UKRO

LGV & PSV Air Suspension Systems: Firefighter Safety

UNITED KINGDOM RESCUE ORGANISATION

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THE CHIEF FIRE OFFICERS ASSOCIATION

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The professional voice of the UK fire and rescue service

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Contents

1. Introduction

In a previous guide we looked at ensuring the vehicles parking brakes were applied at the earliest stage negating the risk of vehicle movement.

The next consideration for attending crews working around a large goods vehicle or public service vehicle must be an appreciation of the vehicles suspension system and how to assess, work around it or utilise it safely.

Around 80% of the commercial vehicle traffic on the roads these days use air suspension, whether for passenger comfort on a large coach travelling into Europe or an articulated LGV delivering to a supermarket where the trailers height can be adjusted to assist with unloading.

The system offers numerous benefits to the owner/ operator;

- Reduces occupant and vehicle fatigue
- Maintains a constant ride height regardless of load
- Fully adjustable
- Reduces the vehicles unladen weight
- Interfaces electronically with other vehicle systems

2. Air Suspension Overview

Systems fall into two main categories, vehicle/ cab suspension or axle lifting suspension.

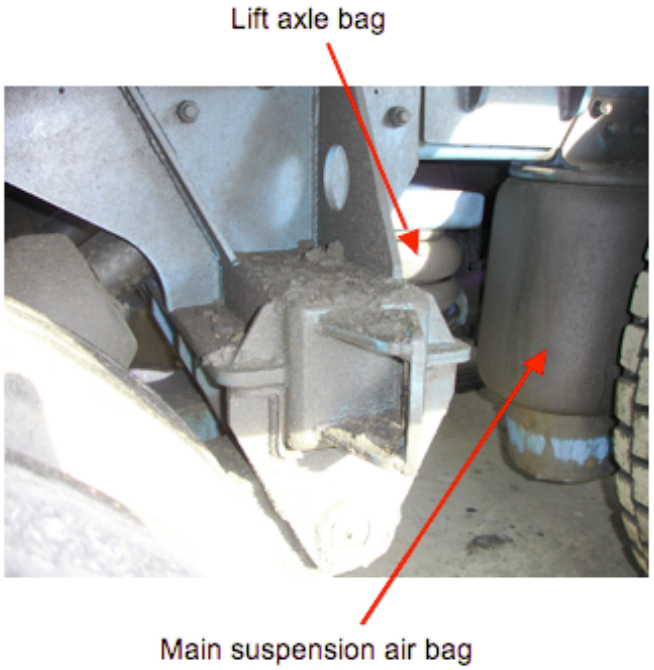
Both systems are supplied with compressed air from the vehicles compressor, this air is dried/ filtered (to remove water and other contaminants) and then stored for use in steel tanks at approximately 10 bar.

The air supply for the vehicles suspension systems comes from the auxiliary circuit.

It is supplied around the vehicles chassis via plastic pipe work and fittings, to numerous valves and controls blocks to ensure it is at the required pressure for the suspension air bag units depending on load.

This regulated air terminates at air bag units mounted between the chassis rail and the axle beam. Each wheel will have either a single or double bag fitted depending on application.

Air bag units are constructed of a reinforced neoprene rubber bag mounted over a steel cylinder (U Bellow type), increasing air supply to the bag will force the bag to expand lengthways forcing it away from the steel cylinder (increasing suspension travel), a reduction in supply pressure will cause the bag to deflate and form around the cylinder reducing its height.



These air bags take the place of the previous leaf spring type suspension systems which have been phased out over time.

Vehicles with lifting axles use separate air bags/s (folding bellows) in conjunction with a pivoting type framework to lift an axle off the road surface when it's not required. This is done by deflating the main suspension air bags and inflating the lifting air bag/s simultaneously.

The purpose of these lifting axles is to reduce tyre and drive train wear along with improved fuel consumption, when the vehicle does not need the axle for load carrying, i.e. lightly loaded or empty.

In general, prime movers (Tractor units/ rigid vehicles) have electronically controlled air suspension on their main drive axle and where fitted middle lifting axle, whereas trailer air suspension is normally controlled by pneumatic valves.

The majority of front axles carry leaf spring suspension as they have no requirement for adjustment.

Modern PSV vehicles will be fully air suspended on all axles to give maximum passenger comfort and to allow ride heights to be lowered to assist passengers when boarding.

Air suspension systems are susceptible to damage from fire, impact, tyre blow out and general wear and tear.

3. Considerations

For incident commanders and crews at these types of incident there are many considerations to ensure safety for all concerned.

- Has the vehicles air suspension system been damaged?
- Older/ poorly maintained vehicles will lose air over time with the engine off.
- Lifted axles are held off the road by air pressure only, there is no interlock fitted.
- Shutting off the engine may cause a lifted axle to drop.
- Electronically controlled systems will continue to adjust the suspension if left active.

In the early stages of an incident consideration should be given to leaving the engine running (if practicable) while the suspension is assessed/ made safe, this will ensure the vehicles ride height is maintained.

Any lifted axles can be lowered or if not practical then chained, strapped or blocked in the raised position.

Chassis stabilisation using LGV rated props or similar should be employed before committing personnel under an air suspended vehicle. (LGV trailer landing legs can be employed in this way, but crews need to ensure the rear of the trailer is also stabilised to ensure no rear suspension drop can occur)

For Fire Service personnel working around LGV/ PSV air suspension systems the main risk is the loss of air in the system.

This can happen over a period of time causing a trailer to slowly drop or possibly a lifted axle starts to fall. Its worth remembering air suspension units can fail without warning causing a potential load shift.

If managed properly these incidents are safe for all, but a good understanding and respect for the subject is fundamental.