Mirrors for Heavy Trucks* and Tractor-Trailers

Fender-mounted convex mirror should be mounted as far forward as possible, with the inside edge of mirror along the edge of the vehicle body.

Side-mounted flat mirrors do not provide enough information by themselves to make good driving decisions. The addition of properly selected and correctly adjusted side-mounted convex mirrors provides significantly more information but still leaves the driver with a "blind spot," particularly on the right side of the vehicle. Convex mirrors mounted on the front fenders provide even more visual cues about vehicles or other objects in this blind spot.

An effective viewing system is built with a combination of these mirrors.

Limiting Factors

The width and configuration of the windshield and side windows determine the appropriate size and spacing of mirrors. Seat position is another factor, especially the driver's eye height when the seat is properly adjusted.

Most mirror-related problems can be overcome if you keep these three important points in mind:

1. Your objective is to have a mirror system that the driver will use and that gives a clear view on each side of the vehicle.

2. The entire reflective surface of all mirrors should be visible from the driver's position.

3. Driver eye height is critical in mirror adjustment.

Dimensions and measurements in this reference are based on driver eye height for 90% of drivers.

* Heavy Trucks: Over 26,001 lbs Gross Vehicle Weight Rating, Class 7 & 8
Mirror Size and Location

Although it is difficult to establish criteria for mirrors that will fit all vehicle types and sizes, the following guidelines represent best industry practices, which may exceed the federal regulatory practices as defined in FMVSS 111.

For sizing and placement of flat and convex mirrors on trucks and tractors:

**Side-Mounted Flat Mirrors**
- One on each side.
- Minimum reflective area: 50 square inches (5 inches wide by 10 inches high).
- Manufacturers generally locate the mirrors on a line parallel to the windshield and up to 18 inches (maximum) forward of the driver.
- The center of the mirror is approximately at eye level when seat height is properly adjusted for driver.
- The inside edge of both mirrors should be located in line with the outer edge of the vehicle body.

**Side-Mounted Convex Mirrors**
- One on each side.
- Minimum reflective area: 25 square inches (5 inches wide by 5 inches high, or 6 inches in diameter).
- Maximum radius of curvature: 20 to 30 inches.
- Convex mirrors should not interfere with, or cover any portion of the flat mirror.
- The inside edge of convex mirrors should be located in line with the outer edge of the vehicle body.

Note: Many late model trucks have large single mirror housing for both the flat and convex mirrors. It is critical that the mirrors be individually adjustable for maximum adjustment capability.

**Fender-Mounted Convex Mirrors**
- Right side recommended (optional on left).
- Size is optional. Minimum recommended diameter is 6 inches, although 8 and 10 inch models are also used.
- Maximum radius of curvature: 20 to 30 inches.
- Mount as far forward as possible, toward the front corner of the unit, with the inside edge of the mirror along the edge of the vehicle body. On conventional units, the mounting position is on the front edge of the right front fender.
On cab-over-engine vehicles, the mirror is projected forward of the cab (by the bracket) on the upper-right front corner.

**Adjusting Your Mirrors**

If your operations involve several vehicles and/or drivers, we recommend one of these standardized methods for mirror checking and adjustment.

- **Full outdoor mirror check station**: the most accurate. It requires the most space to set up and may be difficult for some to put into service.
- **Vertical mirror check station**: requires much less space and is easier for many companies to manage.
- **Mirror adjustment marks placed directly on the truck**: with this third method it should be noted that the procedure may not work for all unit configurations.

These three methods involve placing sighting targets in strategic locations in relation to the truck. With targets properly placed and seat height adjusted, the mirrors are adjusted so the targets appear in the correct location and you are consistently assured of the best possible visibility from the mirror system.

**Full Outdoor Mirror Check Station**

The advantage of a full outdoor mirror check station is that it may be utilized with multiple vehicles, regardless of length and configuration. It will be accurate with all.

Figure 4 shows a full outdoor mirror check station layout. For a permanent setup you can paint a check station on any flat ground surface that is at least 30 feet wide by 80 feet long. As an alternative to a permanent setup you can place appropriately sized objects, such as panel board, on the ground at appropriate distances. Recommended width for Lines A and B is from 2 to 6 inches wide. Duct tape—black, or another visible color—works well when permanent marking can’t be painted. Target boxes C should be approximately 5 feet wide and 10 feet long, and may be solid, outlined or cross-hatched. Target D is 12 inches wide and 10 feet long.

1. Position truck or tractor-trailer unit parallel to, and as close to) Line A as possible.
2. Stop truck or tractor with mirror over Line B.
3. Rotate each flat mirror horizontally until the inside edge shows only the left and right edges of the truck body or trailer.

4. Tilt each flat mirror vertically until the appropriate Target C (left or right) is visible in the bottom of the mirror.
5. Rotate each convex mirror horizontally until the inside edge shows only the left and right sides of the truck body or trailer.
6. Tilt each convex mirror vertically until Target C is visible in the top of the mirror. Figure 5 shows the approximate view for the side-mounted mirrors.
7. Adjust the fender-mounted convex mirror so that the inside edge of the mirror shows the side of the tractor. Target D should be visible at the top of the convex mirror.

Note: The dimensions contained in this reference are for most class 7 and 8 vehicles. Once a baseline has been established, you may need to adjust dimensions for your equipment.

**Vertical Mirror Check Station**

The advantage of the vertical mirror check station is its ability to be used in limited space, indoors or out, and in all types of weather. It also allows flexibility in specific location in the operation.

However, determining where to place the targets involves some calculations based on these factors:

- Driver’s average eye height
- Distance from side mounted mirror to wall

Table 1 lists target heights for the specified distances from the wall. These measurements are based on average eye height of 88 inches and are rounded for convenience. Also included is a tool for easy calculation of target height. Both of these are derived from the following procedure.

1. Measure the average driver eye height in inches.
2. Measure the distance to the wall or door you will use for the vertical check station in inches.

The calculator in Figure 6 of this reference uses these two measurements for the following calculations and gives the distance in inches to the bottom of the vertical target.

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**For driver side target height:**

1. Driver eye height in inches is divided by 420 inches. (This corresponds with the 35 foot target location of the full outdoor mirror check station.)
2. Distance to the wall or door measured in inches is subtracted from 420.
3. Result of step 1 is multiplied by the result of step 2.

**For passenger side target height:**

1. Driver eye height in inches is divided by 900 inches. (This corresponds with the 75 foot target location of the full outdoor mirror check station.)
2. Distance to the wall or door measured in inches is subtracted from 900.
3. Result of step 1 is multiplied by the result of step 2.

Figure 6 depicts a vertical check station. The targets are placed at the determined height with the inside edge of the driver side target even with the inside edge of Line A. The inside edge of the passenger side target is 102 inches from the driver side target.

Recommended width for Lines A and B is from 2 to 6 inches wide. Duct tape—black, or another visible color—works well when permanent marking can’t be painted. The mirror targets themselves may vary in size from 8 to 10 inches high by 10 to 15 inches wide. A sample vertical Mirror Check Station target is provided on the last page of this reference note.

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<table>
<thead>
<tr>
<th>Table 1*</th>
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<tbody>
<tr>
<td><strong>Driver’s Side</strong></td>
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<tr>
<td>Driver Eye Height 80-95 in</td>
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<tr>
<td>Distance to wall (ft)</td>
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<td>Distance to Wall (in)</td>
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<tr>
<td>Height of Target (in) (bottom)</td>
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<table>
<thead>
<tr>
<th><strong>Passenger’s Side</strong></th>
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<tr>
<td>Driver Eye Height 80-95 in</td>
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* Dimensions for target placement contained in this table are average for class 7 and 8 vehicles. Once a baseline has been established, you may need to adjust dimensions for your equipment.
With the targets properly in place, follow these steps:

1. Drive truck or tractor into garage, or back toward wall, parallel to, and as close to Line A as possible.
2. Stop truck or tractor with mirror over Line B.
3. With the truck properly positioned in the check station and the targets properly placed, rotate each flat mirror horizontally until the inside edge shows only the left and right sides of the truck.
4. Tilt each flat mirror vertically until Target C is visible in the bottom inside edge of the mirror.
5. Rotate each side-mounted convex mirror horizontally until the inside edge shows only the left and rear sides of the truck.
6. Tilt each side-mounted convex mirror vertically until Target C is visible in the top, inside edge of the mirror.
7. Adjust the fender-mounted convex mirror so that the inside edge of the mirror shows the side of the tractor. Target D should be visible at the top of the convex mirror.

Figure 7 shows the approximate view from the side-mounted mirrors at a vertical mirror check station.
Figure 6. This illustrates the relationship between placement of the Mirror Adjustment Mark on the truck and the target of a Mirror Check Station.

**Mirror Adjustment Marks on the Truck**

The advantage of this system is convenience. The markings on the vehicle may be used to readjust mirrors at any time.

However, as noted earlier, due to vehicle configuration, it may not be useful with all body types. This system will not work with many day cab units because you must be able to see a portion of the vehicle side on which to place the marking.

IMPORTANT: Unless the trucks or tractors and their wheels are all the same size and dimensions, this process must be repeated for each truck or tractor to make sure the target points are properly positioned.

1. Set up a temporary outdoor mirror check station. Refer to Figure 3, Adjusting Your Mirrors on page 3.
2. Position the vehicle at the station and adjust the mirrors. Refer to Figure 4, How to Adjust Mirrors at a Mirror Check Station on page 3.
3. Now draw an imaginary line, or you may also use a carpenter’s string or chalk line, from the target in the mirror to the target on the ground and mark temporary reference points on both sides of the truck or tractor along this line where it is visible to the driver in the mirror. (Generally, this will be in the lower inside corner of the flat mirrors and upper inside corner of the convex mirrors.) This will vary because truck and tractor designs and widths can vary greatly.
4. Once the temporary reference points have been established, provide a durable, highly-visible target point or marking (e.g., reflective tape) at those points that the driver can use to adjust the mirrors. The target points should be a contrasting color to the surface on which they are placed, and be large enough to be easily seen in the mirror.

The last two pages of this reference are intended to be printed separately and kept in the truck for easy reference.