cap over the Allen bolt and secure it in place with a light tap.

## IX Car Wiring - Driver Side

26. Using the D-Sub hand crimping tool, strip the wires from the car wiring harness and crimp on new female miniature wire connectors (999 652 711 10) on all harness wires.

If a D-sub hand crimping tool is not easily obtainable through an electronic supply house, these wires can be soldered to the connectors using a non-corrosive electronic soldering paste with a quality electronic lead solder. If soldering is to be performed, using long nose pliers, make sure that the connector tabs are bent over the insulated portion of the wire to secure the entire assembly. This will ensure a proper fit into the Connector Plug. The soldered connectors should then be lightly coated with lithium grease prior to plug assembly.

27. Referring to Table 3, "Wiring Diagram - Driver's Side, Large Connector," wire the large male connector plug (928 612 515 01.) Guide motor drive and heater wires through pink rubber grommet into the socket designations shown in the "Car" side of the diagram.
28. Push in the red wire retainer while holding the wires inside the connector plug until a "click" is heard and the retainer locks the wires in place. Verify that the O-Ring is not pinched inside the connector housing when locking the red retainer. The O-Ring must be seated against the flange of the retainer. Lightly pull on the wires to verify that they are secure.
29. Wire the small male Wire connector plug (964 612 616 00.) Guide the seat memory wires through the pink rubber grommet into the socket designations show in the "Car" side of Table 4, "Wiring Diagram - Driver's Side, Small Connector."
30. Push in the red wire retainer while holding the wires inside the connector plug until a "click" is heard and the retainer locks the wires in place. Verify that the O-Ring is not pinched inside the connector housing when locking the red retainer. The O-Ring must be seated against flange of the retainer. Lightly pull on the wires to verify that all is secure.

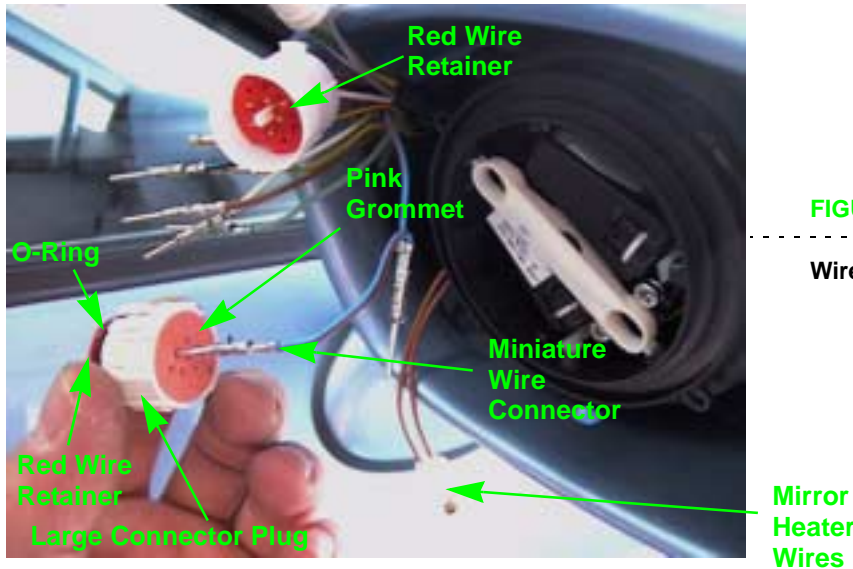
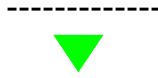


FIGURE 13

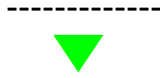
Wire Connector Detail

## X Car Wiring - Passenger Side

31. Wire the large male connector plug (928 612 515 01.) Guide the motor drive and heater wires through the pink rubber grommet into the socket designations show in Table 5, "Wiring Diagram - Passenger's Side, Large Connector."
32. Wire the small male connector plug (964 612 616 00.) Refer to Table 6, "Wiring Diagram - Passenger's Side, Small Connector."

## XI Final Assembly

33. Mate each corresponding connector plug together and tuck them deep into the curved void of the mirror housing. Use a plastic wire retainer strap (e.g. tie-wrap) to bundle the wires so that they do not interfere with the operation of the motor and mirror glass.
34. Install the mirror glass and rotate the locking ring clockwise into the locking gate until you hit the stop.
35. Re-connect battery ground strap.
36. Test the operation of both mirrors. If the wiring has not been done correctly, re-wiring of the connectors will be necessary. Use the DSUB wire connector extraction tool to remove the appropriate wire connector from the connector plug. Verify all connections and test operation.
37. Remove the protective electrical tape from leading edge of the mirror housings.
38. Re-install spare tire and adjust clock and radio.



39. Sit back, crack open a cold one (Canadian of course) and enjoy your work while keeping in mind that you've saved over \$500.00 in labor costs by installing the mirrors yourself!



**FIGURE 14**

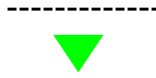
**Done!**

## XII Wiring Diagrams

The following wiring diagrams apply only to model year 1990 and 1991. Please refer to the shop manuals for other model years.

**Table 2: Wire Color Definitions**

BK	Black	BL	Blue	BR	Brown	GR	Grey	GN	Green
PK	Pink	RE	Red	VT	Violet	WT	White	YE	Yellow



**Table 3: Wiring Diagram - Driver's Side, Large Connector**

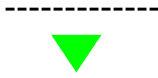
Connection Points					
New		Old			
Color	Number	Number	Color		
MIRROR	WT	11	1	WT/BR	CAR
	BL	14	2	BL/BK <sup>a</sup>	
	RE	13	4	BL/BK	
	BK	10	3	BK/RE	
	BR	12	5	GR/GN	
	BR	15	6	BR	

a. The BL/BK wires are the same wire looped to serving both old connection points 2 and 4.

**Table 4: Wiring Diagram - Driver's Side, Small Connector**

Connection Points					
New		Old			
Color	Number	Number	Color		
MIRROR	PK	3	3	BR/BL	CAR
	YE	4	4	YE	
	GR	5	1	GR	
	GN	2	2	GN	
Temp Sensor	VT	1		BL/GN	
	VT	6		BR/GN	





**Table 5: Wiring Diagram - Passenger's Side, Large Connector**

Connection Points					
New		Old			
Color	Number	Number	Color		
MIRROR	WT	11	1	WT/GR	CAR
	BL	14	2	BL/RE <sup>a</sup>	
	RE	13	4	BL/RE	
	BK	10	3	BK/BL	
	BR	12	5	GR/GN	
	BR	15	6	BR	

a. The BL/RE wires are the same wire looped to serving both old connection points 2 and 4.

**Table 6: Wiring Diagram - Passenger's Side, Small Connector**

Connection Points					
New		Old			
Color	Number	Number	Color		
MIRROR	PK	3	3	BR/YE	CAR
	YE	4	4	YE/GN	
	GR	5	1	GR/YE	
	GN	2	2	GN/BR	