



Product Type: *Autoscope*[®]

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Aiming Video Sensors for Intersection Applications

Purpose

Because the aim of a video sensor can be 25-30% of all the factors that influence detection performance, it is important to correctly aim the camera. If you diligently use the aiming guidelines and procedures in this note, you will have the best possible video detection performance relative to your detection objectives, and you will help prevent:

- Time-consuming detector adjustments,
- Scheduling on-site technical assistance, and
- Performance complaints from the driving public.

Follow these guidelines for aiming video sensors for junction or intersection applications.

This note supersedes a previous Application Note, AP990204, dated 4 February 1999: *Aiming Video Detection Sensors—Intersection Applications*.

Introduction

Video detection objectives for junction or intersection applications typically include demand-for-service and routine traffic data collection for planning and reporting. Demand-for-service includes wide-area presence detection at the stop line, advance extension and dilemma zone detection. Special applications may include detection of wrong-way vehicles or stopped vehicles for preemption. Data collection often includes turning movement counts, speeds, classifications, and intersection operation monitoring. Surveillance video output from detection cameras is increasingly valuable to traffic signal managers, who use video detection resources to validate their timing decisions or to manage incidents.

Aiming Guidelines

The camera should not see much beyond the roadway itself. We want to fill the image with the detection target, while excluding extraneous objects or obstructing light sources that affect performance in some conditions.

Most intersection applications include detection at the stop line. Typically, cameras are mounted on existing poles, luminaire arms and signal mast arms. For most intersections, we aim the camera so the stop-line detection zones are toward the top and centered left-to-right in the image. The traffic can also flow diagonally or across the image if this provides a better field-of-view.

At the stop line, we want to see an extra $\frac{1}{4}$ or $\frac{1}{2}$ lane on either side of the detection area. You can also make adjustments, like rotating the barrel, to block out unwanted light sources—lit signs, window glare, signal heads, etc.—from the picture. If you must zoom out for a wider view, you should move the barrel forward only enough to see a little sunshield in the corners of the picture.

When aiming the camera, we want to tilt down so the farthest-away detection area is toward the edge of the field-of-view. This increases the overall contrast of the image by excluding parts of the broader picture that have no detection purpose. For a remote camera video source, “the *Autoscope*[®] system can detect the presence of vehicles 10 feet away from the camera for every 1 foot high above the detection area.”



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Video detection and video surveillance objectives usually conflict with each other. Aiming cameras for a strictly video detection application is different from the aim for surveillance objectives. You can think of the difference by comparing a portrait or family photograph (video detection) to an outdoor vacation photograph (surveillance). For both objectives, the most value to the viewer is in the useful area of the picture rather than a much broader, panoramic picture. When surveillance video is also required, take time to define what will be the useful area of the scene. For example, we still want to fill the image with the useful target area and exclude extraneous objects or light sources. Finding the useful balance between these two conflicting objectives minimizes the possible impact on detection performance while also providing a higher-quality video picture for surveillance.

The mounting location for your *Autoscope Solo*® MVP sensor or *Autoscope*® Image Sensor Camera was likely selected during the planning and site survey processes. If you need to choose the mounting location, please consult Autoscope Technical Support for site survey guidelines and worksheets for your project.

Tools & Supplies

- Mounting bracket installation supplies, including stainless steel banding
- Appropriate handtools for adjusting the mounting bracket
 - For example: 9/16" wrench,
 - 3/16" Allen wrench, 5/16" nutdriver,
 - 3/8" wrench
- Radios or cell phones to communicate between the cabinet and the bucket
- Laptop and communication interface cables
- Zoom Control Modem and interface cables, for AIS Camera™
- Video monitor—optional, preferably one with under-scan display
- Faceplate cleaning supplies—such as water and a clean lint-free cloth
- Measuring tape to measure the height of the camera above the detection area



Aiming Your Autoscope Video Sensor

Refer to the package inserts in the box with each camera for specific product information.

1. Inventory the equipment against the installation plans, especially what is necessary for each camera location. From the plans, identify the primary and secondary detection objectives for each camera.



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2. Prepare your team to adjust incrementally the left-right, up-down, barrel rotation, and sunshield overhang of the camera as you fine-tune its zoom and aim. Use consistent commands for clear communications (for example, PUSH barrel in, ROTATE barrel clockwise or counterclockwise, SWING left or right, TILT up or down).
3. Start the Autoscope Network Browser. Learn all cameras and check for matching software versions. Start the Configuration Wizard for all cameras. For each camera, follow the prompts to Set Zoom and Get Image.
4. For each camera, plan the camera's field-of-view to meet the detection objectives. Determine on the road where advance detectors will be (if any) and mark with cones in each lane.
5. While the bucket is moving into position, place cones or paint a white rectangle about 60 feet (19 m) back along each lane mark to define known calibration reference points. The Configuration Wizard also allows 30, 40, or 50-foot (10, 13, or 16 m) distances, but 60 feet (19 m) is most typical. Measure from the intersection side of the stop line back; this makes a reference line of cones that is parallel to the stop line.
6. Meanwhile, up in the bucket; first connect the cable to the camera inside the bucket for added safety before mounting the assembly onto the bracket. Loosen all bracket adjustments and the sunshield fasteners. Fingertighten the adjustments until you are ready for final tightening of all fasteners (in Step 14).
7. While aiming the camera to achieve the detection objectives, make bigger changes first to each adjustment and then fine-tune each adjustment again before tightening. (ZOOM, BARREL, SWING, TILT)
8. Zoom in or out to fill the picture with the target vehicles in the detection area.
9. If you see too much sunshield in the image after setting the zoom for a wide view, push the barrel forward to adjust the sunshield overhang. How far to push the barrel forward? Push it forward just enough to still see a little sunshield in the corners of the image. Do not push the barrel forward too much—you should see a little sunshield in the corners of the view. This improves the quality of the video image, minimizes glare, prevents direct sunlight from hitting the faceplate, and helps keep blowing rain or snow from collecting on the faceplate.
10. Rotate the barrel so the traffic generally flows top-to-bottom, or otherwise to eliminate light problems and obstructions in the view. (Note that many installations require no adjustments to the barrel setting.)
11. Swing the camera left or right to center the vehicles in the image with an extra ¼ or ½-lane on either side of the stop-line detection area.
12. Tilt the camera down so the farthest away detectors will be at the edge of the image. This will help reduce glare in the picture. Do not tilt the camera up too far—it is better to be too low!





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13. Repeat steps 8 to 12 to fine-tune each adjustment again before tightening the fasteners.
(ZOOM, BARREL, SWING, TILT)
14. Tighten all fasteners. Start with the sunshield fasteners. Next, tighten the “left-right SWING” fasteners (you may need to tilt the camera down temporarily to tighten them). Lastly, tighten the two “up-down TILT” bolts. We save this most difficult adjustment—firmly holding the tilt angle—for the last.
15. Double check the aim of the camera after everything is tight. Make changes as necessary. You can get an initial bitmap in Configuration Wizard to help check the aim.
16. Inspect the faceplate glass for fingerprints and dirt. Clean appropriately.
17. Before descending to the ground, measure the height of the camera lens relative to the road surface in the detection area, and record the height on the plans or worksheet for later reference.
18. From the Configuration Wizard, capture a “calibration bitmap” image (Get Image) that shows all the reference-point cones or marks. When you save the file, the calibration bitmap is saved with the detector layout.
19. When entering the Properties for this camera, name the camera in the Approach-and-Phases field, which becomes the camera’s title—for example, “EB Broadway @ Main – phases 2 & 5.” Enter the zoom value and height in the Site-Service-Information field—for example, “Zoom=2104, Height=21.”
20. Finish the wizard steps for this camera before you start the next camera.
Remember that if you need more time, you can run the wizard again later to make adjustments.

More Information and Assistance

Please contact your Autoscope representative or Autoscope Technical Support for assistance. At Econolite, please direct questions or comments to Autoscope Technical Support at 800-225-6480 x457, +714.630.3700 x457, or Support@Econolite.com.