

White Paper



# Camera Lowering Devices

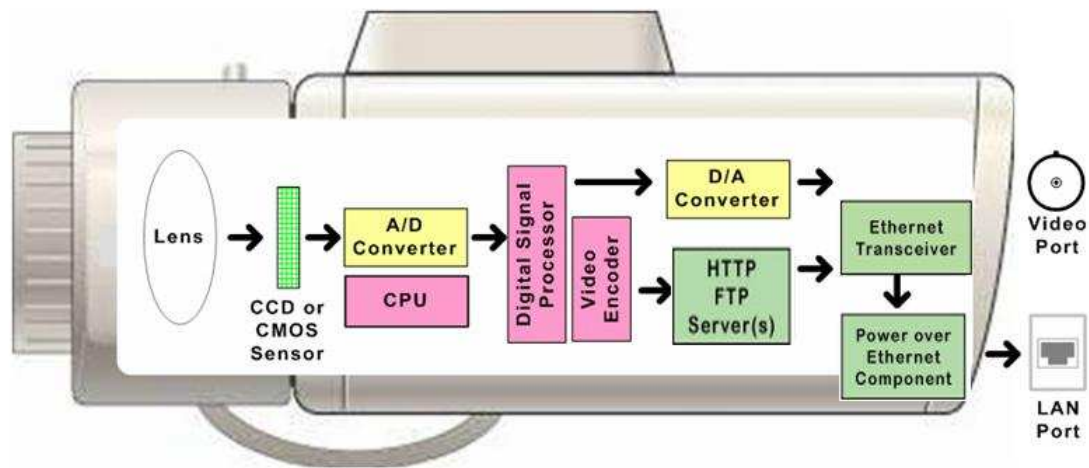
Camera Maintenance and How Lowering Devices May Be Just What You Need

It's no wonder the camera surveillance industry has grown up and out. Grown up, because the technology has improved, enabling cameras to be hung at greater heights, covering larger areas. Grown out, because cameras are being used nearly everywhere.

With all of this growth in the surveillance industry one very critical area continues to be overlooked – camera maintenance.

No one really knows why camera systems need to be serviced, or how to do it. What the industry does know is that they perform better when cleaned, and last longer when serviced. Camera systems are easier to install without ladders, and easier to replace at ground level. They're cumbersome to trouble shoot, and can give a Security Director heartburn when they malfunction – especially if it took six months to convince the owners to pony up for the cameras in the first place. And while camera surveillance is generally understood to be a good thing, it's the maintenance piece of most camera installations that creates the bulk of ongoing issues, and result in lost time and money.

Cameras today are more complicated than they have ever been. An interplay between analog and digital data conversion, digital signal processing, light capture, and video encoding and compression: the modern camera has all the makings of a field-based computer. And like a computer, cameras have very sensitive components. One need only look at the following schematic to get an idea for how very complex this system is.



## So why hasn't maintenance improved to match this complexity?

The answer is, well, there is no answer.

In 2010, the U.S. Department of Transportation invested \$170M of taxpayer money in surveillance cameras, less than 5% of that was spent on hardware to preserve the investment.<sup>1</sup> Sales of video cameras at the Nation's top camera distributors have skyrocketed in recent years. Many distributors are refocusing sales efforts from other technologies in the IT and structured cabling world to accommodate this growing demand. Yet if a client asks for the solution needed to maintain the camera they just purchased, the response will assuredly be... nothing.

Why? Because, until recently, there really hasn't been a solution. The industry has fallen back on maintenance contracts and manufacturer's warranties, which are often rife with cryptic disclaimers and legal indemnification clauses.

A study done on the mean-time-between-failure (MTBF) of cameras yielded additional insight into the problem. MTBF for cameras has traditionally been calculated between the time when a camera repair is implemented and the time when the next failure in the camera occurs, according to the following equation:

$$\text{Mean time between failures} = \text{MTBF} = \frac{\sum (\text{start of downtime} - \text{start of uptime})}{\text{number of failures}}$$

Data on MTBF of cameras indicates a disturbing trend - MTBF is decreasing. Research of one major manufacturer in the surveillance industry suggests that MTBF of their cameras in 2003 was on average 34% higher than in 2010. To illustrate the MTBF concept, the death rate among 25-year old humans is .1% per year. The MTBF for 25 year-old humans, therefore, is 800 years.ii When measured in terms of the decrease in camera MTBF for the above manufacturer, this means that the MTBF of humans would have had to decrease from 800 to 528 years in the span of 8 years. And while there is a debate about the validity of the MTBF metric in comparison to the “mean life of a product,” the trend remains a disturbing one, especially as demand for camera surveillance increases.

There is a logical reason for this significant decrease: The technology in the cameras.

In 2003, security cameras were designed with large CCDs, imagers, digital signal processors, and lenses. Nowadays cameras are tiny, sensitive pieces of hardware. The same kind of hardware that is in a laptop computer is in today’s cameras. It’s just that laptops are seldom stored in sub-zero temperatures in high wind and dust areas.

The MTBF decrease is paced only by the decrease in warranty period offered with modern cameras compared to older models. The trend, studies show, indicate that warranty periods have been cut in a third to as much as a half by many manufacturers, especially in outdoor camera models. So while the environment for surveillance hardware hasn’t changed, the hardware has. And camera manufacturers know this.

Whether the camera technology is IP or analog, new or old, several factors decrease the MTBF of cameras. This includes hot and cold environments, unbalanced power loads, and vibration due to wind.

What is more important than the causal nature of the relationship between environment and MTBF, is the fact that all cameras face environmental factors. If MTBF numbers are calculated absent these factors, and some combination of these factors are prevalent in all camera deployments, what does that say about this metric that already shows a downward trend?

It can be concluded that MTBF numbers are often overstatements of the truth. Apparitions, with the sole intent of steering the consumer away from an inescapable truth, that modern surveillance technology manufacturers are often reporting far fewer failures than are actually occurring.

Regardless of one’s stance on this provocative issue, the message to the surveillance industry is clear: Cameras are sensitive pieces of hardware. Other less expensive system components housed in protected environments, receive better maintenance. But, when the camera image can not be viewed, it is assumed that the camera -- not peripheral equipment -- for example a control box, is most likely the culprit and must be examined. If there was ever a time to pull a camera down and service it, that time would be now.

But that's easier said than done. It's not like people are intentionally ignoring their camera installations. In fact, many camera resellers have built a business on camera maintenance – and a business it is.

Recurring business represents a major portion of the portfolio of the nation's top integrators, much of this coming from camera maintenance contracts. Studies show this number is in many cases more than the installation revenue of the company.<sup>iii</sup> The plans usually work like this: Install a camera system and sell a maintenance plan at 5% to 10% the cost of the hardware.

There is logic to this percentage. Most cameras come with two year manufacturer's warranties. The time commitment of most maintenance plans – 2 years. The cost to service a camera in the first two years, therefore, is the cost of the labor. After the first two years, the camera has usually paid for itself in maintenance fees and the dealer's exposure is covered.

But what does "service" really mean? "Service," which is what one does before the camera malfunctions, would be more aptly described as "replace," which is what the installer does to the broken camera after invoking their right to a free replacement courtesy of a manufacturer's warranty. By then, the camera owner has already suffered the loss of video, the cost of the "maintenance plan," and the hassle of determining the root cause of the failure before the camera is replaced. And whether the installer truly "services," or just uses a maintenance contract to "replace" the camera, one truth holds constant, it would be a heck of a lot easier to do either if they could reach the camera. Which is why a business exists that enables dealers to sell maintenance plans in the first place.

If it was easy – the client would do it themselves.

Therein lies the answer which explains the confusing, and in many cases, illogical approach the camera industry has taken on the subject of camera maintenance. The simple fact is camera maintenance is just too difficult to perform, and because of confusing metrics like the MTBF, the ROI of preventative maintenance is hard to quantify.

There is an alternative to camera maintenance that does not involve selecting the camera with the highest MTBF, or the integrator with the lowest maintenance fee. The alternative is a lowering device.

Originally conceived for use with other products, the lowering device was designed to service street lights. Companies which maintained lights in urban areas had two fee schedules: the one for the technician who serviced lights at ground level, and the one for the technician who had to go up in a lift or on a ladder to service them in the air. The cost difference was dramatic. And so was born the idea to bring lights to the ground for servicing. Usually hand cranked and purely mechanical by design; this same technology exists today.

Where lights and cameras are similar is the maintenance schedule that should be maintained to yield optimal performance. Light enclosures collect dust, bugs, and other particulate matter, power leads corrode, condensation builds in the housing and accumulates on the enclosure which dims the light and reduces its lumen yield over time. And, of course, lights need replacement.

Sound familiar? Precisely. Why would a camera's needs be any different than the average light bulb? In fact, when one considers the average camera costs twice as much as the average street light, perhaps the camera's preventative maintenance needs should not be ignored.

From an ROI standpoint, the answer is in the numbers. Camera repairs often result from poor maintenance. Cracked enclosures, foggy or distorted images, power failure, even network-related troubles, often result from poorly maintained connections and neglect of periodic cleaning schedules of leads, domes, and lenses. To quantify the cost associated with NOT maintaining a camera, security directors may look at the cost to their organization to repair just one camera.

SAMPLE INVOICE	
Item	Unit Price
<b>Bucket Truck</b> (Average service calls per year – 3; average daily truck rental - \$2000)	<b>\$ 6,000.00</b>
<b>Cost of Technicians</b> (Most jobs require at least two technicians for safety reasons. \$40 /hr X 3 visits X 1hr/visit X 3 techs)	<b>\$ 360.00</b>
<b>Cost of Slower Response Time</b> (Delays in scheduling can result in substantial loss of revenue from the services)	<b>\$500.00</b>
<b>Cost of Training</b> (Some facilities require personnel operating bucket trucks to be trained)	<b>\$ 300.00</b>
<b>Administrative Costs</b> (Scheduling of personnel, paperwork required for insurance and/or government purposes, etc)	<b>\$ 500.00</b>
	<b>\$7,660.00</b>

Strictly by the numbers, the cost associated with repair is far greater than the cost to maintain a system. In fact, owning a camera is like owning a car. In this case a whole fleet of cars. Each with its own maintenance needs, depending on location (indoor/outdoor), environment, type of camera (PTZ or fixed,) and frequency of usage (live or recorded viewing.) And, like cars, cameras need continued investment to operate efficiently. What the above illustration fails to illustrate are the added “soft” costs associated with employee risk, time onsite, traffic congestion, and other collateral concerns that impact the organization’s bottom line due to camera outages and the service needed to bring them back online.

In the security industry, camera maintenance has always been performed through maintenance contracts. But the answer can be far more simple, and affordable in lowering devices. There are several for this:

1. Most maintenance is labor related. Camera maintenance does not need to take a long time, a camera can usually be lowered, cleaned, and raised in under 15 minutes.
2. Maintenance contracts must account for the occasional slip and fall, injured employee, and the insurance needed to protect the company performing the maintenance. That uncertainty is a choice, the cost for which is born by the company who pays for maintenance. This may explain why cameras are not being serviced in the first place.
3. If a lift rental is required for even one camera, there is immediate ROI in not having to pay for, and schedule lifts.
4. Field operators and admin staff who coordinate a camera maintenance schedule are a camera’s hidden cost of ownership because their efforts are accounted for only in operational budgets. Lowering devices allow these valuable resources to be applied elsewhere.
5. Lowering devices incentivize maintenance crews to clean cameras more frequently. While infrequent cleaning is good for replacements, it does little to optimize the performance of cameras. More frequent cleaning also helps keep nuisance maintenance, like removal of dirt or insect contamination, from becoming a major expense. It also makes camera testing a routine function, rather than a once-a-year major expense.
6. Safety of servicing personnel and insurance costs are lower for personnel who do not need to climb ladders or ride lifts.
7. Cameras can be installed in locations that the client would not attempt to if they had to service the camera by normal means, which can improve the vantage point of cameras.

Lowering devices save cost while taking the pain out of preventative maintenance, which ensures the camera

- (a) lasts longer
- (b) performs better and captures better video
- (c) can be replaced without the need for bucket trucks; new wire runs; or expensive safety measures like crash trucks, lane closures, or multiple technicians.

## How it works:

Most lowering devices share a few primary components. These are the:

- Disconnect Unit
- Support Arms
- Stabilizing Guides

### The Disconnect Unit

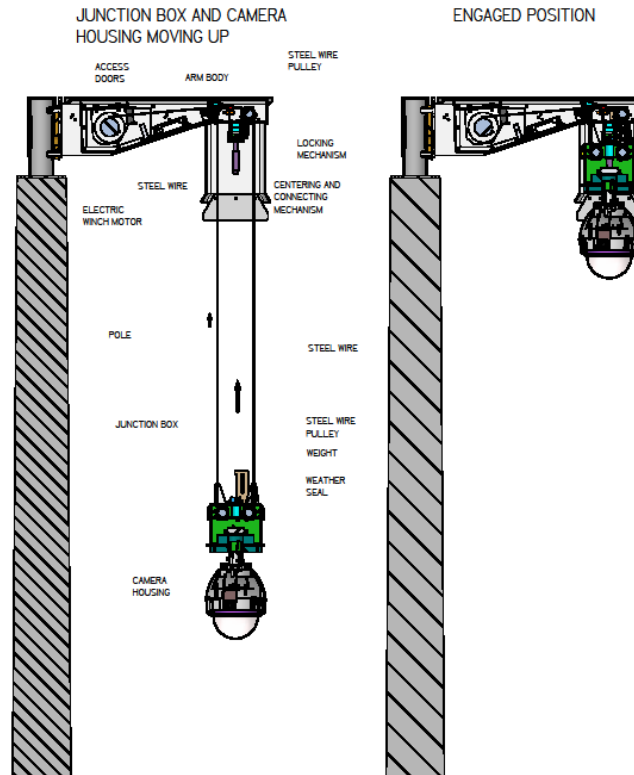
Perhaps the most complex and unique aspect of lowering devices, from one manufacturer to the next, is the disconnect unit. The design of this unit speaks to the safety and reliability of the camera. The disconnect unit controls both halves of the connector unit as they engage and disengage during raising and lowering, respectively. Every manufacturer has a different design.

As the name implies, the disconnect unit handles the power and video feed to the camera. When the connector pin (male) and socket (female) halves separate, power and video stops. To resume either, the male and female halves must reconnect.

Under wind and corrosive conditions, disconnect units perform quite differently. The sockets on the male connect unit should be made of an anti-corrosive, highly conductive metal. Under 300 hours of salt spray testing, gold plated sockets have proven superior to traditionally used brass anodized sockets due to gold's anti-corrosive capabilities.

Another consideration when choosing the correct lowering arm is to evaluate the seating process itself. Disconnect units that can blind mate tend to perform better under varying weather conditions and run less of a risk of damage due to improper seating.

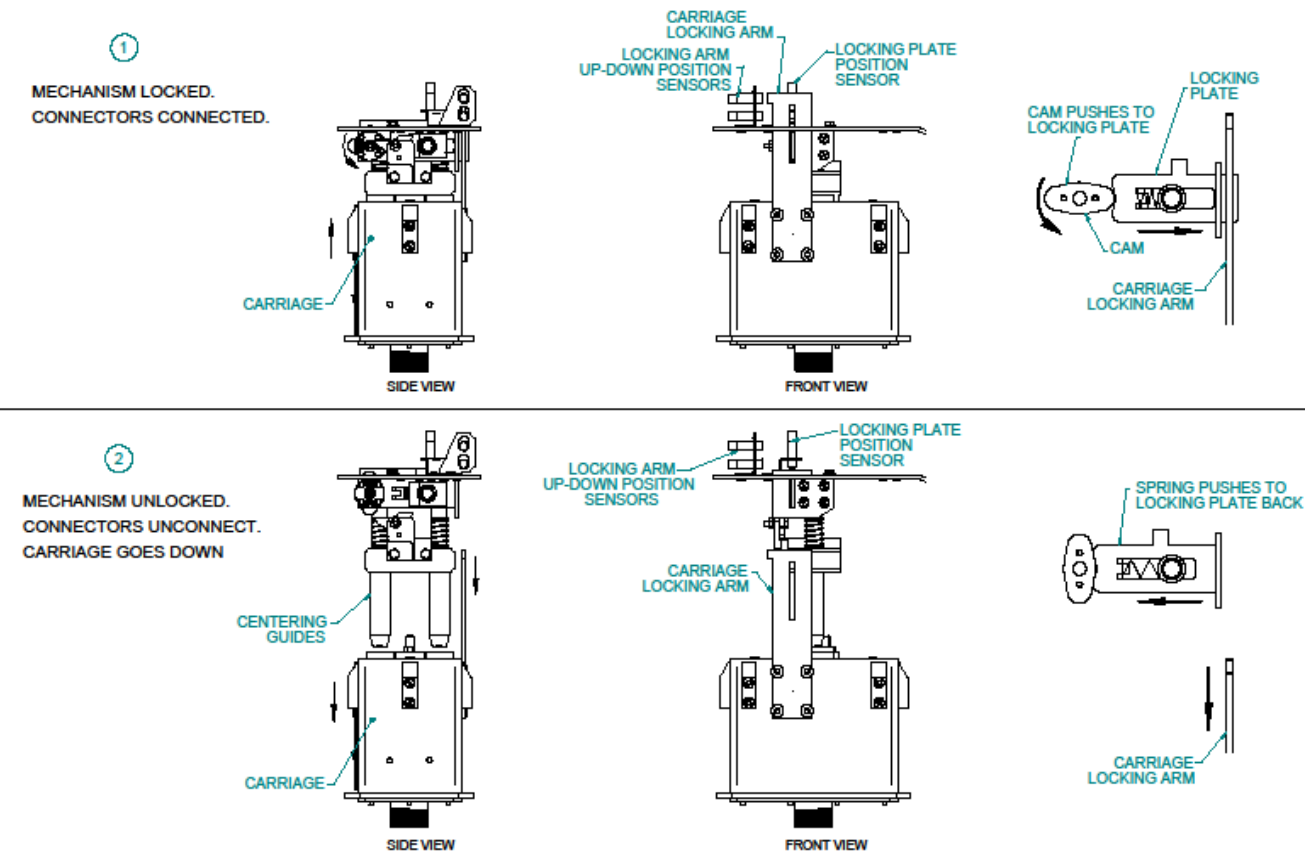
The following image illustrates the concept of blind mating in a disconnect unit:



It's also important to consider the water seal associated with the disconnect unit. Some manufacturers use a rubber material known as Hypalon, but with any rubber material in this vital area the chance for increased degradation due to UV, temperature, and chemical cleansing agents is higher than if the product uses anti-corrosive metals like galvanized steel or anodized aluminum. Over time, the probability of leakage due to non-metal components is high, and the unit's water tight integrity may be compromised.

Perhaps most importantly, customers should simply ask the manufacturer to explain the disconnect unit design and function.

### Support Arms/Locking Process

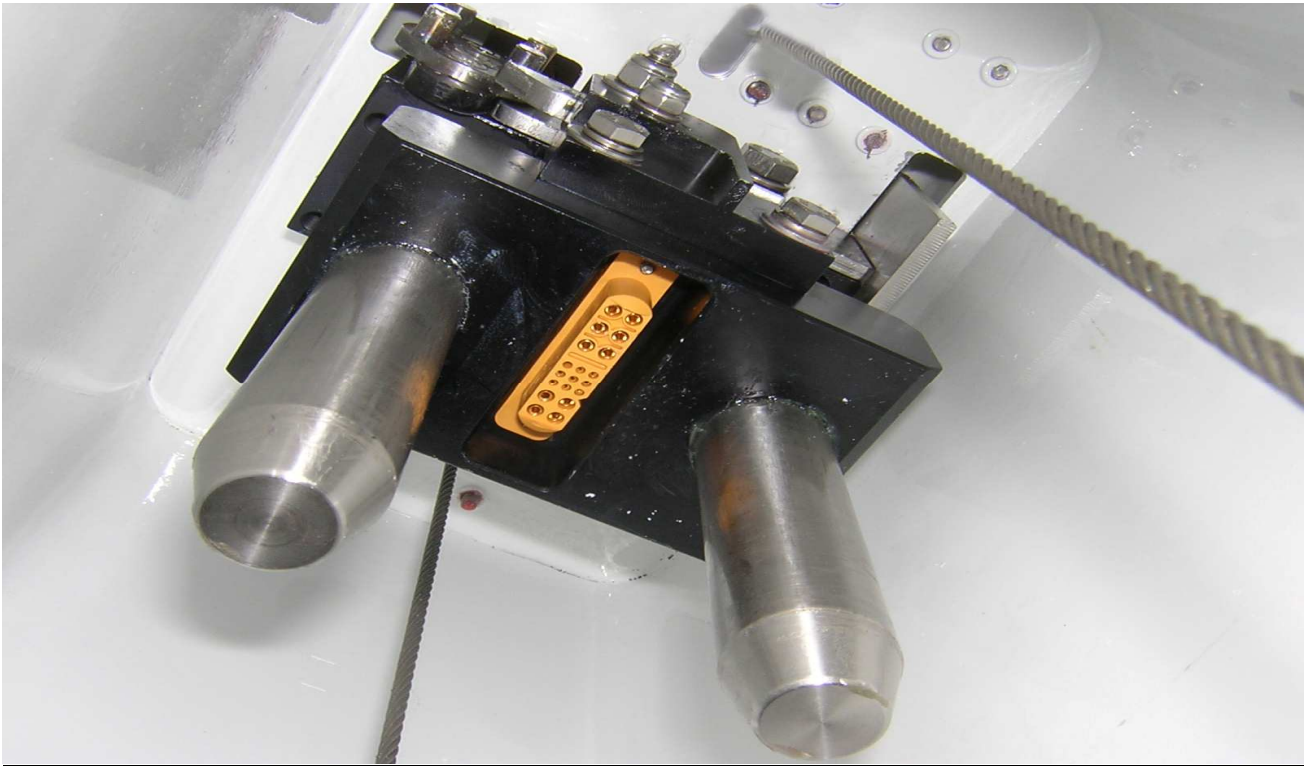


The support arms ensure the male and female connector pieces remain firmly connected while the camera is towering above. Needless to say, a 15lb camera dropped from 80ft would be traveling at 72 ft/sec when it hit the ground, equating to around 400lbs of force per square inch. To prevent this from occurring, a rather sophisticated support arm system is deployed in all camera lowering devices. In most cases, locking arms drop in place when the male and female connector pieces join. To add additional stability, some companies offer a locking pin, which retracts when the unit is lowered. This additional security is only available in electrically powered devices.

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Electrically powered devices have the added benefit of programming sensitivity of the device to ensure proper function. While lowering devices as a whole are generally reliable, cable tends to vary from one manufacturer to the next. Especially in windy conditions, the cable may become ensnared in the winch mechanism. Software programming makes sure that issues such as these do not lead to excessive tension resulting in cable breakage. In all cases, it is important to note that lowering devices do not rely on the cable alone for support of the camera assembly when docked.

### Stabilizing Guides

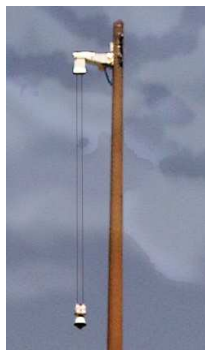


Stabilizing guides are the cables that allow the camera to be raised and lowered. As the name implies, the cables ensure that the disconnect unit properly aligns with the lowering device. Several variations exist of this on the market, most with either one or two cables. Two cable stabilizing guides resist swaying more than one cable, but also require a more intricate system design, and for that reason are less seldom designed into lowering devices. Some lowering devices suffer conductivity loss over time. This can be due to locking pin misalignment. Additional support, or shims, are sometimes provided to the pins to restore proper conductivity upon docking. This is due in major part to swaying, which can be reduced in dual guide designs.

An example of a dual guide, versus a single guide design is below:



Single guide



Dual guide

After evaluating the system design, there are additional considerations worth mentioning.

## How is the system itself maintained?

Does it require lubrication and cleaning? Some units require significantly less maintenance than others. In some cases, manufacturers will void the warranty if it appears the unit was not maintained according to specifications. So it is important to know how much time your service crews will spend servicing both the camera and the camera lowering device, and devise a schedule for both.

Another question to ask: “Is it a retrofit application, or do you have the luxury of installing the lowering device, pole, and peripheral hardware?”

If it is a new installation then the client may be able to specify their own pole. Some types of lowering devices, especially those that are non-electric, require that certain poles be used in conjunction with the device, and installed along with the device. In these cases, due diligence during the specification period is critical, lest the client find the lowering device and pole are incompatible. Systems like the CDP System sold by Camera Lowering Systems (CLS) require the cable inside the pole (CDP System) while a standard pole can be used to accommodate lowering devices made by MG2 or CLS with the CEPM models.

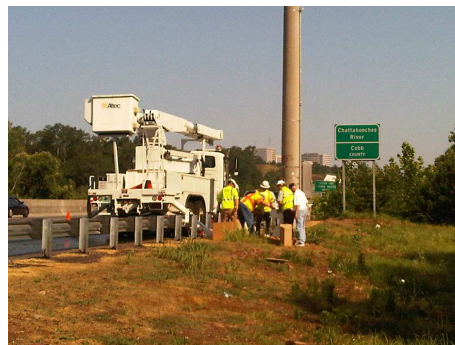
However, in all but a few systems, hand cranks are required. On non-electric lowering devices a separate hand crank must be purchased. Not only are these expensive and cumbersome to use, but they often require the supervision of additional technicians, leading to greater costs and safety concerns. For most applications where lowering devices are currently used today, having multiple personnel service a camera is simply not an option. And of course, it begs the question, “what does one do if their service truck does not have the hand crank? Is the lowering device not functional?”

The alternative to hand cranks are electric key switches. These operate like a car ignition: turn one way to lower, one way to raise. The key switch must be connected to the lowering device, where it is connected is up to the client. This means that a lowering device may be controlled from any location in proximity to the winch, within 170 feet. This helps if the client has a guard house, a utility room, or a covered area where lowering can be performed.

Placing a mechanical lowering device on a pole on the highway makes sense, but what if a lowering device is needed on a water tower, a roof, or a bridge? Electric lowering devices provide access to the camera in areas where lowering devices previously could not be installed.



One man servicing



Team effort

While lowering devices continue to grow in popularity, on highways, in maritime applications, and critical infrastructure areas within the power generation industry, they have been slow to take off in other areas, like corporate offices and schools. Perhaps the industry needs to see more cost taken out of them to drive home the ROI point, or maybe the aesthetics need some fine tuning, and all signs point to strides most manufacturers have made in these areas. In critical areas, however, like increasing the lifespan or maintaining camera performance, there is no better solution.

## About Moog Videolarm

Moog Videolarm is a leading designer and manufacturer of innovative physical security products including PoE Ready™ camera housings, wireless and vandal resistant camera systems, infrared illuminators, mounting poles, and other accessories. Various industries look to Moog Videolarm for surveillance solutions via an international network of partners. [www.videolarm.com](http://www.videolarm.com)

i Source: Mobile Synergistics, August 3, 2010 report: “U.S. spending \$1.4B on Intelligent Transport Systems in 2010.”

ii “MTBF and Reliability,” Engle Paul, September 24, 2009

ii “Elevating RMR’s Potential,” Klotz-Young, Heather, September 14, 2011