



Lens Backfocus & Adjustment Procedures

1. Backfocus

The distance from the lens mounting surface on the front of the CCTV camera and the position of the pickup device (CCD chip or tube) is called the flange focal distance, or backfocus distance. The surface that the lens mounts up against is called the flange. On "C" style cameras, this distance is 17.5mm. On a "CS" style camera, the distance is 12.5mm. This distance is adjustable over a small range on virtually all CCTV cameras. "C" mount lenses may be installed directly on "C" style cameras, or, by using a 5mm C-CS adapter ring, on "CS" style cameras. "CS" lenses cannot be mounted on "C" style cameras. See Figure 1.

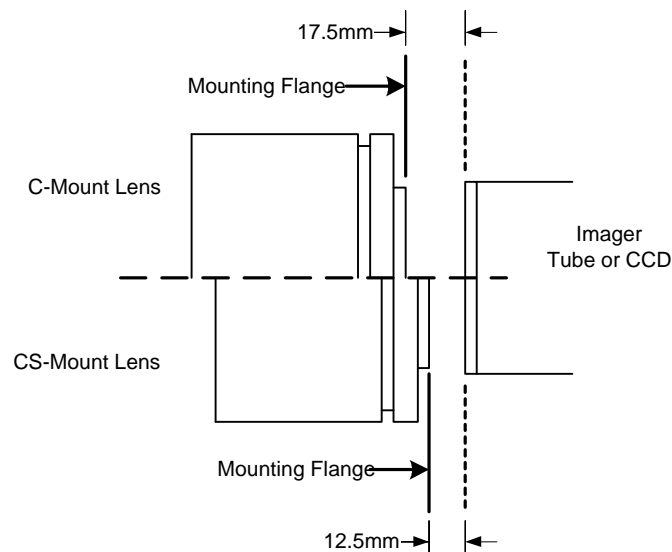


Figure 1: "C" vs. "CS" Mounting Difference

Theoretically, it should be possible to just thread in a lens and have the image in focus, but in reality, manufacturing tolerances on both lenses and cameras combine to make it necessary to backfocus whenever a lens is installed on a camera.

If a lens is not correctly backfocused, it is highly likely that the camera/lens assembly cannot deliver a sharply focused picture either all the time or under conditions of reduced light levels.

General

Backfocus adjustment can be performed on the bench; it does not have to be performed with the camera in place in its final location. Doing the procedure indoors greatly simplifies the process of

reducing ambient light levels. *This procedure should always be done with the lens iris at its maximum open position.*

Fixed Focal Length Manual Iris Lenses

1. Thread the lens into the camera.
2. Adjust the focus ring on the lens to the maximum infinity setting. In most cases, the focusing ring can be recognized by the presence of distance numbers, usually marked in both meters and feet.
3. Open the lens iris to its maximum. If the picture on the monitor is too bright, reduce the ambient lighting (if you are indoors) until the monitor image is optimum.
4. While viewing a good, high-contrast target at a distance of at least 30 feet (10 meters) from the camera, move the camera's backfocus adjustment until the monitor displays the sharpest possible picture.
5. Lock the backfocus adjustment in place, if the camera has a backfocus lock. Not all cameras have a separate backfocus lock.

Fixed Focal Length Autoiris Lenses

1. Thread the lens into the camera and make any wiring connections.
2. Adjust the focus ring on the lens to the maximum infinity setting. In most cases, the focusing ring can be recognized by the presence of distance numbers, usually marked in both meters and feet.
3. Reduce the ambient lighting (if you are indoors) until the lens is opened to its maximum. The simplest way to determine this is to look into the lens. If the location does not allow the reduction of ambient light, a neutral density filter may be used. Neutral density filters are described at the end of this Tech Tip.
4. While viewing a good, high-contrast target at a distance of at least 30 feet (10 meters) from the camera, move the camera's backfocus adjustment until the monitor displays the sharpest possible picture.
5. Lock the backfocus adjustment in place, if the camera has a backfocus lock. Not all cameras have a separate backfocus lock.

Motorized Zoom Lenses

1. Thread the lens into the camera and connect the lens to a lens controller. If the lens has an autoiris, connect the lens iris cable to the camera.
2. Using the lens control, zoom in on a good, high-contrast target at a distance of at least 75 feet (25 meters) from the camera. Use the maximum telephoto setting.
3. Using the lens controller Focus Far control, obtain the best-focused image of the selected target.
4. **Non-Autoiris Zoom Lenses:** Reduce the ambient lighting (if you are indoors) until the lens is opened to its maximum. Use the lens control to open the iris. If the location does not allow the reduction of ambient light, a neutral density filter may be used.

5. **Autoiris Lenses:** Reduce the ambient lighting (if you are indoors) until the lens is opened to its maximum. The simplest way to determine this is to look into the lens. If the location does not allow the reduction of ambient light, a neutral density filter may be used.
6. While viewing a good, high-contrast target at a distance of at least 75 feet (25 meters), move the backfocus adjustment until the monitor displays the sharpest possible picture.
7. Zoom the lens to its maximum wide-angle setting, and repeat Step 6 to obtain the sharpest image.
8. Zoom the lens to the maximum telephoto setting to see if the image is still sharp. If it goes out of focus, readjust the lens controller Focus control (do not readjust the backfocus adjustment). Repeat the zoom in – zoom out cycles to obtain optimum focus.
9. Lock the backfocus adjustment in place, if the camera has a backfocus lock. Not all cameras have a separate backfocus lock.

Neutral Density Filter

This is a piece of gray tinted glass. They are widely available at photographic supply stores and come in different densities and diameters. To use it, simply hold it against the front of the lens while making adjustments. It is not necessary to fasten the filter to the lens.

Other means of reducing ambient light are the glass lenses used in brazing masks (a number 2 or 3). Do not use a film or glass darker than ND 3.0; doing so may degrade picture quality and make focusing difficult.

2. Autoiris Adjustments

Most autoiris lenses in use today fall in to one of two categories. Adjustments will vary between styles.

Video Drive lenses:

These lenses have internal circuitry to process the video signal and can be identified by the ALC and/or Level adjustments located on the lens barrel.

1. **Level:** This is the main adjustment for the video level that the lens will maintain under varying lighting conditions. Too high will open the iris and cause a bright picture; too low and the picture will be dark. After setting the level in daylight, place a dark filter over the lens to simulate night conditions. The iris should open to compensate for the reduced light level.
2. **ALC:** This will adjust the sensitivity of the iris. Adjusting towards Peak will allow the iris to react more quickly to changing light levels.

DC Drive Lenses: These lenses have no internal electronic amplifier circuits or external electrical adjustments.

1. If the camera has an “EE/AI” switch, place the switch in the “AI” position. Adjust the level control on the camera for the correct video level setting, as above under Video Drive Lenses.