

# Technical Disclosure Commons

---

Defensive Publications Series

---

October 18, 2017

## Breakaway structure for a vehicle mounted camera system

Mark Yerdon

Lawrence Piatti

Helen Yoo

Follow this and additional works at: [http://www.tdcommons.org/dpubs\\_series](http://www.tdcommons.org/dpubs_series)

---

### Recommended Citation

Yerdon, Mark; Piatti, Lawrence; and Yoo, Helen, "Breakaway structure for a vehicle mounted camera system", Technical Disclosure Commons, (October 18, 2017)  
[http://www.tdcommons.org/dpubs\\_series/760](http://www.tdcommons.org/dpubs_series/760)



This work is licensed under a [Creative Commons Attribution 4.0 License](https://creativecommons.org/licenses/by/4.0/).

This Article is brought to you for free and open access by Technical Disclosure Commons. It has been accepted for inclusion in Defensive Publications Series by an authorized administrator of Technical Disclosure Commons.

## **Breakaway structure for a vehicle mounted camera system**

### ABSTRACT

Vehicle mounted camera systems may collide with external objects during movement of the vehicle. Such collisions can damage the camera system, the mounting structure, and the vehicle. Techniques described here seek to reduce damage in such instances. During a collision, the vehicle mounted camera system structure is caused to break away from the colliding object such that damage is limited to parts of the mounting structure that can be replaced easily.

### KEYWORDS

- Vehicle mounted
- Camera
- Locking mechanism
- Breakaway structure
- Roof mount

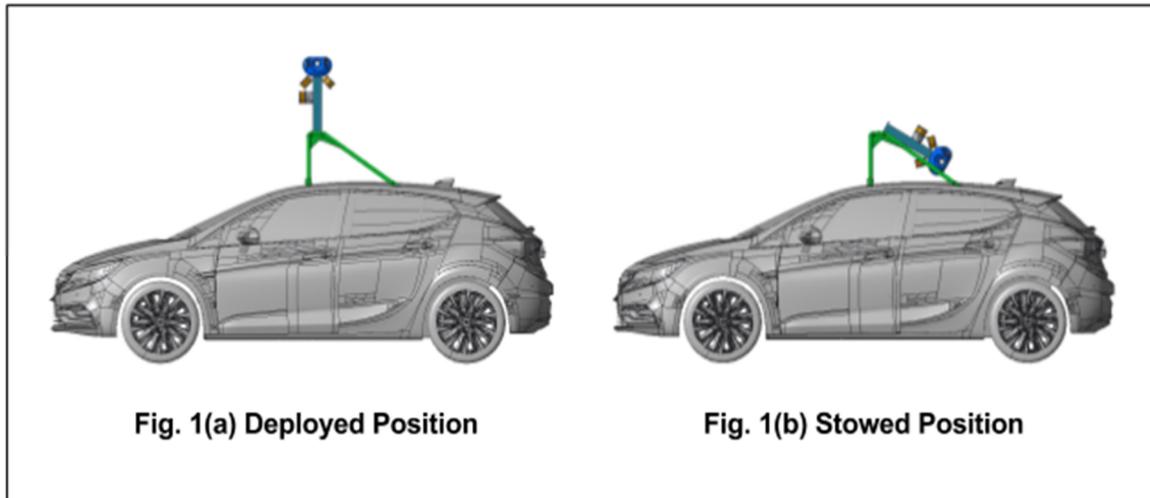
### BACKGROUND

Vehicle mounted camera systems, which can span over 2 meters in height, may be mounted on to the roof. Occasionally, vehicles with such camera systems pass through structures with lower height clearance, e.g., parking garages, awnings, etc. In these situations, the camera system can collide with or scrape the ceiling of the structure. Such incidents can cause damage to the cameras, sensors within the camera structure, structure hosting the camera, and the vehicle itself.

### DESCRIPTION

The described techniques reduce the amount of damage to a vehicle roof mounted camera system in case of a collision between the camera system and an external structure. This is

accomplished by placing the camera system on a mast that breaks away during a collision, but remains stationary and does not break away under normal driving conditions.



### **Example camera mast in deployed and stowed positions**

Fig. 1(a) illustrates a camera mast in deployed (raised) position and Fig. 1(b) in stowed (lowered) position. The camera mast rotates under motor power between deployed and stowed states, with the main shaft of the rotation axis remaining stationary. The mast stays in deployed position (without rotating) when the camera system is in use. In the deployed position, without using the described improved techniques, if the mast accidentally collides with an external object, the camera, sensors, mast, vehicle, and/or external object can get damaged.

Using the described improved techniques, if the mast unintentionally collides with an external object, the main shaft slips against friction and allows the mast to rotate. The rotation action deflects a locking mechanism in the mast structure which permits the camera mast to rotate backwards and downwards away from the colliding external object or structure.

The main shaft around which the mast rotates during actuation is clamped to a space frame. During a collision, the clamped joint slips against friction and allows the shaft to rotate

within the clamps and the frame. The forward motion of the vehicle rotates the mast backwards during the collision, thereby deflecting the locking mechanism and allowing farther rotation downwards.

The coatings and pre-load for the shaft and the frame are selected appropriately so that the joint does not slip during normal driving conditions. The load at which the joint slips is selected so as to not cause damage to the space frame and vehicle interfaces during an unintended collision with an external object.

This solution minimizes damage to the vehicle and roof mounted structure. Also, the mechanism can be fixed quickly and can be reset after the collision by simply replacing the locking mechanism and re-torquing the clamp bolts to deploy the mast.

## CONCLUSION

The described techniques enable a mast bearing a vehicle mounted camera system to break away during a collision with an external structure to minimize damage to the vehicle and roof mounted structure. Although the mast is stationary during normal driving conditions, a collision causes the mast to break away from the colliding object. The mechanism can be fixed quickly and can be reset after the collision.