### Overview

This NOS is about conducting routine maintenance, adjustment and replacement activities as part of the periodic servicing of light vehicles.
**IMILV01**  
**Carry out routine light vehicle maintenance**

**Performance criteria**

**You must be able to:**

- **P1** use suitable personal protective equipment and vehicle coverings throughout all vehicle maintenance activities
- **P2** prepare the vehicle systems and work area for safe working procedures (where appropriate)
- **P3** use suitable **sources of technical information** to support all your vehicle maintenance activities
- **P4** adhere to the correct specifications and tolerances for the vehicle when making **assessments** of system and component performance
- **P5** record details accurately and use this adapted specification as the basis for your examination and assessment where the customer’s vehicle falls outside the manufacturer’s original specification
- **P6** examine the vehicle's systems and components following:
  - **P6.1** the manufacturer's approved **examination methods**
  - **P6.2** recognised repair methods
  - **P6.3** your workplace procedures
  - **P6.4** health and safety requirements
- **P7** ensure your **examination methods** identify accurately any vehicle system and component problems falling outside the maintenance schedule specified
- **P8** carry out adjustments, replacement of vehicle components and replenishment of consumable materials following the manufacturer's current specification for:
  - **P8.1** the particular maintenance interval
  - **P8.2** working methods and procedures
  - **P8.3** use of equipment
  - **P8.4** the tolerances for the vehicle
- **P9** record the details accurately and take action which complies with the customer's instructions where system adjustments cannot be made within the manufacturer’s specification
- **P10** work in a way which minimises the risk of damage to the vehicle and its systems and the surrounding area
- **P11** use suitable testing methods to evaluate the performance of all replaced and adjusted components and systems accurately, prior to returning the vehicle to
Carry out routine light vehicle maintenance

P12 report any problems or issues relating to the vehicle’s condition or conformity to the relevant person(s) promptly

P13 ensure your maintenance records are accurate, complete and passed to the relevant person(s) promptly in the format required

P14 complete all vehicle maintenance activities within the agreed timescale

P15 report any anticipated delays in completion to the relevant person(s) promptly
**Knowledge and understanding**

**Legislative and organisational requirements and procedures**

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<tr>
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<th>Details</th>
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<td><strong>K1</strong></td>
<td>the manufacturer's and warranty requirements relating to routine maintenance activities for vehicle systems and components</td>
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<tr>
<td><strong>K2</strong></td>
<td>the legal requirements relating to the vehicle maintenance activities for vehicle systems and components</td>
</tr>
<tr>
<td><strong>K3</strong></td>
<td>the legislation and workplace procedures relevant to:</td>
</tr>
<tr>
<td><strong>K3.1</strong></td>
<td>health and safety</td>
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<tr>
<td><strong>K3.2</strong></td>
<td>the environment (including waste disposal)</td>
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<td><strong>K3.3</strong></td>
<td>appropriate personal and vehicle protection</td>
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<tr>
<td><strong>K4</strong></td>
<td>your workplace procedures for:</td>
</tr>
<tr>
<td><strong>K4.1</strong></td>
<td>recording vehicle maintenance work and any variations from the original vehicle specification</td>
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<td>the importance of working to agreed timescales and keeping others informed of progress</td>
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<td><strong>K8</strong></td>
<td>the importance of reporting anticipated delays to the relevant person(s) promptly</td>
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**Use of technical information**

<table>
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<tr>
<th>Knowledge and understanding</th>
<th>Details</th>
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<tbody>
<tr>
<td><strong>K9</strong></td>
<td>how to find, interpret and use <strong>sources of technical information</strong> for scheduled maintenance activities, including on-board diagnostic displays</td>
</tr>
<tr>
<td><strong>K10</strong></td>
<td>the importance of using the correct <strong>sources of technical information</strong></td>
</tr>
<tr>
<td><strong>K11</strong></td>
<td>the purpose of and how to use identification codes</td>
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</tbody>
</table>

**Vehicle system operation**

<table>
<thead>
<tr>
<th>Knowledge and understanding</th>
<th>Details</th>
</tr>
</thead>
</table>
| **K12** | how engines, cooling systems, air supply and exhaust systems, fuel systems and ignition systems operate for the type(s) of vehicle on which you are
You need to know and understand:

K13 how clutch assemblies, clutch operating systems, manual gear boxes, automatic gear boxes, drivelines and hubs (if appropriate) and final drive assemblies operate for the type of vehicle on which you are working (including hybrid / alternative fuel and electric vehicles)

K14 how suspension systems, steering systems, braking systems, non-electrical body systems, wheels and tyres operate for the type of vehicle on which you are working (including regenerative braking systems and other energy recuperation systems used on hybrid / electric and alternative fuel vehicles)

K15 the purpose, operating principles and location of power storage systems (including batteries), power generating systems, (including vehicle charging systems), starting systems, lighting systems and ancillary equipment for the type of vehicle on which you are working (including hybrid / alternative fuel and electric vehicles)

K16 the operating specifications and tolerances for the type(s) of vehicles on which you are working (including hybrid / alternative fuel and electric vehicles)

Routine maintenance requirements

K17 how to conduct scheduled, routine examination methods and assessments against vehicle specifications to identify damage, corrosion, inadequate fluid levels, leaks, wear, security problems and general condition and serviceability

K18 how to check and make adjustments to clearances, gaps, settings, alignment, pressures, tension, speeds and levels relevant to the engine area, transmission area, chassis area, electrical area and body (including to valves, ignition, fuel and emissions, brakes, transmission, lights, tyres, steering and body fittings)

K19 how to replenish and replace routine service components and materials, including filters, drive, belts, wiper blades, brake linings and pads, lubricants and fluids

K20 how to recognise and report cosmetic damage to vehicle components and units outside normal service items

K21 how to identify codes and grades of lubricants

K22 how to work safely avoiding damage to the vehicle and its systems (including special precautions that may be required when working on hybrid / alternative...
Carry out routine light vehicle maintenance

- fuel and electric vehicles)
  - K23 the consequence of using incorrect lubricants, fluids and components
Additional information

**Scope/range**

1. **Sources of technical information** are:
   1.1. vehicle technical data
   1.2. schedules of inspection
   1.3. regulations

2. **Examination methods** are:
   2.1. aural
   2.2. visual
   2.3. functional
   2.4. measurements

3. **Assessments** are for:
   3.1. malfunction
   3.2. damage
   3.3. fluid levels
   3.4. leaks
   3.5. wear
   3.6. security
   3.7. condition and serviceability
   3.8. conformity
   3.9. necessity for adjustment(s)
Agreed timescales:

Examples include: manufacturer’s recommended work times, job times set by your company or a job time agreed with a specific customer.

Adjustments:

Examples include: adjustments to clearances, gaps, settings, alignment pressures, tensions, speeds and levels, and adjustments to valves, ignition, fuel and emissions, brakes, transmission, lights, tyres, steering and body fittings.

Commercial Vehicles:

These are medium and large goods vehicles of 3500kgs gross vehicle mass (GVM) and above.

Components:

Examples include: filters, drive belts, wiper blades, brake linings and pads, lubricants and fluids.

Conformity:

Examples include conformity to manufacturer's specifications, UK and European legal requirements where applicable.

Systems testing equipment:

Examples include: test instruments, emission test equipment, wheel alignment equipment, tyre tread depth gauges.

Maintenance records:

Examples include: records of vehicle inspection, manufacturers’, fleet, company or
customer job cards.

**Major service:**

As defined by manufacturers' specifications appropriate to the vehicle being working upon.

**Vehicles:**

These can be any of the following – light vehicles. Additionally these vehicles may be Si, Ci, Hybrid, Electric or Alternative fuelled vehicles.

**Alternative Fuel:**

This is defined as any type of fuel that may be used to power an internal combustion engine, examples would include LPG, bio ethanol etc.

**Routine vehicle maintenance:**

Examples include: conducting scheduled maintenance, adjustments, replacements and replenishment of, or to, components and systems in accordance with manufacturer's instructions for the period and/or mileage interval.

**Vehicle technical data:**

Examples include: hard copy manuals, data on computer and data obtained from on-board diagnostic displays.
| Overview | This NOS is about removing and replacing units and components where dismantling and re-assembly of engine systems is required. It is also about evaluating the performance of replaced units and components. The units and components concerned are those outside those replaced as part of normal routine, vehicle maintenance (servicing) activities. |
Performance criteria

You must be able to:

P1 wear suitable personal protective equipment and use vehicle coverings throughout all removal and replacement activities

P2 support your removal and replacement activities by reviewing
  P2.1 vehicle technical data
  P2.2 removal and replacement procedures
  P2.3 legal requirements

P3 prepare the vehicle systems and work area for safe working procedures (where appropriate)

P4 prepare, test and use all the equipment required following manufacturers' instructions

P5 carry out all removal and replacement activities following;
  P5.1 manufacturers' instructions
  P5.2 recognised repair methods
  P5.3 health and safety requirements
  P5.4 your workplace procedures

P6 work in a way which minimises the risk of:
  P6.1 damage to other vehicle systems
  P6.2 damage to other vehicle components and units
  P6.3 contact with leakage
  P6.4 contact with hazardous substances
  P6.5 damage to your working environment

P7 ensure replaced engine components and units conform to the vehicle operating specification and any legal requirements

P8 record and report any additional faults you notice during the course of your work promptly

P9 use suitable testing methods to evaluate the performance of the reassembled system accurately

P10 ensure the reassembled system performs to the vehicle operating specification and meets any legal requirements prior to return to the customer

P11 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required
IMILV02
Remove and replace light vehicle engine units and components

P12 complete all removal and replacement activities within the agreed timescale
P13 report any expected delays in completion to the relevant person(s) promptly
### IMILV02
Remove and replace light vehicle engine units and components

<table>
<thead>
<tr>
<th>Knowledge and understanding</th>
<th>Legislative and organisational requirements and procedures</th>
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<tbody>
<tr>
<td><strong>You need to know and understand:</strong></td>
<td><strong>K1</strong> the legal requirements relating to the vehicle</td>
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<tr>
<td></td>
<td><strong>K2</strong> the legislation and workplace procedures relevant to:</td>
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<tr>
<td></td>
<td><strong>K2.1</strong> health and safety</td>
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<td></td>
<td><strong>K2.2</strong> the environment (including waste disposal)</td>
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<td></td>
<td><strong>K2.3</strong> appropriate personal and vehicle protective equipment</td>
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<tr>
<td></td>
<td><strong>K3</strong> the importance of documenting removal and replacement information</td>
</tr>
<tr>
<td></td>
<td><strong>K4</strong> the importance of working to agreed timescales and keeping others informed progress</td>
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<tr>
<td></td>
<td><strong>K5</strong> the relationship between time and costs</td>
</tr>
<tr>
<td></td>
<td><strong>K6</strong> the importance of reporting anticipated delays to the relevant person(s) promptly</td>
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</tbody>
</table>

#### Use of technical information

**You need to know and understand:**

**K7** how to find, interpret and use sources of information applicable to units and component removal and replacement within **engine systems**

**K8** the importance of using the correct sources of technical information

**K9** the purpose of and how to use identification codes

#### Electrical principles

**You need to know and understand:**

**K10** vehicle earthing principles and earthing methods

**K11** principles associated with vehicle **engine systems**, including types of sensors, actuators, their application and operation

**K12** types of circuit protection and why these are necessary

**K13** electrical safety procedures

**K14** how warning, charging and starter circuits work

**K15** electric symbols, units and terms

**K16** battery charging

**K17** electronic/electronic control system principles

**K18** the hazards associated with high energy electrical vehicle components
Remove and replace light vehicle engine units and components

Engine system operation and construction

You need to know and understand:
K19 how engine systems and their related units and components are constructed, dismantled and reassembled for the classification of vehicle worked upon
K20 how engine systems and their related units and components operate for the classification of vehicle worked upon

Equipment

You need to know and understand:
K21 how to prepare, test and use all the removal and replacement equipment required

Engine unit and component removal and replacement

You need to know and understand:
K22 how to remove and replace engine system mechanical and electrical units components for the classification of vehicle worked upon
K23 how to file, fit, tap, thread, cut and drill plastics and metals
K24 how to select and fit gaskets, sealants, fittings and fasteners
K25 how to test and evaluate the performance of replacement engine units and components and the reassembled system against the vehicle operating specifications and any legal requirements
K26 the relationship between testing methods and the engine units and components replaced – the use of appropriate test methods
K27 the properties of jointing materials and when and where they should be used
K28 the manufacturer's specification for the type and quality of engine units and components to be used
K29 how to work safely avoiding damage to other vehicle systems, components units and contact with leakage and hazardous substances
Additional information

Scope/range

1. **Equipment is**
   1.1. hand tools
   1.2. special workshop tools
   1.3. general workshop equipment
   1.4. electrical testing equipment

2. **Testing methods** are:
   2.1. visual
   2.2. aural
   2.3. functional
   2.4. measurement

3. **Units and components** are
   3.1. mechanical
   3.2. electrical

4. **Engine systems** are
   4.1. engine mechanical systems
   4.2. cooling, heating and ventilation systems
   4.3. air supply and exhaust systems
   4.4. fuel and ignition systems
   4.5. engine electrical systems
   4.6. lubrication systems
Agreed timescales:

Examples include: manufacturer’s recommended work times, job times set by your company or a job time agreed with a specific customer.

Commercial Vehicles:

These are medium and large goods vehicles of 3500kgs gross vehicle mass (GVM) and above.

Units and components:

Any units or component from the engine system as defined in the Scoping Statement below.

Vehicles:

These can be any of the following – light vehicles, commercial vehicles, motorcycles, mopeds and scooters. Additionally these vehicles may be Si, Ci, Hybrid or Alternative fuelled vehicles.

Alternative Fuel:

This is defined as any type of fuel that may be used to power an internal combustion engine, examples would include LPG, bio ethanol etc.
IMILV03
Remove and replace light vehicle electrical units and components

<table>
<thead>
<tr>
<th>Overview</th>
</tr>
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<tbody>
<tr>
<td>This NOS is about removing and replacing units and components previously</td>
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<tr>
<td>identified as faulty or damaged or where the customer has requested replacements.</td>
</tr>
<tr>
<td>It is also about evaluating the performance of replaced units and components.</td>
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<tr>
<td>The units and components concerned are those outside those replaced as part of normal routine vehicle maintenance.</td>
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</tbody>
</table>
IMILV03
Remove and replace light vehicle electrical units and components

Performance criteria

You must be able to:
P1 wear suitable personal protective equipment and use vehicle coverings throughout all removal and replacement activities

P2 support your removal and replacement activities by reviewing:
P2.1 vehicle technical data
P2.2 removal and replacement procedures
P2.3 legal requirements

P3 prepare, test and use all the equipment required following manufacturers' instructions

P4 prepare the vehicle systems and work area for safe working procedures (where appropriate)

P5 carry out all removal and replacement activities following;
P5.1 manufacturers' instructions
P5.2 your workplace procedures
P5.3 health and safety requirements

P6 work in a way which minimises the risk of:
P6.1 damage to other vehicle systems
P6.2 damage to other vehicle components and units
P6.3 contact with leakage
P6.4 contact with hazardous substances

P7 ensure replaced electrical auxiliary units and components conform to the vehicle operating specification and any legal requirements

P8 record and report any additional faults you notice during the course of your work promptly

P9 use suitable testing methods to evaluate the performance of the reassembled system accurately

P10 ensure the reassembled system performs to the vehicle operating specification and meets any legal requirements prior to return to the customer

P11 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required

P12 complete all removal and replacement activities within the agreed timescale

P13 report any expected delays in completion to the relevant person(s) promptly
### Knowledge and understanding

**Legislative and organisational requirements and procedures**

You need to know and understand:

- **K1** the legal requirements relating to the vehicle (including road safety and refrigerant handling, fuel storage or other requirements)
- **K2** the legislation and workplace procedures relevant to
  - K2.1 health and safety
  - K2.2 the environment (including waste disposal)
  - K2.3 appropriate personal and vehicle protective equipment
- **K3** the importance of documenting removal and replacement information
- **K4** the importance of working to agreed timescales and keeping others informed of progress
- **K5** the relationship between time and costs
- **K6** the importance of reporting anticipated delays to the relevant person(s) promptly

**Use of technical information**

You need to know and understand:

- **K7** how to find, interpret and use sources of information applicable to electrical units and component removal and replacement
- **K8** the importance of using the correct sources of technical information
- **K9** the purpose of and how to use identification codes

**Electrical auxiliary system operation and construction**

You need to know and understand:

- **K10** how electrical units and components are constructed, removed and replaced for the classification of vehicle worked upon
- **K11** how electrical units and components operate for the classification of vehicle worked upon

**Equipment**

You need to know and understand:

- **K12** how to prepare, test and use all the removal and replacement equipment required
### IMILV03
Remove and replace light vehicle electrical units and components

#### Electrical and electronic principles

**You need to know and understand:**

- K13 vehicle earthing principles and earthing methods
- K14 electrical and electronic principles associated with electrical systems, including types of sensors and actuators, their application and operation
- K15 types of circuit protection and why these are necessary
- K16 electrical safety procedures
- K17 how lighting, warning, charging and starter circuits work
- K18 electric symbols, units and terms
- K19 electrical/electronic control system principles
- K20 the hazards associated with high energy electrical vehicle components

#### Electrical units and component removal and replacement

**You need to know and understand:**

- K21 how to remove and replace electrical units and components for the classification of vehicle worked upon
- K22 how to test and evaluate the performance of replacement electrical units and components and the reassembled system against the vehicle operating specifications and any legal requirements
- K23 the relationship between testing methods and the electrical units and components replaced – the use of appropriate test methods
- K24 the manufacturer’s specification for the type and quality of electrical units and components to be used
- K25 how to work safely avoiding damage to other vehicle systems, components and units and contact with leakage and hazardous substances
Additional information

1. **Equipment** is
   1.1. hand tools
   1.2. special workshop tools
   1.3. general workshop equipment
   1.4. electrical meters

2. **Testing methods** are:
   2.1. visual
   2.2. aural
   2.3. functional
   2.4. measurement

3. **Electrical units and components** are
   3.1. lighting systems
   3.2. wiper systems
   3.3. security and alarm systems
   3.4. comfort and convenience systems
   3.5. infotainment systems
   3.6. communication systems
   3.7. electric window systems
   3.8. monitoring and instrumentation systems
Glossary

Agreed timescales:

Examples include: manufacturer’s recommended work times, job times set by your company or a job time agreed with a customer.

Comfort and convenience systems:

Examples are heated seats, electrically adjusted seats, heated screens, electric mirrors, heating, climate control and air conditioning.

Commercial Vehicles:

These are medium and large goods vehicles of 3500kgs gross vehicle mass (GVM) and above.

Units and components:

Any unit or component from the electrical systems defined in the Scoping Statement below.

Vehicles:

These can be any of the following – light vehicles, commercial vehicles, motorcycles, mopeds and scooters. Additionally these vehicles may be Si, Ci, Hybrid or Alternative fuelled vehicles.

Alternative Fuel:

This is defined as any type of fuel that may be used to power an internal combustion engine, examples would include LPG, bio ethanol etc.
Overview

This NOS is about removing and replacing units and components where dismantling and re-assembly of chassis systems is required. It is also about evaluating the performance of replaced units and components. The units and components concerned are those outside those replaced as part of normal routine, vehicle maintenance (servicing) activities.
IMILV04
Remove and replace light vehicle chassis units and components

Performance criteria

You must be able to:

P1 wear suitable personal protective equipment and use vehicle coverings throughout all removal and replacement activities

P2 support your removal and replacement activities by reviewing:
   P2.1 vehicle technical data
   P2.2 removal and replacement procedures
   P2.3 legal requirements

P3 prepare, set up, test and use all the equipment required following manufacturers' instructions

P4 prepare the vehicle systems and work area for safe working procedures (where appropriate)

P5 carry out all removal and replacement activities following;
   P5.1 manufacturers' instructions
   P5.2 recognised repair methods
   P5.3 your workplace procedures
   P5.4 health and safety requirements

P6 work in a way which minimises the risk of:
   P6.1 damage to other vehicle systems
   P6.2 damage to other vehicle components and units
   P6.3 contact with leakage
   P6.4 contact with hazardous substances
   P6.5 damage to your working environment

P7 ensure replaced chassis units and components conform to the vehicle operating specification and any legal requirements

P8 record and report any additional faults you notice during the course of your work promptly

P9 use suitable testing methods to evaluate the performance of the reassembled system accurately

P10 ensure the reassembled chassis system performs to the vehicle operating specification and meets any legal requirements prior to returning it to the customer

P11 ensure your records are accurate, complete and passed to the relevant...
IMILV04
Remove and replace light vehicle chassis units and components

person(s) promptly in the format required

P12 complete all removal and replacement activities within the agreed timescale

P13 report any expected delays in completion to the relevant person(s) promptly
Remove and replace light vehicle chassis units and components

Knowledge and understanding

Legislative and organisational requirements and procedures

You need to know and understand:

K1  the legislation and workplace procedures relevant to:
K1.1  health and safety
K1.2  the environment (including waste disposal)
K1.3  personal and vehicle protective equipment
K2  the importance of documenting removal and replacement information
K3  the importance of working to agreed timescales and keeping others informed of progress
K4  the relationship between time and costs
K5  the importance of reporting anticipated delays to the relevant person(s) promptly

Use of technical information

You need to know and understand:

K6  how to find, interpret and use technical information applicable to unit and component removal and replacement within **chassis systems**
K7  the importance of using the correct sources of technical information
K8  the purpose of and how to use identification codes

Electrical and electronic principles

You need to know and understand:

K9  vehicle earthing principles and earthing methods
K10  electrical and electronic principles associated with chassis and transmission systems, including types of sensors and actuators, their application and operation
K11  types of circuit protection and why these are necessary
K12  electrical safety procedures
K13  electric symbols, units and terms
K14  electrical and electronic control system principles
K15  the hazards associated with high energy electrical vehicle components

Chassis system operation and construction
### IMILV04
Remove and replace light vehicle chassis units and components

<table>
<thead>
<tr>
<th>You need to know and understand:</th>
<th>K16 how <strong>chassis systems</strong> and their related <strong>units and components</strong> are</th>
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<tbody>
<tr>
<td></td>
<td>K17 how <strong>chassis systems</strong> and their related <strong>units and components</strong> operate for classification of vehicle worked upon</td>
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</tbody>
</table>

#### Equipment

| You need to know and understand: | K18 how to prepare, test and use all the removal and replacement **equipment** required |

#### Chassis system unit and component removal and replacement

<table>
<thead>
<tr>
<th>You need to know and understand:</th>
<th>K19 how to remove and replace chassis system mechanical, electrical and hydraulic <strong>units and components</strong> for the classification of vehicle worked upon</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>K20 how to file, fit, tap, thread, cut and drill plastics and metals</td>
</tr>
<tr>
<td></td>
<td>K21 how to select and use gaskets, sealants, seals, fittings and fasteners</td>
</tr>
<tr>
<td></td>
<td>K22 how to test and evaluate the performance of replacement chassis system <strong>units and components</strong> and the reassembled system against the vehicle operating specifications and any legal requirements</td>
</tr>
<tr>
<td></td>
<td>K23 the relationship between <strong>testing methods</strong> and the chassis system <strong>units and components</strong> replaced – the use of appropriate test methods</td>
</tr>
<tr>
<td></td>
<td>K24 when replacement <strong>units and components</strong> must meet the original <strong>equipment</strong> specification (OES) for warranty or other requirements</td>
</tr>
<tr>
<td></td>
<td>K25 how to work safely avoiding damage to other vehicle systems, components and units and contact with leakage and hazardous substances (any special arrangements or precautions when working with alternative fuel or hybrid vehicles must be covered)</td>
</tr>
</tbody>
</table>
Additional information

**Scope/range**

1. **Equipment** is
   1.1. hand tools
   1.2. special workshop tools
   1.3. general workshop equipment
   1.4. electrical testing equipment

2. **Testing methods** are:
   2.1. visual
   2.2. aural
   2.3. functional
   2.4. measurement

3. **Units and components** are:
   3.1. mechanical
   3.2. electrical
   3.3. hydraulic

4. **Chassis systems** are
   4.1. steering
   4.2. suspension
   4.3. braking
Glossary

**Agreed timescales:**

Examples include: manufacturer’s recommended work times, job times set by your company or a job time agreed with a specific customer.

**Units and components:**

Any unit or component from the chassis systems defined in the Scoping Statement below.

**Functional testing:**

Examples include: use of brake roller tester, chassis dynamometer, suspension activation, security activator.

**Steering and suspension system:**

For the purposes of this NOS, this will also include wheels and tyres.

**Vehicles:**

These can be any of the following – light vehicles. Additionally these vehicles may be Si, Ci, Hybrid or Alternative fuelled vehicles.

**Alternative Fuel:**

This is defined as any type of fuel that may be used to power an internal combustion engine, examples would include LPG, bio ethanol etc.
# IMILV05
Inspect light vehicles using prescribed inspection methods

| **Overview** | This NOS is about carrying out a range of inspections on light vehicles using a variety of prescribed testing and inspection methods. |
IMILV05
Inspect light vehicles using prescribed inspection methods

Performance criteria

You must be able to:

P1 use suitable personal and vehicle protective equipment throughout all vehicle inspection activities
P2 use suitable sources of technical information to support your vehicle inspection activities
P3 prepare the vehicle systems and work area for safe working procedures (where appropriate)
P4 carry out systematic vehicle inspections following:
  P4.1 manufacturer's approved procedures
  P4.2 recognised repair methods
  P4.3 health and safety requirements
  P4.4 prescribed documentation
P5 confirm all systems and components inspected, function correctly following the manufacturer's specifications
P6 ensure your comparison of the vehicle against specification accurately identifies any:
  P6.1 differences from the vehicle specification
  P6.2 vehicle appearance and condition faults
P7 work in a way which minimises the risk of damage to the vehicle and its systems, other people and their property
P8 make suitable recommendations for future action based upon the results of your tests and inspections
P9 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required (this includes all vehicle related paperwork)
P10 complete all inspection activities within the agreed timescale and to specification
P11 report any anticipated delays in completion to the relevant person(s) promptly
## IMILV05
Inspect light vehicles using prescribed inspection methods

<table>
<thead>
<tr>
<th>Knowledge and understanding</th>
<th>Legislative and organisational requirements and procedures</th>
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<tbody>
<tr>
<td><strong>You need to know and understand:</strong></td>
<td><strong>K1</strong> the legislation and workplace procedures relevant to:</td>
</tr>
<tr>
<td></td>
<td><strong>K1.1</strong> health and safety</td>
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<tr>
<td></td>
<td><strong>K1.2</strong> the environment (including waste disposal)</td>
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<tr>
<td></td>
<td><strong>K1.3</strong> appropriate personal and vehicle protective equipment</td>
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<tr>
<td></td>
<td><strong>K2</strong> the legislation relevant to the <strong>vehicle inspections</strong> described in the Scoping Statement for this NOS</td>
</tr>
<tr>
<td></td>
<td><strong>K3</strong> the importance of making accurate records of the results of your <strong>tests</strong> and inspections and interpreting them correctly</td>
</tr>
<tr>
<td></td>
<td><strong>K4</strong> the importance of working to agreed timescales and keeping others informed progress</td>
</tr>
<tr>
<td></td>
<td><strong>K5</strong> the relationship between time and costs</td>
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<tr>
<td></td>
<td><strong>K6</strong> the importance of reporting anticipated delays to the relevant person(s) promptly</td>
</tr>
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</table>

### Sources of information

<table>
<thead>
<tr>
<th>You need to know and understand:</th>
<th>K7 how to find, interpret and use technical information</th>
</tr>
</thead>
<tbody>
<tr>
<td>K8</td>
<td>the importance of using technical information to inform your inspection and testing of vehicles</td>
</tr>
</tbody>
</table>

### Testing methods and the conduct of Inspections

<table>
<thead>
<tr>
<th>You need to know and understand:</th>
<th>K9 the hazards associated with high energy electrical vehicle components</th>
</tr>
</thead>
<tbody>
<tr>
<td>K10</td>
<td>how vehicle systems operate (including the engine area, transmission area, chassis / frame area and electrical area) and the operational tolerances for the vehicle(s) on which you are working</td>
</tr>
<tr>
<td>K11</td>
<td>how to follow procedures to carry out the systematic inspections described in the scoping statement above</td>
</tr>
<tr>
<td>K12</td>
<td>how to confirm the correct operation of vehicle systems and vehicle condition</td>
</tr>
<tr>
<td>K13</td>
<td>how to compare <strong>test</strong> and inspection results against vehicle specifications and legal requirements</td>
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<tr>
<td>K14</td>
<td>how to record <strong>test</strong> and inspection results in the format required</td>
</tr>
<tr>
<td>K15</td>
<td>how to make recommendations based upon the results of your inspections</td>
</tr>
<tr>
<td>K16</td>
<td>the implications of failing to carry out inspections activities correctly</td>
</tr>
<tr>
<td>K17</td>
<td>the implications of signing workplace documentation and vehicle records</td>
</tr>
</tbody>
</table>
Additional information

**Scope/range**

1. **Vehicle inspections** are:
   1.1. pre-work
   1.2. post work
   1.3. pre-delivery
   1.4. maintenance Inspection

   Examples of maintenance inspection at this level include:
   1.5. Brake inspections, Seasonal Inspections, Tyre inspections etc.

2. **Test** methods are:
   2.1. visual
   2.2. aural
   2.3. functional
   2.4. measurement

3. **Examples of Equipment** Includes:
   Appropriate test equipment to correctly confirm the functionality of the system that you are inspecting; this may include measuring equipment, specialist diagnostic equipment or any type of tool required.
Glossary

**Agreed timescales:**

Examples include: manufacturer’s recommended work times, job times set by your company or a job time agreed with a specific customer.

**Commercial Vehicles:**

These are medium and large goods vehicles of 3500kgs gross vehicle mass (GVM) and above.

**Vehicles:**

These can be any of the following – light vehicles Additionally these vehicles may be Si, Ci, Hybrid or Alternative fuelled vehicles.

**Alternative Fuel:**

This is defined as any type of fuel that may be used to power an internal combustion engine, examples would include LPG, bio ethanol etc.

**Sources of technical information:**

Examples include pre-determined / pre-printed inspection schedules, manufacturers' manuals and Trade Association check lists, workplace procedures.
| **Overview** | This NOS is about carrying out a range of inspections on light vehicles using a variety of testing methods and equipment. |
Performance criteria

You must be able to:

P1 use suitable personal and vehicle protective equipment throughout all vehicle inspection activities

P2 use suitable sources of technical information to support your vehicle inspection activities

P3 prepare the vehicle systems and work area for safe working procedures (where appropriate)

P4 confirm that equipment has been calibrated to meet manufacturers' and legal requirements where necessary

P5 conduct all vehicle inspections and testing following:
   P5.1 the manufacturer's approved examination methods
   P5.2 recognised methods
   P5.3 your workplace procedures
   P5.4 health and safety requirements

P6 ensure your inspection and testing of the vehicle against specification accurately identifies:
   P6.1 differences from the vehicle specification
   P6.2 vehicle appearance and condition faults
   P6.3 non-compliance with statutory requirements

P7 work in a way which minimises the risk of damage to the vehicle and its systems, other people and their property and your working environment

P8 make suitable recommendations for future action based upon the results of your tests and inspections

P9 explain the reasons for your recommendations to the relevant person(s)

P10 offer alternative options from your recommendations if the customer does not agree to your plan for future action

P11 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required

P12 complete all inspection activities within the agreed timescale

P13 report any anticipated delays in completion to the relevant person(s) promptly
# IMILV06
## Inspect light vehicles

### Knowledge and understanding

<table>
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<tr>
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</thead>
<tbody>
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<td>the legislation and workplace procedures relevant to</td>
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<td>health and safety</td>
</tr>
<tr>
<td>K1.2</td>
<td>the environment (including waste disposal)</td>
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<tr>
<td>K1.3</td>
<td>appropriate personal and vehicle protective equipment</td>
</tr>
<tr>
<td>K2</td>
<td>the legislation relevant to the types of <strong>vehicle inspections</strong> described in the Scoping Statement for this NOS</td>
</tr>
<tr>
<td>K3</td>
<td>your workplace procedures for the referral of problems:</td>
</tr>
<tr>
<td>K4</td>
<td>the importance of making accurate records of the results of your <strong>tests</strong> and inspections and interpreting them correctly</td>
</tr>
<tr>
<td>K5</td>
<td>the importance of working to agreed timescales and keeping others informed of progress</td>
</tr>
<tr>
<td>K6</td>
<td>the relationship between time, costs and profitability</td>
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<td>K7</td>
<td>the importance of reporting anticipated delays to the relevant person(s) promptly</td>
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<td>how to find, interpret and use technical information</td>
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<tr>
<td>K9</td>
<td>the importance of using technical information to inform your inspection and <strong>testing</strong> of vehicles</td>
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</table>

### Testing methods and the conduct of Inspections

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<td>K11</td>
<td>how vehicle systems operate (including the engine area, transmission area, chassis or frame area and electrical area) and the operational tolerances for vehicle(s) on which you are working</td>
</tr>
<tr>
<td>K12</td>
<td>how to follow procedures and processes to enable a logical and systematic inspection of vehicles to take place</td>
</tr>
<tr>
<td>K13</td>
<td>how to <strong>test</strong> the operation and tolerances of vehicle systems and how to assess vehicle condition; including workshop based and road <strong>tests</strong></td>
</tr>
</tbody>
</table>
IMILV06
Inspect light vehicles

K14  how to compare **test** and inspection results against vehicle specifications and legal requirements
K15  how to record **test** and inspection results in the format required
K16  how to make recommendations based upon the results of your inspections
K17  the full implications of failing to carry out an inspection correctly
K18  the implications of signing workplace documentation and vehicle records
**Scope/range**

1. *Vehicle inspections* are:
   1.1. pre-purchase
   1.2. pre-MOT test
   1.3. safety
   1.4. post-accident, pre-repair
   1.5. post accident, post-repair

2. *Test methods* are:
   2.1. visual
   2.2. aural
   2.3. functional
   2.4. measurement

3. Examples of *Equipment* include:
   3.1. emissions testing
   3.2. brake testing
   3.3. headlamp alignment
   3.4. wheel alignment
   3.5. torque setting
   3.6. specialist diagnostic equipment
   3.7. measuring equipment (eg. vernier calipers, micrometer, feeler blades, DTI’s etc.)
Glossary

Agreed timescales:

Examples include: manufacturer’s recommended work times, job times set by your company or a job time agreed with a specific customer.

Commercial Vehicles:

These are medium and large goods vehicles of 3500kgs gross vehicle mass (GVM) and above.

Vehicles:

These can be any of the following – light vehicles. Additionally these vehicles may be Si, Ci, Hybrid or Alternative fuelled vehicles.

Alternative Fuel:

This is defined as any type of fuel that may be used to power an internal combustion engine, examples would include LPG, bio ethanol etc.

Sources of technical information:

Examples include inspection schedules, MOT inspection manuals and guides, manufacturers’ manuals and Trade Association check lists, workplace procedures.
| Overview | This NOS is about diagnosing and rectifying faults occurring in the vehicle engine's mechanical, electrical, hydraulic and fluid systems. |
Performance criteria

You must be able to:

**P1** wear suitable personal protective equipment and use vehicle coverings when using **diagnostic methods** and carrying out **rectification activities**

**P2** support the identification of **faults**, by reviewing vehicle:

- **P2.1** technical data
- **P2.2** diagnostic test procedures

**P3** prepare the vehicle systems and work area for safe working procedures (where appropriate)

**P4** prepare, inspect, test and use all the required **equipment** following manufacturers' instructions

**P5** use **diagnostic methods** which are relevant to the symptoms presented

**P6** collect sufficient diagnostic information in a systematic way to enable an accurate diagnosis of engine system **faults**

**P7** identify and record any system deviation from acceptable limits accurately

**P8** accurately ensure your assessment of dismantled sub-assemblies, components and units identifies their condition and suitability for repair or replacement

**P9** inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform

**P10** carry out all diagnostic and **rectification activities** following:

- **P10.1** manufacturers' instructions
- **P10.2** recognised repair methods
- **P10.3** your workplace procedures
- **P10.4** health and safety requirements

**P11** work in a way which minimises the risk of:

- **P11.1** damage to other vehicle systems
- **P11.2** damage to other components and units
- **P11.3** contact with leakages
- **P11.4** contact with hazardous substances

**P12** ensure all repaired and replaced components and units conform to the vehicle operating specification and any legal requirements

**P13** adjust components and units, when necessary, correctly to ensure that they
operate to meet system requirements

P14 record and report any additional faults you notice during the course of work promptly

P15 use testing methods which are suitable for assessing the performance of the system rectified

P16 ensure the engine system rectified performs to the vehicle operating specification and any legal requirements prior to return to the customer

P17 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required

P18 complete all system diagnostic activities within the agreed timescale

P19 report any anticipated delays in completion to the relevant person(s) promptly
## IMILV07
Diagnose and rectify light vehicle engine and component faults

<table>
<thead>
<tr>
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<tr>
<td></td>
<td><strong>K1.1</strong> health and safety</td>
</tr>
<tr>
<td></td>
<td><strong>K1.2</strong> the environment (including waste disposal)</td>
</tr>
<tr>
<td></td>
<td><strong>K1.3</strong> appropriate personal and vehicle protective equipment</td>
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<tr>
<td></td>
<td><strong>K2</strong> legal requirements relating to the vehicle (including road safety requirements)</td>
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<tr>
<td></td>
<td><strong>K3</strong> your workplace procedures for:</td>
</tr>
<tr>
<td></td>
<td><strong>K3.1</strong> recording fault location and correction activities</td>
</tr>
<tr>
<td></td>
<td><strong>K3.2</strong> reporting the results of tests</td>
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<td></td>
<td><strong>K3.3</strong> the referral of problems</td>
</tr>
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<td></td>
<td><strong>K3.4</strong> reporting delays to the completion of work</td>
</tr>
<tr>
<td></td>
<td><strong>K4</strong> the importance of working to recognised diagnostic and rectification procedures and processes and obtaining the correct information for diagnostic and <strong>rectification activities</strong> to proceed</td>
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<tr>
<td></td>
<td><strong>K5</strong> the importance of documenting diagnostic and rectification information</td>
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<tr>
<td></td>
<td><strong>K6</strong> the importance of working to agreed timescales and keeping others informed of progress</td>
</tr>
<tr>
<td></td>
<td><strong>K7</strong> the relationship between time, costs and profitability</td>
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<td></td>
<td><strong>K8</strong> the importance of reporting anticipated delays to the relevant person(s) promptly</td>
</tr>
</tbody>
</table>

### Electrical and electronic principles

| You need to know and understand: | **K9** electrical and electronic principles associated with engine systems, including |
| | types of sensors and actuators, their application and operation |
| | **K10** how electrical and electronic engine systems operate, including electrical |
| | component function, electrical inputs, outputs, voltages and oscilloscope |
| | patterns, digital and fibre optics principles |
| | **K11** the interaction between electrical, electronic and mechanical components |
| | within vehicle engine systems |
| | **K12** how engine electrical systems interlink and interact, including multiplexing |
| | **K13** electrical symbols, unit and terms |
IMILV07
Diagnose and rectify light vehicle engine and component faults

K14  electrical safety procedures
K15  the hazards associated with high energy electrical vehicle components

Use of diagnostic and rectification equipment

You need to know and understand:

K16  how to prepare and test the accuracy of diagnostic testing equipment
K17  how to use diagnostic and rectification equipment for engine mechanical, electrical, electronic, hydraulic and fluid systems; specialist engine repair tools and general workshop equipment

Engine electrical faults, their diagnosis and correction

You need to know and understand:

K18  how engine mechanical, electrical, electronic, hydraulic and fluid systems are constructed and operate
K19  how engine mechanical, electrical, electronic, hydraulic and fluid systems are dismantled, reassembled and adjusted to manufacturers' specifications
K20  the types and causes of engine mechanical, electrical, electronic, hydraulic and fluid system, component and unit faults and failures
K21  engine mechanical, electrical, electronic, hydraulic and fluid component unit and replacement procedures, the circumstances which will necessitate replacement and other possible courses of action
K22  how to find, interpret and use sources of information on engine electrical and electronic operating specifications, diagnostic test procedures, repair procedures and legal requirements
K23  vehicle operating specifications for limits, fits and tolerances relating to engine mechanical, electrical, electronic, hydraulic and fluid systems for the vehicle(s) on which you work
K24  how to select the most appropriate diagnostic testing method for the symptoms presented
K25  how to carry out systematic diagnostic testing of engine mechanical, electrical, electronic, hydraulic and fluid systems using prescribed processes or formats
K26  how to assess the condition of mechanical, electrical, electronic, hydraulic and fluid components and units
IMILV07
Diagnose and rectify light vehicle engine and component faults

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<tbody>
<tr>
<td>K27</td>
<td>how to interpret test results and vehicle data in order to identify the location and cause of engine system <strong>faults</strong></td>
</tr>
<tr>
<td>K28</td>
<td>how to carry out the <strong>rectification activities</strong> in order to correct <strong>faults</strong> in the engine mechanical, electrical, electronic, hydraulic and fluid systems</td>
</tr>
<tr>
<td>K29</td>
<td>the relationship between test methodology and the <strong>faults</strong> repaired – the use of appropriate testing methods</td>
</tr>
<tr>
<td>K30</td>
<td>how to make cost effective recommendations for rectification</td>
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</tbody>
</table>
IMILV07
Diagnose and rectify light vehicle engine and component faults

Additional information

Scope/range

1. Faults occur within
   1.1. the engine mechanical system
   1.2. the engine electrical and electronic systems
   1.3. the engine hydraulic and fluid systems

2. Diagnostic methods are
   2.1. measurement
   2.2. functional testing
   2.3. electrical and electronic systems testing

3. Diagnostic Testing is defined as:
   3.1. Verify the fault
   3.2. Collect further information
   3.3. Evaluate the evidence
   3.4. Carry out further tests in a logical sequence
   3.5. Rectify the problem
   3.6. Check all systems

4. Equipment is
   4.1. diagnostic and rectification equipment for engine mechanical systems
   4.2. diagnostic and rectification equipment for engine electrical systems
   4.3. diagnostic and rectification equipment for engine hydraulic and fluid systems
   4.4. specialist repair tools
   4.5. general workshop equipment

5. Rectification activities are defined as:
   A suitable repair, replacement, re-coding or re-programming that rectifies
   the fault(s) identified form the diagnostic activities carried out.
Glossary

**Agreed timescales:**

Examples include: manufacturer’s recommended work times, job times set by your company or a job time agreed with a specific customer.

**Commercial Vehicles:**

These are medium and large goods vehicles of 3500kgs gross vehicle mass (GVM) and above.

**Diagnostic information:**

This relates to mechanical condition, including wear, run out, pressures and compressions, flow, leakage and electrical measurements such as voltage and pulse displays, electronic systems data, including fault codes, sensor measurements and control unit outputs and/or signals.

**Engine Area:**

Engine mechanical, cooling systems, electronic ignition, petrol fuel injection, diesel fuel injection, lubrication, engine management systems, exhaust gas recirculation and starting/charging.

**Engine and component faults:**

These are faults that require a multi stage inspection and a series of test results to identify the cause.

**Functional testing:**

Examples include: engine balance, power balance, performance testing and road testing where relevant.
Hydraulic and fluid systems:

These are fuels, oil, lubrication, cooling, air conditioning etc.

Recommendations:

Examples include: servicing, dismantling for further inspection and test, repair and replacement.

Vehicles:

These can be any of the following – light vehicles. Additionally these vehicles may be Si, Ci, Hybrid or Alternative fuelled vehicles.

Alternative Fuel:

This is defined as any type of fuel that may be used to power an internal combustion engine, examples would include LPG, bio ethanol etc.
## Overview

This NOS is about diagnosing and rectifying faults occurring within vehicle steering, suspension systems and braking systems.
Performance criteria

You must be able to:

P1 wear suitable personal protective equipment and use vehicle coverings when using diagnostic methods and carrying out rectification activities

P2 support the identification of faults, by reviewing vehicle:
  P2.1 technical data
  P2.2 diagnostic test procedures

P3 prepare the vehicle systems and work area for safe working procedures (where appropriate)

P4 prepare, inspect, test and use all the required equipment following manufacturers' instructions

P5 use diagnostic methods which are relevant to the symptoms presented

P6 collect diagnostic information in a systematic way relevant to the diagnostic methods used

P7 collect sufficient diagnostic information to enable an accurate diagnosis of chassis system faults

P8 identify and record any system deviation from acceptable limits accurately

P9 accurately ensure your assessment of dismantled sub-assemblies, components and units identifies their condition and suitability for repair or replacement

P10 inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform

P11 carry out all rectification activities following:
  P11.1 manufacturers' instructions
  P11.2 your workplace procedures
  P11.3 health and safety requirements

P12 work in a way which minimises the risk of:
  P12.1 damage to other vehicle systems
  P12.2 damage to other components and units
  P12.3 contact with leakages
  P12.4 contact with hazardous substances

P13 ensure all repaired and replaced components and units conform to the vehicle operating specification and any legal requirements
P14 when necessary, adjust components and units correctly to ensure that they operate to meet system requirements

P15 record and report any additional faults you notice during the course of work promptly

P16 use testing methods which are suitable for assessing the performance of the system rectified

P17 ensure the chassis system rectified performs to the vehicle operating specification and any legal requirements prior to return to the customer

P18 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required

P19 complete all system diagnostic activities within the agreed timescale

P20 report any anticipated delays in completion to the relevant person(s) promptly
Diagnose and rectify light vehicle chassis system faults

**Knowledge and understanding**

**Legislative and organisational requirements and procedures**

You need to know and understand:

- **K1** the legislation and workplace procedures relevant to:
  - K1.1 health and safety
  - K1.2 the environment (including waste disposal)
  - K1.3 appropriate personal and vehicle protective equipment

- **K2** legal requirements relating to the vehicle (including road safety requirements)

- **K3** your workplace procedures for:
  - K3.1 recording fault location and correction activities
  - K3.2 reporting the results of tests
  - K3.3 the referral of problems
  - K3.4 reporting delays to the completion of work

- **K4** the importance of working to recognised diagnostic and rectification procedures and processes and obtaining the correct information for diagnostic and **rectification activities** to proceed

- **K5** the importance of, documenting diagnostic and rectification information

- **K6** the importance of working to agreed timescales and keeping others informed of progress

- **K7** the relationship between time, costs and profitability

- **K8** the importance of reporting anticipated delays to the relevant person(s) promptly

**Electrical and electronic principles**

You need to know and understand:

- **K9** electrical and electronic principles associated with **chassis systems**, including types of sensors and actuators, their application and operation

- **K10** how electrical and electronic **chassis systems** operate, including electrical component function, electrical inputs, outputs, voltages and oscilloscope patterns, digital and fibre optics principles

- **K11** the interaction between electrical, electronic and mechanical components within vehicle **chassis systems**

- **K12** how chassis electrical systems interlink and interact, including multiplexing

- **K13** electrical symbols, units and terms
IMILV08
Diagnose and rectify light vehicle chassis system faults

K14  electrical safety procedures
K15  the hazards associated with high energy electrical vehicle components

Use of diagnostic and rectification equipment

You need to know and understand:
K16  how to prepare and test the accuracy of diagnostic testing equipment
K17  how to use diagnostic and rectification equipment for chassis mechanical, electrical, hydraulic and fluid systems, specialist repair tools and general workshop equipment

Chassis faults, their diagnosis and correction

You need to know and understand:
K18  how chassis mechanical, electrical, electronic, hydraulic and fluid systems are constructed and operate
K19  how chassis mechanical, electrical, electronic, hydraulic and fluid systems are dismantled, reassembled and adjusted to manufacturers specifications
K20  the types and causes of chassis mechanical, electrical, electronic, hydraulic and fluid system, component and unit faults and failures
K21  chassis mechanical, electrical, hydraulic and fluid component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action
K22  how to find, interpret and use sources of information on chassis electrical operating specifications, diagnostic test procedures, repair procedures and legal requirements
K23  vehicle operating specifications for limits, fits and tolerances relating to chassis mechanical, electrical, electronic, hydraulic and fluid systems for the vehicle(s) on which you work
K24  how to select the most appropriate diagnostic testing method for the symptoms presented
K25  how to carry out systematic diagnostic testing of chassis mechanical, electrical, electronic, hydraulic and fluid systems using a prescribed process or format
K26  how to assess the condition evident within chassis mechanical, electrical, electronic, hydraulic and fluid components and units
K27 how to interpret test results and vehicle data in order to identify the location and cause of vehicle system faults
K28 how to carry out the **rectification activities** in order to correct faults in the **chassis** mechanical, electrical, electronic, hydraulic and fluid systems
K29 the relationship between test methodology and the faults repaired – the use of appropriate testing methods
K30 how to make cost effective recommendations for rectification
Addition information

Scope/range

1. **Chassis systems** are:
   1.1. steering
   1.2. suspension
   1.3. braking

2. **Diagnostic methods** are:
   2.1. measurement
   2.2. functional testing
   2.3. electrical and electronic systems testing

3. **Diagnostic Testing** is defined as:
   3.1. Verify the fault
   3.2. Collect further information
   3.3. Evaluate the evidence
   3.4. Carry out further tests in a logical sequence
   3.5. Rectify the problem
   3.6. Check all systems

4. **Equipment** is:
   4.1. diagnostic and rectification equipment for chassis mechanical systems
   4.2. diagnostic and rectification equipment for chassis electrical systems
   4.3. diagnostic and rectification equipment for chassis hydraulic and fluid systems
   4.4. specialist repair tools
   4.5. general workshop equipment

5. **Faults** are:
   5.1. mechanical
   5.2. electrical and electronic
   5.3. hydraulic and fluid

6. **Rectification activities** are defined as:
A suitable repair or replacement that rectifies the fault(s) identified from the diagnostic activities carried out.
**Glossary**

**Agreed timescales:**

Examples include: manufacturer’s recommended work times, job times set by your company or a job time agreed with a specific customer.

**Chassis or Frame Area:**

Suspension systems, assisted steering systems, non-assisted steering systems, braking systems, ABS/traction control, wheels and tyres.

**Chassis system faults:**

These are faults that require a multi stage inspection and a series of test results to identify the cause.

**Diagnostic information:**

This relates to mechanical condition, including wear, run out, pressures, flow, leakage and electrical measurements such as voltage and pulse displays, electronic systems data, including fault codes, sensor measurements and control NOS outputs and/or signals.

**Functional testing:**

Examples include: suspension and steering alignment, performance testing and road testing where relevant.

**Hydraulic and fluid systems:**

Examples are: hydraulic braking systems, hydro-pneumatic suspension systems, power steering.

**Recommendations:**
Examples include: servicing, dismantling for further inspection and test, repair and replacement.

**Vehicles:**

These can be any of the following – light vehicles. Additionally these vehicles may be Si, Ci, Hybrid, Electric or Alternative fuelled vehicles.

**Alternative Fuel:**

This is defined as any type of fuel that may be used to power an internal combustion engine, examples would include LPG, bio ethanol etc.
Overview

This NOS is about the overhaul of light vehicle mechanical units, involving dismantling, assessment, repair, replacement or adjustment of internal components together with re-assembly and testing.
IMILV11
Overhaul light vehicle mechanical units

**Performance criteria**

You must be able to:

P1 wear suitable personal protective equipment throughout all **overhauling activities**

P2 use suitable sources of technical information to support your **overhauling activities**

P3 prepare the vehicle mechanical unit and work area for safe working procedures (where appropriate)

P4 assess and prepare all the equipment required, following manufacturers' instructions, prior to use

P5 use the tools and equipment required correctly and safely throughout all **overhauling activities**

P6 carry out all **overhauling activities** following:

P6.1 manufacturers' instructions

P6.2 recognised repair methods

P6.3 your workplace procedures

P6.4 health and safety requirements

P7 work in a way which minimises the risk of:

P7.1 damage to other components

P7.2 leakages

P7.3 contact with hazardous substances

P8 ensure your assessment of the dismantled units identifies accurately its condition and suitability for overhaul

P9 inform the relevant person(s) promptly where an overhaul is uneconomic or unsatisfactory to perform

P10 use testing methods which comply with the manufacturer's requirements

P11 adjust the units components correctly, when necessary, to ensure that they operate to meet the vehicle operating requirements

P12 ensure the overhauled units and assemblies conform to the vehicle operating specification and any legal requirements

P13 ensure your overhaul records are accurate, complete and passed to the relevant person(s) promptly in the format required

P14 complete all **overhauling activities** within the agreed timescale
P15 report any anticipated delays in completion to the relevant person(s) promptly
<table>
<thead>
<tr>
<th>Knowledge and understanding</th>
<th>Legislative and organisational requirements and procedures</th>
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<tbody>
<tr>
<td>You need to know and understand:</td>
<td>K1 the legal requirements applicable to the units and assemblies overhauled (including road safety requirements)</td>
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<td></td>
<td>K2 the legislation and workplace procedures relevant to</td>
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<td>K3 your workplace procedures for:</td>
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<td>K4 the importance of working to recognised overhauling and repair procedures and processes and obtaining the correct information for overhauling and repair activities to proceed</td>
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<td>K5 the importance of, documenting repair information</td>
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**Equipment**

| You need to know and understand: | K8 how to prepare, and assess the accuracy and operation of all the overhauling and testing equipment required |
| | K9 how to use all the overhauling and testing equipment required |

**Mechanical units overhauling activities**

| You need to know and understand: | K10 how to find, interpret and use sources of information on overhauling procedures and statutory requirements |
| | K11 how vehicle mechanical units and assemblies operate |
K12 how mechanical units and assemblies are constructed, dismantled and reassembled
K13 the possible causes of faults in mechanical units and assemblies
K14 vehicle operating specification for limits, fits and tolerances and where this information can be sourced
K15 how to assess the condition evident within units, sub-assemblies and components
K16 the cost-benefit / relationship between the reconditioning, repair and replacement of components
K17 how to carry out **overhauling activities** for the type(s) of units worked upon
K18 the relationship between test methodology and the faults repaired – the use of appropriate testing methods
K19 how to test and evaluate the performance of overhauled units against the operating specification
K20 how to interpret test results
K21 how to identify the types and causes of mechanical units and assembly failure
K22 how to make suitable adjustments to components and units
K23 how to work safely avoiding personal injury, damage to components leakage and hazardous substances
K24 how to make cost effective recommendations based upon the cost-benefit relationship between the reconditioning, repair and replacement of components
Additional information

**Scope/range**

1. **Overhaul activities** are:
   1.1. dismantling
   1.2. assessment
   1.3. repair
   1.4. replacement
   1.5. adjustment of internal components
   1.6. re-assembly
   1.7. functional testing
Glossary

**Vehicles:**

These can be any of the following – light vehicles. Additionally these vehicles may be Si, Ci, Hybrid, Electric or Alternative fuelled vehicles.

**Alternative Fuel:**

This is defined as any type of fuel that may be used to power an internal combustion engine, examples would include LPG, bio ethanol etc.

**Adjustments:**

Examples include, adjustments made to clearances, gaps, settings, pressures, tensions, pre-load and speeds.

**Agreed timescales:**

Examples include manufacturer’s recommended work times, job times set by your company or a job time agreed with a specific customer.

**Assessments:**

Examples include those for wear, damage, alignment, corrosion, leakage, distortion and balance.

**Equipment:**

Examples include hand tools, pullers and presses, measuring instruments, refurbishment tools, general workshop equipment and special service tools.

**Functional testing:**

This refers to any applicable functional tests carried out after overhaul.
Mechanical Units:

Examples are: engines, gear boxes, final drive assemblies, steering units and components, suspension units and components.

Testing methods:

As prescribed by the appropriate technical literature.
Overview

This NOS is about removing and replacing units and components where dismantling and re-assembly of transmission and driveline systems is required. It is also about evaluating the performance of replaced units and components. The units and components concerned are those outside those replaced as part of normal routine, vehicle maintenance (servicing) activities.
IMILV12
Remove and replace light vehicle transmission and driveline units and components

Performance criteria

You must be able to:

P1 wear suitable personal protective equipment and use vehicle coverings throughout all removal and replacement activities

P2 support your removal and replacement activities by reviewing:
   P2.1 vehicle technical data
   P2.2 removal and replacement procedures
   P2.3 legal requirements

P3 prepare the vehicle systems and work area for safe working procedures (where appropriate)

P4 prepare, inspect, set up, test and use all the equipment required following manufacturers' instructions

P5 carry out all removal and replacement activities following;
   P5.1 manufacturers' instructions
   P5.2 recognised repair methods
   P5.3 health and safety requirements
   P5.4 your workplace procedures

P6 work in a way which minimises the risk of:
   P6.1 damage to other vehicle systems
   P6.2 damage to other vehicle components and units
   P6.3 contact with leakage
   P6.4 contact with hazardous substances
   P6.5 damage to your working environment

P7 ensure replaced driveline units and components conform to the vehicle operating specification and any legal requirements

P8 record and report any additional faults you notice during the course of your work promptly

P9 use suitable testing methods to evaluate the performance of the reassembled system accurately

P10 ensure the reassembled driveline system performs to the vehicle operating specification and meets any legal requirements prior to return to the customer

P11 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required
IMILV12
Remove and replace light vehicle transmission and driveline units and components

P12  complete all removal and replacement activities within the agreed timescale
P13  report any expected delays in completion to the relevant person(s) promptly
Remove and replace light vehicle transmission and driveline units and components

Knowledge and understanding

You need to know and understand:

K1 the legal requirements relating to the vehicle
K2 the legislation and workplace procedures relevant to
   K2.1 health and safety
   K2.2 the environment (including waste disposal)
   K2.3 personal and vehicle protective equipment
K3 your workplace procedures for:
   K3.1 recording removal and replacement information
   K3.2 the referral of problems
   K3.3 reporting delays to the completion of work
K4 the importance of documenting removal and replacement information
K5 the importance of working to agreed timescales and keeping others informed progress
K6 the relationship between time and costs
K7 the importance of reporting anticipated delays to the relevant person(s) promptly

Use of technical information

You need to know and understand:

K8 how to find, interpret and use sources of information applicable to units and component removal and replacement within driveline systems
K9 the importance of using the correct sources of technical information
K10 the purpose of and how to use identification codes

Electrical and electronic principles

You need to know and understand:

K11 vehicle earthing principles and earthing methods
K12 electrical and electronic principles associated with transmission and driveline systems, including types of sensors and actuators, their application and operation
K13 types of circuit protection and why these are necessary
K14 electrical safety procedures electric symbols, units and terms
**IMILV12**
**Remove and replace light vehicle transmission and driveline units and components**

<table>
<thead>
<tr>
<th>Knowledge (K)</th>
<th>Description</th>
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<tbody>
<tr>
<td>K15</td>
<td>electrical and electronic control system principles</td>
</tr>
<tr>
<td>K16</td>
<td>the hazards associated with high energy electrical vehicle components</td>
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</table>

**Transmission and driveline system operation and construction**

**You need to know and understand:**

<table>
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<th>Knowledge (K)</th>
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<tbody>
<tr>
<td>K17</td>
<td>how driveline systems and their related units and components are constructed, removed and replaced for the classification of vehicle worked upon</td>
</tr>
<tr>
<td>K18</td>
<td>how driveline systems and their related units and components operate for the classification of vehicle worked upon</td>
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</tbody>
</table>

**Equipment**

**You need to know and understand:**

<table>
<thead>
<tr>
<th>Knowledge (K)</th>
<th>Description</th>
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<tbody>
<tr>
<td>K19</td>
<td>how to prepare, inspect, test and use all the removal and replacement equipment required</td>
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</tbody>
</table>

**Driveline system units and component removal and replacement**

**You need to know and understand:**

<table>
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<th>Knowledge (K)</th>
<th>Description</th>
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<tbody>
<tr>
<td>K20</td>
<td>how to remove and replace driveline system mechanical, electrical and hydraulic units and components for the classification of vehicle worked upon</td>
</tr>
<tr>
<td>K21</td>
<td>how to file, fit, tap, thread, cut and drill plastics and metals</td>
</tr>
<tr>
<td>K22</td>
<td>how to select and use gaskets, sealants, seals, fittings and fasteners</td>
</tr>
<tr>
<td>K23</td>
<td>how to test and evaluate the performance of replacement driveline system units and components and the reassembled system against the vehicle operating specifications and any legal requirements</td>
</tr>
<tr>
<td>K24</td>
<td>the relationship between testing methods and the driveline system units and components replaced – the use of appropriate test methods</td>
</tr>
<tr>
<td>K25</td>
<td>when replacement units and components must meet the original equipment specification (OES) for warranty or other requirements</td>
</tr>
<tr>
<td>K26</td>
<td>how to work safely avoiding damage to other vehicle systems, components and units and contact with leakage and hazardous substances</td>
</tr>
</tbody>
</table>
Additional information

Scope/range

1. **Equipment** is:
   1.1. hand tools
   1.2. special workshop tools
   1.3. general workshop equipment
   1.4. electrical testing equipment

2. **Testing methods** are:
   2.1. visual
   2.2. aural
   2.3. functional
   2.4. measurement

3. **Units and components** are:
   3.1. mechanical
   3.2. electrical
   3.3. hydraulic

4. **Transmission and driveline systems** are:
   4.1. gearbox
   4.2. hubs and bearings
   4.3. final drive assembly
   4.4. driveline components (including prop and drive shafts)
   4.5. clutch
Glossary

Agreed timescales:

Examples include: manufacturer’s recommended work times, job times set by your company or a job time agreed with a specific customer.

Units and components:

Any unit or component from the transmission and driveline systems defined in the Scoping Statement below.

Functional testing:

Examples include: use of brake roller tester, chassis dynamometer, transmission stall test.

Vehicles:

These can be any of the following – light vehicles. Additionally these vehicles may be Si, Ci, Hybrid, Electric or Alternative fuelled vehicles.

Alternative Fuel:

This is defined as any type of fuel that may be used to power an internal combustion engine, examples would include LPG, bio ethanol etc.
Overview

This NOS is about diagnosing and rectifying faults occurring within light vehicle gearboxes, hubs and bearings, driveline shafts, clutches, differentials and final drive units.
Diagnose and rectify light vehicle transmission and driveline system faults

Performance criteria

You must be able to:

P1 wear suitable personal protective equipment and use vehicle coverings when using diagnostic methods and carrying out rectification activities

P2 support the identification of faults, by reviewing vehicle:
   P2.1 technical data
   P2.2 diagnostic test procedures

P3 prepare the vehicle systems and work area for safe working procedures (where appropriate)

P4 prepare, inspect, test and use all the required equipment following manufacturers' instructions

P5 use diagnostic methods which are relevant to the symptoms presented

P6 collect diagnostic information in a systematic way relevant to the diagnostic methods used

P7 collect sufficient diagnostic information to enable an accurate diagnosis of transmission and driveline system faults

P8 identify and record any system deviation from acceptable limits accurately

P9 accurately ensure your assessment of dismantled sub-assemblies, components and units identifies their condition and suitability for repair or replacement inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform

P10 carry out all diagnostic and rectification activities following:
   P10.1 manufacturers' instructions
   P10.2 recognised repair methods
   P10.3 your workplace procedures
   P10.4 health and safety requirements

P11 work in a way which minimises the risk of:
   P11.1 damage to other vehicle systems
   P11.2 damage to other components and units
   P11.3 contact with leakages
   P11.4 contact with hazardous substances

P12 ensure all repaired and replaced components and units conform to the vehicle operating specification and any legal requirements
IMILV13
Diagnose and rectify light vehicle transmission and driveline system faults

P13 adjust components and units correctly, when necessary, to ensure that they operate to meet system requirements

P14 record and report any additional faults you notice during the course of work promptly

P15 use testing methods which are suitable for assessing the performance of the system rectified

P16 ensure the transmission and driveline system rectified performs to the vehicle operating specification and any legal requirements prior to return to the customer

P17 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required

P18 complete all system diagnostic activities within the agreed timescale

P19 report any anticipated delays in completion to the relevant person(s) promptly
Diagnose and rectify light vehicle transmission and driveline system faults

Knowledge and understanding

**Legislative and organisational requirements and procedures**

You need to know and understand:

- K1 the legislation and workplace procedures relevant to:
  - K1.1 health and safety
  - K1.2 the environment (including waste disposal)
  - K1.3 appropriate personal and vehicle protective equipment

- K2 legal requirements relating to the vehicle (including road safety requirements)

- K3 your workplace procedures for:
  - K3.1 recording fault location and correction activities
  - K3.2 reporting the results of tests
  - K3.3 the referral of problems
  - K3.4 reporting delays to the completion of work

- K4 the importance of working to recognised diagnostic procedures and processes and obtaining the correct information for diagnostic activities to proceed

- K5 the importance of, documenting diagnostic and rectification information

- K6 the importance of working to agreed timescales and keeping others informed of progress

- K7 the relationship between time, costs and profitability

- K8 the importance of reporting anticipated delays to the relevant person(s) promptly

**Electrical and electronic principles**

You need to know and understand:

- K9 electrical and electronic principles associated with transmission and driveline systems, including types of sensors and actuators, their application and operation

- K10 how electrical and electronic transmission and driveline systems operate, including electrical component function, electrical inputs, outputs, voltages and oscilloscope patterns, digital and fibre optics principles

- K11 the interaction between electrical, electronic and mechanical components within vehicle transmission and driveline systems

- K12 how transmission and driveline electrical systems interlink and interact, including multiplexing
IMILV13
Diagnose and rectify light vehicle transmission and driveline system faults

K13   electrical symbols, units and terms
K14   electrical safety procedures
K15   the hazards associated with high energy electrical vehicle components

Use of diagnostic and rectification equipment

You need to know and understand:

K16   how to prepare and test the accuracy of diagnostic testing equipment
K17   how to use diagnostic and rectification equipment for transmission and driveline mechanical, electrical, hydraulic and fluid systems, specialist repair tools and general workshop equipment

Vehicle system faults, their diagnosis and correction

You need to know and understand:

K18   how transmission and driveline mechanical, electrical, electronic, hydraulic and fluid systems are constructed and operate
K19   how transmission and driveline mechanical, electrical, electronic, hydraulic and fluid systems are dismantled, reassembled and adjusted to manufacturers’ specification
K20   the types and causes of transmission and driveline mechanical, electrical, electronic, hydraulic and fluid system, component and unit faults and failures
K21   transmission and driveline mechanical, electrical, hydraulic and fluid component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action
K22   how to find, interpret and use sources of information on transmission and driveline electrical operating specifications, diagnostic test procedures, repair procedures and legal requirements
K23   vehicle operating specifications for limits, fits and tolerances relating to transmission and driveline mechanical, electrical, electronic, hydraulic and fluid systems for the vehicle(s) on which you work
K24   how to select the most appropriate diagnostic testing method for the symptoms presented
K25   how to carry out systematic diagnostic testing of transmission and driveline mechanical, electrical, electronic, hydraulic and fluid systems using a prescribed process or format
K26  how to assess the condition evident within transmission and driveline mechanical, electrical, electronic, hydraulic and fluid components and units

K27  how to interpret test results and vehicle data in order to identify the location and cause of vehicle system faults

K28  how to carry out the rectification activities in order to correct faults in the transmission and driveline mechanical, electrical, electronic, hydraulic and fluid systems

K29  the relationship between test methodology and the faults repaired – the use of appropriate testing methods

K30  how to make cost effective recommendations for rectification
Additional information

Scope/range

1. **Transmission and driveline systems** are:
   1.1. gearbox
   1.2. hubs and bearings
   1.3. final drive assembly
   1.4. driveline components
   1.5. clutch

2. **Diagnostic methods** are:
   2.1. measurement
   2.2. functional testing
   2.3. electrical and electronic systems testing

3. **Diagnostic Testing** is defined as:
   3.1. Verify the fault
   3.2. Collect further information
   3.3. Evaluate the evidence
   3.4. Carry out further tests in a logical sequence
   3.5. Rectify the problem
   3.6. Check all systems

4. **Equipment** is:
   4.1. diagnostic and rectification equipment for transmission mechanical systems
   4.2. diagnostic and rectification equipment for transmission electrical systems
   4.3. diagnostic and rectification equipment for transmission hydraulic and fluid systems
   4.4. specialist repair tools
   4.5. general workshop equipment

5. **Faults** are:
   5.1. mechanical
5.2. electrical and electronic
5.3. hydraulic and fluid

6. **Rectification activities** are defined as:
   A suitable repair of replacement that rectifies the fault(s) identified form the diagnostic activities carried out.
Glossary

Agreed timescales:

Examples include: manufacturers’ recommended work times, job times set by your company or a job time agreed with a specific customer.

Transmission and driveline system fault:

These are faults that require a multi stage inspection and a series of test results to identify the cause.

Diagnostic information:

This relates to mechanical condition, including wear, run out, pressures, flow, leakage and electrical measurements such as voltage and pulse displays, electronic systems data, including fault codes, sensor measurements and control unit outputs and/or signals.

Functional testing:

Examples include performance testing and road testing where relevant.

Hydraulic and fluid systems:

Examples include oil coolers, oil pumps and torque converters.

Transmission Area:

Clutch assemblies, clutch operating systems, manual and automatic gear boxes (including electronic control), drivelines, hubs and final drive assemblies.

Recommendations:

Examples include: servicing, dismantling for further inspection and test, repair and replacement.
Vehicles:

These can be any of the following – light vehicles. Additionally these vehicles may be Si, Ci, Hybrid, Electric or Alternative fuelled vehicles.

Alternative Fuel:

This is defined as any type of fuel that may be used to power an internal combustion engine, examples would include LPG, bio ethanol etc.
Overview

This NOS is about devising and implementing strategies to diagnose faults when the application of standard manufacturer diagnostic procedures has failed to reveal the source and cause of problems. You are also required to identify the best course of action to be taken to correct problems.
Diagnose faults where no prescribed process or format is available in light vehicle environments

Performance criteria

You must be able to:

P1  wear suitable personal protective equipment and use vehicle coverings throughout all diagnostic related activities in the workshop

P2  confirm with the relevant people that all standard diagnostic procedures and techniques have been systematically and correctly applied to the vehicle prior to undertaking further work

P3  prepare the vehicle systems and work area for safe working procedures (where appropriate)

P4  analyse all previous system fault information, diagnostic test methods and results correctly to verify the inconclusive results prior to undertaking further work

P5  liaise with the relevant manufacturer’s representative to obtain up to date information, advice and guidance relevant to the identified fault, when necessary

P6  use diagnostic methods which are relevant to the symptoms presented

P7  collect diagnostic information in a systematic and structured way which progressively eliminates all possible causes of the fault

P8  apply the checks and tests that are most likely to be effective in revealing the cause of the fault

P9  carry out all diagnostic activities following:
   P9.1  your workplace procedures
   P9.2  health and safety requirements
   P9.3  environmental requirements

P10  work in a way which minimises the risk of:
    P10.1  damage to other vehicle systems
    P10.2  damage to other components and units
    P10.3  contact with leakages
    P10.4  contact with hazardous substances

P11  use any equipment required, correctly and safely throughout all diagnostic and rectification activities

P12  collect sufficient diagnostic information to enable an accurate diagnosis of the fault
Diagnose faults where no prescribed process or format is available in light vehicle environments

P13  correctly identify the **cause(s) of the fault**
P14  identify and record any system deviation from acceptable limits accurately
P15  accurately ensure your assessment of dismantled sub-assemblies, components and units identifies their condition and suitability for repair or replacement
P16  make clear recommendations for a suitable course of action to rectify the fault
P17  inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform
P18  complete all system checks and tests in the most cost and time effective way for the fault presented
P19  complete all system diagnostic activities within the agreed timescale
P20  ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required
P21  report any anticipated delays in completion to the relevant person(s) promptly
Diagnose faults where no prescribed process or format is available in light vehicle environments

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<td>K4 how to formulate and construct your own diagnostic procedures and processes in order for diagnostic activities to proceed</td>
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<td>K5 the importance of documenting diagnostic and rectification information</td>
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Electrical and electronic principles

You need to know and understand:

| K9 electrical and electronic principles including types of sensors and actuators, their application and operation |
| K10 how electrical and electronic vehicle systems operate, including electrical component function, electrical inputs, outputs, voltages and oscilloscope patterns, digital and fibre optics principles |
| K11 the interaction between electrical, electronic, mechanical and hydraulic components and systems within a vehicle, including multiplexing |
| K12 electrical symbols, units and terms |
| K13 electrical safety procedures |
| K14 the hazards associated with high energy electrical vehicle components |
IMILV14
Diagnose faults where no prescribed process or format is available in light vehicle environments

Use of diagnostic and rectification equipment

You need to know and understand:

K15  how to prepare and test the accuracy of diagnostic testing equipment
K16  how to use diagnostic and rectification equipment for mechanical, electrical, hydraulic and fluid systems, specialist repair tools and general workshop equipment

Vehicle system faults, their diagnosis and correction

You need to know and understand:

K17  how vehicle mechanical, electrical, electronic, hydraulic and fluid systems are constructed and operate
K18  how vehicle mechanical, electrical, electronic, hydraulic and fluid systems are dismantled, reassembled and adjusted to manufacturers’ specification
K19  the types and causes of vehicle mechanical, electrical, electronic, hydraulic and fluid system component and units faults and failures
K20  vehicle mechanical, electrical, electronic, hydraulic and fluid component and units replacement procedures, the circumstances which will necessitate replacement and other possible courses of action
K21  how to find, interpret and use sources of information on vehicle mechanical, electrical, electronic, hydraulic and fluid system operating specifications, diagnostic test procedures, repair procedures and legal requirements
K22  how to select the most appropriate diagnostic testing method for the symptoms presented
K23  how to carry out systematic diagnostic testing of vehicle mechanical, electrical, electronic, hydraulic and fluid systems
K24  how to interpret, evaluate and analyse test results and vehicle data in order to identify the location and cause of vehicle system faults
K25  how to carry out the rectification activities in order to correct faults in vehicle mechanical, electrical, electronic, hydraulic and fluid systems
K26  your workplace procedure, policy and procedure for:
   K26.1  work carried out under warranty
   K26.2  liaising with manufacturers and outside agencies
K27  the relationship between test methodology and the faults repaired – the use of
Diagnose faults where no prescribed process or format is available in light vehicle environments

appropriate testing methods

K28 how to make cost effective recommendations for rectification
Diagnose faults where no prescribed process or format is available in light vehicle environments

**Additional information**

**Scope/range**

1. **Causes of faults** are:
   1.1. mechanical
   1.2. electrical
   1.3. electronic
   1.4. hydraulic

2. **Faults** cover the:
   2.1. vehicle engine area
   2.2. transmission and driveline area
   2.3. chassis system area
   2.4. electrical and electronic units and components area

3. **Diagnostic methods** are:
   3.1. measurement
   3.2. functional testing
   3.3. electrical and electronic systems testing

4. **Diagnostic Testing** is defined as:
   4.1. verify the fault
   4.2. collect further information
   4.3. evaluate the evidence
   4.4. carry out further tests in a logical sequence
   4.5. rectify the problem
   4.6. check all systems

5. **Equipment** is:
   5.1. diagnostic and rectification equipment for mechanical systems
   5.2. diagnostic and rectification equipment for electrical and electronic systems
   5.3. diagnostic and rectification equipment for hydraulic and fluid systems
   5.4. specialist repair tools
   5.5. general workshop equipment
6. **Rectification activities** are defined as:
   A suitable repair, replacement, re-coding or re-programming that rectifies
   the fault(s) identified from the diagnostic activities carried out.

7. **Operating specifications** include:
   7.1. limits
   7.2. fits
   7.3. tolerances
Glossary

Diagnostic Equipment:

Examples include electronic testing equipment, brake testing equipment, steering geometry equipment, wheel balancing equipment, emission test equipment, measuring instruments, special service tools, charging service stations, noise and vibration detection equipment.

Recommendations:

Examples include: dismantling, return to manufacturer, repair or replacement.

Vehicles:

These can be any of the following – light vehicles. Additionally these vehicles may be Si, Ci, Hybrid, Electric or Alternative fuelled vehicles.

Alternative Fuel:

This is defined as any type of fuel that may be used to power an internal combustion engine, examples would include LPG, bio ethanol etc.

VEHICLE AREAS COVERED BY THIS NOS:

Vehicle Engine Area:

Engines, cooling systems, electronic ignition, petrol fuel injection, diesel fuel injection, engine management systems

Transmission and Driveline Area:

Clutch assemblies, clutch operating systems, manual gear boxes, automatic gear boxes (including electronic control), drivelines and hubs and final drive assemblies.
Diagnose faults where no prescribed process or format is available in light vehicle environments

**Chassis or Frame Area:**

Suspension systems, assisted steering systems, non-assisted steering systems, braking systems, ABS/traction control, wheels and tyres, stability systems, bodywork and related areas.

**Electrical and Electronic Area:**

Starting systems, charging system, body electrical systems (including wiring harnesses, lighting systems, auxiliaries, CANBUS systems, fibre optics, vehicle condition and monitoring, comfort and convenience, alarm systems), supplementary restraint systems (SRS), heating and air conditioning systems, climate control, communication equipment, navigation systems and entertainment equipment.
**Overview**

This NOS is about providing a range of technical support to other workshop colleagues. It includes ensuring technical information is up to date and giving technical advice, instruction and briefings to colleagues.
IMILV15
Provide technical support and advice to colleagues in light vehicle environments

Performance criteria

You must be able to:

P1 check vehicle technical information is up to date and accessible to workshop staff
P2 check staff have the correct technical resources to carry out their work
P3 identify any additional resources required correctly and promptly
P4 report any problems affecting the operation of the workshop to your manager promptly
P5 respond to requests for technical help and advice promptly and positively
P6 provide colleagues with clear instruction on:
  P6.1 product updates
  P6.2 technical tasks
  P6.3 what the results should be
  P6.4 how they should perform tasks
  P6.5 the standard that must be achieved
P7 deliver technical instruction and demonstrations in a manner and at a speed that is appropriate to the individual(s) concerned
P8 give on-going technical support and advice to colleagues
P9 ensure your support and advice is technically accurate and in line with manufacturers' instructions and your organisation's requirements
P10 choose the most effective situation for giving support and advice to colleagues
P11 give colleagues time to consider your response and give further explanation when appropriate, checking they have fully understood
P12 identify and correct mistakes in a way that supports your colleagues' self confidence and praise them when they perform tasks correctly
P13 check the work of colleagues at regular intervals and take prompt action to resolve problems
P14 suggest possible methods for improving the work of colleagues to your manager, when necessary
P15 carry out your checks in a cost effective and efficient manner that is not detrimental to the smooth running of the workshop
IMILV15
Provide technical support and advice to colleagues in light vehicle environments

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Electrical and electronic principles

| You need to know and understand: | K9 electrical and electronic principles including types of sensors and actuators, their application and operation |
| | K10 how electrical and electronic vehicle systems operate, including electrical component function, electrical inputs, outputs, voltages and oscilloscope patterns, digital and fibre optics principles |
| | K11 the interaction between electrical, electronic, mechanical and hydraulic components and systems within a vehicle, including multiplexing |
| | K12 electrical symbols, units and terms |
IMILV15
Provide technical support and advice to colleagues in light vehicle environments

You need to know and understand:

K13 electrical safety procedures
K14 the hazards associated with high energy electrical vehicle components

Use of diagnostic and rectification equipment

You need to know and understand:

K15 how to prepare and test the accuracy of diagnostic testing equipment
K16 how to use diagnostic and rectification equipment for mechanical, electrical, hydraulic and fluid systems, specialist repair tools and general workshop equipment

Vehicle system faults, their diagnosis and correction

You need to know and understand:

K17 how vehicle mechanical, electrical, electronic, hydraulic and fluid systems are constructed and operate
K18 how vehicle mechanical, electrical, electronic, hydraulic and fluid systems are dismantled, reassembled and adjusted to manufacturers’ specifications
K19 the types and causes of vehicle mechanical, electrical, electronic, hydraulic and fluid system, component and unit faults and failures
K20 vehicle mechanical, electrical, electronic, hydraulic and fluid component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action
K21 how to find, interpret and use sources of information on vehicle mechanical, electrical, electronic, hydraulic and fluid system operating specifications, diagnostic test procedures, repair procedures and legal requirements
K22 how to select the most appropriate diagnostic testing method for the symptoms presented
K23 how to carry out systematic diagnostic testing of vehicle mechanical, electrical, electronic, hydraulic and fluid systems
K24 how to interpret, evaluate and analyse test results and vehicle data in order to identify the location and cause of vehicle system faults
K25 how to carry out the rectification activities in order to correct faults in the vehicle mechanical, electrical, electronic, hydraulic and fluid systems
K26 your workplace policy and procedure for:
    K26.1 work carried out under warranty
IMILV15
Provide technical support and advice to colleagues in light vehicle environments

You need to know and understand:

K26.2 liaising with manufacturers and outside agencies
K27 the relationship between test methodology and the faults repaired – the use of appropriate testing methods
K28 how to make cost effective recommendations for rectification

Personal Skills

K29 how to give straightforward presentations on technical matters
K30 how to file and store technical information
K31 how to instruct colleagues and demonstrate tasks clearly and correctly
K32 how to conduct effective checks of your colleague’s work
K33 how to choose the best action to take when work is not in line with requirements
K34 how to discuss colleagues’ work with them in a way that will encourage them to be positive and not lead to conflict
K35 how to give advice and guidance in a way that is appropriate to the colleague you are supporting
K36 how to recognise a training need
K37 what might happen if you undermine colleagues’ self confidence when correcting mistakes
K38 the importance of liaising with your manager when evaluating others’ work and giving feedback
K39 the importance of continuous development and learning
Additional information

**Scope/range**

1. **Information, Advice and Guidance** may be about any of the following:
   1.1. mechanical fault finding
   1.2. electrical fault finding
   1.3. electronic fault finding
   1.4. hydraulic fault finding
   1.5. customer handling
   1.6. road testing
   1.7. time
   1.8. tools
   1.9. equipment
   1.10. materials
   1.11. technical information

2. **Operating specifications** include:
   2.1. limits
   2.2. fits
   2.3. tolerances
Provide technical support and advice to colleagues in light vehicle environments

**Glossary**

**Manufacturers:**

Examples include vehicle and original equipment manufacturers.

**Methods for improving the work of colleagues:**

Examples include further training, on-the-job coaching, giving people more appropriate responsibilities.

**Problems:**

Examples include equipment, tool and material shortfalls and faults; requirements for new resources; lack of technical information; staffing or workload problems; training needs etc.

**Situation for giving support and advice:**

Examples include one-to-one during a work activity, one-to-one away from a work activity, to the whole team.

**Support and advice:**

Examples include demonstrations, instruction and briefings

**Technical information:**

This could be hard copy, electronic information or verbal advice.

**VEHICLE AREAS COVERED BY THIS NOS:**

**Vehicles:**

These can be any of the following – light vehicles. Additionally these vehicles may be Si, Ci, Hybrid, Electric or Alternative fuelled vehicles.
Alternative Fuel:

This is defined as any type of fuel that may be used to power an internal combustion engine, examples would include LPG, bio ethanol etc.

Vehicle Engine Area:

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Electrical Area:

Starting systems, charging system, body electrical systems (including wiring harnesses, lighting systems, auxiliaries, CANBUS systems, fibre optics, vehicle condition and monitoring, comfort and convenience, alarm systems), supplementary restraint systems (SRS), heating and air conditioning systems, climate control, communication equipment, navigation systems and entertainment equipment.
Overview

This NOS covers obtaining and providing information to and from light vehicle manufacturers and suppliers for diagnostic activities, warranty activities, repairs and to support product development.
IMILV16
Liaise with light vehicle and product manufacturers on technical matters

Performance criteria

You must be able to:

P1 be aware of current technical developments and information for the vehicles you handle
P2 seek assistance from manufacturers only when the prescribed diagnostic processes have failed
P3 provide information at the level of detail necessary and in a form and manner which the recipient will understand and accept
P4 report technical problems and quality issues promptly in line with manufacturer's requirements
P5 collect sufficient, detailed information on the vehicle, the problem and action taken prior to contacting the manufacturer
P6 ensure requests for information to manufacturers are made clearly and promptly
P7 respond to requests for information from manufacturers within the specified timescale
P8 ensure all information received from manufacturers is passed on to the relevant person(s) promptly
P9 report any anticipated delays in obtaining or providing information to the relevant person(s) promptly
P10 ensure your reports and technical information are complete, accurate and in the format required
P11 suggest possible methods for improving the reporting process to your manager, when necessary
P12 carry out your reporting in an effective and efficient manner that is not detrimental to the smooth running of the workshop
**Knowledge and understanding**

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**Electrical and electronic principles**

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Liaise with light vehicle and product manufacturers on technical matters

You need to know and understand:

K12  electrical symbols, units and terms
K13  electrical safety procedures

**Use of diagnostic and rectification equipment**

K14  how to prepare and test the accuracy of diagnostic testing equipment
K15  how to use diagnostic and rectification equipment for mechanical, electrical, electronic, hydraulic and fluid systems, specialist repair tools and general workshop equipment

**Vehicle faults, their diagnosis and correction**

You need to know and understand:

K16  how vehicle mechanical, electrical, electronic, hydraulic and fluid systems are constructed, dismantled, reassembled and operate
K17  the types and causes of vehicle mechanical, electrical, electronic, hydraulic and fluid system, component and unit faults and failures
K18  vehicle mechanical, electrical, electronic, hydraulic and fluid component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action
K19  how to find, interpret and use sources of information on vehicle mechanical, electrical, electronic, hydraulic and fluid system specifications, diagnostic test procedures, repair procedures and legal requirements
K20  how to select the most appropriate diagnostic testing method for the symptoms presented
K21  how to carry out systematic diagnostic testing of vehicle mechanical, electrical, electronic, hydraulic and fluid systems
K22  how to interpret, evaluate and analyse test results and vehicle data in order to identify the location and cause of vehicle system faults
K23  how to carry out the rectification activities in order to correct faults in the vehicle mechanical, electrical, electronic, hydraulic and fluid systems
K24  your workplace procedure and policy for
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   K24.2  liaising with manufacturers and outside agencies
K25  the relationship between test methodology and the faults repaired – the use of
IMILV16
Liaise with light vehicle and product manufacturers on technical matters

appropriate testing methods
K26 how to make cost effective recommendations for rectification

**Personal Skills**

You need to know and understand:

K27 how to communicate effectively with manufacturers, managers, colleagues and customers
K28 how to access the reporting system
K29 how to process *information* and compile reports
K30 when it is appropriate to contact the manufacturer and or supplier
K31 the limits of your authority and that of the designated personnel when liaising with the manufacturer or supplier
**Scope/range**

1. **Information** may be about any of the following:
   1.1. mechanical fault finding
   1.2. electrical fault finding
   1.3. electronic fault finding
   1.4. hydraulic fault finding
   1.5. customer handling
   1.6. road testing
   1.7. time
   1.8. tools
   1.9. equipment
   1.10. materials
   1.11. technical information
**Overview**

This NOS covers the competence and knowledge involved in updating technical information systems and diagnostic equipment. It also includes testing for, and rectifying, equipment and system problems.
Provide diagnostic equipment and technical information system support in light vehicle environments

Performance criteria

You must be able to:

P1 use safe working practices when dealing with diagnostic equipment and technical information systems
P2 ensure installation of updates is carried out promptly following delivery
P3 load software correctly following the manufacturer's instructions
P4 set the configuration options according to
  P4.1 manufacturers specification
  P4.2 your workplace procedures
  P4.3 your workplace preferences
P5 take prompt and effective corrective actions to resolve any errors occurring during the loading of the software within the limits of your workplace responsibilities
P6 complete any specified product registration procedures promptly and accurately, when necessary
P7 inform all relevant persons of the completion of the software installation promptly
P8 advise the relevant people of any new features and changes to existing functionality promptly
P9 effectively test the diagnostic equipment and technical information system using the specified self test function(s) to identify the cause and solution in the event of a fault
P10 take prompt and effective actions to resolve any identified problems in diagnostic equipment and technical information systems using the self test instructions
P11 contact external support services only when the self test function fails to identify the cause of and solution to problems
P12 promptly and clearly inform the relevant person(s) of any unresolved loading errors and equipment problems
P13 source alternative diagnostic equipment if equipment has to be sent away for repair and inform the relevant person(s) promptly
P14 inform the relevant person(s) promptly if equipment has to be sent away for repair
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IMILV17
Provide diagnostic equipment and technical information system support in light vehicle environments

functionality promptly

K17 the importance of reporting equipment / software faults and failures to the relevant person(s) promptly
Additional information

Scope/range

1. **Causes of faults** are:
   1.1. mechanical
   1.2. electrical
   1.3. electronic

2. **Faults** cover:
   2.1. software
   2.2. hardware

3. **Solving minor errors** are defined as:
   A suitable repair, replacement, re-coding or re-programming that rectifies the fault(s) identified
Glossary

Problems:

Examples include damaged leads, damaged ports, corrupt software, faulty equipment, lack of connectivity between vehicle and diagnostic test equipment, lack of connectivity between diagnostic test equipment and the workshop information system.
Overview

This NOS is about carrying out diagnostic consultations with customers to investigate their concerns relating to their vehicle. It includes making recommendations to ensure that the customer's concerns are addressed and explaining the results of diagnostic activities to enable customers to fully understand the problem(s) with their vehicle.
Conduct diagnostic consultations with customers in light vehicle environments

**Performance criteria**

You must be able to:

P1 respond to customer’s concerns in a positive and friendly manner

P2 give a positive impression of yourself and your organisation when dealing with customers

P3 obtain sufficient, detailed information using suitably structured questions

P4 carry out a suitable road test to obtain further detailed information on, or clarification of, customer’s concerns, when appropriate

P5 provide customers with accurate, current and relevant advice and information on any further investigation(s) needed

P6 explain the implications of any investigation(s) that may be needed clearly

P7 give technical advice and information accurately, clearly and in a form and manner which the customer will understand

P8 make clear and relevant recommendations for the next course of action

P9 liaise with the customer or other relevant person(s) to agree the next course of action

P10 explain to customers the action that has been taken regarding their vehicle clearly and in a manner the customer will understand, when appropriate

P11 ensure your records are complete, accurate, in the format required and signed by the customer, when necessary

P12 suggest possible methods for improving the customer care process to your manager, when necessary
IMILV18
Conduct diagnostic consultations with customers in light vehicle environments

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| You need to know and understand: | **K7** the hazards associated with high energy electrical vehicle components  |
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|  | **K11** electrical symbols, units and terms  |
|  | **K12** electrical safety procedures  |

**Use of diagnostic and rectification equipment**
IMILV18
Conduct diagnostic consultations with customers in light vehicle environments

You need to know and understand:

K13  how to prepare and test the accuracy of diagnostic testing equipment
K14  how to use diagnostic and rectification equipment for mechanical, electrical, electronic, hydraulic and fluid systems, specialist repair tools and general workshop equipment

Vehicle system faults, their diagnosis and correction

You need to know and understand:

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K24  the relationship between test methodology and the faults repaired – the use of appropriate testing methods
K25  how to make cost effective recommendations for rectification

Personal Skills
Conduct diagnostic consultations with customers in light vehicle environments

You need to know and understand:

K26 how to give straightforward presentations on technical matters
K27 how to communicate effectively with and listen to customers
K28 how to recognise and handle different customer reactions
K29 how to adapt your language when explaining technical matters to customers
K30 how to use effective questioning techniques
K31 how to care for customers and achieve customer satisfaction
K32 your organisation's requirements for personal appearance and conduct when dealing with customers
K33 how successful resolution of customer concerns and problems contributes to customer loyalty and improves relationships
Conduct diagnostic consultations with customers in light vehicle environments

Additional information

Scope/range

3. Information, Advice and Guidance may be about any of the following:
   3.1. mechanical fault finding
   3.2. electrical fault finding
   3.3. electronic fault finding
   3.4. hydraulic fault finding
   3.5. customer handling
   3.6. road testing
   3.7. time
   3.8. tools
   3.9. equipment
   3.10. materials
   3.11. technical information

4. Operating specifications include:
   4.1. limits
   4.2. fits
   4.3. tolerances
Glossary

Courses of action:

Examples include servicing, repair, replacement and customising vehicle features, no action, explanation of the correct operation of the vehicle and its systems.

Customer Reactions:

Examples include anger, confusion, frustration.

Diagnostic consultation:

Examples include face to face and telephone questioning, road tests (very often these will take place with customers to identify and resolve their concerns). It also includes giving technical advice and product information and clarification of technical issues after diagnostic work has been completed.

Relevant person(s):

Examples include managers, vehicle manufacturer and original equipment manufacturers.

VEHICLE AREAS COVERED BY THIS NOS:

Vehicles:

These can be any of the following – light vehicles. Additionally these vehicles may be Si, Ci, Hybrid, Electric or Alternative fuelled vehicles.

Alternative Fuel:

This is defined as any type of fuel that may be used to power an internal combustion engine, examples would include LPG, bio ethanol etc.

Vehicle Engine Area:
Conduct diagnostic consultations with customers in light vehicle environments

Engines, cooling systems, electronic ignition, petrol fuel injection, diesel fuel injection, engine management systems, hybrid systems and alternative fuels

**Transmission and Driveline Area:**

Clutch assemblies, clutch operating systems, manual gear boxes, automatic gear boxes (including electronic control), drivelines and hubs and final drive assemblies.

**Chassis or Frame Area:**

Suspension systems, assisted steering systems, non-assisted steering systems, braking systems, ABS/traction control, wheels and tyres, stability systems, bodywork and related areas.

**Electrical Area:**

Starting systems, charging system, body electrical systems (including wiring harnesses, lighting systems, auxiliaries, CANBUS systems, fibre optics, vehicle condition and monitoring, comfort and convenience, alarm systems), supplementary restraint systems (SRS), heating and air conditioning systems, climate control, communication equipment, navigation systems and entertainment equipment.