

List of Units and Qualification Routes for Vehicle Maintenance and Repair Level 2 and Level 3

ROUTES - UNITS	Maintenance & Repair (LV, HV and MC)		Mobile Electronics & Security	Autoelectrical	
	Level 2	Level 3	Level 2	Level 2	Level 3
Unit G1 - Contribute to Workplace Good Housekeeping	M	M	M	M	M
Unit G2 - Ensure Your Own Actions Reduce Risks to Health and Safety	M	M	M	M	M
Unit G3 - Maintain Positive Working Relationships	M	M	M	M	M
Unit G6 - Enable Learning through Demonstrations and Instruction (ENTO Unit L11)		O			
Unit MR01 - Carry Out Routine Vehicle Maintenance	M				
Unit MR02 - Remove and Replace Engine Units and Components	M				
Unit MR03 - Remove and Replace Electrical Auxiliary Units and Components	M				
Unit MR04 - Remove and Replace Vehicle Chassis Units and Components	M*				
Unit MR04HV - Remove and Replace Commercial Vehicle Chassis Units and Components	M*				
Unit MR05 - Conduct Pre and Post Work Vehicle Inspections	O		O	O	
Unit MR06 - Inspect Vehicles		O			
Unit MR07 - Diagnose and Rectify Vehicle Engine and Component Faults		M			
Unit MR08 - Diagnose and Rectify Vehicle Chassis System Faults		M*			
Unit MR08HV - Diagnose and Rectify Commercial Vehicle Chassis System Faults		M*			
Unit MR09 - Valet Vehicles	O				
Unit MR10 - Identify and Agree Customer Vehicle Needs		O			
Unit MR11 - Overhaul Mechanical Units		O			
Unit MR12 - Remove and Replace Vehicle Transmission and Driveline Units and Components	O				
Unit MR12HV - Remove and Replace Commercial Vehicle Transmission and Driveline Units and Components	O				
Unit MR13 - Diagnose and Rectify Vehicle Transmission and Driveline System Faults		O			
Unit MR13HV - Diagnose and Rectify Commercial Vehicle Transmission and Driveline System Faults		O			
Unit AE01 - Locate and Correct Simple Electrical Faults				M	
Unit AE01ME - Locate and Correct Electrical Faults			M		
Unit AE02 - Enhance Vehicle Electrical System Features				M+	
Unit AE02ME - Enhance Vehicle System Features			M		
Unit AE03 - Repair Electrical Units			O	M+	
Unit AE04 - Diagnose and Rectify Engine Electrical Faults					M
Unit AE05 - Diagnose and Rectify Transmission and Chassis Electrical Faults					M
Unit AE06 - Diagnose and Rectify Auxiliary Equipment Electrical Faults		M*			M*
Unit AE06MC - Diagnose and Rectify Motorcycle Auxiliary Equipment Electrical Faults		M*			M*
Unit BP01 - Remove and Fit Basic Mechanical, Electrical and Trim (MET) Components to Vehicles			M	O	
Unit BP03 - Remove and Fit Non Welded Non-Structural Motorcycle Body Panels	O				
Unit 49 - Process Payment Transactions			O		

* Denotes one of these units must be completed (ie. because there is a different unit for different vehicle types).

+ Denotes one of these units must be completed and that the remaining unit may be taken as an optional unit, if desired.

FOOTNOTES:

8 units must be achieved for the full S/NVQ route for general Maintenance & Repair at Level 2

7 units must be achieved for the full S/NVQ route for general Maintenance & Repair at Level 3.

For Maintenance & Repair, the classification of vehicle worked upon will be recorded and shown on a candidate's certificate.

HV = Heavy vehicle specialist unit

ME = Mobile Electronics and Security specialist unit

MC = Motor Cycle specialist unit

7 units must be achieved for the full S/NVQ route Mobile Electronics & Security at Level 2.

6 units must be achieved for the full S/NVQ route for Autoelectrical at both Levels 2 and 3.

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S/NVQ Qualification Framework Level 1

Level 1 NVQ 1 Light Vehicle MechanicsMotor Vehicle

What does the course include?

The course is designed to enable students to become competent in a variety of skills at NVQ Level 1. Approx 50% of the course is practically based in the well equipped College workshops where students will learn practical tasks on college cars and units. There is an increasing use of IT in motor vehicles and an IT session is included each week as well as tutorial & technology sessions.

What do I need to get on this course?

There are no formal entry requirements other than an interest in motor cars and desire to gain a qualification. Learning Support is provided where appropriate.

How will I be assessed?

All assessments are continuous for both practical & theory units. Work experience is not a requirement of Vehicle Mechanics NVQ Level 1, however students are encouraged to expand their experience of motor cars and the motor industry.

Where does it lead?

Light Vehicle NVQ Level 1 leads directly to NVQ Level 2 and often students who achieve early can transfer straight onto the next level.

S/NVQ Qualification Framework Level 2

Maintenance & Repair (LV, HV and MC) Level 2

8 Units to be achieved for the Maintenance and Repair Routes

Mobile Electronics and Security Level 2

7 Units to be achieved for the Mobile Electronics and Security Routes

Autoelectrical Level 2

6 Units to be achieved for the Autoelectrical Route

Mandatory Units for All Routes:

Unit G1: Contribute to Workplace Good Housekeeping

Unit G2: Ensure Your Own Actions Reduce Risks to Health and Safety (ENTO Unit A)

Unit G3: Maintain Positive Working Relationships

PLUS: The required number of units from one of the routes below:

Maintenance & Repair (LV, HV and MC)	Mobile Electronics & Security	Autoelectrical
MANDATORY UNITS:		
Unit G1 - Contribute to Workplace Good Housekeeping Unit G2 - Ensure Your Own Actions Reduce Risks to Health and Safety Unit G3 - Maintain Positive Working Relationships		
Unit MR01 Carry Out Routine Vehicle Maintenance	Unit BP01 Remove and Fit Basic Mechanical, Electrical and Trim (MET) Components to Vehicles	Unit AE01 Locate and Correct Simple Electrical Faults
Unit MR02 Remove and Replace Engine Units and Components	Unit AE01ME Locate and Correct Electrical Faults	Unit AE02+ Enhance Vehicle Electrical System Features or Unit AE03+ Repair Electrical Units
Unit MR03 Remove and Replace Electrical Auxiliary Units and Components	Unit AE02ME Enhance Vehicle System Features	
Unit MR04 Remove and Replace Vehicle Chassis Units and Components or Unit MR04HV Remove and Replace Commercial Vehicle Chassis Units and Components		
PLUS: 1 Unit from the optional Units below:		
Unit MR05 Conduct Pre and Post Work Vehicle Inspections Unit MR09 Valet Vehicles Unit MR12 Remove and Replace Vehicle Transmission and Driveline Units and Components MR12HV Remove and Replace Commercial Vehicle Transmission and Driveline Units and Components Unit BP03 Remove and Fit Non Welded Non Structural Motorcycle Body Panels	Unit AE03 Repair Electrical Units Unit 49 Process Payment Transactions	Unit BP01 Remove and Fit Basic Mechanical, Electrical and Trim (MET) Components to Vehicles +NOTE The Unit not completed can be selected as your optional Unit, if not desired

S/NVQ Qualification Framework Level 3

Maintenance & Repair (LV, HV and MC) Level 2

7 Units to be achieved for the Maintenance and Repair Route

Autoelectrical Level 3

6 Units to be achieved for the Autoelectrical Route

Mandatory Units for All Routes:

Unit G1: Contribute to Workplace Good Housekeeping

Unit G2: Ensure Your Own Actions Reduce Risks to Health and Safety (ENTO Unit A)

Unit G3: Maintain Positive Working Relationships

PLUS: The required number of units from one of the routes below:

Maintenance & Repair (LV, HV and MC)	Mobile Electronics & Security
MANDATORY UNITS:	
Unit G1 - Contribute to Workplace Good Housekeeping Unit G2 - Ensure Your Own Actions Reduce Risks to Health and Safety Unit G3 - Maintain Positive Working Relationships	
Unit MR07 Diagnose and Rectify Vehicle Engine and Component Faults Unit MR08 Diagnose and Rectify Vehicle Chassis System Faults or Unit MR08HV Diagnose and Rectify Commercial Vehicle Chassis System Faults or Unit AE06 Diagnose and Rectify Auxiliary Equipment Electrical Faults or Unit AE06MC Diagnose and Rectify Motorcycle Auxiliary Equipment Electrical Faults	Unit AE04 Diagnose and Rectify Engine Electrical Faults Unit AE05 Diagnose and Rectify Transmission and Chassis Electrical Faults Unit AE06 Diagnose and Rectify Auxiliary Equipment Electrical Faults or Unit AE06MC Diagnose and Rectify Motorcycle Auxiliary Equipment Electrical Faults
PLUS: 1 Unit from the optional Units below:	
Unit G6 Enable Learning Through Demonstrations and Instruction Unit MR06 Inspect Vehicles Unit MR10 Identify and Agree Customer Vehicle Needs Unit MR11 Overhaul Mechanical Units Unit MR13 Diagnose and Rectify Vehicle Transmission and Driveline System Faults Unit MR13HV Diagnose and Rectify Commercial Vehicle Transmission and Driveline System Faults	

Unit G1 - Contribute to Workplace Good Housekeeping

UNIT OVERVIEW

This unit is about the routine maintenance of the workplace, carrying out basic, non-specialist checks of work tools and equipment, cleaning the work area and using resources economically.

KEY WORDS AND PHRASES

Cleaning agents:

Examples include: solvents and detergents used for cleaning tools and equipment.

Cleaning equipment:

Any equipment relevant to the cleaning activities being undertaken, including manual and or electrically operated cleaning equipment.

Legal requirements:

Examples include: local bye-laws, Environmental Protection Act; Health and Safety at Work Act; Hazardous Substances Regulations (including COSHH) and any EU Regulations applicable.

Personal Protective Equipment:

Examples include: overalls, gloves, goggles and barrier cream.

Resources:

Examples include: power, cleaning materials, time.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Equipment maintenance covers

- a. routine checks on work tools and equipment
- b. cleaning work tools and equipment
- c. replacing minor parts
- d. visual inspection of electrical equipment

2. Housekeeping activities cover

- a. day to day work area cleaning
- b. clearing away
- c. dealing with spillages
- d. disposal of waste, used materials and debris

3. Work tools and equipment are

- a. hand
- b. electrical
- c. mechanical
- d. pneumatic
- e. hydraulic

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the scope of your job responsibilities for the use and maintenance of hand tools, equipment and your work area.
2. workplace policies and schedules for housekeeping activities and equipment maintenance.
3. the manufacturer's requirements for the cleaning and general, non-specialist maintenance of the tools and equipment for which you are responsible.
4. the regulations and information sources applicable to workshop cleaning and maintenance activities for which you are responsible.
5. the importance of reporting faults quickly to the relevant person.
6. the importance of reporting anticipated delays to the relevant person(s) promptly.

Equipment maintenance

7. how to select and use equipment used for basic hand tool maintenance activities.
8. how to store hand tools safely and accessibly.
9. how to report faulty or damaged work tools and equipment.
10. how to work safely when cleaning and maintaining work tools and equipment.

General work area housekeeping

11. how to select and use cleaning equipment
12. how to use resources economically.
13. how to use work area cleaning materials and agents.

14. how to clean and maintain the work tools and equipment and work areas for which you are responsible.
15. how to dispose of unused cleaning agents, materials and debris.
16. the properties and hazards associated with the use of cleaning agents and materials.
17. the importance of wearing personal protective equipment.
18. the importance of using resources economically and for their intended purpose only.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. wear suitable personal protective equipment throughout all housekeeping and equipment maintenance activities.
- b. select and use cleaning equipment which is:
 - of the right type
 - suitable for the task.
- c. use resources economically and for their intended purpose only, following manufacturers' instructions and workplace procedures.
- d. follow workplace policies, schedules and manufacturers' instructions when cleaning and maintaining hand tools and equipment.
- e. clean the work area(s), for which you are responsible, at the specified time and frequency.
- f. carry out housekeeping activities safely and in a way which minimises inconvenience to customers and staff.
- g. follow the manufacturer's instructions when using cleaning and sanitising agents.
- h. ensure your housekeeping activities keep your work area clean and free from debris and waste materials.
- i. ensure your equipment maintenance activities keep your work tools and equipment fit for purpose.
- j. dispose of used cleaning agents, materials and debris to comply with legal and workplace requirements.
- k. store your work tools and equipment in a safe manner which permits ease of access and identification for use.
- l. report any faulty or damaged tools and equipment to the relevant person(s) clearly and promptly.
- m. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or -a combination of both
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of cleaning the part of the work area for which you are responsible on 3 separate occasions.
8. produce evidence of undertaking basic, routine checks of all the following types of work tools and equipment on 3 separate occasions:
 - a. hand
 - b. electrical
 - c. mechanical
 - d. pneumatic
 - e. hydraulic

9. Your assessor must observe you cleaning the part of the work area for which you are responsible on at least 1 occasion and checking all the types of work tools and equipment specified above on at least 1 occasion.

10. Your evidence must include at least 2 instances of you cleaning the part of the work area for which you are responsible and at least 2 instances of you checking all the types of work tools and equipment specified above within your normal workplace.

Unit G2 - Ensure Your Own Actions Reduce Risks to Health and Safety

UNIT OVERVIEW

This unit covers the basic, legally required health and safety duties of everyone in the workplace. It describes the competence required to ensure that:

- your own actions do not create any health and safety risks
- you do not ignore significant risks in your workplace, and
- you take sensible action to put things right, including reporting situations which pose a danger to people in the workplace, and seeking advice from others

This unit does not require you to undertake a full Risk Assessment. It is about having an appreciation of significant risks in the workplace and knowing how to identify them and deal with them.

When you have completed this unit, you will have proved you can:

1. Identify the hazards and evaluate the risks in your workplace
2. Reduce the risks to health and safety in your workplace

KEY WORDS AND PHRASES

The Health and Safety Executive (HSE) is the body appointed to support and enforce health and safety law. They have defined two important concepts as follows:

Hazard:

A hazard is something with potential to cause harm. Consideration of hazards should also include aspects of workplace security (e.g. theft, assault, insecure premises, etc.).

Risk:

A risk is the likelihood of the hazard's potential being realised.

Note: Almost anything may be a hazard, but may or may not become a risk. For example:

- A trailing extension lead from a piece of equipment is a hazard. If it is trailing across a passageway, there is a high risk of someone tripping over it, but if it lies along a wall out of the way, the risk is much less.

- Toxic or flammable chemicals stored in a building are a hazard and by their nature may present a high risk. However, if they are kept in a properly designed secure store, and handled by properly trained and equipped people, the risk is much less than if they are left about in a busy workshop for anyone to use - or misuse.

- A failed light bulb is a hazard. If it is just one bulb out of many in a room, it presents very little risk, but if it is the only light on a stairwell, it is a very high risk. Changing the bulb may be a high risk, if it is high up, or if the power has been left on, or low risk if it is in a table lamp which has been unplugged.

- A box of heavy material is a hazard. It presents a higher risk to someone who lifts it manually than if a mechanical handling device is properly used.

Workplace:

This word is used to describe the single or multiple areas in which you carry out your work.

Working practices:

Any activities, procedures, use of materials or equipment and working techniques used in carrying out your job. In this unit it also covers any omissions in good working practice which may pose a threat to health and safety.

Workplace policies:

This covers the documentation prepared by the employer on the procedures to be followed regarding health and safety matters. It could be the employer's safety policy statement or general health and safety statements and written safety procedures covering aspects of the workplace that should be drawn to the employees' (and 'other persons') attention.

Other persons:

This phrase refers to everyone covered by the Health and Safety at Work Act, including visitors, members of the public, colleagues, contractors, customers, patients, students, pupils.

Personal presentation:

This includes personal hygiene, use of personal protective equipment, clothing and accessories suitable to the particular workplace.

Responsible persons:

The person or persons at work to whom you should report any health and safety issues or hazards. This could be a supervisor, line manager or your employer.

Key Points Regarding Health and Safety Legislation and Regulations

Health and Safety at Work Act 1974

The Health and Safety at Work Act 1974 is the main piece of legislation under which nearly all the other regulations are made. It is for this reason that only this piece of legislation is specifically referred to in this unit.

Employers have a legal duty under this Act to ensure, so far as is reasonably practicable, the health, safety and welfare at work of the people for whom they are responsible and the people who may be affected by the work they do.

Under this Act it is also important to be aware that all people at work, not just employers, have a duty to take reasonable care to avoid harming themselves or others through the work they do.

Risks should be reduced 'so far as is reasonably practicable'. This term means the duty-holder (in most instances the employer) can balance the cost against the degree of risk although obviously, any Health and Safety Inspectors would expect that relevant good practice is followed.

According to the Act:

Employers must safeguard so far as is reasonably practicable, the health, safety and welfare at work of all the people who work for them and 'other persons'. This applies, in particular, to the provision and maintenance of safe plant and systems of work, and covers all machinery, equipment and substances used.

People at work also have a duty under the Act to take reasonable care to avoid harm to themselves or to others by their working practices, and to cooperate with employers and others in meeting statutory requirements. The Act also requires employees not to interfere with or misuse anything provided to protect their health, safety or welfare in compliance with the Act.

Other legislation

There is an array of health and safety regulations and codes of practice which affect people at work. There are regulations for those who, for example, work with electricity, or work on construction projects, as well as regulations covering noise at work, manual handling, working with VDUs, or dealing with substances hazardous to health, etc. The specific requirements for all or any of these can be obtained from HSE local offices.

As many of the regulations are only relevant to certain workplaces or working practices, no specific reference has been made in the 'What you must know' section to any of these regulations. The phrase 'your responsibilities for health and safety as required by any specific legislation covering your job role' is intended to relate to those specific pieces of legislation important to your workplace and or working practices which you should be able to find out about.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Risks resulting from

- a. the use and maintenance of machinery or equipment
- b. the use of materials or substances
- c. working practices which do not conform to laid down policies
- d. unsafe behaviour
- d. accidental breakages and spillages
- e. environmental factors

2. Workplace policies covering

- a. the use of safe working methods and equipment
- b. the safe use of hazardous substances
- c. smoking, eating, drinking and drugs
- d. what to do in the event of an emergency
- e. personal presentation

ESSENTIAL KNOWLEDGE

You need to understand:

Health and Safety Legislation and Workplace Policies

1. your legal duties for health and safety in the workplace as required by the Health and Safety at Work Act 1974
2. your duties for health and safety as defined by any specific legislation covering your job role
3. agreed workplace policies relating to controlling risks to health and safety
4. responsibilities for health and safety in your job description
5. the responsible persons to whom you report health and safety matters

Risks to Health and Safety

6. what hazards may exist in your workplace
7. the particular health and safety risks which may be present in your own job role and the precautions you must take
8. the importance of remaining alert to the presence of hazards in the whole workplace
9. the importance of dealing with or promptly reporting risks
10. the requirements and guidance on the precautions
11. the specific workplace policies covering your job role
12. suppliers' and manufacturers' instructions for the safe use of equipment, materials and products
13. safe working practices for your own job role
14. the importance of personal presentation in maintaining health and safety in the workplace
15. the importance of personal conduct in maintaining the health and safety of yourself and others
16. your scope and responsibility for rectifying risks
17. workplace procedures for handling risks which you are unable to deal with

PERFORMANCE OBJECTIVES

1. Identify the hazards and evaluate the risks

To be competent you must:

- a. name correctly and locate the persons responsible for health and safety in the workplace
- b. identify which workplace policies are relevant to your working practices
- c. identify those working practices in any part of your job role which could harm yourself or other persons
- d. identify those aspects of the workplace which could harm yourself or other persons
- e. evaluate which of the potentially harmful working practices and the potentially harmful aspects of the workplace are those with the highest risk to you or to others
- f. report those hazards which present a high risk to the persons responsible for health and safety in the workplace
- g. deal with the hazards with low risks in accordance with workplace policies and legal requirements.

2. Reduce the risks to health & safety in your workplace:

To be competent you must:

- h. carry out your working practices in accordance with legal requirements
- i. follow the most recent workplace policies for your job role
- j. rectify those health and safety risks within your capability and the scope of your job responsibilities
- k. pass on any suggestions for reducing risks to health and safety within your job role to the responsible persons
- l. ensure your personal conduct in the workplace does not endanger the health and safety of yourself or other persons
- m. follow the workplace policies and suppliers' or manufacturers' instructions for the safe use of equipment, materials and products
- n. report any differences between workplace policies and suppliers' or manufacturers' instructions as appropriate
- o. ensure your personal presentation at work
 - i. ensures the health and safety of yourself and others,
 - ii. meets any legal duties, and
 - iii. is in accordance with workplace policies

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required
4. produce performance evidence resulting from work you have carried out in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.

5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or
 - a combination of both

Specific Performance Evidence for this Unit

6. Evidence must be provided to demonstrate competence in identifying hazards with reference to working activities or aspects of the workplace and acting upon your decisions as to whether the hazard presents a high or low risk.

You must:

7. identify risks which may result from at least 2 of the items listed below:
 - a. the use and maintenance of machinery or equipment
 - b. the use of materials or substances
 - c. working practices which do not conform to laid down policies
 - d. unsafe behaviour
 - e. accidental breakages and spillages
 - f. environmental factors.
8. produce evidence of following at least 4 of the workplace policies listed below:
 - a. the use of safe working methods and equipment
 - b. the safe use of hazardous substances
 - c. smoking, eating, drinking and drugs
 - d. what to do in the event of an emergency
 - e. personal presentation.
9. Your assessor must observe you following workplace policies on at least 2 occasions.
10. Your evidence must include risks you have identified from at least 1 of the items listed, and at least 3 instances of you following workplace policies, within your normal workplace.

Unit G3 - Maintain Positive Working Relationships

UNIT OVERVIEW

This unit is about maintaining good working relationships with all colleagues in the working environment by using effective communication and support skills.

KEY WORDS AND PHRASES

Operational Constraints:

Examples include: variations in working patterns between you and your colleagues and day to day pressure on work time.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Colleagues are

- a. immediate work colleagues
- b. supervisors and managers

2. Requests for assistance covering

- a. technical assistance
- b. personal assistance

ESSENTIAL KNOWLEDGE

You need to understand:

Your responsibilities and constraints

1. your own and your colleague's job role and limits of responsibility for giving advice and support.
2. the operational constraints which may affect interaction with colleagues.
3. lines of communication within your workplace.

Communication skills and working relationships

4. how to use suitable and effective spoken communication skills when responding to and interacting with others.
5. how to adapt written and spoken communication methods to satisfy the needs of colleagues.
6. how to report problems using written and spoken methods of communication.
7. the importance of developing positive working relationships with colleagues - the effect on morale, productivity, and company image.
8. the importance of accepting other peoples' views and opinions.
9. the importance of making and honouring realistic commitments to colleagues.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. contribute actively to team working by initiating ideas and co-operating with colleagues.
- b. respond promptly and willingly to requests for assistance from colleagues which fall within the limits of your own job responsibilities and capabilities.
- c. where requests fall outside your responsibility and capability, refer colleagues to the relevant person(s).
- d. give colleagues sufficient, accurate information and support to meet their work needs.
- e. make requests for assistance to colleagues clearly and courteously.
- f. use methods of communication which meet the needs of colleagues.
- g. treat colleagues in a way which shows respect for their views and opinions and promotes goodwill.
- h. make and keep achievable commitments to colleagues
- i. inform colleagues promptly of any problems or information likely to affect their own work.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required

4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or
 - a combination of both
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

7. gather witness testimony from your work colleagues and supervisor and or manager that you have work well with others and met the performance objectives for this unit.
8. Your assessor will make at least 3 observations of your interactions with others, most likely during their observations linked to your performance of technical work and these will be recorded.

Unit G6 - Enable Learning through Demonstrations and Instruction (ENTO Unit L11)

UNIT OVERVIEW

This unit is about demonstrating skills and methods to learners and providing instruction.

KEY WORDS AND PHRASES

Demonstration and instruction activities

These include; demonstrating how equipment is used, showing a learner how to do something, giving learners instructions on what to do or how to carry out a particular activity, deciding when you should use demonstration or instruction to encourage learning, reviewing the potential use of technology-based learning, checking on the progress of learners and giving feedback to learners.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard.
None has been defined for this unit.

ESSENTIAL KNOWLEDGE

You need to understand:

The nature and role of demonstrations and instruction

1. the separate areas of demonstrations which encourage learning
2. which types of learning are best achieved and supported through demonstrations
3. how to identify and use different learning opportunities
4. how to structure demonstrations and instruction sessions
5. how to choose from a range of demonstration techniques

Principles and concepts

6. how to put learners at their ease and encourage them to take part
7. how to choose between demonstration and instruction as learning methods
8. how to identify individual learning needs
9. which factors are likely to prevent learning and how to overcome them
10. how to check learners' understanding and progress
11. how to put information in order and decide whether the language you will be using is appropriate
12. how to choose and prepare appropriate materials, including technology- based materials
13. the separate areas of instructional techniques which encourage learning
14. which types of learning are best achieved and supported through instruction

External factors influencing human resource development

15. how to make sure everybody acts in line with health, safety and environmental protection legislation and best practice.
16. how to analyse and use developments in learning and new ways of delivery, including technology-based learning.

PERFORMANCE OBJECTIVES

1. Demonstrate skills and methods to learners

To be competent you must:

- a. base the demonstration on an analysis of the skills needed and the order they must be learned in.
- b. ensure that the demonstration is accurate and realistic.
- c. structure the demonstration so the learner can get the most out of it.
- d. encourage learners to ask questions and get explanation at appropriate stages in the demonstration.
- e. give learners the opportunities to practise the skill being demonstrated and give them positive feedback.
- f. give extra demonstrations of the skills being taught to reinforce learning.
- g. ensure that demonstrations take place in a safe environment and allow learners to see the demonstration clearly.
- h. respond to the needs of learners during the demonstration.
- i. reduce distractions and disruptions as much as possible.

2. Instruct learners

To be competent you must:

- a. match instruction to the needs of the learners.
- b. identify which learning outcomes will be achieved through instruction.
- c. ensure that the manner, level and speed of the instruction encourages learners to take part.
- d. regularly check that learners understand and adapt instruction as appropriate.
- e. give learners positive feedback on the learning experience and the outcomes achieved.
- f. identify anything that prevents learning and review this with the learners.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or
 - a combination of both
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

7. provide ONE Record of the activity to be demonstrated PLUS
8. Records of TWO Observations by an Assessor or a Witness (This witness must have been agreed by the Assessor prior to the observation taking place). These observations must cover at least one demonstration and one instruction or a combination of both.
9. The observation and record MUST include the following evidence:

a. Record

It is expected that this will show:

How you:

- decided on the sequence of the demonstration
- ensure that the demonstration is accurate and realistic
- identified which learning outcomes will be achieved
- will ensure a safe environment for the demonstration and allow all learners to see the demonstration clearly

b. Observation

This must show how you:

- structured the demonstration so the learner got the most out of it
- encouraged learners to ask questions and get explanations at appropriate stages in the demonstration
- gave learners the opportunities to practice the skill being demonstrated
- gave them positive feedback
- reinforced learning by repeating the demonstration
- responded to the needs of learners during the demonstration
- reduced distractions and disruptions as much as possible
- matched instruction to the needs of learners
- ensured that the manner, level and speed of the instruction encourages learners to take part

take part

- regularly check that learners understand and adapt instruction as appropriate
- gave learners positive feedback on the learning experience and the outcome achieved

achieved

- identified anything that prevented learning and reviewed this with learners

10. In preparing the record you should consider the following:

- a. Which types of learning are best achieved and supported through demonstrations.
- b. How to choose between demonstration and instruction as learning methods.
- c. How to identify individual learning needs.

- d. Which factors are likely to prevent learning and how to overcome them.
- e. How to choose and prepare appropriate materials, including technology-based materials.
- f. Which types of learning are best achieved and supported through instruction.
- g. How to make sure everybody acts in line with health, safety and environmental protection legislation and best practice.
- h. How to analyse and use developments in learning and new ways of delivery, including technology-based learning.

Unit MR01 - Carry Out Routine Vehicle Maintenance

UNIT OVERVIEW

This unit is about conducting routine examination, adjustment and replacement activities as part of the periodic servicing of vehicles.

KEY WORDS AND PHRASES

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, commercial vehicles and motorcycles.

Routine vehicle maintenance:

Examples include: conducting scheduled examinations, 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

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard.

1. Sources of technical information are:

- a. vehicle technical data
- b. schedules of inspection
- c. regulations

2. Examination methods are:

- a. aural
- b. visual
- c. functional
- d. measurements

3. Assessments are for:

- a. malfunction
- b. damage
- c. fluid levels
- d. leaks
- e. wear
- f. security
- g. condition and serviceability
- h. conformity
- i. necessity for adjustment(s)

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the manufacturer's and legal requirements relating to routine maintenance activities for vehicle systems and components.
2. the legal requirements relating to the vehicle (including road safety requirements).
3. the health and safety legislation and workplace procedures relevant to vehicle maintenance activities and personal and vehicle protection.
4. your workplace procedures for
 - recording vehicle maintenance work and any variations from the original vehicle specification
 - the referral of problems
 - reporting delays to the completion of work
5. the importance of documenting vehicle maintenance information
6. the importance of working to agreed timescales and keeping others informed of progress.
7. the relationship between time and costs.
8. the importance of reporting anticipated delays to the relevant person(s) promptly.

Use of technical information

9. how to find, interpret and use sources of technical information for scheduled maintenance activities, including on-board diagnostic displays.
10. the importance of using the correct sources of technical information.
11. the purpose of and how to use identification codes.

Vehicle system operation

12. 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 working.
13. 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.
14. 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.
15. how batteries, starting systems, charging systems, lighting systems and ancillary equipment operate for the type of vehicle on which you are working.
16. the operating specifications and tolerances for the type(s) of vehicles on which you are working.

Routine maintenance requirements

17. 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.
18. 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).
19. how to replenish and replace routine service components and materials, including filters, drive, belts, wiper blades, brake linings and pads, lubricants and fluids.
20. how to recognise cosmetic damage to vehicle components and units outside normal service items
21. how to identify codes and grades of lubricants.
22. how to work safely avoiding damage to the vehicle and its systems.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. use suitable personal protective equipment and vehicle coverings throughout all vehicle maintenance activities.
- b. use suitable sources of technical information to support all your vehicle maintenance activities.
- c. use the correct specifications and tolerances for the vehicle when making assessments of system and component performance.
- d. where the customer's vehicle falls outside the manufacturer's original specification, record details accurately and use this adapted specification as the basis for your examination and assessment.

- e. examine the vehicle's systems and components following:
 - the manufacturer's approved examination methods
 - your workplace procedures
 - health and safety requirements.
- f. ensure your examination methods identify accurately any vehicle system and component problems falling outside the servicing schedule specified.
- g. carry out adjustments, replacement of vehicle components and replenishment of consumable materials following the manufacturer's current specification for:
 - the particular service interval
 - working methods and procedures
 - use of equipment
 - the tolerances for the vehicle.
- h. where system adjustments cannot be made within the manufacturer's specification, record the details accurately and take action which complies with the customer's instructions.
- i. work in a way which minimises the risk of damage to the vehicle and its systems.
- j. use suitable testing methods to evaluate the performance of all replaced and adjusted components and systems accurately, prior to returning the vehicle to the customer.
- k. report any problems or issues relating to the vehicle's condition or conformity to the relevant person(s) promptly.
- l. ensure your maintenance records are accurate, complete and passed to the relevant person(s) promptly in the format required.
- m. complete all vehicle maintenance activities within the agreed timescale.
- n. report any anticipated delays in completion to the relevant persons(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that your performance has covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in:
 - your normal workplace
 - an approved centre, or
 - a combination of both
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

7. You must produce evidence of competently carrying out servicing activities on at least 3 different vehicles which collectively cover the scope for this unit.
8. Your assessor must physically observe you in your normal workplace successfully carrying out a range of servicing activities on at least 1 occasion which must include clearances, pressures, tensions and levels.

Unit MR02 - Remove and Replace Engine Units and Components

UNIT OVERVIEW

This unit 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.

KEY WORDS AND PHRASES

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 unit 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

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Equipment is

- a. hand tools
- b. special workshop tools
- c. general workshop equipment
- d. electrical testing equipment

2. Testing methods are:

- a. visual
- b. aural
- c. functional

3. Unit and components are

- a. mechanical
- b. electrical

4. Engine systems are

- a. engine mechanical systems
- b. cooling systems
- c. air supply and exhaust systems
- d. fuel and ignition systems
- e. engine electrical systems
- f. lubrication systems

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the legal requirements relating to the vehicle (including road safety requirements).
2. the health and safety legislation and workplace procedures relevant to vehicle maintenance activities and personal and vehicle protection.
3. your workplace procedures for
 - recording removal and replacement information
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of documenting removal and replacement information
5. the importance of working to agreed timescales and keeping others informed of progress.
6. the relationship between time and costs.
7. the importance of reporting anticipated delays to the relevant person(s) promptly.

Use of technical information

8. how to find, interpret and use sources of information applicable to unit and component removal and replacement within engine systems.
9. the importance of using the correct sources of technical information

10. the purpose of and how to use identification codes.

Electrical and electronic principles

11. vehicle earthing principles and earthing methods.

12. electrical and electronic principles associated with vehicle engine systems, including types of sensors, actuators, their application and operation.

13. types of circuit protection and why these are necessary.

14. electrical safety procedures.

15. how warning, charging and starter circuits work.

16. electric symbols, units and terms.

17. battery charging.

18. electronic/electronic control system principles.

Engine system operation and construction

19. how engine systems and their related units and components are constructed, dismantled and reassembled for the classification of vehicle worked upon.

20. how engine systems and their related units and components operate for the classification of vehicle worked upon.

Equipment

21. how to prepare, test and use all the removal and replacement equipment required.

Engine unit and component removal and replacement

22. how to remove and replace engine system mechanical and electrical units and components for the classification of vehicle worked upon.

23. how to file, fit, tap, thread, cut and drill plastics and metals.

24. how to select and fit gaskets, sealants, fittings and fasteners.

25. 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.

26. the relationship between testing methods and the engine units and components replaced - the use of appropriate test methods.

27. the properties of jointing materials and when and where they should be used.

28. the manufacturer's specification for the type and quality of engine units and components to be used.

29. how to work safely avoiding damage to other vehicle systems, components and units and contact with leakage and hazardous substances.

PERFORMANCE OBJECTIVES

To be competent you must:

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

b. support your removal and replacement activities by reviewing

- vehicle technical data
- removal and replacement procedures
- legal requirements.

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

d. carry out all removal and replacement activities following;

- manufacturers' instructions
- your workplace procedures
- health and safety requirements.

e. you work in a way which minimises the risk of:

- damage to other vehicle systems
- damage to other vehicle components and units
- contact with leakage
- contact with hazardous substances.

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

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

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

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

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

- k. complete all removal and replacement activities within the agreed timescale.
- l. you report any expected delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that your performance has covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in:
 - your normal workplace
 - an approved centre, or
 - a combination of both
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

7. Your assessor must physically observe you in your normal workplace successfully carrying out the following on at least 1 occasion:
 - a. the removal and replacement of engine mechanical units and components
 - b. the removal and replacement of units and components from 3 out of the 6*systems below:
 - engine mechanical systems
 - cooling systems
 - air supply and exhaust systems
 - fuel and ignition systems
 - engine electrical systems
 - lubrication systems

*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of all the systems listed above.

Unit MR03 - Remove and Replace Electrical Auxiliary Units and Components

UNIT OVERVIEW

This unit is about removing and replacing units and components previously identified as faulty, damaged, deteriorated or where the customer has requested replacements. 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.

KEY WORDS AND PHRASES

Agreed timescales:

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

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Equipment is

- a. hand tools
- b. special workshop tools
- c. general workshop equipment
- d. electrical meters

2. Testing methods are:

- a. visual
- b. aural
- c. functional

3. Electrical auxiliary units and components are for

- a. lighting systems
- b. wiper systems
- c. security and alarm systems
- d. comfort and convenience systems
- e. audio systems
- f. communication systems
- g. electric window systems
- h. monitoring and instrumentation systems

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the legal requirements relating to the vehicle (including road safety and refrigerant handling requirements).
2. the health and safety legislation and workplace procedures relevant to vehicle maintenance activities and personal and vehicle protection.
3. your workplace procedures for
 - recording removal and replacement information
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of documenting removal and replacement information
5. the importance of working to agreed timescales and keeping others informed of progress.
6. the relationship between time and costs.
7. the importance of reporting anticipated delays to the relevant person(s) promptly.

Use of technical information

8. how to find, interpret and use sources of information applicable to electrical unit and component removal and replacement.

9. the importance of using the correct sources of technical information

10. the purpose of and how to use identification codes

Electrical auxiliary system operation and construction

11. how electrical auxiliary units and components are constructed, removed and replaced for the classification of vehicle worked upon.

12. how electrical auxiliary units and components operate for the classification of vehicle worked upon.

Equipment

13. how to prepare, test and use all the removal and replacement equipment required.

Electrical and electronic principles

14. vehicle earthing principles and earthing methods.

15. electrical and electronic principles associated with electrical auxiliary systems, including types of sensors and actuators, their application and operation

16. types of circuit protection and why these are necessary.

17. electrical safety procedures.

18. how lighting, warning, charging and starter circuits work.

19. electric symbols, units and terms.

20. electrical/electronic control system principles

Electrical unit and component removal and replacement

21. how to remove and replace electrical auxiliary units and components for the classification of vehicle worked upon.

22. how to test and evaluate the performance of replacement electrical auxiliary units and components and the reassembled system against the vehicle operating specifications and any legal requirements.

23. the relationship between testing methods and the electrical auxiliary units and components replaced - the use of appropriate test methods.

24. the manufacturer's specification for the type and quality of electrical auxiliary units and components to be used.

25. how to work safely avoiding damage to other vehicle systems, components and units and contact with leakage and hazardous substances.

PERFORMANCE OBJECTIVES

To be competent you must:

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

b. support your removal and replacement activities by reviewing

- vehicle technical data
- removal and replacement procedures
- legal requirements.

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

d. carry out all removal and replacement activities following;

- manufacturers' instructions
- your workplace procedures
- health and safety requirements.

e. you work in a way which minimises the risk of:

- damage to other vehicle systems
- damage to other vehicle components and units
- contact with leakage
- contact with hazardous substances.

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

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

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

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

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

- k. complete all removal and replacement activities within the agreed timescale.
- l. you report any expected delays in completion to the relevant person(s) promptly

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that your performance has covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in:
 - your normal workplace
 - an approved centre, or
 - a combination of both
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of removing and replacing at least 4 units or components, each from a different electrical auxiliary system. At least 3 of these 4 pieces of evidence must come from work in your normal workplace.
8. Your assessor must physically observe you in your normal workplace successfully carrying out on at least 1 occasion the removal and replacement of electrical auxiliary units and components from 2 out of the 8* systems below:
 - lighting systems
 - wiper systems
 - security and alarm systems
 - comfort and convenience systems
 - audio systems
 - communication systems
 - electric window systems
 - monitoring and instrumentation systems

*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of all the systems listed above.

Unit MR04 - Remove and Replace Vehicle Chassis Units and Components

UNIT OVERVIEW

This unit is about removing and replacing units and components where dismantling and re-assembly of transmission and 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.

KEY WORDS AND PHRASES

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 unit, this will also include wheels and tyres.

Vehicles:

These can be any of the following - light vehicles, motorcycles, mopeds and scooters

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Equipment is

- a. hand tools
- b. special workshop tools
- c. general workshop equipment
- d. electrical testing equipment

2. Testing methods are:

- a. visual
- b. aural
- c. functional

3. Units and components are:

- a. mechanical
- b. electrical
- c. hydraulic

4. Chassis systems are

- a. steering
- b. suspension
- c. braking

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the legal requirements relating to the vehicle (including road safety requirements).
2. the health and safety legislation and workplace procedures relevant to vehicle maintenance activities and personal and vehicle protection.
3. your workplace procedures for
 - recording removal and replacement information
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of documenting removal and replacement information
5. the importance of working to agreed timescales and keeping others informed of progress.
6. the relationship between time and costs.
7. the importance of reporting anticipated delays to the relevant person(s) promptly.

Use of technical information

8. how to find, interpret and use sources of information applicable to unit and component removal and replacement within chassis systems.
9. the importance of using the correct sources of technical information

10. the purpose of and how to use identification codes.

Electrical and electronic principles

11. vehicle earthing principles and earthing methods.

12. electrical and electronic principles associated with chassis and transmission systems, including types of sensors and actuators, their application and operation.

13. types of circuit protection and why these are necessary.

14. electrical safety procedures.

15. electric symbols, units and terms.

16. electrical and electronic control system principles.

Chassis system operation and construction

17. how chassis systems and their related units and components are constructed, removed and replaced for the classification of vehicle worked upon.

18. how chassis systems and their related units and components operate for the classification of vehicle worked upon.

Equipment

19. how to prepare, test and use all the removal and replacement equipment required.

Chassis system unit and component removal and replacement

20. how to remove and replace chassis system mechanical, electrical and hydraulic units and components for the classification of vehicle worked upon .

21. how to file, fit, tap, thread, cut and drill plastics and metals.

22. how to select and use gaskets, sealants, seals, fittings and fasteners.

23. how to test and evaluate the performance of replacement chassis system units and components and the reassembled system against the vehicle operating specifications and any legal requirements.

24. the relationship between testing methods and the chassis system units and components replaced - the use of appropriate test methods.

25. when replacement units and components must meet the original equipment specification (OES) for warranty or other requirements.

26. how to work safely avoiding damage to other vehicle systems, components and units and contact with leakage and hazardous substances.

PERFORMANCE OBJECTIVES

To be competent you must:

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

b. support your removal and replacement activities by reviewing

- vehicle technical data
- removal and replacement procedures
- legal requirements.

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

d. carry out all removal and replacement activities following;

- manufacturers' instructions
- your workplace procedures
- health and safety requirements.

e. you work in a way which minimises the risk of:

- damage to other vehicle systems
- damage to other vehicle components and units
- contact with leakage
- contact with hazardous substances.

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

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

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

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

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

k. complete all removal and replacement activities within the agreed timescale.

l. you report any expected delays in completion to the relevant person(s) promptly

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or
 - a combination of both
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of removing and replacing 4 different units or components in total which must include items from steering, suspension and braking systems. Your evidence must include mechanical, electrical and hydraulic/fluid units or components.
8. Your assessor must physically observe you in your normal workplace on at least 1 occasion successfully removing and replacing units and components from each of the following systems:
 - steering
 - suspension
 - braking

Unit MR04HV - Remove and Replace Commercial Vehicle Chassis Units and Components

UNIT OVERVIEW

This unit is about removing and replacing commercial vehicle 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.

KEY WORDS AND PHRASES

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 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 unit, this will also include wheels and tyres.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Equipment is

- a. hand tools
- b. special workshop tools
- c. general workshop equipment
- d. electrical testing equipment

2. Testing methods are:

- a. visual
- b. aural
- c. functional

3. Units and components are:

- a. mechanical
- b. electrical
- c. hydraulic and fluid
- d. pneumatic

4. Chassis systems are

- a. steering
- b. suspension
- c. braking

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the legal requirements relating to the vehicle (including road safety requirements).
2. the health and safety legislation and workplace procedures relevant to vehicle maintenance activities and personal and vehicle protection.
3. your workplace procedures for
 - recording removal and replacement information
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of documenting removal and replacement information
5. the importance of working to agreed timescales and keeping others informed of progress.
6. the relationship between time and costs.
7. the importance of reporting anticipated delays to the relevant person(s) promptly.

Use of technical information

8. how to find, interpret and use sources of information applicable to unit and component removal and replacement within chassis systems.
9. the importance of using the correct sources of technical information
10. the purpose of and how to use identification codes.

Electrical and electronic principles

11. vehicle earthing principles and earthing methods.
12. electrical and electronic principles associated with chassis systems, including types of sensors and actuators, their application and operation.
13. types of circuit protection and why these are necessary.
14. electrical safety procedures.
15. electric symbols, units and terms.
16. electrical and electronic control system principles.

Chassis system operation and construction

17. how commercial vehicle chassis systems and their related units and components are constructed, removed and replaced.
18. how commercial vehicle chassis systems and their related units and components operate.

Equipment

19. how to prepare, test and use all the removal and replacement equipment required.

Chassis system unit and component removal and replacement

20. how to remove and replace commercial vehicle chassis system mechanical, electrical, hydraulic and pneumatic units and components.
21. how to file, fit, tap, thread, cut and drill plastics and metals.
22. how to select and use gaskets, sealants, seals, fittings and fasteners.
23. how to test and evaluate the performance of replacement chassis system units and components and the reassembled system against the vehicle operating specifications and any legal requirements.
24. the relationship between testing methods and the chassis system units and components replaced - the use of appropriate test methods.
25. when replacement units and components must meet the original equipment specification (OES) for warranty or other requirements.
26. how to work safely avoiding damage to other vehicle systems, components and units and contact with leakage and hazardous substances.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. wear suitable personal protective equipment and use vehicle coverings throughout all removal and replacement activities.
- b. support your removal and replacement activities by reviewing
 - vehicle technical data
 - removal and replacement procedures
 - legal requirements.
- c. prepare, test and use all the equipment required following manufacturers' instructions.
- d. carry out all removal and replacement activities following;
 - manufacturers' instructions
 - your workplace procedures
 - health and safety requirements.
- e. you work in a way which minimises the risk of:
 - damage to other vehicle systems
 - damage to other vehicle components and units
 - contact with leakage
 - contact with hazardous substances.
- f. ensure replaced chassis units and components conform to the vehicle operating specification and any legal requirements.
- g. record and report any additional faults you notice during the course of your work promptly.
- h. use suitable testing methods to evaluate the performance of the reassembled system accurately.
- i. ensure the reassembled chassis system performs to the vehicle operating specification and meets any legal requirements prior to return to the customer.
- j. ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required.
- k. complete all removal and replacement activities within the agreed timescale.

I. you report any expected delays in completion to the relevant person(s) promptly

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or
 - a combination of both
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of removing and replacing 4 different units or components in total which must include items from steering, suspension and braking systems. Your evidence must include mechanical, electrical and hydraulic/fluid units or components.
8. Your assessor must physically observe you in your normal workplace on at least 1 occasion successfully removing and replacing units and components from each of the following systems:
 - steering
 - suspension
 - braking

Unit MR05 - Conduct Pre and Post Work Vehicle Inspections

UNIT OVERVIEW

This unit is about carrying out pre and post work inspections of vehicles using a variety of basic testing and inspection methods.

KEY WORDS AND PHRASES

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, commercial vehicles, motorcycles, mopeds and scooters

Sources of technical information:

Examples include inspection schedules, manufacturers' manuals and Trade Association check lists, workplace procedures.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Inspections are

- a. pre-work
- b. post work

2. Test methods are

- a. visual
- b. aural
- c. functional

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health and safety legislation and workplace procedures relevant to conducting pre and post work vehicle inspections and personal and vehicle protection.

2. your workplace procedures for

- recording pre and post work inspections and any variations from acceptable tolerances

- the referral of problems

- reporting delays to the completion of work

3. the importance of making accurate records of the results of your tests and inspections and interpreting them correctly.

4. the importance of working to agreed timescales and keeping others informed of progress.

5. the relationship between time and costs.

6. the importance of reporting anticipated delays to the relevant person(s) promptly.

Sources of information

7. how to find, interpret and use technical information .

8. the importance of using technical information to inform your inspection and testing of vehicles.

Testing methods and the conduct of Inspections

9. how vehicle systems operate (including the engine area, transmission area, chassis or frame area and electrical area) and the operational requirements for the vehicle(s) on which you are working.

10. how to follow procedures for the systematic pre and post work inspection of vehicles.

11. how to test the operation of vehicle systems and vehicle condition

12. how to compare test and inspection results against vehicle specifications and legal requirements.

13. how to record test and inspection results in the format required.

14. how to make recommendations based upon the results of your inspections.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. use suitable personal protective equipment throughout all inspection activities.
- b. use suitable sources of technical information to support your inspection activities.
- c. carry out systematic vehicle inspections following:
 - your workplace procedures
 - health and safety requirements.
- d. conduct all vehicle testing following:
 - the manufacturer's instructions
 - your workplace procedures
 - health and safety requirements.
- e. ensure your comparison of the vehicle against specification accurately identifies any:
 - differences from the vehicle specification
 - vehicle appearance and condition faults
- f. work in a way which minimises the risk of damage to the vehicle and its systems, other people and their property.
- g. make suitable recommendations for future action based upon the results of your tests and inspections.
- h. ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required.
- i. complete all inspection activities within the agreed timescale and to specification.
- j. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in your normal workplace
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of carrying out the following on different vehicles:
 - 2 pre-work inspections
 - 2 post-work inspections
8. Your assessor must observe you in your normal workplace successfully carrying out either a pre or post work inspection on at least 1 occasion.

Unit MR06 - Inspect Vehicles

UNIT OVERVIEW

This unit is about carrying out a range of inspections of vehicles using a variety of testing methods and equipment.

KEY WORDS AND PHRASES

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, commercial vehicles, motorcycles, mopeds and scooters

Sources of technical information:

Examples include inspection schedules, MOT inspection manuals and guides, manufacturers' manuals and Trade Association check lists, workplace procedures.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Vehicle inspections are

- a. pre-delivery
- b. pre-purchase
- c. pre-MOT test
- d. safety
- e. post-accident

2. Test methods are

- a. visual
- b. aural
- c. functional
- d. measurement

3. Equipment

- a. emissions testing
- b. brake testing
- c. headlamp alignment
- d. wheel alignment
- e. torque setting
- f. specialist diagnostic equipment

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health and safety legislation and workplace procedures relevant to conducting vehicle inspections and personal and vehicle protection.

2. the legislation relevant to the types of vehicle inspections described in the Scoping Statement for this unit.

3. your workplace procedures for

- recording vehicle inspections and any variations from acceptable tolerances
- the referral of problems
- reporting delays to the completion of work

4. the importance of making accurate records of the results of your tests and inspections and interpreting them correctly.

5. the importance of working to agreed timescales and keeping others informed of progress.

6. the relationship between time, costs and profitability.

7. the importance of reporting anticipated delays to the relevant person(s) promptly.

Sources of information

8. how to find, interpret and use technical information .

9. the importance of using technical information to inform your inspection and testing of vehicles.

Testing methods and the conduct of Inspections

10. how vehicle systems operate (including the engine area, transmission area, chassis or frame area and electrical area) and the operational tolerances for the vehicle(s) on which you are working.

11. how to follow procedures for the systematic inspection of vehicles.

12. how to test the operation of vehicle systems and vehicle condition, including workshop based and road tests.

13. how to compare test and inspection results against vehicle specifications and legal requirements.

14. how to record test and inspection results in the format required.

15. how to make recommendations based upon the results of your inspections.

16. the implications of failing to carry out an inspection correctly.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. use suitable personal protective equipment throughout all vehicle inspection activities.
- b. use suitable sources of technical information to support your vehicle inspection activities.
- c. where necessary, confirm that equipment has been calibrated to meet manufacturers' and legal requirements.
- d. carry out systematic vehicle inspections following:
 - your workplace procedures
 - health and safety requirements.
- e. conduct all vehicle testing following:
 - the manufacturer's instructions
 - the recognised test methods
 - your workplace procedures
 - health and safety requirements.
- f. ensure your comparison of the vehicle against specification accurately identifies any:
 - differences from the vehicle specification
 - vehicle appearance and condition faults
 - non-compliance with statutory requirements
- g. work in a way which minimises the risk of damage to the vehicle and its systems, other people and their property.
- h. make suitable recommendations for future action based upon the results of your tests and inspections.
- i. ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required.
- j. complete all inspection activities within the agreed timescale and to specification.
- k. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in your normal workplace
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of inspecting at least 4 different vehicles. Your evidence must include at least 2* of the following types of inspection:
 - a. pre-delivery
 - b. pre-purchase

- c. pre-MOT test
- d. safety
- e. post-accident

8. Your assessor must observe you carrying out inspection of vehicles in your normal workplace on at least 1 occasion.

*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of all the types of inspections listed.

Unit MR07 - Diagnose and Rectify Vehicle Engine and Component Faults

UNIT OVERVIEW

This unit is about diagnosing and rectifying faults occurring in the vehicle engine mechanical, electrical and hydraulic and fluid systems.

KEY WORDS AND PHRASES

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 two or more step diagnostic activity using a prescribed process or format 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, commercial vehicles, motorcycles, mopeds and scooters.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Faults occur within

- a. the engine mechanical system
- b. the engine electrical and electronic systems
- c. the engine hydraulic and fluid systems

2. Diagnostic methods are

- a. measurement
- b. functional testing
- c. electrical and electronic systems testing

3. Equipment is

- a. diagnostic and rectification equipment for engine mechanical systems
- b. diagnostic and rectification equipment for engine electrical systems
- c. diagnostic and rectification equipment for engine hydraulic and fluid systems
- d. specialist repair tools
- e. general workshop equipment

4. Rectification activities are:

- a. dismantling
- b. replacement of units and components
- c. adjustment of units and components
- d. repairs to wiring and connectors
- e. re-programming vehicle systems
- f. reassembly
- g. functional testing

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health and safety legislation and workplace procedures relevant to workshop practices and personal and vehicle protection when diagnosing and rectifying engine faults.
2. legal requirements relating to the vehicle (including road safety requirements).
3. your workplace procedures for
 - recording diagnostic and rectification activities
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of, documenting diagnostic and rectification information.
5. the importance of working to agreed timescales and keeping others informed of progress.
6. the relationship between time, costs and profitability.
7. the importance of reporting anticipated delays to the relevant person(s) promptly.

Electrical and electronic principles

8. electrical and electronic principles associated with engine systems, including types of sensors and actuators, their application and operation
9. how electrical and electronic engine systems operate, including electrical component function, electrical inputs, outputs, voltages and oscilloscope patterns, digital and fibre optics principles.
10. the interaction between electrical, electronic and mechanical components within vehicle engine systems
11. electrical symbols, units and terms.
12. electrical safety procedures.

Use of diagnostic and rectification equipment

13. how to prepare and test the accuracy of diagnostic testing equipment.
14. 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

15. how engine mechanical, electrical, electronic and hydraulic and fluid systems are constructed, operate, dismantled and reassembled.
16. the types and causes of engine mechanical, electrical, electronic and hydraulic and fluid system, component and unit faults and failures.
17. engine mechanical, electrical, electronic and hydraulic and fluid component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action.
18. how to find, interpret and use sources of information on engine electrical and electronic operating specifications, diagnostic test procedures, repair procedures and legal requirements.
19. vehicle operating specifications for limits, fits and tolerances relating to engine mechanical, electrical, electronic and hydraulic and fluid systems for the vehicle(s) on which you work.
20. how to select the most appropriate diagnostic testing method for the symptoms presented.
21. how to carry out systematic diagnostic testing of engine mechanical, electrical and electronic, hydraulic and fluid systems using a prescribed process or format and the diagnostic methods listed in the Scoping Statement for this unit.
22. how to assess the condition evident within mechanical, electrical, electronic, hydraulic and fluid components and units.
23. how to interpret test results and vehicle data in order to identify the location and cause of vehicle system faults.
24. how to carry out the rectification activities listed in the Scoping Statement for this unit in order to correct faults in the engine mechanical, electrical, electronic and hydraulic and fluid systems.
25. the relationship between test methodology and the faults repaired - the use of appropriate testing methods
26. how to make cost effective recommendations for rectification.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. wear suitable personal protective equipment and use vehicle coverings when using diagnostic methods and carrying out rectification activities.
- b. support the identification of faults, by reviewing vehicle:

- technical data
 - diagnostic test procedures.
- c. prepare, connect and test all the required equipment following manufacturers' instructions prior to use.
- d. use diagnostic methods which are relevant to the symptoms presented.
- e. collect sufficient diagnostic information in a systematic way to enable an accurate diagnosis of engine system faults.
- f. identify and record any system deviation from acceptable limits accurately.
- g. ensure your assessment of dismantled sub-assemblies, components and units identifies their condition and suitability for repair or replacement, accurately.
- h. inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform.
- i. use the equipment required, correctly and safely throughout all rectification activities.
- j. carry out all rectification activities following:
- manufacturers' instructions
 - your workplace procedures
 - health and safety requirements.
- k. work in a way which minimises the risk of :
- damage to other vehicle systems
 - damage to other components and units
 - contact with leakages
 - contact with hazardous substances.
- l. ensure all repaired and replaced components and units conform to the vehicle operating specification and any legal requirements.
- m. when necessary, adjust components and units correctly to ensure that they operate to meet system requirements.
- n. record and report any additional faults you notice during the course of work promptly.
- o. use testing methods which are suitable for assessing the performance of the system rectified.
- p. ensure the engine system rectified performs to the vehicle operating specification and any legal requirements prior to return to the customer.
- q. ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required.
- r. complete all system diagnostic activities within the agreed timescale.
- s. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or
 - a combination of both
6. Simulated activities will be acceptable to assess candidates' diagnosis and rectification of faults which do not occur at frequent intervals on vehicles within the normal workplace or in the RWE environment, but which must be diagnosed and rectified to ensure that all the evidence requirements can be met.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of diagnosing and rectifying 1 fault in each of the following:
 - a. engine mechanical systems
 - b. engine electrical systems

c. engine hydraulic and fluid systems

Your identification of faults must have involved a 2 or more step diagnostic activity using a prescribed process or format.

8. Of the 3 pieces of evidence above, 2 must come from work carried out in your normal workplace.

9. Your assessor must physically observe you on at least 1 occasion undertaking an engine related diagnostic and rectification activity

Unit MR08 - Diagnose and Rectify Vehicle Chassis System Faults

UNIT OVERVIEW

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

KEY WORDS AND PHRASES

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 two or more step diagnostic activity using a prescribed process or format 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: 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, motorcycles, mopeds and scooters.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Chassis systems are

- a. steering
- b. suspension
- c. braking

2. Diagnostic methods are

- a. measurement
- b. functional testing
- c. electrical and electronic systems testing

3. Equipment is

- a. diagnostic and rectification equipment for chassis mechanical systems
- b. diagnostic and rectification equipment for chassis electrical systems
- c. diagnostic and rectification equipment for chassis hydraulic and fluid systems
- d. specialist repair tools
- e. general workshop equipment

4. Faults are

- a. mechanical
- b. electrical and electronic
- c. hydraulic and fluid

5. Rectification activities are:

- a. dismantling
- b. replacement of units and components
- c. adjustment of units and components
- d. repairs to wiring and connectors
- e. re-programming vehicle systems
- f. reassembly
- g. functional testing

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health and safety legislation and workplace procedures relevant to workshop practices and personal and vehicle protection when diagnosing and rectifying chassis faults.
2. legal requirements relating to the vehicle (including road safety requirements).
3. your workplace procedures for
 - recording diagnostic and rectification activities
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of, documenting diagnostic and rectification information.
5. the importance of working to agreed timescales and keeping others informed of progress.
6. the relationship between time, costs and profitability.
7. the importance of reporting anticipated delays to the relevant person(s) promptly.

Electrical and electronic principles

8. electrical and electronic principles associated with chassis systems, including types of sensors and actuators, their application and operation.
9. how electrical and electronic chassis systems operate, including electrical component function, electrical inputs, outputs, voltages and oscilloscope patterns, digital and fibre optics principles.
10. the interaction between electrical, electronic and mechanical components within vehicle chassis systems.
11. electrical symbols, units and terms.
12. electrical safety procedures.

Use of diagnostic and rectification equipment

13. how to prepare and test the accuracy of diagnostic testing equipment.
 14. 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
15. how chassis mechanical, electrical, electronic and hydraulic and fluid systems are constructed, dismantled, reassembled and operate.
 16. the types and causes of chassis mechanical, electrical, electronic and hydraulic and fluid system, component and unit faults and failures
 17. chassis mechanical, electrical and hydraulic and fluid component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action.
 18. how to find, interpret and use sources of information on chassis electrical operating specifications, diagnostic test procedures, repair procedures and legal requirements.
 19. vehicle operating specifications for limits, fits and tolerances relating to chassis mechanical, electrical, electronic and hydraulic and fluid systems for the vehicle(s) on which you work.
 20. how to select the most appropriate diagnostic testing method for the symptoms presented.
 21. how to carry out systematic diagnostic testing of chassis mechanical, electrical and electronic, hydraulic and fluid systems using a prescribed process or format .
 22. how to assess the condition evident within chassis mechanical, electrical, electronic, hydraulic and fluid components and units.
 23. how to interpret test results and vehicle data in order to identify the location and cause of vehicle system faults.
 24. how to carry out the rectification activities listed in the Scoping Statement for this unit in order to correct faults in the chassis mechanical, electrical, electronic and hydraulic and fluid systems.
 25. the relationship between test methodology and the faults repaired - the use of appropriate testing methods
 26. how to make cost effective recommendations for rectification.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. wear suitable personal protective equipment and use vehicle coverings when using diagnostic methods and carrying out rectification activities.
- b. support the identification of faults, by reviewing vehicle:
 - technical data

- diagnostic test procedures.
- c. prepare, connect and test all the required equipment following manufacturers' instructions prior to use.
- d. use diagnostic methods which are relevant to the symptoms presented.
- e. collect diagnostic information in a systematic way relevant to the diagnostic methods used.
- f. collect sufficient diagnostic information to enable an accurate diagnosis of chassis system faults.
- g. identify and record any system deviation from acceptable limits accurately.
- h. ensure your assessment of dismantled sub-assemblies, components and units identifies their condition and suitability for repair or replacement, accurately.
- i. inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform.
- j. use the equipment required, correctly and safely throughout all rectification activities.
- k. carry out all rectification activities following:
 - manufacturers' instructions
 - your workplace procedures
 - health and safety requirements.
- l. work in a way which minimises the risk of :
 - damage to other vehicle systems
 - damage to other components and units
 - contact with leakages
 - contact with hazardous substances.
- m. ensure all repaired and replaced components and units conform to the vehicle operating specification and any legal requirements.
- n. when necessary, adjust components and units correctly to ensure that they operate to meet system requirements.
- o. record and report any additional faults you notice during the course of work promptly.
- p. use testing methods which are suitable for assessing the performance of the system rectified.
- q. ensure the chassis system rectified performs to the vehicle operating specification and any legal requirements prior to return to the customer.
- r. ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required.
- s. complete all system diagnostic activities within the agreed timescale.
- t. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or
 - a combination of both
6. Simulated activities will be acceptable to assess candidates' diagnosis and rectification of faults which do not occur at frequent intervals on vehicles within the normal workplace or in the RWE environment, but which must be diagnosed and rectified to ensure that all the evidence requirements can be met.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of diagnosing and rectifying 1 fault in each of the following systems:
 - a. steering
 - b. suspension
 - c. the braking

Your identification of faults must have involved a 2 or more step diagnostic activity using a prescribed process or format.

8. Of the 3 pieces of evidence above, 2 must come from work carried out in your normal workplace.

9. Your assessor must physically observe you on at least 1 occasion undertaking a chassis related diagnostic and rectification activity.

Unit MR08HV - Diagnose and Rectify Commercial Vehicle Chassis System Faults

UNIT OVERVIEW

This unit is about diagnosing and rectifying faults occurring within commercial vehicle steering and suspension systems, braking systems and other systems fitted to commercial vehicle chassis.

KEY WORDS AND PHRASES

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.

Commercial Vehicles

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

Chassis system faults

These are faults that require a two or more step diagnostic activity using a prescribed process or format 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: brake roller testing, performance testing and road testing where relevant.

Hydraulic and fluid systems

Examples are: hydraulic braking systems, hydro-pneumatic suspension systems, power steering, hydraulic load handling and or moving systems.

Pneumatic systems

Examples are pneumatic braking systems, pneumatic suspension systems, pneumatic control systems.

Recommendations

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

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Chassis systems are

- a. steering
- b. suspension
- c. braking

2. Diagnostic methods are

- a. measurement
- b. functional testing
- c. electrical and electronic systems testing

3. Equipment is

- a. diagnostic and rectification equipment for chassis mechanical systems
- b. diagnostic and rectification equipment for chassis electrical systems
- c. diagnostic and rectification equipment for chassis hydraulic and fluid systems
- d. diagnostic and rectification equipment for chassis pneumatic systems
- e. specialist repair tools
- f. general workshop equipment

4. Faults are:

- a. mechanical
- b. electrical and electronic
- c. hydraulic and fluid
- d. pneumatic

5. Rectification activities are:

- a. dismantling
- b. replacement of units and components
- c. adjustment of units and components

- d. repairs to wiring and connectors
- e. re-programming vehicle systems
- f. reassembly
- g. functional testing
- h. repairs to air line and connectors

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health and safety legislation and workplace procedures relevant to workshop practices and personal and vehicle protection when diagnosing and rectifying chassis faults.
2. legal requirements relating to the vehicle (including road safety requirements).
3. your workplace procedures for
 - recording diagnostic and rectification activities
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of, documenting diagnostic and rectification information.
5. the importance of working to agreed timescales and keeping others informed of progress.
6. the relationship between time, costs and profitability.
7. the importance of reporting anticipated delays to the relevant person(s) promptly.

Electrical and electronic principles

8. electrical and electronic principles associated with chassis systems, including types of sensors and actuators, their application and operation.
9. how electrical and electronic chassis systems operate, including electrical component function, electrical inputs, outputs, voltages and oscilloscope patterns, digital and fibre optics principles.
10. the interaction between electrical, electronic and mechanical components within vehicle chassis systems.
11. electrical symbols, units and terms.
12. electrical safety procedures.

Use of diagnostic and rectification equipment

13. how to prepare and test the accuracy of diagnostic testing equipment.
 14. 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
15. how chassis mechanical, electrical, electronic, pneumatic and hydraulic and fluid systems are constructed, dismantled, reassembled and operate.
 16. the types and causes of chassis mechanical, electrical, electronic, pneumatic and hydraulic and fluid system component and unit faults and failures
 17. chassis mechanical, electrical, electronic, pneumatic, hydraulic and fluid component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action.
 18. how to find, interpret and use sources of information on chassis electrical and electronic operating specifications, diagnostic test procedures, repair procedures and legal requirements.
 19. vehicle operating specifications for limits, fits and tolerances relating to chassis mechanical, electrical, electronic, pneumatic and hydraulic and fluid systems for the vehicle(s) on which you work.
 20. how to select the most appropriate diagnostic testing method for the symptoms presented.
 21. how to carry out systematic diagnostic testing of chassis mechanical, electrical and electronic, pneumatic, hydraulic and fluid systems using a prescribed process or format.
 22. how to assess the condition evident within chassis mechanical, electrical, electronic, pneumatic, hydraulic and fluid components and units.
 23. how to interpret test results and vehicle data in order to identify the location and cause of vehicle system faults.
 24. how to carry out the rectification activities listed in the Scoping Statement for this unit in order to correct faults in the chassis mechanical, electrical, electronic, pneumatic and hydraulic and fluid systems.
 25. the relationship between test methodology and the faults repaired - the use of appropriate testing methods
 26. how to make cost effective recommendations for rectification.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. wear suitable personal protective equipment and use vehicle coverings when using diagnostic methods and carrying out rectification activities.
- b. support the identification of faults, by reviewing vehicle:
 - technical data
 - diagnostic test procedures.
- c. prepare, connect and test all the required equipment following manufacturers' instructions prior to use.
- d. use diagnostic methods which are relevant to the symptoms presented.
- e. collect diagnostic information in a systematic way relevant to the diagnostic methods used.
- f. collect sufficient diagnostic information to enable an accurate diagnosis of chassis system faults.
- g. identify and record any system deviation from acceptable limits accurately.
- h. ensure your assessment of dismantled sub-assemblies, components and units identifies their condition and suitability for repair or replacement, accurately.
- i. inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform.
- j. use the equipment required, correctly and safely throughout all rectification activities.
- k. carry out all rectification activities following:
 - manufacturers' instructions
 - your workplace procedures
 - health and safety requirements.
- l. work in a way which minimises the risk of :
 - damage to other vehicle systems
 - damage to other components and units
 - contact with leakages
 - contact with hazardous substances.
- m. ensure all repaired and replaced components and units conform to the vehicle operating specification and any legal requirements.
- n. when necessary, adjust components and units correctly to ensure that they operate to meet system requirements.
- o. record and report any additional faults you notice during the course of work promptly.
- p. use testing methods which are suitable for assessing the performance of the system rectified.
- q. ensure the chassis system rectified performs to the vehicle operating specification and any legal requirements prior to return to the customer.
- r. ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required.
- s. complete all system diagnostic activities within the agreed timescale.
- t. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or
 - a combination of both
6. Simulated activities will be acceptable to assess candidates' diagnosis and rectification of faults which do not occur at frequent intervals on vehicles within the normal workplace or in the RWE environment, but which must be diagnosed and rectified to ensure that all the evidence requirements can be met.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of diagnosing and rectifying 1 fault in each of the following systems:
 - a. steering
 - b. suspension
 - c. braking

Your identification of faults must have involved a 2 or more step diagnostic activity using a prescribed process or format.

8. Of the 3 pieces of evidence above, 2 must come from work carried out in your normal workplace.

9. Your assessor must physically observe you on at least 1 occasion undertaking a chassis related diagnostic and rectification activity.

Unit MR09 - Valet Vehicles

UNIT OVERVIEW

This unit is about carrying a full exterior and interior valet of vehicles, including hard and soft trim surfaces where relevant.

KEY WORDS AND PHRASES

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.

Full valet

Light vehicles - a valet covering both the interior, exterior, hard and soft trim of the vehicle.

Motorcycles, mopeds and scooters - a valet covering the entire machine.

Commercial vehicle - a valet covering the interior and exterior of the cab, including hard and soft trim.

Hard trim

Examples include; decorative metal, decorative wood, scuff plates, rubbing strips and inlaid bumpers

Soft trim

Examples are plastic, leather, fabric and carpets.

Vehicles

These can be any of the following - light vehicles, commercial vehicles, motorcycles, mopeds and scooters.

Vehicle interior

This can include the engine compartment as well as the passenger compartment, where relevant to the vehicle.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Equipment is

- a. vehicle wash equipment
- b. vacuum cleaners
- c. polishing machines
- d. hand cleaning equipment

2. Materials are

- a. sprays
- b. polishes
- c. de-waxing agents
- d. cleaning chemicals
- e. waxes
- f. trim and tyre dressings

3. Surfaces are

- a. paintwork
- b. glass
- c. rubber
- d. hard trim
- e. soft trim
- f. wheels and tyres

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative, organisational and customer requirements and procedures

1. the health and safety legislation and workplace procedures relevant to workshop practices and personal and vehicle protection.
2. the safety and environmental requirements applicable when valeting vehicles.
3. your workplace procedures for
 - recording valeting activities
 - reporting problems and or vehicle damage

- reporting delays to the completion of work
- 4. any specific customer instructions
- 5. the importance of working to agreed timescales and keeping others informed of progress.
- 6. the importance of reporting anticipated delays to the relevant person(s) promptly.
- 7. the relationship between time and cost.

Equipment and materials

- 8. how to prepare and check vehicle valeting equipment.
- 9. how to use vehicle valeting equipment.
- 10. the properties and use of vehicle exterior and interior cleaning materials.
- 11. the manufacturers' instructions and safety data sheets for the use of external and internal cleaning materials.

Valeting vehicles

- 12. how to clean and restore paintwork, clean glass, plastic, rubber, engines and engine compartments, soft trim, hard trim, wheels and tyres.
- 13. the importance of working in an organised and sequential manner when cleaning vehicles.
- 14. how to dispose of waste materials and cleaning materials.
- 15. the importance of disposing of waste safely and the consequences of not doing so to others and the environment.
- 16. the importance of protecting customer possessions from cleaning materials and the cleaning process.
- 17. how to work safely avoiding damage to the vehicle and its systems

PERFORMANCE OBJECTIVES

To be competent you must:

- a. wear suitable personal protective equipment and use vehicle coverings where necessary throughout all valeting activities.
- b. carry out all valeting procedures in the designated area.
- c. check and prepare all the equipment required, following manufacturers' instructions, prior to use.
- d. store safely and return any loose customer possessions likely to be affected by valeting activities.
- e. use external and internal cleaning materials which are suitable for the vehicle's surfaces and specification.
- f. use all cleaning materials and equipment following:
 - the manufacturer's instructions
 - your workplace procedures
 - health and safety requirements.
- g. clean all surfaces following the customer contract and timescale agreed.
- h. report any vehicle damage you notice to the relevant person(s) promptly.
- i. leave all exterior and internal surfaces free from residual cleaning and finishing agents.
- j. dispose of waste materials and cleaning materials to conform with legal and workplace requirements.
- k. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

- 1. produce evidence to show you meet all of the performance objectives consistently
- 2. produce evidence to show that you have covered all the items listed in the scope for this unit
- 3. produce evidence to show that you possess all the knowledge required.
- 4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
- 5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or
 - a combination of both
- 6. produce evidence of valeting one vehicle classification i.e. light, commercial vehicles or motorcycles, mopeds or scooters.

7. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

8. produce evidence of conducting a full valet on 3 vehicles.
9. Your assessor must observe you carrying out 1 full valet.
10. Your evidence must include you valeting 2 vehicles within your normal workplace.

Unit MR10 - Identify and Agree Customer Vehicle Needs

UNIT OVERVIEW

This unit is about: gaining information from customers on their perceived needs; giving advice and information and agreeing a course of action; contracting for the agreed work and completing all necessary records and instructions.

KEY WORDS AND PHRASES

Courses of action

Examples include: servicing, diagnosis of system faults, dismantling for further inspection and testing, repair, replacement and customising vehicle features.

Customers

Internal and external customers, including people who have contracted work to your company.

Recording systems

Examples include: records of vehicle inspection, job cards, vehicle manufacturers' records, company and customer records and invoices.

Terms and conditions

Examples include: payments, costs, timescales, responsibilities and liabilities for vehicle welfare, warranty procedures and contracts.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

No items listed for this unit.

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the fundamental legal requirements of current consumer legislation and the consequences of your own actions in respect of this legislation.
2. the terms and conditions applicable to the acceptance of customer vehicles.
3. the content and limitations of vehicle and component warranties for the vehicles dealt with by your company.
4. the limits of your own authority for accepting vehicles.
5. the importance of keeping customers informed of progress.
6. your workplace requirements for the completion of records.
7. how to complete and process all the necessary documentation.

Customer communication and care

7. how to communicate effectively with, and listen to, customers.
8. how to adapt your language when explaining technical matters to non-technical customers.
9. how to use effective questioning techniques.
10. how to care for customers and achieve customer satisfaction.

Company products and services

11. the courses of action available to resolve vehicle problems.
12. the range and type of services offered by your company.
13. the effect of resource availability upon the receipt of customer vehicles and the completion work.
14. how to access costing and work completion time information.

Vehicle information systems, servicing and repair requirements

15. how to use and interpret vehicle data and operating procedures.
16. vehicle repair and service procedures for the type(s) of vehicles on which you work.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. obtain sufficient, relevant information from the customer to make an assessment of their own and perceived vehicle needs.
- b. provide customers with accurate, current and relevant advice and information on:
 - suitable vehicle repair and service procedures
 - potential courses of action
 - the implications of courses of action
 - the estimated costs.

- c. provide advice and information clearly and in a form and manner which the customer will understand.
- d. actively encourage customers to ask questions and seek clarification during your conversation.
- e. support the accurate identification and clarification of customer and vehicle needs, by referring to:
 - vehicle data
 - operating procedures.
- f. before accepting the vehicle, agree with the customer and record:
 - the extent and nature of the work to be undertaken
 - the terms and conditions of acceptance
 - the cost
 - the timescale.
- g. confirm your customer's understanding of the agreement you have made.
- h. ensure your recording systems are complete, accurate, in the format required and signed by the customer where necessary.
- i. pass all completed records to the next person in the process promptly.
- j. gain further customer approval where the contracted agreement is likely to be exceeded.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in your normal workplace
6. produce performance evidence of you dealing with customers with regard to their vehicles
7. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

8. produce evidence, including records, to show that you have dealt with 3 different customers.
9. Your assessor must physically observe you in your normal workplace dealing with at least 1 customer.
10. All your evidence must come from dealing with customers in your normal workplace.

Unit MR11 - Overhaul Mechanical Units

UNIT OVERVIEW

This unit is about the bench-based overhaul of mechanical units, involving dismantling, assessment, repair, replacement or adjustment of internal components together with re-assembly and testing.

KEY WORDS AND PHRASES

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 drives, steering, suspension, motorcycle chassis assemblies.

Testing methods

As prescribed by the appropriate technical literature.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Overhaul activities are

- a. dismantling
- b. assessment,
- c. repair
- d. replacement
- e. adjustment of internal components
- f. re-assembly
- g. functional testing

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the legal requirements applicable to the units and assemblies overhauled (including road safety requirements).
2. the health and safety legislation and workplace procedures relevant to workshop practices and personal and vehicle protection.
3. your workplace procedures for
 - recording overhaul activities
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of, documenting repair information.
5. the importance of working to agreed timescales and keeping others informed of progress.
6. the importance of reporting any anticipated delays to the relevant person(s) promptly.

Equipment

7. how to prepare, and assess the accuracy and operation of all the overhauling and testing equipment required.
8. how to use all the overhauling and testing equipment required. Mechanical unit overhauling activities
9. how to find, interpret and use sources of information on overhauling procedures and statutory requirements.
10. how vehicle mechanical units and assemblies operate.
11. how mechanical units and assemblies are constructed, dismantled and reassembled.

12. the possible causes of faults in mechanical units and assemblies units.
13. vehicle operating specification for limits, fits and tolerances and where this information can be sourced.
14. how to assess the condition evident within unit sub-assemblies and components.
15. the cost-benefit relationship between the reconditioning, repair and replacement of components within units.
16. how to carry out overhauling activities for the type(s) of unit worked upon.
17. the relationship between test methodology and the faults repaired - the use of appropriate testing methods.
18. how to test and evaluate the performance of overhauled units against the operating specification.
19. how to interpret test results.
20. how to identify the types and causes of mechanical unit and assembly failure.
21. how to make suitable adjustments to components and units.
22. how to work safely avoiding personal injury, damage to components leakage and hazardous substances.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. wear suitable personal protective equipment throughout all overhauling activities.
- b. use suitable sources of technical information to support your overhauling activities.
- c. assess and prepare all the equipment required, following manufacturers' instructions, prior to use.
- d. use the tools and equipment required correctly and safely throughout all overhauling activities.
- e. carry out all overhauling activities following:
 - the manufacturer's instructions
 - your workplace procedures
 - health and safety requirements.
- f. work in a way which minimises the risk of:
 - damage to other components
 - leakages
 - contact with hazardous substances.
- g. ensure your assessment of the dismantled unit identifies accurately its condition and suitability for overhaul.
- h. inform the relevant person(s) promptly where an overhaul is uneconomic or unsatisfactory to perform
- i. use testing methods which comply with the manufacturer's requirements.
- j. when necessary, adjust the unit's components correctly to ensure that they operate to meet the vehicle operating requirements.
- k. ensure the overhauled units and assemblies conform to the vehicle operating specification and any legal requirements.
- l. ensure your overhaul records are accurate, complete and passed to the relevant person(s) promptly in the format required.
- m. complete all overhauling activities within the agreed timescale.
- n. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or

- a combination of both
- 6. Evidence from simulated activities is not acceptable for this unit

Specific Performance Evidence for this Unit

You must:

- 7. produce evidence of overhauling 4 units, comprising of 1 or more of the following types of mechanical unit :
 - a. engines
 - b. gear boxes
 - c. final drives
 - d. steering
 - e. suspension
 - f. motorcycle chassis assemblies
- 8. The overhaul of 3 of the above units must have been undertaken in your normal workplace.
- 9. Your assessor must physically observe you overhauling at least 2 units, 1 of which must be in your normal workplace.

Unit MR12 - Remove and Replace Vehicle Transmission and Driveline Units and Components

UNIT OVERVIEW

This unit 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.

KEY WORDS AND PHRASES

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, motorcycles, mopeds and scooters

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Equipment is

- a. hand tools
- b. special workshop tools
- c. general workshop equipment
- d. electrical testing equipment

2. Testing methods are:

- a. visual
- b. aural
- c. functional

3. Units and components are:

- a. mechanical
- b. electrical
- c. hydraulic

4. Transmission and driveline systems are

- a. gearbox
- b. hubs and bearings
- c. driveline shafts
- d. clutch

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the legal requirements relating to the vehicle (including road safety requirements).
2. the health and safety legislation and workplace procedures relevant to vehicle maintenance activities and personal and vehicle protection.
3. your workplace procedures for
 - recording removal and replacement information
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of documenting removal and replacement information
5. the importance of working to agreed timescales and keeping others informed of progress.
6. the relationship between time and costs.
7. the importance of reporting anticipated delays to the relevant person(s) promptly.

Use of technical information

8. how to find, interpret and use sources of information applicable to unit and component removal and replacement within transmission and driveline systems.
9. the importance of using the correct sources of technical information

10. the purpose of and how to use identification codes.

Electrical and electronic principles

11. vehicle earthing principles and earthing methods.

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

13. types of circuit protection and why these are necessary.

14. electrical safety procedures.

15. electric symbols, units and terms.

16. electrical and electronic control system principles.

Transmission and driveline system operation and construction

17. how transmission and driveline systems and their related units and components are constructed, removed and replaced for the classification of vehicle worked upon.

18. how transmission and driveline systems and their related units and components operate for the classification of vehicle worked upon.

Equipment

19. how to prepare, test and use all the removal and replacement equipment required.

Transmission and driveline system unit and component removal and replacement

20. how to remove and replace transmission and driveline system mechanical, electrical and hydraulic units and components for the classification of vehicle worked upon .

21. how to file, fit, tap, thread, cut and drill plastics and metals.

22. how to select and use gaskets, sealants, seals, fittings and fasteners.

23. how to test and evaluate the performance of replacement transmission and driveline system units and components and the reassembled system against the vehicle operating specifications and any legal requirements.

24. the relationship between testing methods and the transmission and driveline system units and components replaced - the use of appropriate test methods.

25. when replacement units and components must meet the original equipment specification (OES) for warranty or other requirements.

26. how to work safely avoiding damage to other vehicle systems, components and units and contact with leakage and hazardous substances.

PERFORMANCE OBJECTIVES

To be competent you must:

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

b. support your removal and replacement activities by reviewing

- vehicle technical data
- removal and replacement procedures
- legal requirements.

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

d. carry out all removal and replacement activities following;

- manufacturers' instructions
- your workplace procedures
- health and safety requirements.

e. you work in a way which minimises the risk of:

- damage to other vehicle systems
- damage to other vehicle components and units
- contact with leakage
- contact with hazardous substances.

f. ensure replaced transmission and driveline units and components conform to the vehicle operating specification and any legal requirements.

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

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

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

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

k. complete all removal and replacement activities within the agreed timescale.

l. you report any expected delays in completion to the relevant person(s) promptly

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or
 - a combination of both
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of removing and replacing 4 different units or components in total which must include a gearbox, clutch, hubs and bearings and driveline shafts. Your evidence must include mechanical, electrical and hydraulic/fluid units or components.
8. Your assessor must physically observe you in your normal workplace on at least 1 occasion successfully removing and replacing transmission and driveline units and components.

Unit MR12HV - Remove and Replace Commercial Vehicle Transmission and Driveline Units and Components

UNIT OVERVIEW

This unit is about removing and replacing commercial vehicle 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.

KEY WORDS AND PHRASES

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

Functional testing:

Examples include: chassis dynamometer and transmission stall test.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Equipment is

- a. hand tools
- b. special workshop tools
- c. general workshop equipment
- d. electrical testing equipment

2. Testing methods are:

- a. visual
- b. aural
- c. functional

3. Units and components are:

- a. mechanical
- b. electrical
- c. hydraulic and fluid
- d. pneumatic

4. Transmission and driveline systems are

- a. gearbox and power take off
- b. hubs and bearings
- c. driveline shafts
- d. clutch

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the legal requirements relating to the vehicle (including road safety requirements).
2. the health and safety legislation and workplace procedures relevant to vehicle maintenance activities and personal and vehicle protection.
3. your workplace procedures for
 - recording removal and replacement information
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of documenting removal and replacement information
5. the importance of working to agreed timescales and keeping others informed of progress.
6. the relationship between time and costs.
7. the importance of reporting anticipated delays to the relevant person(s) promptly.

Use of technical information

8. how to find, interpret and use sources of information applicable to unit and component removal and replacement within transmission and driveline systems.
9. the importance of using the correct sources of technical information
10. the purpose of and how to use identification codes.

Electrical and electronic principles

11. vehicle earthing principles and earthing methods.
12. electrical and electronic principles associated with chassis and transmission systems, including types of sensors and actuators, their application and operation.
13. types of circuit protection and why these are necessary.
14. electrical safety procedures.
15. electric symbols, units and terms.
16. electrical and electronic control system principles.

Transmission and driveline system operation and construction

17. how commercial vehicle transmission and driveline systems and their related units and components are constructed, removed and replaced.
18. how commercial vehicle transmission and driveline systems and their related units and components operate.

Equipment

19. how to prepare, test and use all the removal and replacement equipment required.

Transmission and driveline system unit and component removal and replacement

20. how to remove and replace commercial vehicle transmission and driveline system mechanical, electrical, hydraulic and pneumatic units and components.
21. how to file, fit, tap, thread, cut and drill plastics and metals.
22. how to select and use gaskets, sealants, seals, fittings and fasteners.
23. how to test and evaluate the performance of replacement transmission and driveline system units and components and the reassembled system against the vehicle operating specifications and any legal requirements.
24. the relationship between testing methods and the transmission and driveline system units and components replaced - the use of appropriate test methods.
25. when replacement units and components must meet the original equipment specification (OES) for warranty or other requirements.
26. how to work safely avoiding damage to other vehicle systems, components and units and contact with leakage and hazardous substances.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. wear suitable personal protective equipment and use vehicle coverings throughout all removal and replacement activities.
- b. support your removal and replacement activities by reviewing
 - vehicle technical data
 - removal and replacement procedures
 - legal requirements.
- c. prepare, test and use all the equipment required following manufacturers' instructions.
- d. carry out all removal and replacement activities following;
 - manufacturers' instructions
 - your workplace procedures
 - health and safety requirements.
- e. you work in a way which minimises the risk of:
 - damage to other vehicle systems
 - damage to other vehicle components and units
 - contact with leakage
 - contact with hazardous substances.
- f. ensure replaced transmission and driveline units and components conform to the vehicle operating specification and any legal requirements.
- g. record and report any additional faults you notice during the course of your work promptly.
- h. use suitable testing methods to evaluate the performance of the reassembled system accurately.
- i. ensure the reassembled transmission and driveline system performs to the vehicle operating specification and meets any legal requirements prior to return to the customer.
- j. ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required.

- k. complete all removal and replacement activities within the agreed timescale.
- l. you report any expected delays in completion to the relevant person(s) promptly

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or
 - a combination of both
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of removing and replacing 4 different units or components in total which must include a gearbox and power take off, clutch, hubs and bearings and driveline shafts. Your evidence must include mechanical, electrical and hydraulic/fluid units or components.
8. Your assessor must physically observe you in your normal workplace on at least 1 occasion successfully removing and replacing transmission and driveline units and components.

Unit MR13 - Diagnose and Rectify Vehicle Transmission and Driveline System Faults

UNIT OVERVIEW

This unit is about diagnosing and rectifying faults occurring within vehicle gearboxes, hubs and bearings, driveline shafts and clutches.

KEY WORDS AND PHRASES

Agreed timescales:

Examples include: manufacturer's 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 two or more step diagnostic activity using a prescribed process or format 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 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, motorcycles, mopeds and scooters.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Transmission and driveline systems are

- a. gearbox
- b. hubs and bearings
- c. driveline shafts
- d. clutch

2. Diagnostic methods are

- a. measurement
- b. functional testing
- c. electrical and electronic systems testing

3. Equipment is

- a. diagnostic and rectification equipment for transmission mechanical systems
- b. diagnostic and rectification equipment for transmission electrical systems
- c. diagnostic and rectification equipment for transmission hydraulic and fluid systems
- d. specialist repair tools
- e. general workshop equipment

5. Faults are

- a. mechanical
 - b. electrical and electronic
 - c. hydraulic and fluid
- #### **6. Rectification activities are:**
- a. dismantling
 - b. replacement of units and components
 - c. adjustment of units and components
 - d. repairs to wiring and connectors
 - e. re-programming vehicle systems
 - f. reassembly
 - g. functional testing

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health and safety legislation and workplace procedures relevant to workshop practices and personal and vehicle protection when diagnosing and rectifying transmission and driveline faults.
2. legal requirements relating to the vehicle (including road safety requirements).
3. your workplace procedures for
 - recording diagnostic and rectification activities
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of, documenting diagnostic and rectification information.
5. the importance of working to agreed timescales and keeping others informed of progress.
6. the relationship between time, costs and profitability.
7. the importance of reporting anticipated delays to the relevant person(s) promptly.

Electrical and electronic principles

8. electrical and electronic principles associated with transmission and driveline systems, including types of sensors and actuators, their application and operation.
9. 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.
10. the interaction between electrical, electronic and mechanical components within vehicle transmission and driveline systems.
11. electrical symbols, units and terms.
12. electrical safety procedures.

Use of diagnostic and rectification equipment

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

Transmission and driveline faults, their diagnosis and correction

15. how transmission and driveline mechanical, electrical, electronic and hydraulic and fluid systems are constructed, dismantled, reassembled and operate.
16. the types and causes of transmission and driveline mechanical, electrical, electronic and hydraulic and fluid system, component and unit faults and failures
17. transmission and driveline mechanical, electrical and hydraulic and fluid component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action.
18. how to find, interpret and use sources of information on transmission and driveline electrical operating specifications, diagnostic test procedures, repair procedures and legal requirements.
19. vehicle operating specifications for limits, fits and tolerances relating to transmission and driveline mechanical, electrical, electronic and hydraulic and fluid systems for the vehicle(s) on which you work.
20. how to select the most appropriate diagnostic testing method for the symptoms presented.
21. how to carry out systematic diagnostic testing of transmission and driveline mechanical, electrical and electronic, hydraulic and fluid systems using a prescribed process or format.
22. how to assess the condition evident within transmission and driveline mechanical, electrical, electronic, hydraulic and fluid components and units.
23. how to interpret test results and vehicle data in order to identify the location and cause of vehicle system faults.
24. how to carry out the rectification activities listed in the Scoping Statement for this unit in order to correct faults in the transmission and driveline mechanical, electrical, electronic and hydraulic and fluid systems.
25. the relationship between test methodology and the faults repaired - the use of appropriate testing methods
26. how to make cost effective recommendations for rectification.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. wear suitable personal protective equipment and use vehicle coverings when using diagnostic methods and carrying out rectification activities.
- b. support the identification of faults, by reviewing vehicle:
 - technical data
 - diagnostic test procedures.
- c. prepare, connect and test all the required equipment following manufacturers' instructions prior to use.
- d. use diagnostic methods which are relevant to the symptoms presented.
- e. collect diagnostic information in a systematic way relevant to the diagnostic methods used.
- f. collect sufficient diagnostic information to enable an accurate diagnosis of transmission and driveline system faults.
- g. identify and record any system deviation from acceptable limits accurately.
- h. ensure your assessment of dismantled sub-assemblies, components and units identifies their condition and suitability for repair or replacement, accurately.
- i. inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform.
- j. use the equipment required, correctly and safely throughout all rectification activities.
- k. carry out all rectification activities following:
 - manufacturers' instructions
 - your workplace procedures
 - health and safety requirements.
- l. work in a way which minimises the risk of :
 - damage to other vehicle systems
 - damage to other components and units
 - contact with leakages
 - contact with hazardous substances.
- m. ensure all repaired and replaced components and units conform to the vehicle operating specification and any legal requirements.
- n. when necessary, adjust components and units correctly to ensure that they operate to meet system requirements.
- o. record and report any additional faults you notice during the course of work promptly.
- p. use testing methods which are suitable for assessing the performance of the system rectified.
- q. ensure the transmission and driveline system rectified performs to the vehicle operating specification and any legal requirements prior to return to the customer.
- r. ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required.
- s. complete all system diagnostic activities within the agreed timescale.
- t. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or
 - a combination of both
6. Simulated activities will be acceptable to assess candidates' diagnosis and rectification of faults which do not occur at frequent intervals on vehicles within the normal workplace or in the RWE environment, but which must be diagnosed and rectified to ensure that all the evidence requirements can be met.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of diagnosing and rectifying at least 1 fault in each of the following systems:
 - a. gearbox
 - b. hubs and bearings
 - c. driveline shafts
 - d. clutch

Your identification of faults must have involved a 2 or more step diagnostic activity using a prescribed process or format.

8. Of the 4 pieces of evidence above, 3 must come from work carried out in your normal workplace.

9. Your assessor must physically observe you on at least 1 occasion undertaking a transmission and driveline related diagnostic and rectification activity.

Unit MR13HV - Diagnose and Rectify Commercial Vehicle Transmission and Driveline System Faults

UNIT OVERVIEW

This unit is about diagnosing and rectifying faults occurring within commercial vehicle gearboxes, hubs and bearings, driveline shafts and clutches.

KEY WORDS AND PHRASES

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.

Transmission and driveline system faults

These are faults that require a two or more step diagnostic activity using a prescribed process or format 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 chassis dynamometer, performance testing and road testing where relevant.

Hydraulic and fluid systems

These are commercial vehicle transmission and driveline related hydraulic and fluid systems.

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.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Transmission and driveline systems are

- a. gearbox and power take off
- b. hubs and bearings
- c. driveline shafts
- d. clutch

2. Diagnostic methods are

- a. measurement
- b. functional testing
- c. electrical and electronic systems testing

3. Equipment is

- a. diagnostic and rectification equipment for transmission and driveline mechanical systems
- b. diagnostic and rectification equipment for transmission and driveline electrical systems
- c. diagnostic and rectification equipment for transmission and driveline hydraulic and fluid systems
- d. diagnostic and rectification equipment for transmission and driveline pneumatic systems
- d. specialist repair tools
- e. general workshop equipment

5. Faults are

- a. mechanical
- b. electrical and electronic
- c. hydraulic and fluid
- d. pneumatic

6. Rectification activities are:

- a. dismantling
- b. replacement of units and components
- c. adjustment of units and components
- d. repairs to wiring and connectors
- e. re-programming vehicle systems

- f. reassembly
- g. functional testing
- h. repairs to air line and connectors

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health and safety legislation and workplace procedures relevant to workshop practices and personal and vehicle protection when diagnosing and rectifying commercial vehicle transmission and driveline faults.
2. legal requirements relating to the vehicle (including road safety requirements).
3. your workplace procedures for
 - recording diagnostic and rectification activities
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of, documenting diagnostic and rectification information.
5. the importance of working to agreed timescales and keeping others informed of progress.
6. the relationship between time, costs and profitability.
7. the importance of reporting anticipated delays to the relevant person(s) promptly.

Electrical and electronic principles

8. electrical and electronic principles associated with commercial vehicle transmission and driveline systems, including types of sensors and actuators, their application and operation.
9. how commercial vehicle electrical and electronic transmission and driveline systems operate, including electrical component function, electrical inputs, outputs, voltages and oscilloscope patterns, digital and fibre optics principles.
10. the interaction between electrical, electronic and mechanical components within commercial vehicle transmission and driveline systems.
11. electrical symbols, units and terms.
12. electrical safety procedures.

Use of diagnostic and rectification equipment

13. how to prepare and test the accuracy of diagnostic testing equipment.
14. how to use diagnostic and rectification equipment for commercial vehicle transmission and driveline mechanical, electrical, hydraulic and fluid systems, specialist repair tools and general workshop equipment Transmission and driveline faults, their diagnosis and correction
15. how commercial vehicle transmission and driveline mechanical, electrical, electronic, pneumatic and hydraulic and fluid systems are constructed, dismantled, reassembled and operate.
16. the types and causes of commercial vehicle transmission and driveline mechanical, electrical, electronic, pneumatic and hydraulic and fluid system component and unit faults and failures
17. commercial vehicle transmission and driveline mechanical, electrical, electronic, pneumatic and hydraulic and fluid component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action.
18. how to find, interpret and use sources of information on commercial vehicle transmission and driveline electrical and electronic operating specifications, diagnostic test procedures, repair procedures and legal requirements.
19. vehicle operating specifications for limits, fits and tolerances relating to transmission and driveline mechanical, electrical, electronic, pneumatic, hydraulic and fluid systems for the vehicle(s) on which you work.
20. how to select the most appropriate diagnostic testing method for the symptoms presented.
21. how to carry out systematic diagnostic testing of commercial vehicle transmission and driveline mechanical, electrical and electronic, pneumatic, hydraulic and fluid systems using a prescribed process or format.
22. how to assess the condition evident within commercial vehicle transmission and driveline mechanical, electrical, electronic, pneumatic, hydraulic and fluid components and units.
23. how to interpret test results and vehicle data in order to identify the location and cause of vehicle system faults.
24. how to carry out the rectification activities listed in the Scoping Statement for this unit in order to correct faults in commercial vehicle transmission and driveline mechanical, electrical, electronic, pneumatic and hydraulic and fluid systems.

25. the relationship between test methodology and the faults repaired - the use of appropriate testing methods
26. how to make cost effective recommendations for rectification.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. wear suitable personal protective equipment and use vehicle coverings when using diagnostic methods and carrying out rectification activities.
- b. support the identification of faults, by reviewing vehicle:
 - technical data
 - diagnostic test procedures.
- c. prepare, connect and test all the required equipment following manufacturers' instructions prior to use.
- d. use diagnostic methods which are relevant to the symptoms presented.
- e. collect diagnostic information in a systematic way relevant to the diagnostic methods used.
- f. collect sufficient diagnostic information to enable an accurate diagnosis of transmission and driveline system faults.
- g. identify and record any system deviation from acceptable limits accurately.
- h. ensure your assessment of dismantled sub-assemblies, components and units identifies their condition and suitability for repair or replacement, accurately.
- i. inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform.
- j. use the equipment required, correctly and safely throughout all rectification activities.
- k. carry out all rectification activities following:
 - manufacturers' instructions
 - your workplace procedures
 - health and safety requirements.
- l. work in a way which minimises the risk of :
 - damage to other vehicle systems
 - damage to other components and units
 - contact with leakages
 - contact with hazardous substances.
- m. ensure all repaired and replaced components and units conform to the vehicle operating specification and any legal requirements.
- n. when necessary, adjust components and units correctly to ensure that they operate to meet system requirements.
- o. record and report any additional faults you notice during the course of work promptly.
- p. use testing methods which are suitable for assessing the performance of the system rectified.
- q. ensure the transmission and driveline system rectified performs to the vehicle operating specification and any legal requirements prior to return to the customer.
- r. ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required.
- s. complete all system diagnostic activities within the agreed timescale.
- t. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or
 - a combination of both

6. Simulated activities will be acceptable to assess candidates' diagnosis and rectification of faults which do not occur at frequent intervals on vehicles within the normal workplace or in the RWE environment, but which must be diagnosed and rectified to ensure that all the evidence requirements can be met.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of diagnosing and rectifying at least 1 fault in each of the following systems:
 - a. gearbox and power take off
 - b. hubs and bearings
 - c. driveline shafts
 - d. clutch

Your identification of faults must have involved a 2 or more step diagnostic activity using a prescribed process or format.

8. Of the 4 pieces of evidence above, 3 must come from work carried out in your normal workplace.

9. Your assessor must physically observe you on at least 1 occasion undertaking a transmission and driveline related diagnostic and rectification activity.

Unit AE01 - Locate and Correct Simple Electrical Faults

UNIT OVERVIEW

This unit is about conducting a range of routine electrical tests and identifying simple faults on a variety of basic electrical components and undertaking suitable correction activities.

KEY WORDS AND PHRASES

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.

Hand held diagnostic equipment:

This can be electrical and or electronic equipment hand held equipment for the detection of faults.

Simple electrical faults:

These are electrical and or electronic faults requiring a one step inspection with a single test result to identify them.

Examples include: battery discharge, gravity and voltage faults, alternator output, input and warning circuit faults, starter voltage, continuity, pinion condition and operation faults, fuse continuity, voltage and rating faults, lighting and indicator earthing, bulb and voltage faults, switching faults, sensor and actuator faults.

Vehicles:

These can be any of the following - light vehicles, commercial vehicles, motorcycles, mopeds and scooters.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Electrical components are:

- a. batteries
- b. alternators
- c. starters
- d. fuses
- e. lighting and indicators
- f. engine management sensors and actuators

2. Electrical testing equipment covers:

- a. volt meters,
- b. ammeters,
- c. ohmmeters
- d. multimeters
- e. battery testing equipment
- f. hand held diagnostic equipment
- g. test lamp

3. Tools and equipment:

- a. hand tools
- b. special purpose tools
- c. general workshop equipment

4. Electrical testing techniques are:

- a. voltage measuring
- b. ohm and amp measuring
- c. circuit testing
- d. visual
- e. aural

5. Electrical fault location within:

- a. the start/charge system
- b. engine management and ignition systems
- c. the lighting system

6. Correction activities are:

- a. replacing electrical components
- b. repairing wiring and connectors

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health and safety legislation and workplace procedures relevant to workshop practices and personal and vehicle protection when carrying out electrical fault location and correction activities
2. statutory requirements for vehicle lighting.
3. your workplace procedures for
 - recording fault location and correction activities
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of working to agreed timescales and keeping others informed of progress.
5. the relationship between time and costs.
6. your workplace procedures for reporting the results of tests.
7. the importance of reporting any anticipated delays to the relevant person(s) promptly.

Electrical and electronic principles

8. vehicle earthing principles and earthing methods.
9. basic electrical and electronic principles, including Ohms Law, voltage, power, current (AC/DC) resistance, magnetism, electromagnetism and electromagnetic induction.
10. fuses and circuit protection devices.
11. electrical safety procedures.
12. how lighting, warning, engine management and ignition, charging and starter circuits work.
13. electric symbols, units and terms.
14. battery charging.

Use of electrical testing equipment and electrical testing techniques

15. when and where to use voltage, ohm, amp and specific gravity measurements and simple circuit testing techniques.
16. how to use voltage, ohm, amp, specific gravity measuring and simple circuit testing techniques.
17. how to use the electrical testing equipment required.
18. how to conduct tests following electrical safety and workplace procedures.
19. how to calculate amps, ohms, and volts to determine component condition.
20. how to make recommendations based upon the results of your tests.
21. how to interpret the results of your tests.
22. the importance of basing your recommendations upon the results of your tests.

Vehicle electrical equipment faults and their correction

23. how to identify damage and simple faults in all vehicle electrical and electronic systems for the vehicles worked upon.
24. the causes of damage and faults within the electrical components listed above.
25. how to interpret simple wiring diagrams (including those for lighting, warning, engine management and ignition, charging and starter circuits)
26. the purpose, operating principles and location of batteries (including lead acid and alkaline types), generators (including generator systems, including dynamos, dynastart, alternators and current regulators), starters (including axial, co-axial, inertia and pre-engaged types), engine management electrical components (both petrol and diesel fuel injection), fuses, lighting units and indicator units for the vehicles worked upon.
27. the purpose and function of motors, capacitors, resistors, semi-conductors, transistors, actuators and sensors (including active or self-generating and passive or modulating).
28. limits of wear and serviceability of the electrical components listed at iv. (above).
29. how to dispose of any removed electrical components.
30. how to perform safety and operational checks on the tools and equipment required to remove and replace electrical components.
31. how to check that any replaced electrical components are functioning correctly and the importance of doing so before release to the customer.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. wear suitable personal protective equipment and use vehicle coverings throughout all electrical fault location and correction activities.
- b. confirm that all equipment is safe prior to use

- c. carry out tests on those electrical components relevant to the reported needs of the vehicle.
- d. use electrical testing techniques which are suitable for the electrical components and systems concerned.
- e. conduct all electrical testing techniques following:
 - the electrical testing equipment manufacturer's instructions
 - your workplace procedures
 - health and safety requirements.
- f. ensure your electrical testing techniques clearly identify the cause of identified faults.
- g. report the results of your tests and any recommendations for further action to the relevant person(s) clearly and accurately, when necessary.
- h. seek the assistance of the relevant person(s) promptly where the results of your testing are unclear
- i. complete all correction activities required effectively using suitable tools and equipment following:
 - the electrical component manufacturer's instructions
 - the vehicle manufacturer's instructions
 - your workplace procedures
 - health and safety requirements
- j. ensure all replaced and repaired electrical components are secure and function as required prior to release to the customer.
- k. work in a way which minimizes the risk of damage to the vehicle and its systems
- l. dispose of any removed electrical components safely to comply with legal requirements and your workplace procedures
- m. complete all electrical fault location and correction activities within the agreed timescale.
- n. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or
 - a combination of both
5. Simulated activities will be acceptable to assess candidates' identification of simple electrical faults which do not occur at frequent intervals on vehicles within the normal workplace or in the RWE environment, but which must be identified to ensure that all evidence requirements can be met.

Specific Performance Evidence for this Unit

You must:

6. produce evidence of locating and correcting at least 9 electrical faults, comprising of 3 different faults associated with each of the following systems and equipment:
 - a. the start/charge system
 - b. engine management and ignition systems
 - c. the lighting system
7. Your assessor must observe you locating and correcting at least 1 electrical fault on each of the above types of systems.

Unit AE01ME - Locate and Correct Electrical Faults

UNIT OVERVIEW

This unit is about conducting a range of routine electrical tests and identifying simple faults on a variety of basic electrical components and undertaking noncomplex correction activities.

This unit is designed for those operating in the mobile electronics and security sector.

KEY WORDS AND PHRASES

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.

Hand held diagnostic equipment:

This can be electrical and or electronic equipment hand held equipment for the detection of faults.

Electrical faults:

These are electrical and electronic faults requiring a one stage inspection with a single test result to identify them.

Examples include: battery discharge, gravity and voltage faults, alternator output, input and warning circuit faults, starter voltage, continuity, pinion condition and operation faults, fuse continuity, voltage and rating faults, lighting and indicator earthing, bulb and voltage faults, switching faults, sensor and actuator faults.

Vehicles:

These can be any of the following - light vehicles, commercial vehicles, motorcycles, mopeds and scooters.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Electrical components are:

- a. batteries
- b. generators
- c. starter motors
- d. fuses
- e. communications and telematics systems
- f. in-vehicle entertainment
- g. anti-theft systems
- h. towbars electrical fittings
- i. safety device electrical fittings
- j. security device electrical fittings
- k. lighting systems

2. Electrical testing equipment covers:

- a. volt meters,
- b. ammeters,
- c. ohmmeters
- d. multimeters
- e. dedicated diagnostic equipment

3. Tools and equipment:

- a. hand tools
- b. special purpose tools

4. Electrical testing techniques are:

- a. voltage measuring
- b. ohm and amp measuring
- c. circuit testing
- d. visual
- e. aural

5. Electrical fault location within:

- a. the starting and charging system
- b. communications and telematics systems
- c. the lighting system
- d. anti-theft, security and safety systems

- e. in-vehicle entertainment systems
- f. tow bar fitments

6. Rectification activities are:

- a. replacing electrical components
- b. repairing wiring and connectors

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health and safety legislation and workplace procedures relevant to workplace practices and personal and vehicle protection when carrying out electrical fault location and correction activities
2. statutory requirements for vehicle lighting.
3. your workplace procedures for
 - recording fault location and correction activities
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of working to agreed timescales and keeping others informed of progress.
5. the relationship between time and costs.
6. your workplace procedures for reporting the results of tests.
7. the importance of reporting any anticipated delays to the relevant person(s) promptly.

Electrical principles

8. vehicle earthing principles and earthing methods.
9. basic electrical and electronic principles, including Ohms Law, voltage, power, current (AC/DC) resistance, magnetism, electromagnetism, and electromagnetic induction.
10. fuses and circuit protection devices.
11. electrical safety procedures.
12. how lighting, warning, charging, starter, in vehicle entertainment, communications/telematics, anti-theft and safety circuits work.
13. electric symbols, units and terms.
14. battery charging.

Use of electrical testing equipment and electrical testing techniques

15. when and where to use voltage, ohm, amp, and simple circuit testing techniques.
16. how to use voltage, ohm, amp, strain and simple circuit testing techniques.
17. how to use the electrical and electronic testing equipment required.
18. how to conduct tests following electrical safety and workplace procedures.
19. how to calculate amps, ohms, and volts to determine component condition.
20. how to make recommendations based upon the results of your tests.
21. how to interpret the results of your tests.
22. the importance of basing your recommendations upon the results of your tests.

Vehicle electrical equipment faults and their correction

23. how to identify electrical faults occurring within batteries, alternators, in-vehicle entertainment, communications and telematics, anti-theft, safety and electrical components connected with towbars, safety fitments, physical security devices.
24. the causes of damage and faults within the electrical components listed above.
25. how to interpret simple wiring diagrams (including those for lighting, warning, engine management and ignition, charging and starter circuits).
26. the purpose, operating principles and location of batteries, alternators, in-vehicle entertainment, communications and telematics, anti-theft, safety and electrical components connected with towbars, safety fitments, physical security devices.
27. the purpose and function of motors, capacitors, resistors, semi- conductors, transistors, actuators and sensors (including active or self-generating and passive or modulating).
28. limits of wear and serviceability of the electrical components listed in the

Scoping Statement above.

29. how to dispose of any removed electrical components.
30. how to perform safety and operational checks on the tools and equipment required to remove and replace electrical components.
31. how to check that any replaced electrical components are functioning correctly and the importance of doing so before release to the customer.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. wear suitable personal protective equipment and use vehicle coverings throughout all electrical fault location and correction activities.
- b. confirm that all equipment is safe prior to use
- c. carry out tests on those electrical components relevant to the reported needs of the vehicle.
- d. use electrical testing techniques which are suitable for the electrical components and systems concerned.
- e. conduct all electrical testing techniques following:
 - the electrical testing equipment manufacturer's instructions
 - your workplace procedures
 - health and safety requirements.
- f. ensure your electrical testing techniques clearly identify the cause of identified faults.
- g. report the results of your tests and any recommendations for further action to the relevant person(s) clearly and accurately, when necessary.
- h. seek the assistance of the relevant person(s) promptly where the results of your testing are unclear
- i. complete all rectification activities required effectively using suitable tools and equipment following:
 - the electrical component manufacturer's instructions
 - the vehicle manufacturer's instructions
 - your workplace procedures
 - health and safety requirements
- j. ensure all replaced and repaired electrical components are secure and function as required prior to release to the customer.
- k. work in a way which minimises the risk of damage to the vehicle and its systems
- l. dispose of any removed electrical components safely to comply with legal requirements and your workplace procedures
- m. complete all electrical fault location and correction activities within the agreed timescale.
- n. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - and approved centre, or
 - a combination of both
6. Simulated activities will be acceptable to assess candidates' identification of simple electrical faults which do not occur at frequent intervals on vehicles within the normal workplace or in the RWE environment, but which must be identified to ensure that all evidence requirements can be met.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of locating and correcting at least 10 electrical faults, comprising of 2 different faults associated with electrical components in each of the following systems*:
 - a. the starting and charging system
 - b. communications and telematics systems
 - c. the lighting system
 - d. anti-theft, security and safety systems
 - e. in-vehicle entertainment systems

8. Your assessor must observe you locating and correcting simple electrical faults on at least 3 occasions. Each observation must be of a fault from a different electrical system.

*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of simple faults occurring in all the systems and equipment listed in the Scoping Statement for this unit.

Unit AE02 - Enhance Vehicle Electrical System Features

UNIT OVERVIEW

This unit is about fitting electrical features and components to customise the original vehicle specification to meet customer requirements.

KEY WORDS AND PHRASES

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, commercial vehicles, motorcycles, mopeds and scooters.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Electrical enhancements are:

- a. audio systems
- b. visual systems
- c. communications equipment
- d. safety fitments
- e. lamps
- f. tow bar electrics
- g. reversing aids
- h. navigation systems
- i. alarm systems
- j. immobiliser systems

2. Tools and equipment are:

- a. hand tools
- b. specialist fitting tools
- c. general workshop equipment
- d. testing equipment

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health and safety legislation and workplace procedures relevant to workshop practices and personal and vehicle protection when fitting vehicle electrical enhancements
2. the legal implications of the mechanical and electrical customisation of vehicles.
3. your workplace procedures for
 - recording electrical enhancement activities
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of working to agreed timescales and keeping others informed of progress.
5. the relationship between time and costs
6. the importance of reporting anticipated delays to the relevant person(s) promptly.

Tools and equipment

7. how to prepare, test and use general workshop, special tools and appropriate testing equipment.

Electrical and electronic principles

8. vehicle earthing principles and earthing methods.
9. basic electrical and electronic principles, including Ohms Law, voltage, power, current (AC/DC) resistance, magnetism, electromagnetism and electromagnetic induction.
10. fuses and circuit protection devices.
11. electrical safety procedures.
12. how lighting, warning, engine management and ignition, charging and starter circuits work.
13. electric symbols, units and terms.
14. battery charging.

Fitting electrical enhancements

15. the function and purpose of the electrical components fitted within audio systems, visual systems, communications equipment, safety fitments, lamps, tow bars, reversing aids, navigation systems, alarm systems and immobiliser systems and how they operate.

16. how to interpret and follow technical instructions and customer requirements.

17. how enhancement opportunities may be limited by the existing vehicle systems and fitments.

18. the advantages and disadvantages of electrical customisation.

19. manufacturers' requirements relating to the components which you fit.

20. how to fit audio systems, visual systems, communications equipment, safety fitments, lamps, tow bar electrics, reversing aids, navigation systems, alarm systems and immobiliser systems.

21. how to fit tow bars if you are working on light vehicles or draw bars if you are working on heavy vehicles.

22. how to check that the components to be fitted are compatible with the vehicle specification and customer requirements.

23. how to check that newly fitted electrical enhancements are functioning correctly and the importance of doing so before release to the customer

24. how to make adjustments to components and any surrounding systems to ensure effective working.

25. how to work safely avoiding damage injury to yourself and damage to vehicles.

PERFORMANCE OBJECTIVES

To be competent you must:

a. wear suitable personal protective equipment and use vehicle coverings throughout all electrical enhancement activities.

b. support your customisation activities, by reviewing:

- fitting procedures
- technical data
- legal requirements.

c. prepare and test all the tools and equipment required, following manufacturers' instructions, prior to use.

d. fit components which are compatible with the vehicle specification and customer requirements.

e. carry out all electrical enhancement activities following:

- manufacturers' instructions
- your workplace procedures
- health and safety requirements
- legal requirements.

f. work in a way which minimises the risk of damage to the vehicle and its systems.

g. when necessary, adjust the components fitted and vehicle systems correctly to ensure that they meet the manufacturer's specification for effective operation.

h. ensure all newly fitted electrical enhancements function to specification prior to release to the customer.

i. complete all electrical enhancement activities within the agreed timescale.

j. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in your normal workplace
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of carrying out different electrical enhancements to 3 out of the 10* systems below:

- a. audio systems
- b. visual systems
- c. communications equipments
- d. safety fitments
- e. lamps
- f. tow bar electrics
- g. reversing aids
- h. alarm system
- i. navigation systems
- j. immobiliser systems

8. Your assessor must physically observe you in your normal workplace successfully carrying out at least 1 enhancement of vehicle electrical system features.

*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of all the types of electrical enhancements listed.

Unit AE02ME - Enhance Vehicle System Features

UNIT OVERVIEW

This unit is about fitting electrical features and components, including racking and panel linings where relevant to customise the original vehicle specification to meet customer requirements.

This unit is designed for those operating in the mobile electronics and security sector.

KEY WORDS AND PHRASES

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, commercial vehicles, motorcycles, mopeds and scooters.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Vehicle system enhancements are:

- a. audio systems
- b. visual systems
- c. communications equipment
- d. telematics systems
- e. anti-theft systems
- f. safety fitments
- g. physical security devices
- h. lamps
- i. tow bars
- j. vehicle racking installation
- k. vehicle panel lining

2. Tools and equipment are:

- a. hand tools
- b. power tools
- c. specialist fitting tools
- d. testing equipment

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health and safety legislation and workplace procedures relevant to workshop practices and personal and vehicle protection when fitting vehicle system enhancements
2. the legal implications of the mechanical and electrical customisation of vehicles.
3. your workplace procedures for
 - recording vehicle system enhancement activities
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of working to agreed timescales and keeping others informed of progress.
5. the relationship between time and costs
6. the importance of reporting anticipated delays to the relevant person(s) promptly.

Tools and equipment

7. how to prepare, test and use hand and power tools, special tools and appropriate testing equipment.

Electrical and electronic principles

8. vehicle earthing principles and earthing methods.
9. basic electrical and electronic principles, including Ohms Law, voltage, power, current (AC/DC) resistance, magnetism, electromagnetism and electromagnetic induction.
10. fuses and circuit protection devices.
11. electrical safety procedures.
12. how lighting, warning, engine management and ignition, charging and starter circuits work.

13. electric symbols, units and terms.
14. battery charging.

Fitting vehicle enhancements

15. the function and purpose of the vehicle system components you fit (e.g. in-vehicle entertainment systems, communications equipment, anti-theft systems, etc.) and how they operate.
16. how to interpret and follow technical instructions and customer requirements.
17. how enhancement opportunities may be limited by the existing vehicle systems and fitments.
18. the advantages and disadvantages of mechanical and electrical customisation.
19. manufacturers' requirements relating to the components which you fit.
20. how to fit the vehicle system enhancements listed in the Scoping

Statement for this unit.

21. how to check that the components to be fitted are compatible with the vehicle specification and customer requirements.
22. how to check that newly fitted vehicle system enhancements are functioning correctly and the importance of doing so before release to the customer
23. how to make adjustments to components and any surrounding systems to ensure effective working.
24. how to work safely avoiding damage injury to yourself and damage to vehicles.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. wear suitable personal protective equipment and use vehicle coverings throughout all vehicle system enhancement activities.
- b. support your customisation activities, by reviewing:
 - fitting procedures
 - technical data
 - legal requirements.
- c. prepare and test all the tools and equipment required, following manufacturers' instructions, prior to use.
- d. fit components which are compatible with the vehicle specification and customer requirements.
- e. carry out all vehicle system enhancement activities following:
 - manufacturers' instructions
 - your workplace procedures
 - health and safety requirements
 - legal requirements.
- f. work in a way which minimises the risk of damage to the vehicle and its systems.
- g. when necessary, adjust the components fitted and vehicle systems correctly to ensure that they meet the manufacturer's specification for effective operation.
- h. ensure all newly fitted vehicle system enhancements function to specification prior to release to the customer.
- i. complete all vehicle system enhancement activities within the agreed timescale.
- j. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in your normal workplace
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of carrying out different enhancements to 3 out of the 11* systems below:

- a. audio systems
- b. visual systems
- c. communications equipments
- d. telematics systems
- e. anti-theft systems
- f. safety fitments
- g. physical security devices
- h. lamps
- i. tow bar electrics
- j. vehicle racking installation
- k. vehicle panel lining

8. Your assessor must physically observe you in your normal workplace successfully carrying out at least 1 enhancement of vehicle system features.

*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of all the types of vehicle system enhancements listed.

Unit AE03 - Repair Electrical Units

UNIT OVERVIEW

This unit is about the bench-based repair of electrical units.

KEY WORDS AND PHRASES

Agreed timescales:

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

Generators

These can be externally and internally regulated.

Starters

Examples include pre-engaged; inertia; axial and co-axial.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Electrical equipment is

- a. volt meters
- b. ammeters
- c. ohmmeters
- d. insulation testing equipment

2. Testing methods are

- a. torque tests
- b. resistance tests
- c. insulation tests
- d. visual

3. Repair activities are

- a. stripping
- b. cleaning and evaluating the unit
- c. soldering
- d. replacing faulty parts
- e. reassembly
- f. testing

4. Electrical units are

- a. generators
- b. starters

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health and safety legislation and workplace procedures relevant to workshop practices and personal protection when undertaking basic electrical unit repair activities.
2. your workplace requirements for
 - recording repair activities
 - the referral of problems
 - reporting delays to the completion of work
3. the importance of, documenting repair information.
4. the importance of working to agreed timescales and keeping others informed of progress.
5. the cost-benefit relationship between the reconditioning, repair and replacement of components within alternators and starters.
6. the importance of reporting anticipated delays to the relevant person(s) promptly.

Electrical principles

7. the principles of electrical charging.
8. how alternator and starter electrical circuits work.
9. basic electrical and electronic principles, including Ohms Law, voltage, power, current (AD/DC) resistance, magnetism, electromagnetism and electromagnetic induction.
10. electrical symbols, units and terms.
11. the types of alternators and starters and how they work.
12. how starter motor drive mechanisms work.
13. electrical safety procedures.

Use of electrical testing equipment and electrical testing techniques

14. how to prepare, and assess the accuracy and operation of all the electrical repair and testing equipment required

15. how to use all the electrical repair and testing equipment required.

16. how to interpret test results and perform electrical efficiency calculations.

Alternator and starter fault finding and repair

17. how to find, interpret and use sources of information on electrical repair procedures.

18. alternator and starter operating specifications and where this information can be sourced.

19. suppression requirements applicable to alternators and starters. the type and causes of faults which can occur in alternators and starters.

20. the purpose of, and when to use torque, resistance, insulation and visual tests.

21. how to test the diode pack, rotor field and stator windings of an alternator.

22. the relationship between test methodology and the faults repaired - the use of appropriate testing methods.

23. how to assess the condition of components within alternators and starters and find electrical faults.

24. how to repair alternators, starters.

25. how to test and evaluate the performance of repaired alternators and starters against the operating specification required.

26. how to solder materials together.

27. how to identify the types and causes of alternator and starter failure.

28. how to make suitable adjustments to the starter drive setting.

29. how to work safely avoiding personal injury and damage to components.

PERFORMANCE OBJECTIVES

To be competent you must:

a. wear suitable personal protective equipment throughout all repair activities.

b. use suitable sources of technical information to support your repair activities.

c. assess and prepare all the electrical equipment required, following manufacturers' instructions, prior to use.

d. use the electrical equipment required correctly and safely throughout all repairing activities.

e. carry out all repair activities following:

- the manufacturer's instructions

- your workplace procedures

- health and safety requirements.

f. work in a way which minimises the risk of damage to other components and equipment.

g. ensure your initial assessment and testing methods of electrical units identifies accurately their condition and suitability for reconditioning, repair or replacement.

h. inform the relevant person(s) promptly where an repair is uneconomic or unsatisfactory to perform.

i. use electrical testing methods which are suitable for assessing the performance of the type of electrical unit repaired.

j. when necessary, adjust starter drive settings correctly to ensure that they operate to requirements.

k. ensure repaired alternators and starters conform to the electrical efficiency operating specification required and any legal requirements.

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

m. complete all repair activities within the agreed timescale.

n. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently

2. produce evidence to show that you have covered all the items listed in the scope for this unit

3. produce evidence to show that you possess all the knowledge required.

4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an

approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.

5. be observed by a qualified assessor carrying out work in

- your normal workplace
- and approved centre, or
- a combination of both

6. Simulated activities will be acceptable to assess candidates repairing electrical units where this activity does not occur at frequent intervals on vehicles within the normal workplace or the RWE environment, but which must be carried out to ensure that all evidence requirements can be met.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of repairing a total of 8 electrical units, comprising of 2 repairs to each of the following:

- 2 different types of starters
- 2 different types of alternators

8. Your assessor must physically observe you successfully repairing 1 starter and 1 generator on at least 1 occasion.

Unit AE04 - Diagnose and Rectify Engine Electrical Faults

UNIT OVERVIEW

This unit is about identifying and rectifying electrical faults occurring within a variety of electrical systems within the vehicle engine area.

KEY WORDS AND PHRASES

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.

Electrical faults:

These are faults that require a two or more step inspection and a series of test results to identify the cause.

Vehicles:

These can be any of the following - light vehicles, commercial vehicles, motorcycles, mopeds and scooters.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Electrical faults occurring within

- a. starting and charging system
- b. ignition system
- c. petrol engine management system
- d. diesel engine management system
- e. electrical components of the cooling system

2. Electrical and electronic testing equipment covers:

- a. volt meters,
- b. ammeters,
- c. ohmmeters
- d. multimeters
- e. battery testing equipment
- f. hand held diagnostic equipment
- g. computer based diagnostic equipment
- h. test lamp

3. Tools and equipment:

- a. hand tools
- b. special purpose tools
- c. general workshop equipment

4. Electrical and electronic testing techniques are:

- a. voltage measuring
- b. ohm and amp measuring
- c. circuit testing
- d. visual
- e. aural
- f. computer based testing

5. Rectification activities are:

- a. replacing electrical components
- b. repairing wiring and connectors
- c. re-programming vehicle systems

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health and safety legislation and workplace procedures relevant to workshop practices and personal and vehicle protection when diagnosing and rectifying engine electrical faults.
2. legal requirements relating to the vehicle electrics (including road safety and refrigerant handling requirements).
3. your workplace procedures for

- recording fault location and rectification activities
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of, documenting diagnostic and rectification information.
 5. the importance of working to agreed timescales and keeping others informed of progress.
 6. the relationship between time, costs and profitability.
 7. the importance of reporting anticipated delays to the relevant person(s) promptly.

Electrical and electronic principles

8. electrical and electronic principles, including Ohms Law, voltage, power, current (AC/DC) resistance, magnetism, electromagnetism and electromagnetic induction, digital and fibre optics principles.

9. the principles of electrical charging.

10. how engine electrical and electronic systems are constructed, dismantled and reassembled

11. how electrical and electronic engine systems operate, including electrical component function, electrical inputs, outputs, voltages and oscilloscope patterns.

12. the interaction between electrical, electronic and mechanical components within vehicle engine systems

13. electrical symbols, units and terms.

14. electrical safety procedures.

Use of electrical testing equipment

15. how to prepare and test the accuracy of diagnostic testing equipment.

16. how to use electrical and electronic testing equipment

Engine electrical faults, their diagnosis and correction

17. the types and causes of engine electrical system, component and unit faults and failures

18. engine electrical component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action.

19. how to find, interpret and use sources of information on engine electrical operating specifications, diagnostic test procedures, repair procedures and legal requirements

20. the relationship between diagnostic methods and the symptoms presented by the vehicle.

21. how to carry out systematic diagnostic testing of engine electrical and electronic systems using electrical testing techniques.

22. how to select the most appropriate diagnostic testing method for the symptoms presented.

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

24. how to rectify electrical and electronic faults in electrical systems within the vehicle engine area (ie. start/charge system, ignition system, petrol engine management system, diesel engine management system and electrical cooling system)

25. how to make suitable adjustments to components and units.

26. how to make cost effective recommendations for rectification.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. wear suitable personal protective equipment and use vehicle coverings when using electrical testing techniques and carrying out rectification activities.
- b. support the identification of electrical faults, by reviewing vehicle:
 - technical data
 - diagnostic test procedures.
- c. prepare, connect and test all the required electrical testing equipment following manufacturers' instructions prior to use.
- d. use electrical testing techniques which are relevant to the symptoms presented.
- e. collect sufficient diagnostic information in a systematic way to enable an accurate diagnosis of engine electrical system faults.
- f. identify and record any system deviation from acceptable limits accurately.
- g. make cost effective recommendations for rectification based upon your analysis of the diagnostic information gained.
- h. use the tools and equipment required, correctly and safely throughout all rectification activities.
- i. carry out all rectification activities following:
 - manufacturers' instructions
 - your workplace procedures

- health and safety requirements.
- j. work in a way which minimises the risk of :
 - damage to other vehicle systems
 - damage to other components and units
 - contact with leakages
 - contact with hazardous substances.
- k. ensure all repaired and replaced electrical components and units conform to the vehicle operating specification and any legal requirements.
- l. when necessary, adjust components and units correctly to ensure that they operate to meet system requirements.
- m. ensure the electrical system rectified performs to the vehicle operating specification and any legal requirements prior to return to the customer.
- n. ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required.
- o. complete all system diagnostic activities within the agreed timescale.
- p. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in
 - your normal workplace
 - an approved centre, or
 - a combination of both
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of diagnosing and rectifying faults occurring in 3 out of the 5* engine electrical systems listed in the Scoping Statement, at least 2 of which must come from work carried out in your normal workplace.

Your evidence must also include use of at least 2 out of the 3* types of rectification activities listed in the Scoping Statement, both of which must have come from work carried out in your normal workplace.

8. Your assessor must physically observe you on at least 2 occasions, each observation covering the diagnosis and rectification of a fault in a different engine electrical system. At least 1 of these observations must be carried out in your normal workplace.

*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of faults occurring in all the types of engine electrical systems.

Unit AE05 - Diagnose and Rectify Transmission and Chassis Electrical Faults

UNIT OVERVIEW

This unit is about identifying and rectifying electrical faults occurring within a variety of electrical systems within the vehicle transmission and chassis areas.

KEY WORDS AND PHRASES

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.

Transmission and chassis electrical faults:

These are faults that require a two or more step inspection and a series of test results to identify the cause.

Vehicles:

These can be any of the following - light vehicles, commercial vehicles, motorcycles, mopeds and scooters.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Electrical faults occurring within:

- a. electronic clutch control system
- b. electronic gear box control system
- c. electronic automatic gear box control system
- d. electric retarder systems
- e. electronically controlled slip differential system
- f. electronic suspension control system
- g. ABS and traction control system
- h. electric/electronic steering control systems
- i. electronic stability control systems

2. Electrical and electronic testing equipment covers:

- a. volt meters,
- b. ammeters,
- c. ohmmeters
- d. multimeters
- e. battery testing equipment
- f. hand held diagnostic equipment
- g. computer based diagnostic equipment

3. Tools and equipment:

- a. hand tools
- b. special purpose tools
- c. general workshop equipment

4. Electrical and electronic testing techniques are:

- a. voltage measuring
- b. ohm and amp measuring
- c. circuit testing
- d. visual
- e. aural
- f. computer based testing

5. Correction activities are:

- a. replacing electrical components
- b. repairing wiring and connectors

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health and safety legislation and workplace procedures relevant to workshop practices and personal and vehicle protection when diagnosing and rectifying transmission and chassis electrical faults.

2. legal requirements relating to the vehicle electrics (including road safety requirements).
3. your workplace procedures for
 - recording fault location and rectification activities
 - the referral of problems
 - reporting delays to the completion of work
4. the importance of, documenting diagnostic and rectification information.
5. the importance of working to agreed timescales and keeping others informed of progress.
6. the relationship between time, costs and profitability.
7. the importance of reporting anticipated delays to the relevant person(s) promptly.

Electrical and electronic principles

8. electrical and electronic principles, including Ohms Law, voltage, power, current (AC/DC) resistance, magnetism, electromagnetism and electromagnetic induction, digital and fibre optics principles.

9. the principles of electrical charging.

10. electrical symbols, units and terms.

11. electrical safety procedures.

12. how transmission and chassis related electrical and electronic systems are constructed, dismantled and reassembled

13. how transmission and chassis electrical and electronic systems operate, including electrical component function, electrical inputs, outputs, voltages and patterns.

14. the interaction between electrical, electronic and mechanical components within the vehicle's transmission and chassis systems

15. how the transmission and chassis electrical systems interlink and interact, including multiplexing

Use of electrical testing equipment

16. how to prepare and test the accuracy of diagnostic testing equipment.

17. how to use electrical and electronic testing equipment Transmission and chassis electrical faults, their diagnosis and correction

18. the types and causes of transmission and chassis electrical system, component and unit faults and failures

19. transmission and chassis electrical component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action.

20. how to find, interpret and use sources of information on transmission and chassis electrical operating specifications, diagnostic test procedures, repair procedures and legal requirements

21. the relationship between diagnostic methods and the symptoms presented by the vehicle.

22. how to carry out systematic diagnostic testing of transmission and chassis electrical and electronic systems using electrical testing techniques.

23. how to select the most appropriate diagnostic testing method for the symptoms presented.

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

25. how to rectify electrical and electronic faults in electrical systems within the vehicle transmission and chassis area (ie. electronic clutch control system, electronic gear box control system, electronic automatic gear box control system, electric retarder systems, electronically controlled slip differential system, electronic suspension control system, ABS and traction control system, electric/electronic steering control systems, electronic stability control systems).

26. how to make suitable adjustments to components and units

27. how to make cost effective recommendations for rectification.

PERFORMANCE OBJECTIVES

To be competent you must:

a. wear suitable personal protective equipment and use vehicle coverings when using electrical testing techniques and carrying out rectification activities.

b. support the identification of electrical faults, by reviewing vehicle:

- technical data
- diagnostic test procedures.

c. prepare, connect and test all the required electrical testing equipment following manufacturers' instructions prior to use.

d. use electrical testing techniques which are relevant to the symptoms presented.

e. collect sufficient diagnostic information in a systematic way to enable an accurate diagnosis of engine electrical system faults.

- f. identify and record any system deviation from acceptable limits accurately.
- g. make cost effective recommendations for rectification based upon your analysis of the diagnostic information gained.
- h. use the tools and equipment required, correctly and safely throughout all rectification activities.
- i. carry out all rectification activities following:
 - manufacturers' instructions
 - your workplace procedures
 - health and safety requirements.
- j. work in a way which minimises the risk of :
 - damage to other vehicle systems
 - damage to other components and units
 - contact with leakages
 - contact with hazardous substances.
- k. ensure all repaired and replaced electrical components and units conform to the vehicle operating specification and any legal requirements.
- l. when necessary, adjust components and units correctly to ensure that they operate to meet system requirements.
- m. ensure the electrical system rectified performs to the vehicle operating specification and any legal requirements prior to return to the customer.
- n. ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required.
- o. complete all system diagnostic activities within the agreed timescale.
- p. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in your normal workplace
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of diagnosing and rectifying faults occurring in 3 out of the 9* transmission and chassis electrical systems listed in the Scoping Statement, at least 2 of which must come from work carried out in your normal workplace.
Your evidence must also include use of all the types of rectification activities listed in the Scoping Statement, all of which must come from your normal workplace.
8. Your assessor must physically observe you on at least 2 occasions, each observation covering the diagnosis and rectification of a fault in a different transmission and or chassis electrical system.
*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of faults occurring in all the types of transmission and chassis electrical systems.

Unit AE06 - Diagnose and Rectify Auxiliary Equipment Electrical Faults

UNIT OVERVIEW

This unit is about identifying and rectifying electrical faults occurring within a variety of electrical systems within vehicle auxiliary equipment.

KEY WORDS AND PHRASES

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.

Battery testing equipment

This can include high rate discharge testers (HRD).

Comfort and convenience systems

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

Auxiliary equipment electrical faults:

These are faults that require a two or more step inspection and a series of test results to identify the cause.

Vehicles:

These can be the following - light vehicles or commercial vehicles

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Electrical faults occurring within

- a. lighting systems
- b. wiper systems
- c. security and alarm systems
- d. comfort and convenience systems
- e. safety restraint systems (SRS)
- f. electric window systems
- g. sun roof systems
- h. audio systems
- i. visual systems
- j. navigation systems

2. Electrical and electronic testing equipment covers:

- a. volt meters,
- b. ammeters,
- c. ohmmeters
- d. multimeters
- f. battery testing equipment
- h. dedicated and computer based diagnostic equipment

3. Tools and equipment:

- a. hand tools
- b. special purpose tools
- c. general workshop equipment

4. Electrical and electronic testing techniques are:

- a. voltage, resistance and current measuring
- b. frequency measuring
- c. visual
- d. dedicated and computer based testing

5. Rectification activities are:

- a. replacing electrical components
- b. repairing wiring and connectors

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health and safety legislation and workplace procedures relevant to workshop practices and personal and vehicle protection when diagnosing and rectifying auxiliary equipment electrical faults.

2. legal requirements relating to the vehicle electrics (including road safety and refrigerant handling requirements).

3. your workplace procedures for

- recording fault location and rectification activities
- the referral of problems
- reporting delays to the completion of work

4. the importance of, documenting diagnostic and rectification information.

5. the importance of working to agreed timescales and keeping others informed of progress.

6. the relationship between time, costs and profitability.

7. the importance of reporting anticipated delays to the relevant person(s) promptly.

Electrical and electronic principles

8. electrical and electronic principles, including Ohms Law, voltage, power, current (AC/DC) resistance, magnetism, electromagnetism and electromagnetic induction, digital and fibre optics principles.

9. electrical symbols, units and terms.

10. electrical safety procedures.

11. how auxiliary equipment electrical and electronic systems are constructed, dismantled and reassembled.

12. how auxiliary equipment electrical and electronic systems operate, including electrical component function, electrical inputs, outputs, voltages and patterns.

13. the interaction between electrical, electronic and mechanical components within the systems defined in Scoping Statement 1 above.

14. how the auxiliary equipment electrical systems interlink and interact, including multiplexing.

Use of electrical testing equipment

15. how to prepare and test the accuracy of diagnostic testing equipment.

16. how to use electrical and electronic testing equipment

Auxiliary equipment electrical faults, their diagnosis and correction

17. the types and causes of auxiliary equipment electrical system, component and unit faults and failures.

18. auxiliary equipment electrical component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action.

19. how to find, interpret and use sources of information on auxiliary equipment electrical operating specifications, diagnostic test procedures, repair procedures and legal requirements.

20. how to carry out systematic diagnostic testing of auxiliary equipment electrical and electronic systems using electrical testing techniques.

21. how to select the most appropriate diagnostic testing method for the symptoms presented.

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

23. how to rectify electrical and electronic faults in electrical systems within the vehicle auxiliary equipment (i.e. lighting systems, wiper systems, security and alarm systems, comfort and convenience systems, safety restraint systems (SRS), electric window systems, run roof systems, audio systems, visual systems, navigation systems).

24. how to make suitable adjustments to components and units.

25. how to make cost effective recommendations for rectification.

PERFORMANCE OBJECTIVES

To be competent you must:

a. wear suitable personal protective equipment and use vehicle coverings when using electrical testing techniques and carrying out rectification activities.

b. support the identification of electrical faults, by reviewing vehicle:

- technical data
- diagnostic test procedures.

c. prepare, connect and test all the required electrical and electronic testing equipment following manufacturers' instructions prior to use.

d. use electrical and electronic testing techniques which are relevant to the symptoms presented.

e. collect sufficient diagnostic information in a systematic way to enable an accurate diagnosis of electrical system faults.

- f. identify and record any system deviation from acceptable limits accurately.
- g. make cost effective recommendations for rectification based upon your analysis of the diagnostic information gained.
- h. use the tools and equipment required, correctly and safely throughout all rectification activities.
- i. carry out all rectification activities following:
 - manufacturers' instructions
 - your workplace procedures
 - health and safety requirements.
- j. work in a way which minimises the risk of :
 - damage to other vehicle systems
 - damage to other components and units
 - contact with leakages
 - contact with hazardous substances.
- k. ensure all repaired and replaced electrical components and units conform to the vehicle operating specification and any legal requirements.
- l. when necessary, adjust components and units correctly to ensure that they operate to meet system requirements.
- m. ensure the electrical system rectified performs to the vehicle operating specification and any legal requirements prior to return to the customer.
- n. ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required.
- o. complete all system diagnostic activities within the agreed timescale.
- p. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in your normal workplace
6. Simulated activities will be acceptable to assess candidates' diagnosis and rectification of faults which do not occur at frequent intervals on vehicles within the normal workplace or in the RWE environment, but which must be diagnosed and rectified to ensure that all the evidence requirements can be met.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of diagnosing and rectifying faults occurring in at least 3 out of the 10* auxiliary equipment systems listed in the Scoping Statement. Your evidence must also include use of all the types of rectification activities listed in the Scoping Statement. Of the 3 pieces of evidence produced, at least 2 must come from work in your normal workplace.
8. Your assessor must physically observe you in your normal workplace on at least 2 occasions, each observation covering the diagnosis and rectification of a fault in a different auxiliary equipment electrical system.

*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of faults occurring in all the types of auxiliary equipment electrical systems.

Unit AE06MC - Diagnose and Rectify Motorcycle Auxiliary Equipment Electrical Faults

UNIT OVERVIEW

This unit is about identifying and rectifying electrical faults occurring within a variety of electrical systems within motor cycle auxiliary equipment.

KEY WORDS AND PHRASES

Agreed timescales:

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

Battery testing equipment

This can include high rate discharge testers (HRD).

Electrical faults:

These are faults that require a two or more step inspection and a series of test results to identify the cause.

Motor cycles:

These can be the following - motor cycles, mopeds or scooters.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Electrical faults occurring within

- a. lighting systems
- b. security and alarm systems

2. Electrical and electronic testing equipment covers:

- a. volt meters,
- b. ammeters,
- c. ohmmeters
- d. multimeters
- e. battery testing equipment
- g. dedicated and computer based diagnostic equipment

3. Tools and equipment:

- a. hand tools
- b. special purpose tools
- c. general workshop equipment

4. Electrical and electronic testing techniques are:

- a. voltage, resistance and current measuring
- b. frequency measuring
- c. visual
- d. dedicated and computer based testing

5. Rectification activities are:

- a. replacing electrical components
- b. repairing wiring and connectors

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health and safety legislation and workplace procedures relevant to workshop practices and personal and motor cycle protection when diagnosing and rectifying auxiliary equipment electrical faults.

2. legal requirements relating to motor cycle electrics (including road safety requirements).

3. your workplace procedures for

- recording fault location and rectification activities
- the referral of problems
- reporting delays to the completion of work

4. the importance of, documenting diagnostic and rectification information.

5. the importance of working to agreed timescales and keeping others informed of progress.

6. the relationship between time, costs and profitability.

7. the importance of reporting anticipated delays to the relevant person(s) promptly.

Electrical and electronic principles

8. electrical and electronic principles, including Ohms Law, voltage, power, current (AC/DC) resistance, magnetism, electromagnetism and electromagnetic induction, digital and fibre optics principles.

10. electrical symbols, units and terms.

11. electrical safety procedures.

12. how auxiliary equipment electrical and electronic systems are constructed, dismantled and reassembled.

13. how auxiliary equipment electrical and electronic systems operate, including electrical component function, electrical inputs, outputs, voltages and oscilloscope patterns.

14. the interaction between electrical, electronic and mechanical components within the systems defined in Scoping Statement 1 above.

15. how the auxiliary equipment electrical systems interlink and interact, including multiplexing.
Use of electrical testing equipment

16. how to prepare and test the accuracy of diagnostic testing equipment.

17. how to use electrical and electronic testing equipment

Auxiliary equipment electrical faults, their diagnosis and correction

18. the types and causes of auxiliary equipment electrical system, component and unit faults and failures.

19. auxiliary equipment electrical component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action.

20. how to find, interpret and use sources of information on auxiliary equipment electrical operating specifications, diagnostic test procedures, repair procedures and legal requirements.

21. how to carry out systematic diagnostic testing of auxiliary equipment electrical and electronic systems using electrical testing techniques.

22. how to select the most appropriate diagnostic testing method for the symptoms presented.

23. how to interpret test results and motor cycle data in order to identify the location and cause of motor cycle system faults.

24. how to rectify electrical and electronic faults in electrical systems within the motor cycle auxiliary equipment (i.e. lighting systems, security and alarm systems)

25. how to make suitable adjustments to components and units.

26. how to make cost effective recommendations for rectification.

PERFORMANCE OBJECTIVES

To be competent you must:

a. wear suitable personal protective equipment and use motor cycle coverings when using electrical testing techniques and carrying out rectification activities.

b. support the identification of electrical faults, by reviewing motor cycle:

- technical data
- diagnostic test procedures.

c. prepare, connect and test all the required electrical and electronic testing equipment following manufacturers' instructions prior to use.

d. use electrical and electronic testing techniques which are relevant to the symptoms presented.

e. collect sufficient diagnostic information in a systematic way to enable an accurate diagnosis of electrical system faults.

f. identify and record any system deviation from acceptable limits accurately.

g. make cost effective recommendations for rectification based upon your analysis of the diagnostic information gained.

h. use the tools and equipment required, correctly and safely throughout all rectification activities.

i. carry out all rectification activities following:

- manufacturers' instructions
- your workplace procedures
- health and safety requirements.

j. work in a way which minimises the risk of :

- damage to other motor cycle systems
- damage to other components and units
- contact with leakages
- contact with hazardous substances.

k. ensure all repaired and replaced electrical components and units conform to the motor cycle operating specification and any legal requirements.

- l. when necessary, adjust components and units correctly to ensure that they operate to meet system requirements.
- m. ensure the electrical system rectified performs to the motor cycle operating specification and any legal requirements prior to return to the customer.
- n. ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required.
- o. complete all system diagnostic activities within the agreed timescale.
- p. report any anticipated delays in completion to the relevant person(s) promptly.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in your normal workplace
6. Simulated activities will be acceptable to assess candidates' diagnosis and rectification of faults which do not occur at frequent intervals on vehicles within the normal workplace or in the RWE environment, but which must be diagnosed and rectified to ensure that all the evidence requirements can be met.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of diagnosing and rectifying at least 4 different faults, comprising of the following:
 - 2 lighting system faults
 - 2 security and alarm system faults

Your evidence must also include use of all the types of rectification activities listed in the Scoping Statement.

Of the 4 pieces of evidence, 3 must come from work in your normal workplace.

8. Your assessor must physically observe you in your normal workplace on at least 2 occasions, each observation covering the diagnosis and rectification of a fault in a different auxiliary equipment electrical system.

Unit BP01 - Remove and Fit Basic Mechanical, Electrical and Trim (MET) Components to Vehicles

UNIT OVERVIEW

This unit is about the straightforward removal and fitting of basic mechanical, electrical and trim (MET) components to vehicles. It is also about checking the operation of the components fitted.

KEY WORDS AND PHRASES

Agreed timescales

Examples include: job times set by your company or agreed with a specific customer

Commercial Vehicles

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

Components fitted:

These can be either replacement or refitted components

MET:

Mechanical, electrical and trim

Vehicles:

These can be any of the following: light vehicles, commercial vehicles, motorcycles, mopeds and scooters

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard.

1. Basic MET components are

- a. bumpers
- b. headlamp units
- c. door trim
- d. window and waist mouldings
- e. road wheels
- f. batteries
- g. bonnet and boot lid trim

2. Tools and equipment are

- a. spanners
- b. socket set
- c. screwdrivers
- d. manufacturer's specified specialist tools
- e. pliers and self locking grips
- f. power drill and drill bits
- g. trolley jack
- h. axle stands
- i. vehicle lifts
- j. torque wrench

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health, safety and legal requirements relating to the removal and fitting of basic MET components
2. your workplace procedures for:
 - the referral of problems
 - reporting of delays to the completion of work
 - completion of work records
3. the work that needs to be done and the standard required
4. the requirements for protecting the vehicle and contents from damage before, during and after removing and fitting activities
5. the importance of selecting, using and maintaining the appropriate personal protective equipment when removing and fitting basic MET components

Removing and fitting basic MET components

6. find, interpret and use sources of information applicable to the removal and fitting of basic MET components

7. how to select, check and use all the tools and equipment required to remove and fit basic MET components
8. the procedures for removing and fitting basic MET components
9. the methods of storing removed parts and the importance of storing them correctly
10. the different types of fastenings and the reasons for their use
11. the need for correct alignment of components and the methods used to achieve this
12. the types of quality checks that can be used to ensure correct alignment and operation of components to manufacturer's specification and their purpose

PERFORMANCE OBJECTIVES

To be competent you must:

- a. use the appropriate personal protective equipment when removing and fitting basic MET components
- b. protect the vehicle and its contents effectively when removing and fitting basic MET components
- c. select and use the correct tools and equipment for the components you are going to remove or fit
- d. ensure that the tools and equipment you require are in a safe working condition
- e. remove and fit basic MET components following:
 - removal and fitting procedures
 - manufacturers' instructions
 - your workplace procedures
 - health, safety and legal requirements
- f. avoid damaging other components and units on the vehicle
- g. store all removed components safely in the correct location
- h. check that the components you have fitted operate correctly following the manufacturer's specification
- i. report any additional faults you find during the course of your work to the relevant person(s) promptly
- j. report any delays in completing your work to the relevant person(s) promptly
- k. remove and fit basic MET components within the agreed timescale
- l. complete work records accurately, in the format required and pass them to the relevant person(s) promptly

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit.
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in:
 - your normal workplace
 - an approved centre, or
 - a combination of both
6. Evidence from simulated activities is not acceptable for this unit. Specific Performance Evidence for this Unit
7. Your assessor must physically observe you removing and fitting at least:
 - 2 bumpers, each on different vehicles on different occasions
 - 2 headlamp units, each on different vehicles on different occasions
 - 2 door trims, each on different vehicles on different occasions
 - 1 window and 1 waist moulding
 - 2 road wheels, each on different vehicles on different occasions
 - 2 batteries, each on different vehicles on different occasions
 - 1 bonnet and 1 boot lid trim
8. Your assessor must observe you using spanners, socket set, screwdrivers, manufacturer's specified specialist tools, pliers and self locking grips, power drill and drill bits, trolley jack, axle stands, vehicle lift and torque wrench.

Unit BP03 Remove and Fit Non Welded Non-Structural Motorcycle Body Panels

UNIT OVERVIEW

This unit is about removing and fitting basic non welded panels such as full fairings, seat cowlings, tank panels on motorcycles.

KEY WORDS AND PHRASES

Agreed timescales

Examples include job times set by your company or agreed with a specific customer.

Motorcycles

This term also includes mopeds and scooters.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard.

1. Motorcycle non welded non-structural body panels are

- a. full fairings
- b. seat cowlings
- c. tank panels
- d. mudguards
- e. screens
- f. mirror

2. Tools and equipment are

- a. spanners
- b. socket set
- c. screwdrivers
- d. Allen keys
- e. manufacturer's specified specialist tools

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. the health, safety and legal requirements relating to the removal and fitting of motorcycle non welded non-structural body panels
2. your workplace procedures for:
 - the referral of problems
 - reporting of delays to the completion of work
 - completion of work records
3. the work that needs to be done and the standard required
4. the requirements for protecting the motorcycle and contents from damage before, during and after removing and fitting activities
5. the importance of selecting, using and maintaining the appropriate personal protective equipment when removing and fitting motorcycle non welded non-structural body panels

Removing and fitting motorcycle non-structural body panels

6. how to find, interpret and use sources of information applicable to the removal and fitting of basic motorcycle non welded non-structural body panels
7. how to select, check and use all the tools and equipment required to remove and fit basic motorcycle non welded non-structural body panels
8. the different types of mechanical fixings for motorcycle non welded non-structural body panels and when and why they should be used
9. the correct procedures and processes for removing and fitting motorcycle non welded non-structural body panels
10. the need for correct alignment of panels and the methods used to achieve this
11. the types of quality control checks that can be used to ensure correct alignment and contour of panels and operation of components to manufacturer's specification
12. the methods of storing removed panels and the importance of storing them correctly

PERFORMANCE OBJECTIVES

To be competent you must:

- a. use the appropriate personal protective equipment when removing and fitting motorcycle non welded non-structural body panels

- b. protect the motorcycle and its contents effectively when removing and fitting motorcycle non welded non-structural body panels
- c. select and use the correct tools and equipment for the panels you are going to remove or fit
- d. ensure that the tools and equipment you require are in a safe working condition
- e. remove and fit motorcycle non welded non-structural body panels following:
 - removal and fitting procedures
 - manufacturers' instructions
 - your workplace procedures
 - health, safety and legal requirements
- f. avoid damaging other components, units and panels on the motorcycle
- g. store all removed panels safely in the correct location
- h. realign the panels you have fitted correctly in a way which regains their original manufactured gaps
- i. check that the components you have fitted operate correctly following the manufacturer's specification
- j. report any additional faults you notice during the course of your work to the relevant person(s) promptly
- k. report any delays in completing your work to the relevant person(s) promptly
- l. remove and fit motorcycle non welded non-structural body panels within the agreed timescale
- m. complete work records accurately, in the format required and pass them to the relevant person(s) promptly

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit.
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or in a realistic working environment (RWE) as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
5. be observed by a qualified assessor carrying out work in:
 - your normal workplace
 - an approved centre, or
 - a combination of both
6. Evidence from simulated activities is not acceptable for this unit. Specific Performance Evidence for this Unit
7. Your assessor must physically observe you removing and fitting each of the following on at least 2 occasions:
 - full fairings
 - seat cowlings
 - tank panels
 - mudguards
 - screens
 - mirror
8. Your assessor must observe you using all the tools and equipment listed in the Scoping Statement for this unit.

Unit 49 - Process Payment Transactions

UNIT OVERVIEW

This unit is about calculating the cost of parts and services and processing not only cash payments but other forms of payment too, including account payments.

You are expected to be able to use the relevant point of sale equipment and be aware of and able to deal with, instances of potential fraud.

KEY WORDS AND PHRASES

Legislation:

Current, relevant legal requirements governing the sale of goods, trade descriptions and consumer protection.

Non-cash Payments:

Examples include cheques, account payments, credit and debit card payments. Parts and services: These are vehicle parts, any accessories and consumables. Services can be any associated with the retail motor industry.

Sources of information:

Examples include parts and services pricing information, other colleagues and your line manager.

SCOPE OF THIS UNIT:

All of the items listed below form part of this National Occupational Standard

1. Payments are:

- cash
- non-cash

2. Payment documentation covers:

- receipts and records
- credit and charge card slips
- credit account slips
- cheques

ESSENTIAL KNOWLEDGE

You need to understand:

Legislative and organisational requirements and procedures

1. your organisation's systems and procedures for:

- authorising non-cash and credit account transactions
- verifying account holders
- calculating and taking payments
- booking purchases to customer accounts
- dealing with suspected fraud

2. the relevant rights, duties and responsibilities contained within current versions of consumer legislation.

3. the features of any current parts and or services campaigns and promotions.

4. the limits of your authority for processing payments

Pricing

5. how to identify and check prices in your own parts and services operation.

6. how to get information and advice to deal with pricing problems.

7. how to identify current discounts and special offers (e.g. campaigns and promotions).

Handling payments and payment problems

8. how to keep cash and other payments safe and secure.

9. how to check for and identify counterfeit payments.

10. how to check for stolen cheques, credit cards, charge cards or debit cards.

11. how to deal with customers offering suspect tender or non-cash payments.

12. common methods of calculating payments, including the use of point of sale equipment and manual calculations.

13. the types of payment you are able to receive and accept.

14. the types of transactions errors that can occur and the consequences of failure to report errors.

Customer Care

15. how to balance giving the correct amount of attention to individual customers whilst maintaining a responsibility towards other customers in busy trading periods.

16. the value and importance of customer service to effective trading operations.

PERFORMANCE OBJECTIVES

To be competent you must:

- a. identify the price of items accurately.
- b. resolve any problems in pricing parts and services promptly by using the sources of information at your disposal.
- c. calculate the total price of the transaction correctly.
- d. inform customers of the amount due clearly and accurately.
- e. confirm the cash amount given by your customer and the change you give them.
- f. verify the identity of account holders following your organisation's procedures prior to debiting their account.
- g. gain authorisation for accepting non-cash payments and processing account debits when the value of the order exceeds the limit you are able to authorise.
- h. inform the customer tactfully when authorisation for payment cannot be obtained for non-cash transactions.
- i. complete and process payment documentation accurately.
- j. store payments securely and protect them from theft.
- k. be courteous to customers at all times.
- l. balance the need to give attention to individual customers whilst ensuring that others are not left without attention.

EVIDENCE REQUIREMENTS

General Requirements

You must:

1. produce evidence to show you meet all of the performance objectives consistently
2. produce evidence to show that you have covered all the items listed in the scope for this unit
3. produce evidence to show that you possess all the knowledge required.
4. produce performance evidence resulting from work that you carried out in your normal workplace
5. be observed by a qualified assessor carrying out work in your normal workplace
6. Evidence from simulated activities is not acceptable for this unit.

Specific Performance Evidence for this Unit

You must:

7. produce evidence of processing payments on at least 3 separate occasions
8. produce performance evidence to show that you have covered all the items in the Scoping Statement for this unit
9. Your assessor must observe you processing payments on at least 2 separate occasions