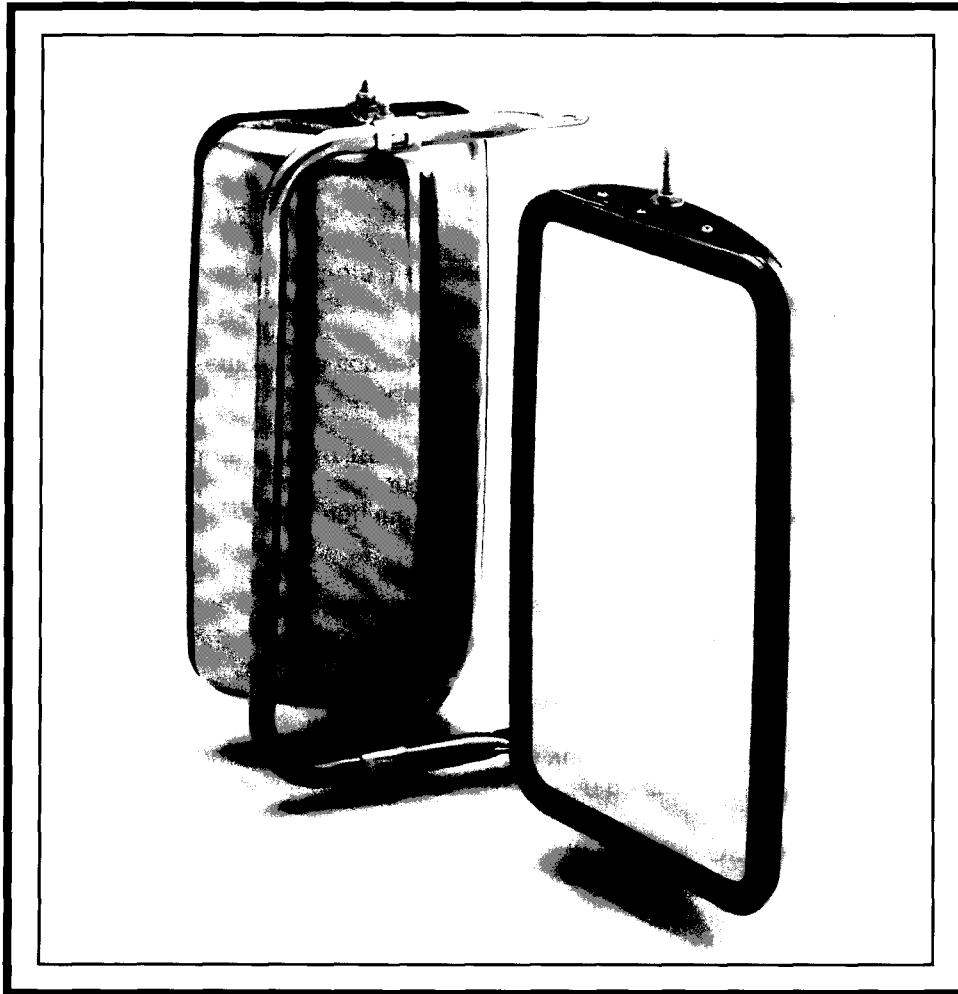


# INSTALLATION INSTRUCTIONS AND SERVICE MANUAL FOR VELVAC® MODEL 2010 MIRROR



## MOTORIZED – HEATED – LIGHTED WEST COAST MIRRORS

*The Velvac Model 2010 West Coast mirror was designed for safety, reliability and ease of use. This guide provides valuable installation information and simple component tests that can be used to determine part performance.*

NOTE: READ ALL INSTRUCTIONS FIRST BEFORE PROCEEDING WITH INSTALLATION.

### DO NOT USE POWER TOOLS

#### TOOLS REQUIRED FOR INSTALLATION

- Electric drill
- 7/16" Drill bit
- Pliers or grommet tool
- Terminal crimping tool
- 1/2" Wrench
- 9/16" Wrench

*The following procedure indicates how to properly attach motorized and non-motorized mirror heads to the mounting bracket.*

#### Contents

Velvac Mirror Removal and Installation  
Velvac Mirror Motor Removal and Installation  
Velvac Mirror Glass and Heating Element Removal and Installation  
*Troubleshooting*  
*Testing*

For assistance beyond this service guide, please call Velvac's Technical Service Department at 800-783-8871.

For more information on Velvac Products please call 800-783-8871 or 262-786-0700

Fax: 262-786-4101

E-Mail: [Technicalservice@Velvac.com](mailto:Technicalservice@Velvac.com)

## Velvac Mirror Removal and Installation

### Removal

1. Apply the parking brake; turn the key switch to the OFF position.

NOTE: Most repairs to the Velvac mirrors can be made with the mirror head still mounted to the brackets on the vehicle.

2. Disconnect the batteries.
3. Using pliers or a grommet tool, depress the grommet tab and remove the plastic grommet for the mirror wiring harness from the bottom of the mirror head. See Fig. 1.
4. Pull the wires through the hole for the grommet so that the wire connectors are outside the mirror head. Disconnect all the electrical connectors at the mirror.
5. If a convex mirror is mounted on the bottom shaft of the Velvac mirror, remove the convex mirror.
6. Remove the nuts securing the clamp to the C-bracket and remove the Velvac mirror from the vehicle.
7. Using a 1/2 inch backup wrench to prevent the jam nuts for the motorized mirror or the hex nut for the non-motorized mirror at the top of the mirror head from turning on the shaft, remove the locknut from the top shaft. Remove the washers and clamp from the top shaft. See Fig. 2 for the motorized mirror and see Fig. 3 for the non-motorized mirror.
8. Using a 9/16 inch backup wrench to prevent the nut at the bottom of the mirror head from turning, remove the locknut from the bottom shaft. Remove the washers and clamp from the bottom shaft. See Fig. 3.

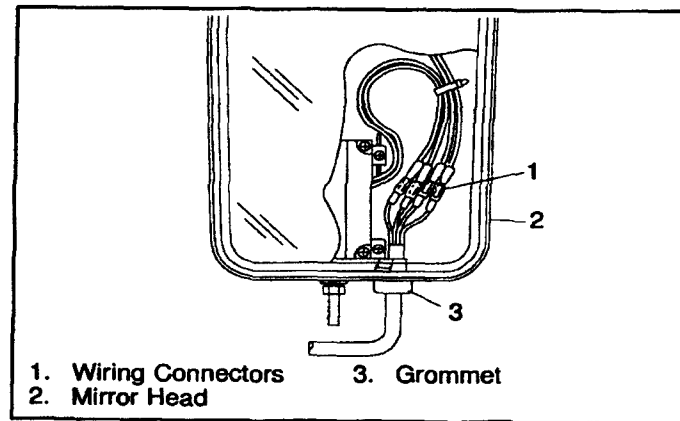


Fig. 1, Disconnecting the Wiring

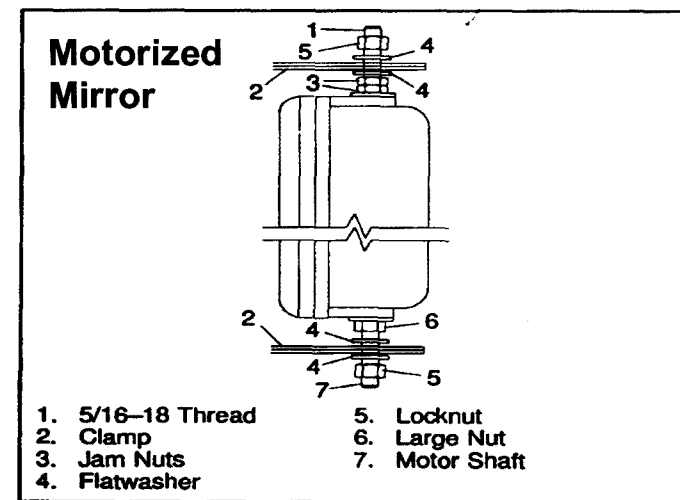


Fig. 2

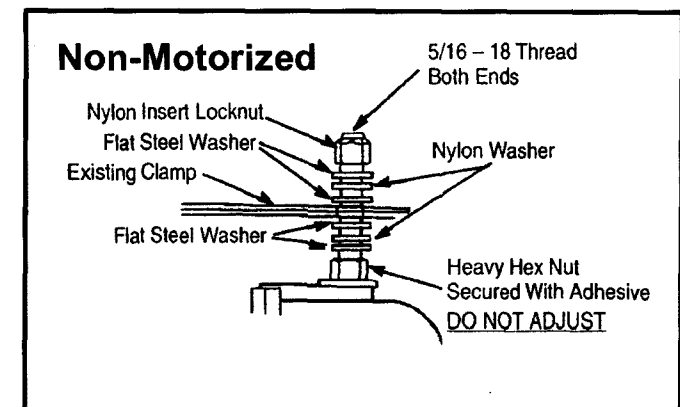


Fig. 3

## Installation – Motorized Mirrors

1. Install a flat washer on top of the two jam nuts on the top of the shaft of the mirror head. Install the top clamp and another flat washer. Install a locknut with a nylon insert onto the top shaft. See Fig. 2.

**IMPORTANT:** Use a backup wrench on the jam nuts to prevent the jam nuts from turning in relationship to the top shaft of the mirror. These jam nuts have been tightened at the factory and must not rotate when tightening the top clamp locknut. The top shaft must be free to rotate in relationship to the mirror head.

2. With a back up wrench on the jam nuts to prevent turning, tighten the locknut that holds the clamp on the top shaft to 125-200 in/lbs.
3. Install a flat washer on the bottom shaft of the mirror head. Install the bottom clamp and another flat washer. Install the locknut with a nylon insert onto the bottom shaft.

**IMPORTANT:** Use a back up wrench on the nut next to the mirror head to prevent the nut from turning in relationship to the bottom shaft of the mirror. The nut was tightened at the factory and must not rotate when the tightening at the bottom clamp locknut. If the nut was loosened, tighten it only until the bottom shaft starts turning with the nut.

4. With backup wrench on the nut next to the mirror head to prevent turning, tighten the locknut that holds the clamp on the bottom shaft 125-200 in/lbs.
5. Connect the wires from the mirror to the wiring harness according to the color code chart in Table 1.
6. Slide the plastic grommet in position on the jacket of the mirror harness. Using pliers or a grommet tool, push the grommet and harness into the hole in the bottom of the mirror head. Make sure that the grommet tab locks into place.

### ----- CAUTION -----

**Avoid putting force on the glass or using sharp tools to separate the glass from the mirror housing. The glass can easily break, causing injury, and the housing can be scratched by the use of sharp tools.**

7. Rotate the mirror head by hand to make sure that there is clearance.
8. Test the operation of all the mirror functions using the switches inside the cab. The mirror should be warm to the touch within 5 minutes of starting the mirror heater.

## Installation – Non-motorized Mirrors

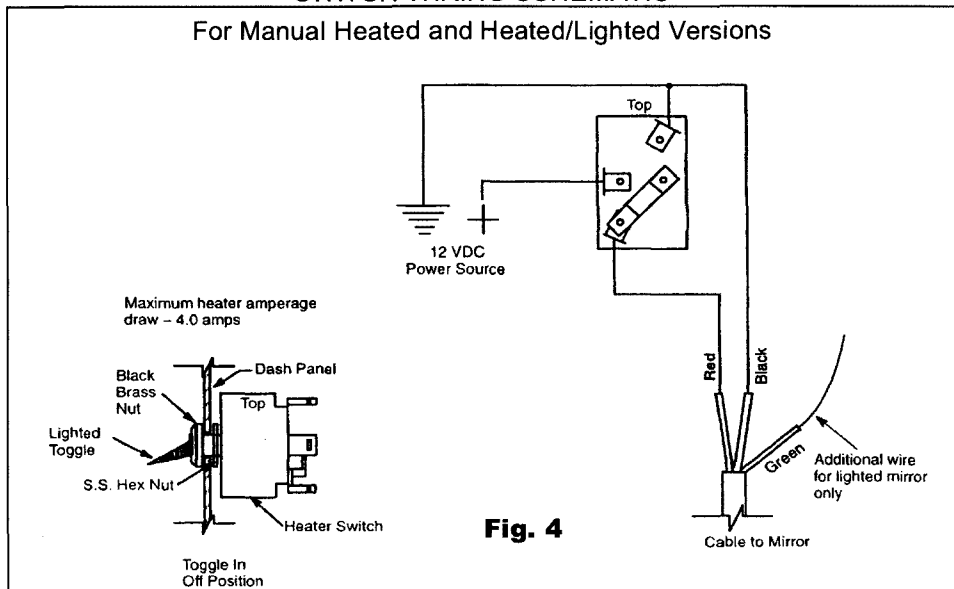
1. Install flat washers and nylon washers as shown in Fig. 3.
2. With backup wrench on the nut next to the mirror head to prevent turning, tighten the locknut that holds the clamp on the bottom shaft 125-200 in/lbs.
3. Tighten the locknut that holds the clamp on the top or bottom of the shaft to 60-80 in/lbs.
4. Connect the wires from the mirror to the wiring harness according to the color code chart in Table 1.
5. Slide the plastic grommet in position on the jacket of the mirror harness. Using pliers or a grommet tool, push the grommet and harness into the hole in the bottom of the mirror head. Make sure that the grommet tab locks into place. See previous \*CAUTION\*.
6. Rotate the mirror head by hand to make sure that there is clearance.
7. Test the operation of all the mirror functions using the switches inside the cab. The mirror should be warm to the touch within 5 minutes of starting the mirror heater.

Mirror Wiring Color Code	
Mirror Head	Harness
Red (heater +)	Red
Black (heater, light -)	Black
Blue (light +)	Blue
White (motor)	White
Green (motor)	Green

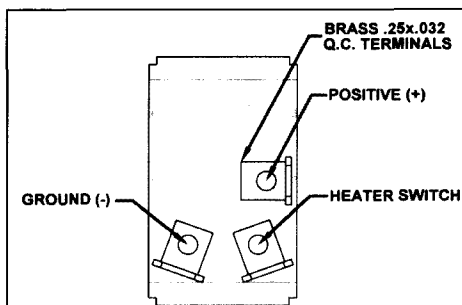
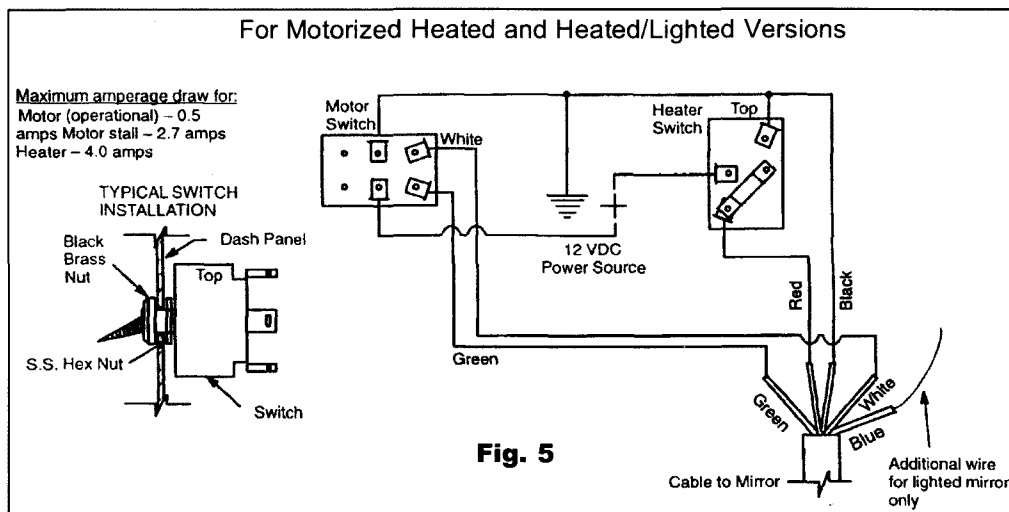
Table 1

## SWITCH WIRING SCHEMATIC

For Manual Heated and Heated/Lighted Versions



For Motorized Heated and Heated/Lighted Versions



## Velvac Mirror Motor Removal and Installation

### Motor Removal

1. Apply the parking brake and turn the key switch to the OFF position.
2. Disconnect the batteries.

NOTE: The motor in the Velvac mirror can be replaced with the mirror head still mounted to the brackets on the vehicle.

3. Remove any tape from the perimeter of the bezel. Remove the two screws on both the top and the bottom of the mirror head. See Fig. 7.

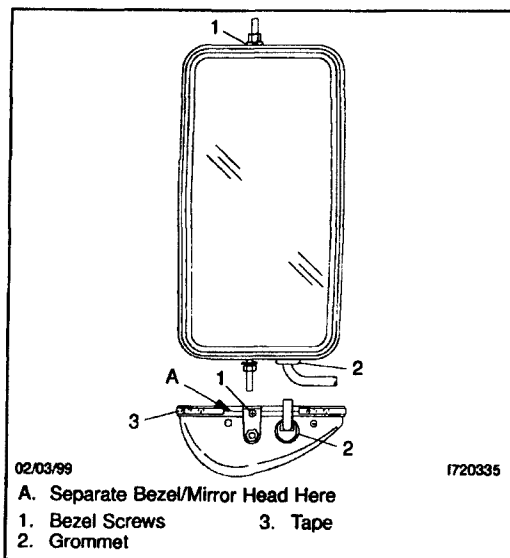
----- CAUTION -----

**Avoid putting force on the glass or using sharp tools to separate the glass from the mirror housing. The glass can easily break, causing injury, and the housing can be scratched by the use of sharp tools.**

4. Use your hands to carefully separate the bezel and glass assembly from the mirror housing. The plastic bezel is held in the housing by six Tinnerman clips in the internal groove along the rear edge of the mirror housing.
5. Remove the wire connectors from the heater element on the back of the mirror glass. Put the mirror glass and heater element in a safe place.
6. Cut the tie wrap and remove the wires to the mirror motor.
7. Remove the lower clamp from the A-bracket. Remove the locknut, and flat washers from the motor shaft at the lower bracket.
8. Install two jam nuts on the motor shaft and tighten against each other. Hold a backup wrench on the outer jam nut to prevent the motor shaft from turning. Remove the large nut from the motor shaft.

NOTE: The nut on the motor shaft uses thread sealant to help it stay in position.

9. Using a Philips screwdriver, remove the four screws that hold the motor to the housing. Lift the motor from the mirror housing.

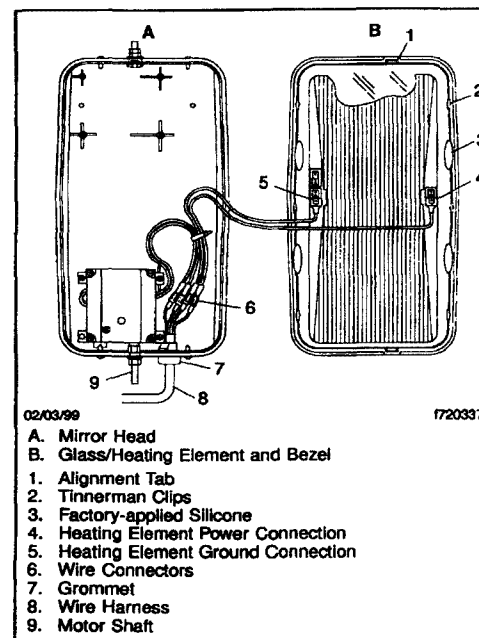


**Fig. 7**

### Motor Installation

1. Install the shaft of the new motor into its hole in the housing.
2. Install and carefully tighten the four screws that hold the motor to the housing.
3. Apply Loctite to the threads of the motor shaft nut and install it on the shaft. Tighten the nut until the shaft begins to turn. Install a flat washer, the clamp, another flat washer, and a new nylon-insert locknut, but do not tighten the lock nut.
4. Fasten the lower clamp to the A-bracket. Use a 9/16 inch backup wrench to prevent the shaft from turning and tighten the locknut on the end of the motor shaft.
5. Connect the wires from the motor to the wires of the same color in the harness. Install a tie wrap in the same location as before.
7. Remove any Tinnerman clips left in the groove in the housing or on the bezel. Install new clips in the six locations on the bezel shown in Fig. 8.

8. Connect the black wire and the blue wire to the two terminals on the ground side of the heating element. Connect the red wire to the terminal on the other side of the element.
9. Align the tabs on the top and bottom of the bezel with the slots in the housing. Carefully and evenly press the glass and bezel assembly into the groove in the housing so that the clips firmly hold the bezel assembly in place.
10. Carefully press the glass and bezel assembly against the housing while installing the bezel mounting screws into the housing. Push down on the screwdriver while turning the screws, but do not over-tighten the screws into the plastic mirror housing.
11. Apply the tape that was removed earlier, around the perimeter of the bezel.
12. Connect the batteries and test the mirror operation.



**Fig. 8**

# Velvac Mirror Glass and Heating Element Removal and Installation

## Removal

1. Apply the parking brake; turn the key switch to the OFF position.
2. Disconnect the batteries

NOTE: The heating element in the Velvac mirror can be replaced with the mirror head still mounted to the brackets on the vehicle.

3. Remove and discard any tape from the perimeter of the bezel. Remove the screws on the top and the bottom that hold the bezel to the mirror head. See Fig. 9.

### ----- CAUTION -----

**Avoid putting force on the glass or using sharp tools to separate the glass from the mirror housing. The glass can easily break, causing injury, and the housing can be scratched by the use of sharp tools.**

4. Use your hands to carefully separate the bezel and glass assembly from the mirror housing. The plastic bezel is held in the housing by six Tinnerman clips in the internal groove along the rear edge of the mirror housing. See Fig. 10 and 11.
5. Remove the wire connectors from the heater element on the back of the mirror glass.

## Installation

1. Remove any Tinnerman clips left in the groove in the housing or on the bezel. See Fig. 11. Install new clips in the six locations on the bezel shown in Fig. 10.
2. Connect the black wire and the blue wire to the two terminals on one side of the heating element. Connect the red wire to the terminal on the other side of the element.
3. Align the tabs on the top and bottom of the bezel with the slots in the housing. Carefully and evenly press the glass and bezel assembly into the groove in the housing so that the clips firmly hold the bezel assembly in place.

4. Carefully press the glass and bezel assembly against the housing while installing the bezel mounting screws into the housing. Push down on the screwdriver while turning the screws, but do not over-tighten the screws into the plastic mirror housing.
5. Connect the batteries and test the mirror operation.

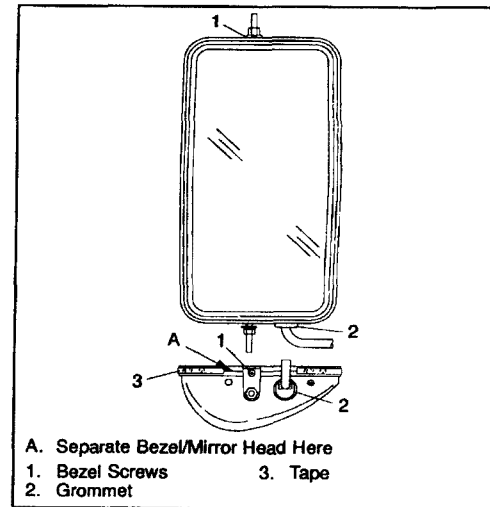


Fig. 9

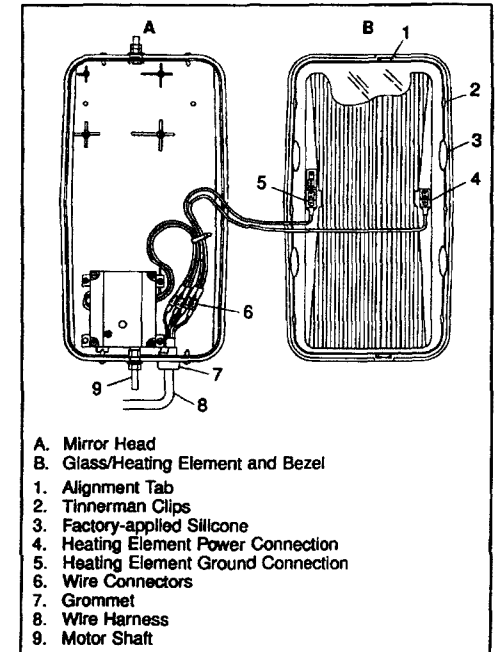


Fig. 10

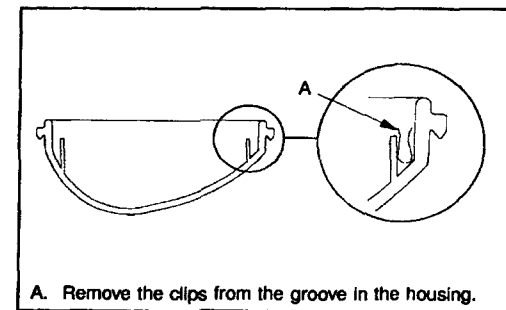


Fig. 11

## Troubleshooting

Use the information in the following table to determine the possible causes and remedies of problems with the Velvac mirrors. To test the mirror components, see instructions on following pages.

<b>Problem – The mirror will not rotate when the switch is closed.</b>	
<i>Possible Causes</i>	<i>Remedy</i>
An obstruction is in the path of the mirror.	Remove the obstruction.
The motor switch does not have power.	Turn the power on.
The fuse or circuit breaker is open.	Replace the fuse or reset the circuit breaker.
The switch is not working.	Test the switch. Replace it, if necessary.
The wiring is damaged.	Check and repair the wiring.
The motor is worn.	Test the motor. Go to “Testing the Electric Motor” on page 8.

<b>Problem – The heater does not work.</b>	
<i>Possible Causes</i>	<i>Remedy</i>
There is no power to the heater switch.	Turn the power on.
The fuse or circuit breaker is open.	Replace the fuse or reset the circuit breaker.
The switch is not working	Test the switch. Replace it, if necessary.
The wiring is damaged	Check and repair the wiring.
The heating element is not working.	Test the element. Go to “Testing the Heater” on page 9.

<b>Problem – The mirror will not stay adjusted, moves at high speed, or vibrates.</b>	
<i>Possible Causes</i>	<i>Remedy</i>
The fasteners are not tight.	Tighten the mirror mounting hardware.
The slip clutch is worn.	Test the slip clutch. Go to “Testing the Slip Clutch” on page 8.

<b>Problem – The glass is broken.</b>	
<i>Possible Causes</i>	<i>Remedy</i>
An object had struck the glass.	Replace the glass. For instructions, go to page 6.

<b>Problem – The glass surface has scratches.</b>	
<i>Possible Causes</i>	<i>Remedy</i>
The glass was cleaned incorrectly.	Replace the glass, if necessary. Use only non-abrasive cleaners and soft cloths to clean the glass surface.

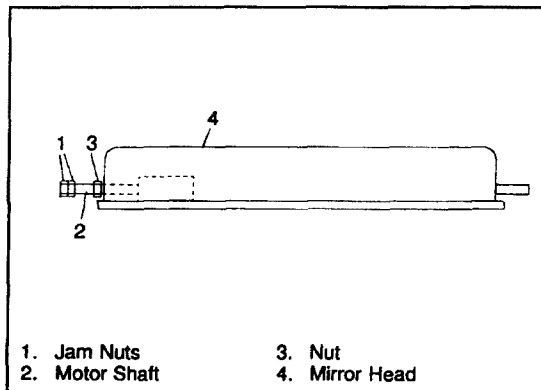
<b>Problem – The glass is distorted.</b>	
<i>Possible Causes</i>	<i>Remedy</i>
The mounting brackets are misaligned causing the head to flex.	Align the mounting brackets
The mirror hits an obstruction during its rotation.	Remove the obstruction.

<b>Problem – The marker light does not illuminate.</b>	
<i>Possible Causes</i>	<i>Remedy</i>
The bulb is burnt out.	Replace the bulb.
The switch is not working.	Test the switch. Replace it, if necessary.
The wiring is damaged.	Check and repair the wiring.
The fuse or circuit breaker is open.	Replace the fuse or reset the circuit breaker.

## Testing the Slip Clutch

The Velvac mirror slip clutch allows the mirror head to be positioned manually without damaging the motor gear assembly. The slip clutch resistance to rotation keeps the mirror from moving unintentionally. To test the torque needed to rotate the mirror head in relation to the motor shaft, use the following procedure.

1. Remove the Velvac mirror head from the vehicle. See page 2.
2. Install 2 jam nuts on the motor shaft of the mirror head. Using a backup wrench on one of the jam nuts, tighten the other jam nut against the first. See Fig. 1.
3. Use a beam-type or dial-type torque wrench on the outer jam nut. Hold the mirror head from rotating and note the reading on the torque wrench while rotating the jam nuts and motor shaft.
4. The torque required to turn the motor shaft in relation to the motor head must be between 60 and 110 in/lbs.
5. Replace the motor assembly if the torque needed to rotate the shaft is more than 110 in/lbs. For instructions see page 4. If the motor shaft begins to turn at a torque value of less than 60 in/lbs, tighten the large nut on the motor shaft just until the shaft begins to turn with the nut. Check the rotating torque again. Replace the motor assembly if the torque needed to turn the shaft is still not correct.



**Fig. 12**

## Testing the Electric Motor

To test the electric motor that rotates the mirror head, use the following procedure.

1. Apply the parking brake and turn key switch to the OFF position.
2. Disconnect the batteries.

**NOTE:** Most repairs to the Velvac mirrors can be made with the mirror head still mounted to the brackets on the vehicle.

3. Using pliers or a grommet tool, depress the grommet tab and remove the plastic grommet for the mirror wiring harness from the bottom of the mirror head. See Fig. 13.
4. Pull the mirror wires through the hole for the grommet so that the wire connectors are outside the mirror head. Disconnect the electrical connectors for the white and green wires.
5. Connect a jumper wire from the battery negative post (or a good ground) to the white wire in the mirror head.

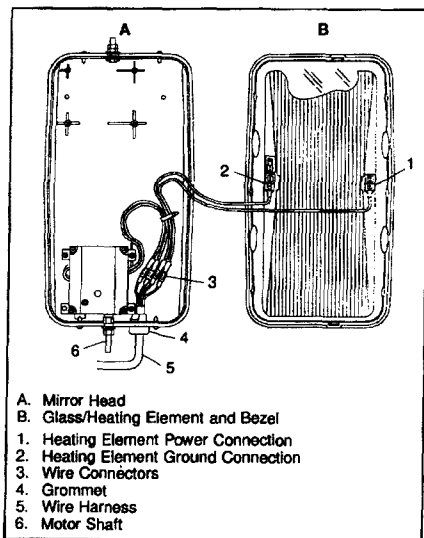
### -----CAUTION-----

**The mirror head will immediately start rotating when you complete the temporary circuit. Make sure that your hands and all objects are out of the way of the mirror head before starting this test. Disconnect the wires before the mirror head can hit any object. Failure to do so could cause personal injury or damage to the mirror.**

6. Temporarily touch a jumper wire from the battery positive post to the green wire in the mirror head. The motor should immediately start turning the mirror head in a clockwise direction (looking from the top).
7. Disconnect the white wire from the jumper wire connected to the battery negative post (or ground). Connect the grounded jumper to the green wire in the mirror.
8. With your hands away from the mirror head, temporarily touch a jumper wire from the battery positive post to the white wire in the mirror head. The motor should immediately start turning the mirror head in a counter-clockwise direction (looking from the top).



9. Replace the motor if it does not operate as stated above. See page 5 for the motor replacement procedure.
10. Remove the jumper wires and connect the batteries.



**Fig. 13**

### Testing the Heater

To test the electric heating element in the mirror head, use the following procedure.

1. Using pliers or grommet tool, depress the grommet tab and remove the plastic grommet for the mirror wiring harness from the bottom of the mirror head. See Fig. 13.
2. Pull the mirror wires through the hole for the grommet so that the wire connectors are outside the mirror head. Disconnect the electrical connectors for the black and the red wires.
3. Test for continuity in the heater circuit by connecting one probe of an ohmmeter to the black wire from the mirror and the other probe to the red wire. The ohmmeter must indicate continuity. Replace the mirror glass/heating element if the ohmmeter indicates an open circuit.

4. Connect a jumper wire from the battery negative post (or a good ground) to the black wire in the mirror head.
5. Connect a jumper wire from the battery positive post to the red wire in the mirror head. The heating element will make the mirror glass warm to the touch within 5 minutes.
6. Replace the mirror glass and heating element assembly if it does not operate as stated above. See page 6 for the heating element replacement procedure.
7. Remove the jumper wires and connect the batteries.

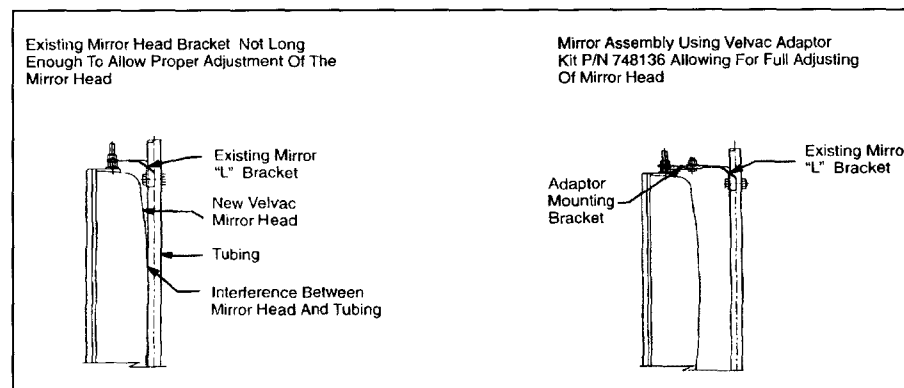
### Extension Kit

On some vehicles the existing mirror head bracket will not be long enough to allow for proper adjustment of the mirror head.

This will generally be the case for Volvo and Navistar vehicles. An example of this situation is shown on the picture below. In that situation, order Velvac adaptor kit P/N 748136.

This adaptor kit can also be used to increase the mounting span between existing brackets by approximately 1/4 inch.

Call Velvac at 1-800-783-8871 and the adaptor will be sent to you at no charge.



**Fig. 14**

### **Customer Satisfaction Statement**

Velvac commits to providing high quality and high value branded products at competitive prices, friendly customer service, good order fill rates and fast order turnaround. These goals focus on one objective – TOTAL CUSTOMER SATISFACTION.

### **LIMITED WARRANTY**

The standard warranty coverage is for twelve months from the date of installation (unless otherwise noted). This warranty covers defects in material or workmanship for new Velvac products which, under normal use or service, are proven defective after a factory evaluation. If proven defective, Velvac will replace, ground freight prepaid, with a new part or issue a full credit for the part, plus incoming freight charges. If Velvac personnel finds that a product is not covered under warranty or is found to function normally, the product may be returned to the customer freight collect or Velvac can dispose of the part(s) at our factory, based on the customer's request.

If a Velvac product is claimed defective, a request for a Returned Goods Authorization (RGA) number must be obtained by contacting Velvac prior to returning the product. State the part number, the quantity you wish to return, describe the problem in detail and provide proof of installation or use for less than 12 months. When you receive the RGA number, indicate whether you want credit or a new part if the warranty is approved. Then indicate whether you wish to have the parts scrapped or returned if determined they are not covered under warranty. Freight must be prepaid and the RGA number must appear on packaging list and outside of the shipping container(s).

This warranty does not extend to any products which have been subject to misuse, accident, improper application, improper installation or improper maintenance, nor does it extend to products which have been repaired or altered outside of Velvac's plant. Damages caused by inadequate packaging or mishandling of return shipments are not covered under warranty. This warranty does not cover charges for installation, labor, travel, consequential damage, loss of time or other incidental changes.

Credit or replacement of the part is the exclusive remedy for products found to be defective under this warranty. This warranty is in lieu of all other warranties, including any implied warranty of merchantability or fitness for a particular purpose. All decisions made by Velvac regarding product warranty are final.



Velvac Incorporated is a leading manufacturer and supplier of components to the truck, recreational and specialty vehicle industries. Opening its doors in Detroit, Michigan in 1934 as the Vacuum Power Equipment Company, the corporate name was changed to Velvac in 1940 to encompass its Velvet Vacuum Brakes brand. The year 1947 saw another change in Velvac, this one being a physical move from Detroit to Milwaukee, Wisconsin.

Twenty-five years later, the company relocated to an industrial park in a community just minutes west of downtown Milwaukee called New Berlin.

Today Velvac is a multinational company with offices and primary warehouse based in New Berlin and a manufacturing facility located in Reynosa, Mexico.

With a long heritage and staunch commitment to quality and service, Velvac continually upgrades and expands its operations and quality systems to improve customer satisfaction and the reliability of its broad product line. Coupling that with the written guarantee behind every component offered sums up the ideals Velvac stands for:

*Quality Driven Vehicle Components Since 1934*

**For more information on Velvac products,**

**call 800.783.8871 / 262.786.0700**

- or -

**fax us at 262.786.4101**

- or -

**send an e-mail to [technicalservice@velvac.com](mailto:technicalservice@velvac.com)**

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**visit us on the web at [www.velvac.com](http://www.velvac.com)**



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