



# TRANSIT BUS CAMERAS

## *Covering All the Angles*

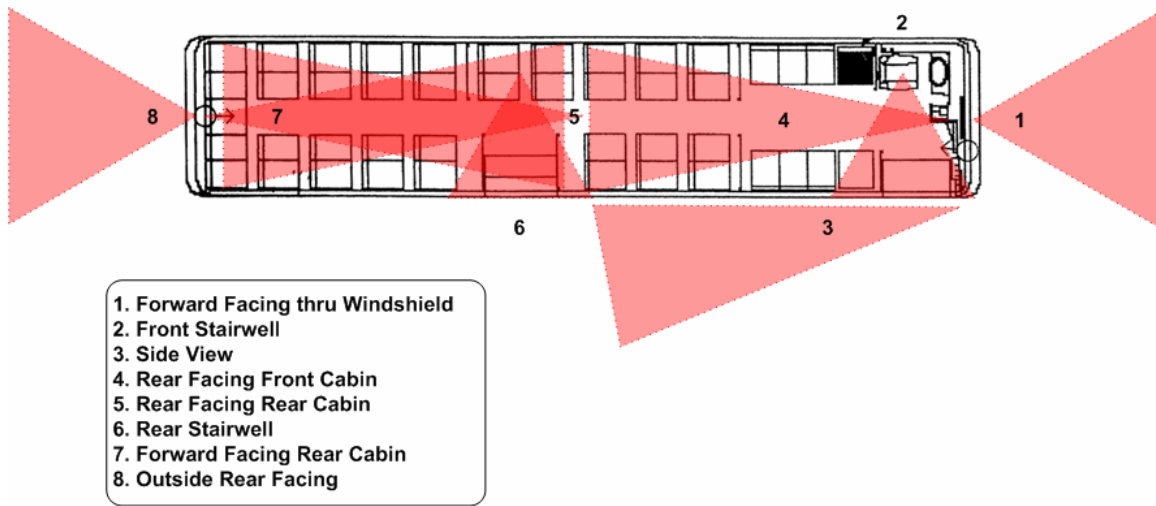
By Steve Hemenway

When considering on-board video surveillance systems for transit bus vehicles determining how many cameras and where to place them can be a prolonged discussion depending upon which agency department is sitting at the table. There are safety, risk management, security and operational issues to consider. Typically a recent incident prompts an agency to consider installing video systems. There may have been some violence to drivers, a vehicle accident, a passenger claim, or some vehicle vandalism. Whatever the incident, this usually is the main reason for installing on-board cameras and determines what they will be monitoring.

### Camera Placement

The diagram below shows the standard camera placements used by transit agencies for on-board video surveillance systems. Following is an overview of the camera positions and the reasons for their placement.

**Transit Bus Video Camera Placement**





### **Camera Position 1 – Forward Facing thru Windshield**

This camera view allows agencies to view vehicles that are in front of the transit bus and provides good recording view of vehicles cutting in front of the bus, illegal intersection traffic and illegally parked vehicles. This angle also allows operations to see the condition of the bus stops, passenger density, and passenger activity directly in front of the bus including use of bike racks.

### **Camera Position 2 – Front Stairwell**

This provides for good monitoring of “slip and falls” on the stairwell and the condition of sidewalks. This angle allows for viewing the fare box and of interactions between driver and boarding or disembarking passengers. Typically it is this position that is audio monitored with a microphone installed with camera or in nearby vicinity.

### **Camera Position 3 – Side View**

Placement provides good external side vehicle view of activity outside the bus for both the front and rear stairwell activity. This is a good secondary view for slip and falls, passenger density, passenger loading and unloading and provides a good perspective for vehicle damage on the side all the way to the rear corner of the bus. For coach operators this camera provides good monitoring of ‘over the road’ storage areas.

### **Camera Position 4 – Rear Facing Front Cabin**

Location provides good camera viewing coverage of main forward seating area allowing for good facial view of all passengers seating or standing. This camera can also provide long view of whole bus cabin area. However, nearest objects and people are the most identifiable.

### **Camera Position 5 – Rear Facing Rear Cabin**

Another good camera viewing angle for the main passenger rear cabin area. The “back of the bus” area gets a lot of attention from many agencies because of vehicle vandalism and passenger behavior.

### **Camera Position 6 – Rear Stairwell**

Allows for monitoring of slip and fall, illegal boarding or vandalism incidents.



### Camera Position 7 – Forward Facing Rear Cabin

This provides good perspective for viewing rear-of-seat vandalism and graffiti. There are a few instances where this camera is installed covertly and acts as a security backup to any cameras that may be damaged by criminal activity.

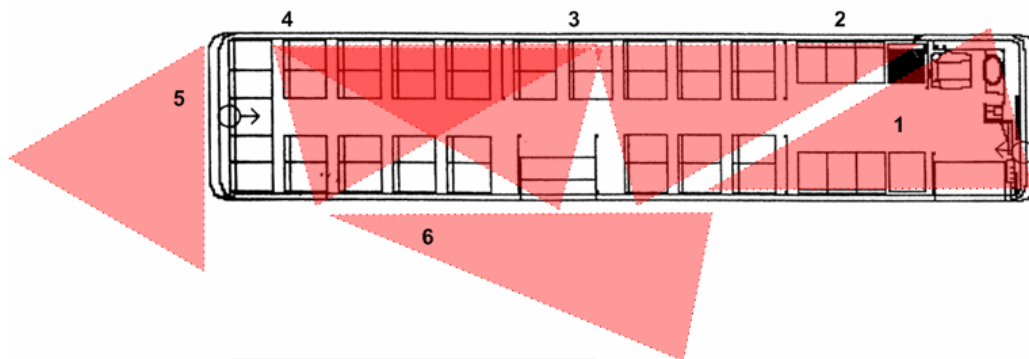
### Camera Position 8 – Outside Rear Facing

Many agencies have placed cameras on the rear of the bus to help understand rear vehicle damage. In some cases camera may be placed to either the driver side or sidewalk side because damage has gravitated to this side.

When tape-based video systems were more prevalent, a standard configuration was a single camera placement at position 4. With first-generation digital video systems a typical configuration would consist of placements at inside bus positions 2,4,5 & 6. With today's more advanced mobile surveillance systems enabling increased storage and recording capacity, it is now becoming more common to see a configuration with placements at 1,2,3,4,5 & 6. Many agencies will place additional external cameras specific to their concerns regarding vehicle damage or vehicle accidents.

Although not the norm, there are also camera installations where there have been other installation and operational influences. The following diagram shows some alternate camera placements that have been deployed by various agencies. These positions have been placed because of ease of installation and to optimize camera field of views to monitor main areas of interest.

### Alternate Transit Bus Video Camera Placement



- 1. Forward Facing thru Windshield
- 2. Rear Facing Front Cabin
- 3. Rear Facing Rear Cabin
- 4. Front Facing Rear Cabin
- 5. Rear Cross View
- 6. Rear Forward Facing Side Mount



## **Additional Considerations**

### **How Many Cameras?**

The number of cameras is usually prioritized by desired system results and available budgets. Most digital video recording systems will provide for multiple video camera inputs and recordings. Newer systems no longer need to share video channel switching back and forth between cameras. Recent trending is that most agencies have 5 to 6 cameras per 40' vehicle installation. The main emphasis has been provision of good internal vehicle coverage and 1 or 2 cameras for outside viewing of the vehicle. This has been through the windshield, side view or rear view.

### **Lens Considerations**

With each camera installation there is the option of determining lens size. Camera lens sizes vary from 2.9MM to 16MM. Proper lens selection provides investigators with recorded images that have good proximity for image objects and good field of view. Selection of lenses is somewhat discretionary to the end user. However, the usual considerations are identification of objects in foreground or background and field of view (both horizontal and vertical). For inside the cabin (4,5 & 7) lens sizes are usually 6MM or 8MM. Stairwells (6 & 2) usually are 4MM. Outside cameras can vary depending upon application with considerations including license plate recognition, grade level crossings and intersection traffic.

### **New Camera Technology**

Items to watch for on the technology horizon include new cameras with advanced capabilities. These may include increased image quality, expanded field of view and flexible mounting for mobile installations. New digital or 'IP Cameras' are now available for advanced mobile applications that require more coverage, higher image definition, network-ability and video analytics.

For more information about Mobile Video Systems for Transit Bus or Rail contact Steve Hemenway at 940-465-7778 or visit [www.integrian.com](http://www.integrian.com).