School Bus Installation Overview

Universal Disclaimer:

Due to the litigious nature of our current culture, the multimillion dollar awards in the transportation industry lawsuit settlements, and the voracious nature of the ambulance chasing lawsuit seeking sycophants, two things should be crystal clear to the reader by now;
1- I do not hold the legal profession in high regard (Most senators were attorneys)
2- manufacturers of vehicle mobile video monitoring systems would be insane and reckless were they to provide specific instructions on where to mount the components and what exact wire connections to make to the vehicle.
The below information is for a “BASIC” understanding, illustration or overview of how the system is connected to a generic vehicle and in no way instructs, or suggests any specific electrical connection be made, or any specific mounting location be used. This is how ABV staff has installed systems, and it is in no way telling anyone to do anything that may be dangerous to the driver, passengers or in any way damage the vehicle, so ABV accepts no responsibility for any problems relating from the installation nor operation of the system on any vehicle.
Agency implies Stewardship, the 3rd of 13 Principles of Prosperity of Capitalism, in this case meaning only the owner is best suited to make decisions for their own vehicles.
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<u>System Components Included in the “System” Cost:</u>
Mobile DVR - generally a 4-channel that supports 4-cameras
Analog Camera -Generally D1 resolution Dome, 2.8mm lens, color, IR LEDs, built in audio
Camera Extension Cables - generally 5 meter for front & 20 meter for rear cameras

<u>System components Not Included in the “System” Cost but Required:</u>
LCD Setup Monitor - Service tool, analog video signal, to aim cameras & program DVR (1 per fleet)
Memory Storage Device - generally SD or HDD depending on system (1 per vehicle)

<u>Power Extension Wire provided by installer:</u>
If the DVR is to be mounted 3 feet from Power connection panel, you will need 3 feet of 3 conductor wire 18g - 22G

<u>Tools Required:</u>
See “*Tools Required for Basic Bus Video Installation” listed below.

Safety Considerations:

<u>Safety of the driver and passengers is the primary consderation-</u>
Meaning consider all aspects of the installation first through a prism of how it might adversely affect the passengers/driver of the vehicle, and do nothing that could endanger the passengers/driver well being. This includes but is not limited to mounting cameras where children or drivers may impact them with their heads, securing cables so they cannot cause a entanglement or tripping hazard, covering sharp metal spurs from hole saws and mounting DVRs where they will not be likely to be impacted…….

<u>Safety of the vehicle is secondary -</u>
Meaning after all thoughts of passenger and driver safety, then and only then consider the safety of the vehicle, usually this involves but is not limited to insuring fuses are connected to all amperage drawing connections, not connecting to power sources likely to become overloaded by other devices connected to

that point, insuring you do not use test lights or analog test meters on multiplexed buses to prevent damage.

Basic Component Installation Configuration:

DVR mounting location -
This is variable and should be left up to the customer to decide on where they wish the DVR mounted. The only restrictions or considerations should be dry location away from water, and vandalism precautions to keep the DVR away from tampering by keeping it in the driver area of the vehicle.

Install Tip; see images of ABV installs for some guidance (if no customer preference is made)

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Camera mounting locations-
Cameras should be high in the vehicle to permit them to see over seats that are getting higher each year. Camera locations should be areas that the installer can access from the rear, as bus cameras use BTC-A vandal resistant cameras that are designed to sit over the access hole for their cable and when screwed down over said access hole they cover the cable and prevent access to the cable from those who may tamper with them.

Install Tip; A good idea is the wire the DVR for power, plug the LCD setup monitor to the DVR and let the DVR power up by turning the bus key to ACC position when the DVR powers up it will provide a Quad screen view of all 4 DVR channels and any cameras connected to it. This will permit cameras to be moved to locations so you can see on the monitor what image is provided and what field of view is captured by moving her cameras around, once satisfied with the view, mark the vehicle for mounting locations.

Install Tip; Press the #1 - #4 button on the DVR remote and the DVR video output will display that camera channel in full screen mode to make it much easier to see the image in a zoomed mode. To go back to the quad view press “esc” or “Menu” on the different remotes to get back to the live Quad view.

Install Tip; Rear Camera cable access is via the conduit trough or access panels run over the drivers side window, and are often secured by 10-30 Phillips or square head screws, these must be removed to provide access for the rear camera cable to reach the rear of the bus.

It should also be noted that t buses have built in roll bars like a rib cage that is located between the ceiling on the inside and the outer skin or roof of the bus. Camera holes and cables must be drilled and routed between the ribs where there is a gap in order to protect the integrity of the bus roll bars.

Install Tip: Do not under any circumstance drill or cut any of the roll bar ribs in-between the ceiling and the roof as this could conceivable weaken the roll cage aspect of the bus in a accident.

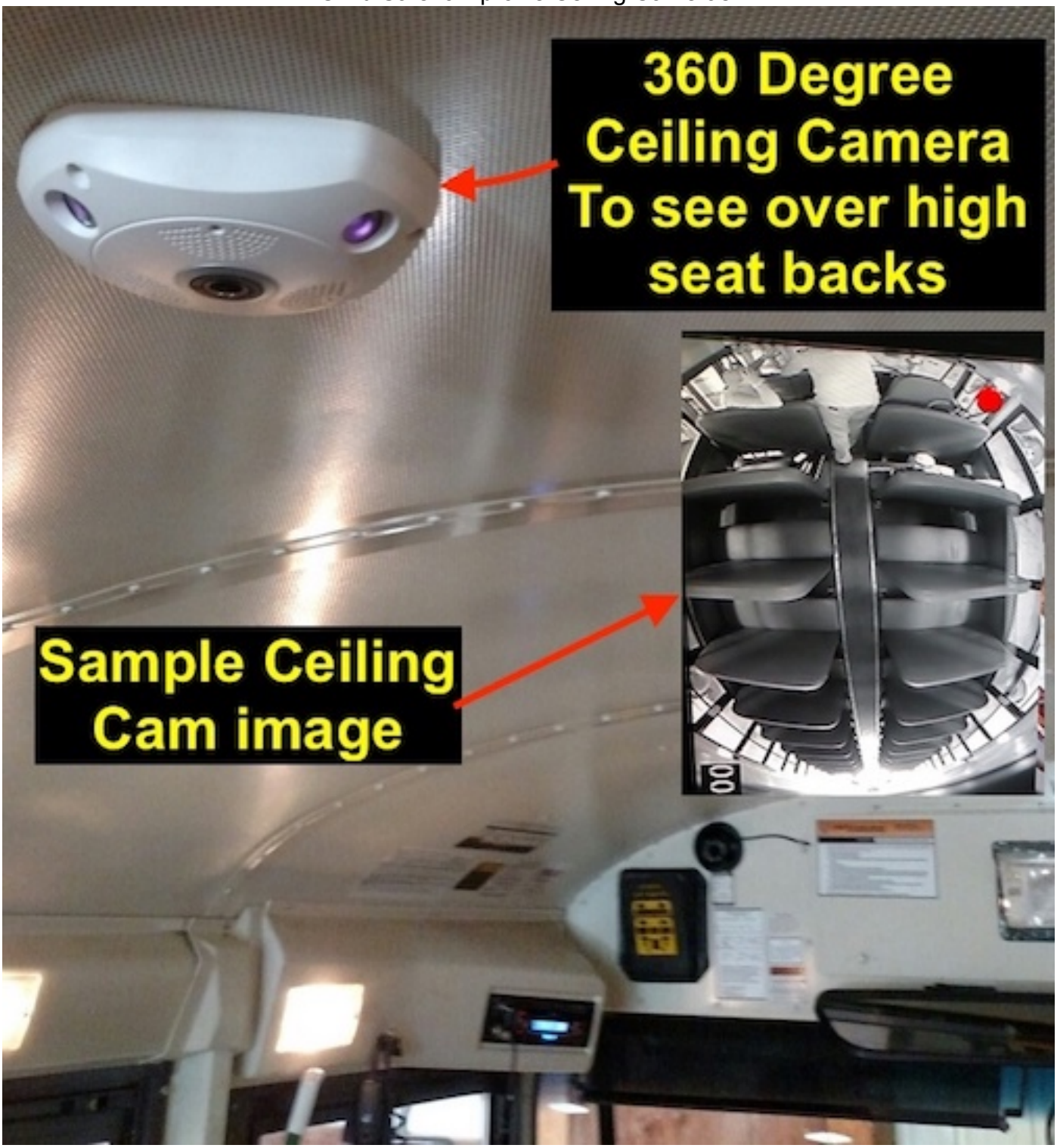
Install Tip: see images of ABV installs for some guidance (if no customer preference is made)

Install Tip: ABV techs place the included sticker under the front passenger facing camera for public notice requirements in some states.
For almost 30 years I have spec'ed camera IR LEDS to be high intensity so that in dark, when the IR LEDs activate, they glow red. Normally standard intensity IR LEDs do not glow, so there is no indication when the bus is dark that the passengers are being recorded. Much of the obscene, illicit or unlawful acts that occur on a vehicle occur when they feel they are not visible and less likely to be held accountable for heir actions. I believe even in the dark it is a good ideal to remind them they are on camera and their activities are being recorded by the glowing red LEDs on the camera.


Front Camera
faces Children
Driver/Stairwell
Camera
Wheelchair Lift
Camera


Tape connections to insure they do not seperate when
pulled through pannels

The new CC-AF Ceiling Camera is a way to see over the higher seat backs on school buses. 360 Degree Child Safe low profile Ceiling Cameras.



The above image shows the CC-AF Ceiling camera can cover driver actions, stairwell, wheelchair lift activities and inn many cases can replace 2 or more cameras in the front or rear of the bus.

Basic Installation Wiring:

Power Extension Wire provided by installer; If the DVR is to be mounted 3 feet from Power connection panel, you will need 3 feet of 3 conductor wire 18g - 22G

School buses usually have a well laid our electrical connection access panels, as these vehicles often face long service lines and are expected to be serviceable. The connection panel may be exterior or interior but they still contain similar electrical connections for third parties to access for 2-way radios, stereos, PA systems, Video display systems, GPS tracking systems, video surveillance systems and other safety related items that will be added after manufacturer.

Basic wiring for most of the High Definition 720P versions SD4HD, SD4HW, SD4HC as well as the new Full High Definition 1080P versions SD4FHD, SD4FHW & SD4FHC mobile DVRs sold for school bus applications will be listed below.

QUICK WIRING for: SD4FHD, SD4FHW & SD4FHC

Power Harness Cable

Wire Color	Function
Red	**+12v Battery (Fused 5A)**
Blue (Trigger -ACC)	**+12v Ignition On**
Black	**-12V Ground**

Customer Online Resources are here:
https://americanbusvideo.com/customer-resources.html

Select your DVR model; SD4FHD, SD4FHW…to be direct to the appropriate folder for your system.

Download & Read: User Manual

Download the Manufacturer Provided Dedicated Video Player

Below are a few Connection panel close-ups showing where we make connections for basic power wires.

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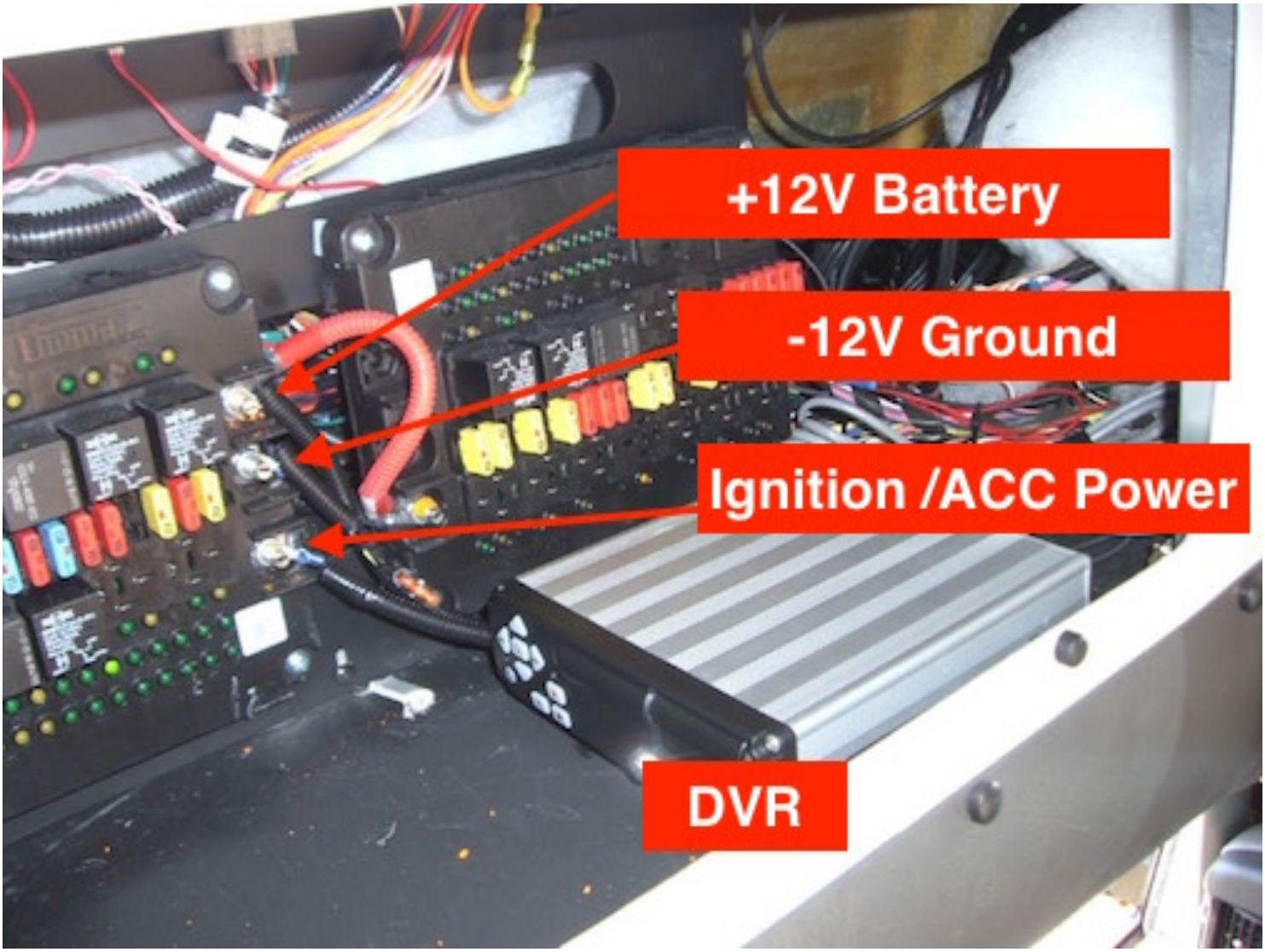
Dollars follow value (#7 of 13 PoP), so a general rule is the value of a persons service is reflected by the price they charge for their service. The lowest price for a series is not always the best value if the quality of work suffers by cutting corners and damaging the vehicle, or endangering those who ride in it. Meaning if you do not have the installations performed by those who are trained to service the vehicle it is in your best interest to choose wisely.



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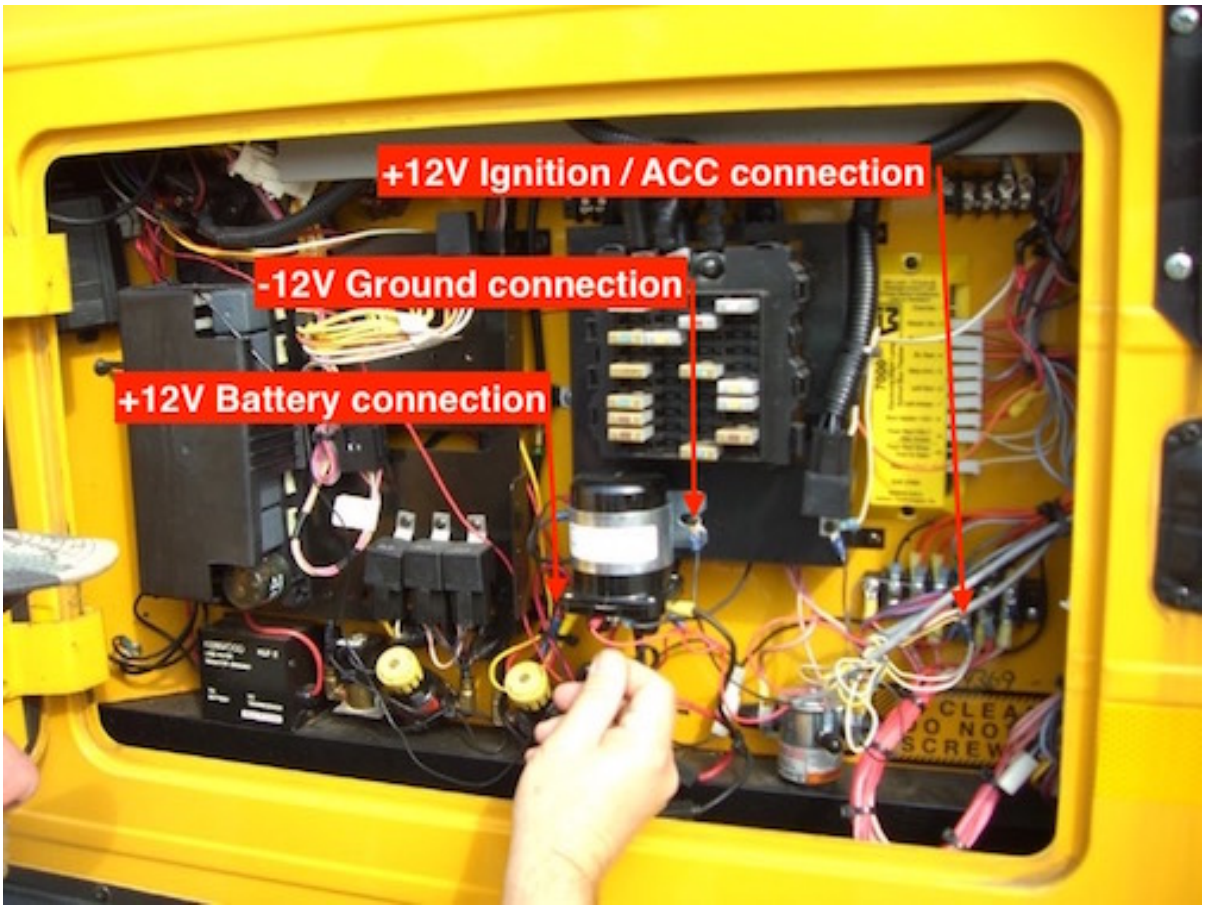

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Tools Required for Basic Bus Video Installation

Uniformity Disclaimer
While the general process of mobile video system installation is similar within vehicle classifications, there is considerable variation required for different vehicle types or classes. It is not practical to try to provide a definitive listing of what might be required for each differing vehicle scenario to be installed in, so what follows is a streamlined overview at best of what our service team uses on bus video installations.

ABV's Most Common School Bus Installation Requirements:
LCD setup monitor (analog) Bring extra NIB backup just in case, Digital meter or test probe, Bring B/U just in case, cordless drill 18+ volt Lithium with Phillips #2, #3 & square hole drives, (Several just in case)
1", 1.25" & 1.5" hole saws (Several as they break often) 8-18x1.25" self drilling Phillips head screws 4 per camera 8-18x.5" self drilling Phillips head screws, 4 per DVR steel cage 3/8" ring connectors
1/4" ring connectors
blue butt connectors
electrical tape for cold weather
split loom 1/4"
split loom 1/2"
Split loom 1"
Rubber Grommets 1", 1.25" & 1.5"
Power cable, 3 conductor 18-22 gauge 5'-15' in length per bus
Adhesive (clear in color) in tube or caulk gun dispenser
Crimpers (Bring B/U just in case)
steel snake (ABV techs prefer large coat hangers your call)
Small whisk broom
gloves & long sleeve shirts as the hole saw drops hot metal on your arms 3/8" & 1/2" nut driver deep socket

in case you use the main electrical connections.
Better idea would be to bring a complete set of deep socket just in case. Kevlar gauntlet gloves (Army Navy surplus store) because most metal edges behind the surface are sharp as a razor
First Aid Kit
Potassium tablets and lots of water as dehydration in summer heat is a real problem.

Times required for installs on short bus:
1 camera system 20 minutes to 1 man hour per bus (Personal best time was 18 minutes at Maxwell AFB in 2016)
2 camera system 1.5 man hour to 3 man hours per bus 3 camera system 2 man hours to 3.5 man hours per bus 4 camera system 2.5 man hours to 4 man hours per bus
ABV techs always work in 2 men teams per bus, for safety reasons, so the above times are less than 1/2.
Make sure you bring one SD card and get sample video from each DVR after you set the time date and bus ID#, so later on you can prove each was operational if needed.
Buses get hot in the summer, we have documented 158 degree buses in SC, so places like AZ will be much hotter.

If you are a contracted installer, I suggest a HD 1080P movie of every bus install showing:
Bus #
DVR mount location
each camera mount location
electrical connections
any other interesting item while I speak the bus number and details so it shows up ion the video playback.
Later if needed I can make screenshots from the video if any require details of mount, wiring locations of cameras etc.
In the past we have also made sample video on a SD card from every vehicle when we were done, again to insure we can prove the systems full function when we are completed, in case of driver or other person vandalism of the system.
This has been a lifesaver when systems were destroyed after we left the site by vandals. We were able to show the customer the live video function and condition of the system when we left, as technically once installed they are no longer our responsibility if damaged by vandals. Until we install them we have to accept responsibility if they are lost or damaged.

One last tip:
Should the customer not be self-insured, suggest they contact their vehicle insurance company and let them know they are installing a system that can record activities on the vehicle, especially important would be the application of a forward facing road view camera as this can capture what happens should their be an accident. In the HD trucking industry many insurance companies will deduct the cost of the system from their yearly policy cost the first year, if they have access to the video in case of claims they are liable for defenses of and payment of. Insurance companies know that nothing beats impartial, unbiased expert witness provided by video in most litigation court cases.

American Bus Video Inc.
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AmericanBusVideo.com
sales@AmericanBusVideo.com
10-Year Camera Warranty Standard
Testudo Lifetime System Warranty Available
30+ Years of Mobile Digital Sales & Service Experience

”SAC-A” Stop Arm Camera

License Plate Capture Cameras for School Bus Child Safety

10-Year Camera Warranty Standard

SAC-A Camera Special Features

- High Definition 1080P resolution
- Vandal-resistant metal shell
- 2 Mega Pixel High Definition Supported
- 12mm Lens for License Plate Capture
- 3-axis of adjustments Pan, Tilt & Level
- IP 67 rated for dust & moisture resistance
- Built-in security locking screws
- Built-in IR LED 20 meter range

The ***SAC-AF camera*** is a weather-resistant vandal-resistant , 1080P Stop Arm Camera that can be mounted on the side of a vehicle, to document vehicles passing when the Stop Arm is extended during loading and unloading of children, in violation of the law.

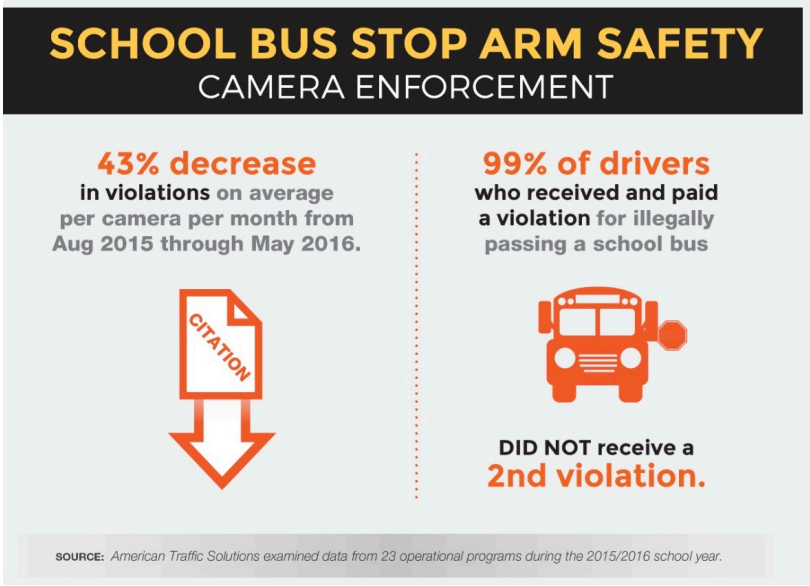
”SAC-AF” Stop Arm Camera Specifications

Image Sensor	1/3" Panasonic SONYIMX122 ultra-low illumination CMOS
Total Pixel2	1.0 Mega Pixels Progressive Scan
Resolution	1920(V) x 1080(H)
Video Output	HD-SDI/1.0Vp-p (75Ω,Composite)
Frame Rate	60Hz: 30FPS 1280*720*
Lens	HD professional 1MegaPixel lens 12mm
Sync System	Internal
Shutter Speed	1/50 (1/60)s - 1/10,000 s
White Balance	AWB / ATW / PUSH / MANUAL
WDR	Off/On (Adjustable)
3-DNR	Off/On (Low/ Middle/ High)
IR LED / Sensor	850nm 24 EA (Option; 940nm)
LED Lighting Distance	20 meter
Input/Output Connector	Power (Red Jack), Video Output (Yellow Jack)
Supplied Voltage	DC 10V~14V (Recommended DC~12V)
Power Consumption	Less Than 150mA
Water Resistance Rated	IP67 water-resistant (Do not use a High-pressure washer)

The above school bus shows the 2 preferred camera mounting locations one Forward Facing SAC-A 12mm Stop Arm Camera, and one Rear Facing SAC-AF 12mm Stop Arm Camera.

Using 2 cameras can remove the doubts of who might be operating the vehicle, in cases where a single camera captured the rear license plate of the vehicle only and was not supported with a second camera to capture the face of the vehicle operator.

Install Tip: Make certain the camera can see the Stop Arm in the image frame, so there is no doubt the Stop Arm was extended and or flashing commanding vehicles to stop.



High Definition Stop Arm Violation Camera screenshots Toll Free 866-468-8042

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