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Heavy Vehicle Construction
Aim

The aim of this session is to familiarise Operational Firefighters with the latest technology in Heavy vehicle construction and design.
Heavy Vehicle Construction

Contents

• Vehicle Construction
• Air Braking systems
• Suspension systems
• Operational considerations
Chassis

- Made of 8mm-12mm High Tensile steel, channel section.
- Braced via cross members, channel or tubular section
- Provides Linear and torsional strength
- Carries all the main components i.e. gearbox, cab etc
- Can be flexible for differing applications
Chassis

Main chassis (channel section)
Cross members
Air supply pipe work (Plastic)
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**Cab**

- Normal Steel (heavy panel gauge)
- High Strength Low Alloy Steel (HSLA)
Heavy Vehicle Construction

**Cab**

- Glass Reinforced Plastic (High roof sleeper cabs)
- Main cab panels of normal Steel (Heavy panel gauge)
- Cab reinforcement (Possibly Boron steel)
- Micro Alloy Steel pillars filled with foam
- Plastics
- Composites

High Strength Low Alloy Steel HSLA (Twice as strong)
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HSLA Cab Strengthening

Chair: Dave Webb · OFSM, MA, IRSc (Hons)
Cab Doors

Heavy Gauge panel steel

GRP/ Plastic (reinforced)

Through door /extended hinges (75mm x 8-12mm)
Glass

• Windscreen laminated construction, held in with rubber seal, or bonded on newer vehicles.

• Side glass toughened, normally held by rubber seal.

• Tankers/Hazchem will have heavy duty/reinforced rear glass panel.

• HGV windscreens can be heavy, 80kgs for a modern high roof sleeper cab (glass carrying handles on all RTs).
HGV Cab suspension, 2 types, Air or coil spring

(Consider cab stabilisation before access)
If cab has to be tilted for access, ensure it is propped/ held forward before working underneath.
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Double bunk, hidden objects etc

Night heater controls/ 12/24v socket, cab lights

24v fridge/ storage

Storage lockers

Cab Interior
Air bags not mandatory on new 2009 HGV’s.

Fitted as an optional extra, generally drivers air bag and seat belt pre tensioner plus possible passenger pre tensioner.
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Driver’s seat

UKRO

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Chair: Dave Webb OFSM MA IRSc (Hons)
Driver’s seat (Mechanical)

- Manual drivers weight control (90-150 kg’s)
- Gas spring/strut
- Cantilever/ scissors frame
Drivers seat management
Remove rubber skirt, insert wedge under frame, lower seat under control via air dump or height adjustment knob, disconnect air supply to seat.
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New HGV’s consider Air adjustment

Reach/ Rake Adjustment

Steering Wheel adjustment
5th wheel

Connects Tractor unit to trailer

Safety hook and chains

Release handle (pull out and forward)

Slider release handle (manual or air)
Tractor Unit Connections (Suzies)
Supplies Air and Electricity to trailer

Service Line
Primary electrics
Emergency line
ABS Connector
Secondary electrics

(Removing the red emergency line will immediately apply the trailer parking brakes)
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Decision Line Emergency

Line Primary electrics

Secondary electrics

ABS Connector

Service Line

(Removing the red emergency line will immediately apply the trailer parking brakes)

Trailer Connections (Suzies)
• Designed to take full GVW of trailer
• Allows unit to un-couple
• Has a two speed gearbox to allow a full GVW trailer to be raised.

Consider winding down to assist with stabilisation

Gearbox (Push in for low gear, out for high)

Winding handle

Extending legs with rocker feet

Trailer Landing Legs
Vehicle batteries

2x 12v Batteries (in series) (24V)

Positive lead

Link strap

Earth lead

Battery isolator

To disconnect, Look for isolator or remove earth lead
Air Brakes

- Uses air supplied from engine driven compressor, via storage tanks and valves.

- Two circuits, Service (footbrake) and Emergency (Parking brake).

- Coloured yellow (service) and red (Emergency) on trailer connections (Suzie's).
Air Brakes System

- Foot valve
- Parking brake chamber
- Service brake chamber
- Hand valve
- Air Reservoirs
Air Brakes

Service (foot brake) chamber

- **Service brake (Footbrake)** operates when air supplied from drivers foot valve acts on a diaphragm contained in the chamber, extending the push rod and applying the service brake (footbrace).

- On release the return spring overcomes the falling chamber pressure, and the diaphragm returns to its off position.

Air in, brake applied
• Parking brake chamber provides both the service (foot brake) brake facility and also the mechanical parking brake via a high capacity coil spring contained in the rear of the chamber.

• Operation of the hand brake lever exhausts air pressure holding back the main parking brake spring, applying the parking brake.

Air Brakes System
In the event of a loss of air pressure in the braking circuit, the parking brake will apply automatically.

Parking brakes can be released by manually winding off each chamber.

Each parking brake chamber will require individual release via a 24mm or 15/16 inch socket.

The vehicle must be secured/chocked fully before attempting this, as the vehicle's handbrake is completely removed.

Consider specialist advice.
Air Brakes System

- The parking brake lever (Handbrake) will lock in the ON position.

- To release the parking brakes, the release collar needs to be lifted before the lever can be operated.
Air Brakes System
Trailer Brake controls

- Red park button (applies trailer parking brakes)
- Black shunt button (allows shunting without air from tractor unit)

- Located mid chassis on trailer
• Previously most dominant spring type fitted in commercial vehicle sector.
• Positively locates the axle.
• High weight, increases ULW.
• Simple in design and operation.
• Non-adjustable
Heavy Vehicle Construction

Rubber Suspension

“Elephants feet”

• Fitted to Double drive bogies, Tippers, Low Loaders etc
• Very robust/heavy construction
• Utilises the natural properties of rubber
• Non adjustable
**Heavy Vehicle Construction**

**Air Suspension**

- Most dominant spring type fitted in commercial vehicle sector
- Modern Electronic Systems (ECAS) etc
- Reduces vehicles ULW
- Reduces driver and vehicle fatigue
- Fully adjustable
- Maintains constant ride height regardless of load
- Requires additional axle location
Suspension systems
Wabco Air Suspension Components

Air Reservoirs
(System operating pressure up to 10bar)

Levelling valve
(constantly measures chassis height)

Air Bag (U Bellow type)
(Air bag internal working pressure 5-8 bar approx)

Air Bag (Folding bellow)
Suspension systems
Lift Axles

- Purpose to increase tyre/axle life span and improve fuel economy.
- Lifted electronically by the driver when axle load allows.
- Will lower automatically when axle is loaded.

- Electronically controlled (ECAS system)
- When traction assist is required will automatically raise.
- Ensure axle is secured via chains, ratchet straps or blocks etc, before working around a raised lift axle.
- Switching off the engine or isolating vehicles batteries may cause the axle to lower.

Lifting bag
Suspension air bag
Suspension systems
Wabco Air Suspension Controls

Tractor unit/ Prime mover control pad

Trailer Control Handle
Operational considerations

- Vehicle parking brake.

Rigid vehicles check hand brake lever, drain air tanks via manual drain or foot valve operation, wheel chocks.

Artic/ Draw bar, apply trailer brake or remove red emergency line, wheel chocks.

Cab/ Chassis stabilisation,

Primary via ratchet straps/blocks before casualty carer access.

Secondary via Rescue tender/ Paratech.

Wind down landing legs of trailer to aid chassis stability.
• Air bag considered if not deployed, bagbuster etc.

• Driver seat suspension managed using wedge/ air supply disconnection.

• Steering wheel relocated

• Air suspension managed before working beneath chassis.

• Lift axle lowered if possible, or strapped/ chained/ blocked in the raised position before accessing.
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Any Questions?