TRAINING REGULATIONS

AUTOMOTIVE SERVICING NC III

AUTOMOTIVE SECTOR

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY
East Service Road, South Superhighway, Taguig City, Metro Manila

TABLE OF CONTENTS

AUTOMOTIVE/LAND TRANSPORT SECTOR

AUTOMOTIVE SERVICING NC III

TRAINING REGULATIONS FOR

AUTOMOTIVE SERVICING NC III

SECTION 1 AUTOMOTIVE SERVICING NC III QUALIFICATION

The AUTOMOTIVE SERVICING NC III Qualification consists of competencies that a person must achieve to check, test, replace and repair mechanical, electrical and electronic control system components of a motor vehicle such as the automatic transmission systems; engine management system; steering and suspension systems; to inspect, prepare, install and service mechanical, electrical and electronic control parts, components, assemblies and sub-assemblies of LPG Kit to or gas engine light-duty automotive vehicle in accordance with manufacturer's specifications; to remove and replace auto engine and engine-related system for re-powering the vehicle. It also covers testing and replacing electronic components or devices in security and engine management systems.

This Qualification is packaged from the competency map of the Automotive Industry (Service sector) as shown in Annex A.

The Units of Competency comprising this Qualification include the following

CODE NO.	BASIC COMPETENCIES
500311109	Lead workplace communication
500311110	Lead small teams
500311111	Develop and practice negotiation skills
500311112	Solve problems related to work activities
500311113	Use mathematical concepts and techniques
500311114	Use relevant technologies
CODE NO.	**COMMON COMPETENCIES**
ALT723201	Apply Appropriate Sealant/Adhesive
ALT723202	Move and Position Vehicle
ALT311202	Perform Mensuration and Calculation
ALT723203	Read, Interpret and Apply Specifications and Manuals
ALT723204	Use and Apply Lubricant/Coolant
ALT723205	Perform Shop Maintenance
ALT311204	Perform Job Estimate
ALT311205	Interpret/Draw Technical Drawing
ALT723206	Practice health, safety and environment procedures
ALT311207	Inspect technical quality of work
ALT311208	Maintain quality systems
ALT311209	Provide work skill instructions
ALT723210	Identify and select original automotive parts and products

CODE NO.	CORE COMPETENCIES
ALT 723316	Test and Repair Electrical Security System/Components
ALT 723317	Service Electronic Engine Management
ALT 723318	Overhaul Engines and Associated Components
ALT 723319	Service Automatic Transmission
ALT 723320	Perform Maintenance Service Check-Up and Repair to Auto AC System
ALT 723353	Remove and Replace Automotive Engine and Engine-Related Systems
ALT 723358	Service and repair electronically controlled steering systems
ALT 723359	Service and repair electronically controlled suspension systems
ALT 723360	Repair Instruments and warning systems
ALT 723361	Carry out diagnostic procedures

`

CODE NO.	ELECTIVE COMPETENCIES
ALT 723350	Install LPG Conversion Kit
ALT 723351	Test and Adjust LPG Calibration
ALT 723352	Service LPG System

A person who has achieved this Qualification is competent to be:

- Automotive Senior Technician
- Automotive Aircon Technician
- Automotive Electrician
- Automotive LPG-Fuel (Retrofitting/Conversion) Technician
- Automotive LPG-Fuel (Re-powering) Technician
- Under Chassis Technician

SECTION 2 COMPETENCY STANDARDS

This section gives the details of the contents of the basic, common and core units of competency required in AUTOMOTIVE SERVICING NC III.

BASIC COMPETENCIES

UNIT OF COMPETENCY : LEAD WORKPLACE COMMUNICATION

UNIT CODE : 500311109

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to lead in the dissemination and discussion of ideas, information and issues in the workplace.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Communicate information about workplace processes	1.1. Appropriate ***communication method*** is selected 1.2. Multiple operations involving several topics areas are communicated accordingly 1.3. Questions are used to gain extra information 1.4. Correct sources of information are identified 1.5. Information is selected and organized correctly 1.6. Verbal and written reporting is undertaken when required 1.7. Communication skills are maintained in all situations
2. Lead workplace discussions	2.1. Response to workplace issues are sought 2.2. Response to workplace issues are provided immediately 2.3. Constructive contributions are made to workplace discussions on such issues as production, quality and safety 2.4. Goals/objectives and action plan undertaken in the workplace are communicated
3. Identify and communicate issues arising in the workplace	3.1. Issues and problems are identified as they arise 3.2. Information regarding problems and issues are organized coherently to ensure clear and effective communication 3.3. Dialogue is initiated with appropriate personnel 3.4. Communication problems and issues are raised as they arise

RANGE OF VARIABLES

VARIABLE	RANGE
1. Methods of communication	1.1. Non-verbal gestures 1.2. Verbal 1.3. Face to face 1.4. Two-way radio 1.5. Speaking to groups 1.6. Using telephone 1.7. Written 1.8. Internet

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1. Dealt with a range of communication/information at one time 1.2. Made constructive contributions in workplace issues 1.3. Sought workplace issues effectively 1.4. Responded to workplace issues promptly 1.5. Presented information clearly and effectively written form 1.6. Used appropriate sources of information 1.7. Asked appropriate questions 1.8. Provided accurate information
2. Underpinning knowledge and attitude	2.1. Organization requirements for written and electronic communication methods 2.2. Effective verbal communication methods
3. Underpinning skills	3.1. Organize information 3.2. Understand and convey intended meaning 3.3. Participate in variety of workplace discussions 3.4. Comply with organization requirements for the use of written and electronic communication methods
4. Resource implications	The following resources **MUST** be provided: 4.1. Variety of Information 4.2. Communication tools 4.3. Simulated workplace
5. Method of assessment	Competency may be assessed through: 5.1. Competency in this unit must be assessed through 5.2. Direct Observation 5.3. Interview
6. Context of assessment	6.1. Competency may be assessed in the workplace or in simulated workplace environment

UNIT OF COMPETENCY : LEAD SMALL TEAMS

UNIT CODE : 500311110

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes to lead small teams including setting and maintaining team and individual performance standards.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Provide team leadership	1.1. ***Work requirements*** are identified and presented to team members 1.2. Reasons for instructions and requirements are communicated to team members 1.3. ***Team members' queries and concerns*** are recognized, discussed and dealt with
2. Assign responsibilities	2.1. Duties, and responsibilities are allocated having regard to the skills, knowledge and aptitude required to properly undertake the assigned task and according to company policy 2.2. Duties are allocated having regard to individual preference, domestic and personal considerations, whenever possible
3. Set performance expectations for team members	3.1. Performance expectations are established based on client needs and according to assignment requirements 3.2. Performance expectations are based on individual team members duties and area of responsibility 3.3. Performance expectations are discussed and disseminated to individual team members
4. Supervised team performance	4.1. ***Monitoring of performance*** takes place against defined performance criteria and/or assignment instructions and corrective action taken if required 4.2. Team members are provided with ***feedback***, positive support and advice on strategies to overcome any deficiencies 4.3. ***Performance issues*** which cannot be rectified or addressed within the team are referenced to appropriate personnel according to employer policy 4.4. Team members are kept informed of any changes in the priority allocated to assignments or tasks which might impact on client/customer needs and satisfaction 4.5. Team operations are monitored to ensure that employer/client needs and requirements are met 4.6. Follow-up communication is provided on all issues affecting the team 4.7. All relevant documentation is completed in accordance with company procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. Work requirements	1.1. Client Profile 1.2. Assignment instructions
2. Team member's concerns	2.1. Roster/shift details
3. Monitor performance	3.1. Formal process 3.2. Informal process
4. Feedback	4.1. Formal process 4.2. Informal process
5. Performance issues	5.1. Work output 5.2. Work quality 5.3. Team participation 5.4. Compliance with workplace protocols 5.5. Safety 5.6. Customer service

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1. Maintained or improved individuals and/or team performance given a variety of possible scenario 1.2. Assessed and monitored team and individual performance against set criteria 1.3. Represented concerns of a team and individual to next level of management or appropriate specialist and to negotiate on their behalf 1.4. Allocated duties and responsibilities, having regard to individual's knowledge, skills and aptitude and the needs of the tasks to be performed 1.5. Set and communicated performance expectations for a range of tasks and duties within the team and provided feedback to team members
2. Underpinning knowledge and attitude	2.1. Company policies and procedures 2.2. Relevant legal requirements 2.3. How performance expectations are set 2.4. Methods of Monitoring Performance 2.5. Client expectations 2.6. Team member's duties and responsibilities
3. Underpinning skills	3.1. Communication skills required for leading teams 3.2. Informal performance counseling skills 3.3. Team building skills 3.4. Negotiating skills
4. Resource implications	The following resources **MUST** be provided: 4.1. Access to relevant workplace or appropriately simulated environment where assessment can take place 4.2. Materials relevant to the proposed activity or task
5. Methods of assessment	Competency may be assessed through: 5.1. Direct observations of work activities of the individual member in relation to the work activities of the group 5.2. Observation of simulation and/or role play involving the participation of individual member to the attainment of organizational goal 5.3. Case studies and scenarios as a basis for discussion of issues and strategies in teamwork
6. Context of assessment	6.1. Competency assessment may occur in workplace or any appropriately simulated environment 6.2. Assessment shall be observed while task are being undertaken whether individually or in-group

UNIT OF COMPETENCY: DEVELOP AND PRACTICE NEGOTIATION SKILLS

UNIT CODE : 500311111

UNIT DESCRIPTOR : This unit covers the skills, knowledge and attitudes required to collect information in order to negotiate to a desired outcome and participate in the negotiation.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	
1. Plan negotiations	1.1	Information on ***preparing for negotiation*** is identified and included in the plan
	1.2	Information on creating ***non verbal environments*** for positive negotiating is identified and included in the plan
	1.3	Information on ***active listening*** is identified and included in the plan
	1.4	Information on different ***questioning techniques*** is identified and included in the plan
	1.5	Information is checked to ensure it is correct and up-to- date
2. Participate in negotiations	2.1	Criteria for successful outcome are agreed upon by all parties
	2.2	Desired outcome of all parties are considered
	2.3	Appropriate language is used throughout the negotiation
	2.4	A variety of questioning techniques are used
	2.5	The issues and processes are documented and agreed upon by all parties
	2.6	Possible solutions are discussed and their viability assessed
	2.7	Areas for agreement are confirmed and recorded
	2.8	Follow-up action is agreed upon by all parties

RANGE OF VARIABLES

VARIABLE	RANGE
1. Preparing for negotiation	1.1 Background information on other parties to the negotiation 1.2 Good understanding of topic to be negotiated 1.3 Clear understanding of desired outcome/s 1.4 Personal attributes 1.4.1 self awareness 1.4.2 self esteem 1.4.3 objectivity 1.4.4 empathy 1.4.5 respect for others 1.5 Interpersonal skills 1.5.1 listening/reflecting 1.5.2 non verbal communication 1.5.3 assertiveness 1.5.4 behavior labeling 1.5.5 testing understanding 1.5.6 seeking information 1.5.7 self disclosing 1.6 Analytic skills 1.6.1 observing differences between content and process 1.6.2 identifying bargaining information 1.6.3 applying strategies to manage process 1.6.4 applying steps in negotiating process 1.6.5 strategies to manage conflict 1.6.6 steps in negotiating process 1.6.7 options within organization and externally for resolving conflict
2. Non verbal environments	2.1 Friendly reception 2.2 Warm and welcoming room 2.3 Refreshments offered 2.4 Lead in conversation before negotiation begins
3. Active listening	3.1 Attentive 3.2 Don't interrupt 3.3 Good posture 3.4 Maintain eye contact 3.5 Reflective listening
4. Questioning techniques	4.1 Direct 4.2 Indirect 4.3 Open-ended

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Demonstrated sufficient knowledge of the factors influencing negotiation to achieve agreed outcome 1.2 Participated in negotiation with at least one person to achieve an agreed outcome
2. Underpinning knowledge and Attitude	2.1 Codes of practice and guidelines for the organization 2.2 Organizations policy and procedures for negotiations 2.3 Decision making and conflict resolution strategies procedures 2.4 Problem solving strategies on how to deal with unexpected questions and attitudes during negotiation 2.5 Flexibility 2.6 Empathy
3. Underpinning skills	3.1 Interpersonal skills to develop rapport with other parties 3.2 Communication skills (verbal and listening) 3.3 Observation skills 3.1 Negotiation skills
4. Resource implications	The following resources **MUST** be provided: 4.1 Room with facilities necessary for the negotiation process 4.2 Human resources (negotiators)
5. Method of assessment	Competency may be assessed through: 5.1 Observation/demonstration and questioning 5.2 Portfolio assessment 5.3 Oral and written questioning 5.4 Third party report
6. Context of assessment	6.1 Competency to be assessed in real work environment or in a simulated workplace setting.

UNIT OF COMPETENCY : **SOLVE PROBLEMS RELATED TO WORK ACTIVITIES**

UNIT CODE : **500311112**

UNIT DESCRIPTOR : This unit of competencies covers the knowledge, skills and attitudes required to solve problems in the workplace including the application of problem solving techniques and to determine and resolve the root cause of problems.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Identify the problem	1.1. Variances are identified from normal operating parameters; and product quality 1.2. Extent, cause and nature are of the problem are defined through observation, investigation and ***analytical techniques*** 1.3. ***Problems*** are clearly stated and specified
2. Determine fundamental causes of the problem	2.1. Possible causes are identified based on experience and the use of problem solving tools / analytical techniques. 2.2. Possible cause statements are developed based on findings 2.3. Fundamental causes are identified per results of investigation conducted
3. Determine corrective action	3.1. All possible options are considered for resolution of the problem 3.2. Strengths and weaknesses of possible options are considered 3.3. Corrective actions are determined to resolve the problem and possible future causes 3.4. **Action *plans*** are developed identifying measurable objectives, resource needs and timelines in accordance with safety and operating procedures
4. Provide recommendation/s to manager	4.1. Report on recommendations are prepared 4.2. Recommendations are presented to appropriate personnel. 4.3. Recommendations are followed-up, if required

RANGE OF VARIABLES

VARIABLE	RANGE
1. Analytical techniques	1.1. Brainstorming 1.2. Intuitions/Logic 1.3. Cause and effect diagrams 1.4. Pareto analysis 1.5. SWOT analysis 1.6. Gant chart, Pert CPM and graphs 1.7. Scattergrams
2. Problem	2.1. Non – routine process and quality problems 2.2. Equipment selection, availability and failure 2.3. Teamwork and work allocation problem 2.4. Safety and emergency situations and incidents
3. Action plans	3.1. Priority requirements 3.2. Measurable objectives 3.3. Resource requirements 3.4. Timelines 3.5. Co-ordination and feedback requirements 3.6. Safety requirements 3.7. Risk assessment 3.8. Environmental requirements

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1. Identified the problem 1.2. Determined the fundamental causes of the problem 1.3. Determined the correct / preventive action 1.4. Provided recommendation to manager These aspects may be best assessed using a range of scenarios / case studies / what ifs as a stimulus with a walk through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations that may have happened.
2. Underpinning knowledge and attitude	2.1. Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations 2.2. Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 2.2.1. Relevant equipment and operational processes 2.2.2. Enterprise goals, targets and measures 2.2.3. Enterprise quality, OHS and environmental requirement 2.2.4. Principles of decision making strategies and techniques 2.2.5. Enterprise information systems and data collation 2.2.6. Industry codes and standards
3. Underpinning skills	3.1. Using range of formal problem solving techniques 3.2. Identifying and clarifying the nature of the problem 3.3. Devising the best solution 3.4. Evaluating the solution 3.5. Implementation of a developed plan to rectify the problem
4. Resource implications	4.1. Assessment will require access to an operating plant over an extended period of time, or a suitable method of gathering evidence of operating ability over a range of situations. A bank of scenarios / case studies / what ifs will be required as well as bank of questions which will be used to probe the reason behind the observable action.
5. Method of assessment	Competency may be assessed through: 5.1. Case studies on solving problems in the workplace 5.2. Observation The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.
6. Context of assessment	6.1. In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

UNIT OF COMPETENCY: **USE MATHEMATICAL CONCEPTS AND TECHNIQUES**

UNIT CODE : **500311113**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required in the application of mathematical concepts and techniques.

ELEMENT	Performance Criteria ***Italicized terms*** are elaborated in the Range of Variables
1. Identify mathematical tools and techniques to solve problem	1.1 Problem areas are identified based on given condition 1.2 ***Mathematical techniques*** are selected based on the given problem
2. Apply mathematical procedure/solution	2.1 Mathematical techniques are applied based on the problem identified 2.2 Mathematical computations are performed to the level of accuracy required for the problem 2.3 Results of mathematical computation is determined and verified based on job requirements
3. Analyze results	3.1 Result of application is reviewed based on expected and required specifications and outcome 3.2 ***Appropriate action*** is applied in case of error

RANGE OF VARIABLES

VARIABLE	RANGE
1. Mathematical techniques	May include but are not limited to: 1.1 Four fundamental operations 1.2 Measurements 1.3 Use/Conversion of units of measurements 1.4 Use of standard formulas
2. Appropriate action	2.1 Review in the use of mathematical techniques (e.g. recalculation, re-modeling) 2.2 Report error to immediate superior for proper action

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Identified, applied and reviewed the use of mathematical concepts and techniques to workplace problems
2. Underpinning knowledge and attitude	2.1 Fundamental operation (addition, subtraction, division, multiplication) 2.2 Measurement system 2.3 Precision and accuracy 2.4 Basic measuring tools/devices
3. Underpinning skills	3.1 Applying mathematical computations 3.2 Using calculator 3.3 Using different measuring tools
4. Resource implications	The following resources **MUST** be provided: 4.1 Calculator 4.2 Basic measuring tools 4.3 Case Problems
5. Method of assessment	Competency may be assessed through: 5.1 Authenticated portfolio 5.2 Written Test 5.3 Interview/Oral Questioning 5.4 Demonstration
6. Context of assessment	6.1 Competency may be assessed in the work place or in a simulated work place setting

UNIT OF COMPETENCY: USE RELEVANT TECHNOLOGIES

UNIT CODE : 500311114

UNIT DESCRIPTOR : This unit of competency covers the knowledge, skills, and attitude required in selecting, sourcing and applying appropriate and affordable technologies in the workplace.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Study/select appropriate technology	1.1 Usage of different ***technologies*** is determined based on job requirements 1.2 Appropriate technology is selected as per work specification
2. Apply relevant technology	2.1 Relevant technology is effectively used in carrying out function 2.2 Applicable software and hardware are used as per task requirement 2.3 ***Management concepts*** are observed and practiced as per established industry practices
3. Maintain/enhance ~~of~~ relevant technology	3.1 Maintenance of technology is applied in accordance with the ***industry standard operating procedure***, ***manufacturer's operating guidelines*** and ***occupational health and safety procedure*** to ensure its operative ability 3.2 Updating of technology is maintained through continuing education or training in accordance with job requirement 3.3 Technology failure/ defect is immediately reported to the concern/responsible person or section for ***appropriate action***

RANGE OF VARIABLES

VARIABLE	RANGE
1. Technology	May include but are not limited to: 1.1 Office technology 1.2 Industrial technology 1.3 System technology 1.4 Information technology 1.5 Training technology
2. Management concepts	May include but not limited to: 2.1 Real Time Management 2.2 KAIZEN or continuous improvement 2.3 5s 2.4 Total Quality Management 2.5 Other management/productivity tools
3. Industry standard operating procedure	3.1 Written guidelines relative to the usage of office technology/equipment 3.2 Verbal advise/instruction from the co-worker
4. Manufacturer's operating guidelines/ instructions	4.1 Written instruction/manuals of specific technology/ equipment 4.2 General instruction manual 4.3 Verbal advise from manufacturer relative to the operation of equipment
5. Occupational health and safety procedure	5.1 Relevant statutes on OHS 5.2 Company guidelines in using technology/equipment
6. Appropriate action	6.1 Implementing preventive maintenance schedule 6.2 Coordinating with manufacturer's technician

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Studied and selected appropriate technology consistent with work requirements 1.2 Applied relevant technology 1.3 Maintained and enhanced operative ability of relevant technology
2. Underpinning knowledge and attitude	2.1 Awareness on technology and its function 2.2 Repair and maintenance procedure 2.3 Operating instructions 2.4 Applicable software 2.5 Communication techniques 2.6 Health and safety procedure 2.7 Company policy in relation to relevant technology 2.8 Different management concepts 2.9 Technology adaptability
3. Underpinning skills	3.1 Relevant technology application/implementation 3.2 Basic communication skills 3.3 Software applications skills 3.4 Basic troubleshooting skills
4. Resource implications	The following resources **MUST** be provided: 4.1 Relevant technology 4.2 Interview and demonstration questionnaires 4.3 Assessment packages
5. Method of assessment	Competency must be assessed through: 5.1 Interview 5.2 Actual demonstration 5.3 Authenticated portfolio (related certificates of training/seminar)
6. Context of assessment	6.1 Competency may be assessed in actual workplace or simulated environment

COMMON COMPETENCIES

UNIT OF COMPETENCY: APPLY APPROPRIATE SEALANT/ADHESIVE

UNIT CODE: ALT723201

UNIT DESCRIPTOR: This unit covers the knowledge, skills and attitudes required in the selection and application of sealant/adhesives.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Identify appropriate Sealant/adhesive	1.1***Sealant/adhesive*** selected in line with job requirements and manufacturer's specification 1.1 ***Sealant/adhesive checking*** is performed to ensure that the product is fit for use.
2. Prepare surface for Sealant/adhesive	2.1 Surface materials are identified as per construction 2.2 Surface is cleaned and free of moisture, dust and other foreign matters to ensure maximum adhesion or seal.
3. Apply sealant/adhesive evenly	3.1 Sealant/adhesive is applied evenly on the surface in line with manufacturer's specification 3.2 Excess sealant/adhesive is removed by sanding or scrapping 3.3***Tools and equipment*** used to apply sealant/adhesive are appropriate to job requirements 3.4 ***Safety*** are observed and PPE are worn in accordance with industry SOP 3.5 ***Hazards*** associated with the use of sealant and adhesives are identified.
4. Store/Dispose of sealant/adhesive	4.1 Sealant/adhesive are stored as per prescribed procedure 4.2 Waste are disposed as per workshop standard operating procedures (SOP)

RANGE OF VARIABLES

VARIABLE	RANGE
1. Sealant/Adhesive	May include: 1.1Form in Place Gasket (FIPG) 1.2 Ribbon Sealer 1.3Hametite 1.4Silicon Body sealer 1.5 Prestite for Auto and Auto Aircon
2. Tools and equipment	May include: 2.1 Putty knife 2.2 Scraper 2.3 Compressor 2.4 Steel brush 2.5 Paint brush 2.6 Rubber hammer 2.7 Hand tools Personal protective equipment include: 2.8 Gloves 2.9 Apron 2.10 Safety shoes 2.11Goggles 2.12Gas mask
3. Safety	May include: 3.1 Ventilation 3.2 Handling of Flammable/Irritating substances 3.3 Use of Personal Protective Equipment
4. Hazards	May include: 4.1 Fumes 4.2 Skin irritation 4.3 Burns
5.Adhesive/Sealant checking	May include: 5.1 Expiry date 5.2 Free of contamination 5.1 Cap/Covers 5.2 Tightly closed 5.3 Concentration

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Identified appropriate sealant/adhesives 1.2 Prepared surface for sealant/adhesive 1.3 Applied sealant/adhesive 1.4 Stored unused or disposed of used sealant/adhesive
2. Required knowledge	2.1 OH & S regulations 2.2 Safe handling of sealant/adhesive 2.3 Industry code of practice 2.2 Procedures in sealant/adhesive application 2.3 Procedures in interpreting manuals
3. Required skills	3.1 Handling sealant/adhesive 3.2 Applying sealant/adhesive 3.3.Sanding the surface 3.4 Use of tools, equipment 3.5 Mixing of body filler and epoxy base and hardener
4. Resource implications	The following resources should be provided: 4.1 Materials relevant to the activity 4.2 Appropriate tools and equipment 4.3 Real or simulated workplace
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Observation with questioning 5.2 Interview related to: • Safe and correct use of tools and equipment • Application of adhesive/sealant
6. Context of assessment	6.1 Competency elements must be assessed in a safe working environment 6.2 Assessment may be done in a workplace or in a simulated environment

UNIT OF COMPETENCY: MOVE AND POSITION VEHICLE

UNIT CODE: ALT723202

UNIT DESCRIPTOR: This unit covers the knowledge, skills and attitude needed to move and position vehicle in a workshop.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Prepare vehicle for driving	1.2 Correct ***check-up procedures*** performed based on vehicle manufacturer's standard
2. Move and position vehicle	2.1 Select vehicle to be moved or re-position. *2.2* Drive the vehicle to appropriate location *2.3* Park vehicle following ***parking safety techniques*** and procedure
3. Check the vehicle	3.1 ***Vehicle*** position is checked as per requirement 3.2 Vehicle is checked for external damages

RANGE OF VARIABLE

VARIABLE	RANGE
1. Check up procedure	May include: 1.1 Oil level 1.2 Brake fluid 1.3 Clutch fluid 1.4 Coolant level 1.5 Battery (electrolyte) 1.6 Tire pressure 1.7 Position of driving gear 1.8 Lighting and warning devices
2. Vehicles	May include: 2.1 Vehicles with automatic transmission 2.2 Vehicles with manual transmission
3.Parking safety techniques	May include: 3.1 Engaging of Park brake 3.2 Vehicle parking position 3.3 Front wheel position

EVIDENCE GUIDE

1.Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Prepared vehicle for driving. 1.2 Moved and positioned vehicle 1.3 Checked the vehicle.
2. Required knowledge	2.1 Driver's Code of conduct 2.2 Workshop signs and symbols 2.3 Driving skills 2.4 Vehicle accessories for safe driving and parking
3. Required skills	3.1 Ability to handle vehicle/maneuver vehicle the easiest way 3.2 Immediate response to accident 3.3 Preparing vehicle for driving 3.4 Parking Downhill, Uphill, Parallel 3.5 Shifting Gears 3.6 Maneuvering
4. Resource implications	The following resources should be provided: 4.1 Driving range/area 4.2 Appropriate vehicle for driving Vehicle accessories
5. Method of assessment	Competency in this unit may be assessed through: 5.4 Observation with questioning 5.5 Written or oral examination
6. Context of assessment	6.1 Assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines 6.3 Assessment of practical skills must be done in a workplace or simulated environment.

UNIT OF COMPETENCY: PERFORM MENSURATION AND CALCULATION

UNIT CODE: ALT311202

UNIT DESCRIPTOR: This unit covers the knowledge, skills and attitudes in identifying, caring, handling and using of measuring instrument.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Select measuring instruments	1.1 Object or component to be measured is identified 1.2 Correct specifications are obtained from relevant source 1.3 Appropriate ***measuring instrument*** is selected according to job requirements
2. Carry out measurements and calculation	2.1 Measuring tools are selected in line with job requirements 2.2 Accurate measurements are obtained in accordance with job requirements 2.3 ***Calculation*** needed to complete work tasks are performed using the four fundamental operations of addition (+), subtraction (-), multiplication (x) and division (/). 2.4 Calculations involving fractions, percentages and mixed numbers are used to complete workplace tasks. 2.5 Numerical computation is self-checked and corrected for accuracy 2.5 Instruments are read to the limit of accuracy of the tool.
4 Maintain measuring instruments	4.1 Measuring instruments are kept free from corrosion 4.2 Measuring instruments are not dropped to avoid damage 4.3 Measuring instruments are cleaned before and after using.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Measuring instruments	May include: 1.1 Multitester 1.2 Micrometer (In-out, depth) 1.3 Vernier caliper (Out, inside) 1.4 Dial Gauge with Mag. Std. 1.5 Plastigauge 1.6 Straight Edge 1.7 Thickness gauge 1.8 Torque Gauge 1.9 Small Hole gauge 1.10 Telescopic Gauge 1.11 Try square 1.12 Protractor 1.13 Combination gauge 1.14 Steel rule
2. Calculation	May include: 2.1 Volume 2.2 Area 2.3 Displacement 2.4 Inside diameter 2.5 Circumference 2.6 Length 2.7 Thickness 2.8 Outside diameter 2.9 Taper 2. 10 Out of roundness 2.11Oil clearance 2.12 End play/thrust clearance

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Selected measuring instruments 1.2 Carried out measurements and calculations. 1.3 Maintained measuring instruments
2. Required knowledge	2.1 Types of Measuring instruments and their uses 2.2 Safe handling procedures in using measuring instruments 2.3 Four fundamental operation of mathematics 2.4 Formula for Volume, Area, Perimeter and other geometric figures
3. Required skills	3.1 Caring and Handling measuring instruments 3.2 Calibrating and using measuring instruments 3.1 Performing calculation by Addition, Subtraction, Multiplication and Division 3.2 Visualizing objects and shapes 3.3 Interpreting formula for volume, area, perimeter and other geometric figures
4. Resource implications	The following resources should be provided: 4.1 Workplace location 4.2 Measuring instrument appropriate to servicing processes 4.3 Instructional materials relevant to the propose activity
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Observation with questioning 5.2 Written or oral examination 5.3 Interview 5.4 Demonstration with questioning
6. Context of assessment	6.1 Competency elements must be assessed in a safe working environment 6.2 Assessment may be conducted in a workplace or simulated environment

UNIT TITLE: **READ, INTERPRET AND APPLY SPECIFICATION AND MANUALS**.

UNIT CODE: ALT723203

UNIT DESCRIPTOR: This unit deals with identifying, interpreting and applying service specification manuals, maintenance procedure manuals and periodic maintenance manual.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Identify and access manual/ specification	1.1 Appropriate ***manuals*** are identified and accessed as per job requirements. 1.2 Version and date of manual are checked to ensure that correct specification and procedure are identified.
2. Interpret manuals	2.1 Relevant sections, chapters of manuals/specifications are located in relation to the work to be conducted 2.2 Information and procedure in the manual are interpreted in accordance with industry practices
3. Apply information in manual	3.1 Manual is interpreted according to job requirements 3.2 Work steps are correctly identified in accordance with manufacturer specification 3.3 Manual data are applied according to the given task 3.4 All correct sequencing and adjustments are interpreted in accordance with information contained on the manual or specifications
4. Store manuals	4.1 Manual or specification are stored appropriately to ensure prevention of damage, ready access and updating of information when required in accordance with company requirements

RANGE OF VARIABLES

VARIABLE	RANGE
1. Manuals	May include: 1.1 Manufacturer's specification manual 1.2 Repair manual 1.3 Maintenance Procedure Manual 1.4 Periodic Maintenance Manual

EVIDENCE GUIDE

1.Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Identified and accessed manual/specification 1.2 Interpreted manuals 1.3 Applied information in manuals 1.4 Stored manuals
2. Required knowledge	2.1 Types of manuals used in automotive industry 2.2 Identification of symbols used in the manuals 2.3 Identification of units of measurements 2.4 Unit conversion
3. Required skills	3.1 Reading and comprehension skills required to identify and interpret automotive manuals and specifications 3.2 Accessing information and data
4. Resource implication	The following resources should be provided: 4.1 All manuals/catalogues relative to Automotive 4.2 Job order, requisitions 4.3 Actual vehicle or simulator
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Observation with questioning 5.2 Interview
6. Context of assessment	6.1 Assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines 6.2 Assessment may be conducted in the workplace or in a simulated environment.

UNIT OF COMPETENCY: USE AND APPLY LUBRICANTS/COOLANTS

UNIT CODE: ALT723204

UNIT DESCRIPTOR: This unit covers the knowledge, skills and attitudes required in selecting and applying different types of lubricants.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Identify types of lubricants/ coolants	1.1 Correct information on ***lubrication schedule*** is accessed and interpreted from appropriate manufacturers specifications ***manuals*** 1.2 Type and quantity of ***lubricants/coolant*** are identified as per job requirements
2. Use and apply lubricants/coolant	2.1 Correct procedure for change of lubricant is identified following manufacturer's specification or manual 2.2 Correct tools and equipment are selected and used in line with job requirements 2.3 Existing lubricants are removed and replaced with specified types and quantity of new materials in line with manufacturer's specification 2.4 Safe procedure and use of ***PPE*** are observed when removing or replacing lubricant 2.5 Used lubricants are disposed in accordance with environmental guidelines 2. 6 Work is checked in line with company SOP.
3. Perform housekeeping activities	*3.1* ***Tools, equipment*** and materials are properly stored as per company SOP 3.2 Workplace is free from waste materials

RANGE OF VARIABLES

VARIABLE	RANGE	
1. Manuals	May include: 1.1 Manufacturer's specification manual 1.2 Periodic Maintenance manual 1.3 Service Manual	
2.Lubricants/ Coolant	May include: 2.1 Engine oil: • Diesel engine oil • Gasoline engine oil 2.2 Automatic Transmission Fluid • Destro II • T4 2.3 Gear oil lubricants: • Oil #90 • Oil #140 • Oil #30 • Oil #40 2.4 Grease • Special (velocity joint) Molybdenum disolfate) • Ordinary • Multi-purpose oil • Contact point lubricant (grease)	2.5 Brake/Clutch System • Brake fluid • DOT3 2.6 Power Steering Fluid • Hydraulic Fluid 2.7 Radiator Coolant • Long last coolant 2.8 A/C Compressor Oil • Pag oil
3. Lubricant Schedule	May include: 3.1 Kilometers traveled/used 3.2 No. of Hours used 3.3 Monthly	
4. Tool and equipment	May include: 4.4 Hand tools 4.5 Oiler 4.6 Oil Dispenser 4.7 Grease gun	
5. Personal Protective Equipment (PPE)	May include: 5.1 Apron 5.2 Gloves 5.3 Goggles 5.4 Safety shoes	

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Identified types of lubricants and lubrication schedule. 1.2 Used and applied lubricants. 1.3 Performed housekeeping
2. Required knowledge	2.1 Types/Classification of Lubricants 2.2 Identifying lubrication schedule 2.3 Cause and Effects of Gear Oil Dilution 2.4 Purpose of Lubrication (Problem and effects) 2.5 Hazard associated with lubrication
3. Required skills	3.1 Handling of oils (Gear, oil, engine oil) 3.2 Familiarization/Classification of Lubricants 3.3 Lubrication Procedure
4. Resource implications	The following resources should be provided: 4.1 Workplace: Real or simulated work area 4.2 Appropriate tools and equipment 4.3 Materials relevant to activity
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Demonstration with questioning 5.2 Written/Oral examination
6. Context of assessment	6.1 Competency elements must be assessed in a safe working environment 6.2 Assessment must be undertaken in accordance with the endorsed industry assessment guidelines 6.3 Assessment of underpinning knowledge and skills may be assessed on or off-the-job

UNIT OF COMPETENCY: PERFORM SHOP MAINTENANCE

UNIT CODE: ALT723307

UNIT DESCRIPTOR: This unit deals with inspecting and cleaning of work area including tools, equipment and facilities. Storage of tools/ equipment and disposal of used supplies/materials are also incorporated in this competency.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Inspect/clean tools and work area	1.1 Cleaning solvent used as per workshop/tools ***cleaning requirement*** 1.2 ***Work area*** is checked and cleaned 1.3 Wet surface/spot in work area is wiped and dried
2. Store/arrange tools and shop equipment	2.1 Tools/equipment are checked and stored in their respective shelves/location 2.2 Corresponding labels are posted and visible 2.3 Tools are safely secured and logged in the records
3. Dispose wastes/used lubricants	3.1 Containers for used lubricants are visibly labeled 3.2 Wastes/used lubricants are disposed as per workshop SOP
4. Report damaged tools/equipment	4.1 Complete inventory of tools/equipment is maintained 4.2 Damaged tools/equipment/facilities are identified and repair recommendation is given 4.3 Reports prepared have no error/discrepancy

RANGE OF VARIABLES

VARIABLE	RANGE
1. Work Area	May include: 1.1 Workshop areas for servicing/repairing light and/or heavy vehicle and/or plant transmissions and/or outdoor power equipment 1.2 Open workshop/garage and enclosed, ventilated office area 1.3 Other variables may include workshop with: • Mess hall • Wash room • Comfort room
2. Cleaning requirement	May include: 2.1 Cleaning solvent 2.2 Inventory of supplies, tools, equipment, facilities 2.3 List of mechanics/technicians 2.4 Rags 2.5 Broom 2.6 Map 2.7 Pail 2.8 Used oil container 2.9 Oiler 2.10 Dust/waste bin
3. Manuals	May include: 3.1 Vehicle/plant manufacturer specifications 3.2 Company operating procedures 3.3 Industry/Workplace Codes of Practice 3.4 Product manufacturer specifications 3.5 Customer requirements 3.6 Industry Occupational Health &Safety
4. Company standard operating procedure	May include: 4.1 Gloves 4.2 Apron 4.3 Goggles 4.4 Safety shoes

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1Cleaned workshop tools/facilities 1.2Maintained equipment, tools and facilities 1.3Disposed wastes and used lubricants/fluid as per required procedure
2. Required knowledge	2.1 5S or Total Quality Management (TQM) 2.2 Service procedures 2.3 Relevant technical information 2.4 Safe handling of Equipment and tools 2.5 Vehicle safety requirements 2.6 Workshop policies 2.7 Personal safety procedures 2.8 Fire Extinguishers and prevention 2.9 Storage/Disposal of Hazardous/flammable materials 2.10 Positive Work Values (Perseverance, Honesty, Patience, Attention to Details)
3. Required skills	3.1 Handling/Storing of tools/equipment/supplies and material 3.2 Cleaning grease/lubricants 3.3 Disposing of supplies/materials 3.4 Preparing inventory of s/m and tools and equipment 3.5 Monitoring of s/m and tools/equipment
4. Resource implications	The following resources should be provided: 4.1 Workplace: Real or simulated work area 4.2 Appropriate Tools & equipment 4.3 Materials relevant to the activity
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Written/Oral Questioning 5.2 Demonstration
6. Context of assessment	6.1 Competency must be assessed on the job or in a simulated environment. 6.2 The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

UNIT OF COMPETENCY: **PREPARE JOB ESTIMATE/COSTING**

CODE: ALT311204

UNIT DESCRIPTOR: This competency unit covers the knowledge, skills and attitude in estimating/costing automotive repair.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Identify nature/scope of work	1.1 Effective ***communication*** skills are applied to determine the nature and scope of work to be undertaken 1.2 Extent of service to be rendered is determined and documented in line with standard operating procedures (SOP)
2. Prepare and present estimate	2.1 Type and quantity of supplies, materials and labor required to perform work are identified in line with job requirements 2.2 Cost of supplies, materials are obtained from ***suppliers*** 2.3 ***Total cost*** of required services is calculated in line with SOP 2.4 Estimate is presented to customer in line with SOP.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Communication	May include: 1.1 Listening to customer 1.2 Speaking with suppliers, customers and co-workers 1.3 Questioning
2. Suppliers	May include: 2.1 Distributors 2.2 Managers 2.3 Proprietors
3. Cost	May include: 3.1 Materials 3.2 Labor 3.3 Overhead

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate 1.1 Identified nature/scope of work 1.2 Prepared and presented estimate
2. Required knowledge	2.1 Consumer mathematics 2.2 Replaceable/Fabricated Materials or Spare parts in a vehicle 2.3 Automotive Repair Procedures and Techniques 2.4 Job estimates 2.5 Honesty, Perseverance, Patience, Attention to Details
3. Required skills	3.1 Computing using the Four Mathematical Operations 3.2 Estimating repair works and activities
4. Resource implications	The following resources should be provided: 4.1 Appropriate tools such as calculator, paper, pen, and other measuring instruments relevant to activity
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Observation with questioning 5.2 Presentation of Finished drawing
6. Context of assessment	6.1 Competency must be assessed in a room or any simulated places 6.2 Assessment must be given according to industry standard

UNIT OF COMPETENCY: INTERPRET/DRAW TECHNICAL DRAWING

CODE: ALT311205

UNIT DESCRIPTOR: This unit identifies the competencies required to draw/interpret basic trade drawing

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** t***erms*** are elaborated in the Range of Variables
1. Interpret technical drawing	1.1 Components, assemblies or objects are recognized as required 1.2 Dimensions are identified as appropriate to the field of employment 1.3 Instructions are identified and followed as required 1.4 Material and other ***consumable*** requirements are identified as required 1.5 Symbols are recognized as appropriate in ***drawing***
2. Select correct technical drawing	2.1 Drawing is checked and validated against job requirements or equipment 2.2 Drawing version is checked and validated according to the ***Manual***
3. Apply freehand sketching	3.1 Correct freehand sketching is produced using the necessary ***tools and materials***

RANGE OF VARIABLES

VARIABLE	RANGE
1. Drawing	May include: 1.1 Drawing symbols 1.2 Alphabet of lines 1.3 Orthographic views 1.3.1 Front view 1.3.2 Right side view/left side view 1.3.3 Top view 1.3.4 Pictorial 1.4 Schematic diagram
2. Manual	May include: 2.1 technical drawing manual 2.2 manufacturers schematic diagram
3. Consumables	May include: 3.1 drawing plate 3.2 pencil and eraser 3.3 scotch tape
4. Tools and materials	May include: 4.1 compass 4.2 divider 4.3 rulers 4.4 triangles 4.5 drawing tables 4.6 computer

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Interpreted technical drawing 1.2 Selected correct technical drawing 1.3 Applied freehand sketching
2. Required knowledge	2.1 Drawing standard symbols 2.2 Safe handling of tools and consumables 2.3 Identification of types of drawing 2.4 Patience, Perseverance, Attention to Details
3. Required skills	3.1 Draw/interpret orthographic drawing 3.2 Handling of drawing instruments
4. Resource implications	The following resources should be provided: 4.1 Drawing room 4.2 Appropriate tools 4.3 Materials relevant to activity
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Observation with questioning 5.2 Written/Oral examination 5.3 Presentation of Finished drawing
6. Context of assessment	6.1 Must be assessed in a drawing room or in any simulated places 6.2 Assessment must be given according to industry standard

UNIT OF MPETENCY: **PRACTICE HEALTH, SAFETY AND ENVIRONMENT PROCEDURES**

UNIT CODE : **ALT723206**

UNIT DESCRIPTOR : This unit of competency incorporates the work safe regional guidelines and encompasses competencies necessary to apply basic safety and emergency procedures to maintain a safe workplace for staff, customers and others.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Apply basic safety procedures	1.1. ***Policies and procedures*** to achieve a safe working environment are followed and maintained in line with ***occupational health and safety (OHS) procedures*** and according to worksite policy 1.2. All unsafe situations are recognized and reported according to worksite policy 1.3. All breakdowns in relation to machinery and equipment are reported to supervisor or nominated persons 1.4. Fire and safety ***hazards*** are identified and precautions are taken or reported according to worksite policy and procedures 1.5. Dangerous goods and substances are identified, handled and stored according to worksite policy and procedures and OHS requirements 1.6. Worksite policy regarding manual handling practice is followed 1.7. Participation in consultative arrangements established by company for OHS is exercised
2. Apply emergency procedures	2.1. Worksite policies and emergency procedures regarding illness or accidents are identified and applied 2.2. Safety alarms are identified 2.3. Qualified persons are contacted in the event of accident or sickness of customers or staff and accident details are documented according to worksite accident/ injury procedures 2.4. Worksite evacuation procedures are identified and applied

RANGE OF VARIABLES

VARIABLE	RANGE
1. Policies and procedures	May include: 1.1. Hazard policies and procedures 1.2. Emergency, fire and accident procedures 1.3. Personal safety procedures 1.4. Procedures for the use of personal protective clothing and equipment 1.5. Use of motor vehicles 1.6. Resolution procedures 1.7. Job procedures 1.8. Work instructions
2. OHS procedures	May include: 2.1. Safe manual handling and lifting customers, staff, equipment/tooling, premises and stock
3. Hazards	May include: 3.1. Sharp cutting tooling and instruments 3.2. Electricity and water 3.3. Toxic substances 3.4. Damaged packing material or containers 3.5. Broken or damaged equipment 3.6. Flammable materials and fire hazards 3.7. Lifting practices 3.8. Spillages, waste and debris especially on floors, ladders, trolleys and glue guns/burns
4. Emergency procedures	May include: 4.1. Sickness 4.2. Accident 4.3. Fire or store evacuation involving staff or customers

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate has: 1.1 Communicated effectively with others involved in or affected by the work 1.2 Identified and assessed hazardous situations and rectified, or reported to the relevant persons 1.3 Operated fire-fighting equipment 1.4 Handled safely and stored dangerous and/or hazardous goods and substances 1.5 Applied safe manual handling practices 1.6 Operated safely and effectively equipment and utilized materials over the full range of functions 1.7 Followed worksite evacuation procedures.
2. Required knowledge	General knowledge of: 2.1 The implications of OHS on efficiency, morale and customer relations 2.2 Common automotive terminology 2.3 OHS regulations/requirements, equipment, material and personal safety requirements 2.4 Safe manual handling theories and practices 2.5 The selection and application of fire-fighting equipment 2.6 Dangerous goods and hazardous chemicals handling processes 2.7 Worksite reporting procedures
3. Required Skills	3.1. Collect, organize and understand information related to recognizing and reporting situations 3.2. Communicate ideas and information to reporting procedures (verbal and written) 3.3. Plan and organize activities which implement and follow standard procedures 3.4. Work with others and in a team by assisting and cooperating with team members 3.5. Use mathematical ideas and techniques to document and report numbers for emergency procedures 3.6. Establish diagnostic processes which recommend improvements for OHS issues 3.7. Use workplace technology related to the use of technology to assist with safe work practices
4. Resource Implications	The following resources should be provided: 4.1. A workplace or simulated workplace 4.2. Situations requiring safe working practices 4.3. Worksite or equivalent instructions on safe working practice 4.4. Hazardous chemicals and/or dangerous goods information 4.5. Materials, tooling and equipment 4.6. Firefighting appliances and fire test facilities
5. Methods of Assessment	Competency in this unit may be assessed through: 5.1 Portfolio Assessment 5.2 Interview 5.3 Case Study/Situation
6. Context for Assessment	6.1 Competency may be assessed in the work place or in a simulated work place setting

UNIT OF COMPETENCY: INSPECT TECHNICAL QUALITY OF WORK

UNIT CODE : ALT311207

UNIT DESCRIPTOR : . This unit covers the competence to inspect work done by other staff, apply quality standards to work, and protect customer property and interests.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Gather information to carry out inspection	1.1 ***OH&S requirements***, including company regulatory requirements and personal protection needs are observed throughout the work 1.2 Pertinent ***information*** are sourced 1.3 Different methods are analyzed and those most appropriate to the circumstances are selected and prepared 1.4 Technical and/or calibration requirements for inspection are sourced and needed equipment is identified and prepared
2. Inspect and apply quality standards to work	2.1 Work is identified and confirmed for inspection in accordance with company ***quality procedures*** 2.2 ***Quality Inspections*** are conducted throughout the course of the work to ensure quality standards are maintained 2.3 Quality standards are applied during work completion to ensure the treatment of customer property meets industry and / or company standards 2.4 Activities are coordinated throughout the workplace in accordance with company procedures 2.5 Documents of work quality are maintained according to company requirements
3. Achieve quality work outcomes	3.1 Damage to customer property is avoided through ensuring staff adherence to quality procedures and use of protective materials at all stages of the repair or service 3.2 ***Communication*** pertaining to quality improvements and recommendations are to be done in accordance with company requirements

RANGE OF VARIABLES

VARIABLE	RANGE
1. OH&S Requirements	May include: 1.1 Safety equipment 1.2 Personal protective equipment and clothing 1.3 First aid equipment 1.4 Hazard and risk control 1.5 Elimination of hazardous materials and substances manual handling, including shifting, lifting and carrying 1.6 Emergency procedures 1.4 Road rules and safe driving policy
2. Information	May include: 2.1 Manufacturer / component supplier specifications 2.2 Company operating procedures 2.3 Supplier directories 2.4 Parts catalogues 2.5 Customer orders 2.6 Service manual 2.7 Material safety data sheets
3. Quality Procedures	May include: 3.1 Worksite quality system documentation 3.2 Work instructions 3.3 Safe work procedures 3.4 Product specifications 3.5 Equipment maintenance schedules 3.6 Technical procedures 3.7 Adopted or specifically prepared standards
4. Quality Inspections	May include: 4.1 Periodic inspection during the job or observation at completion of the job to ensure all ordered parts have been fitted, components used meet manufacturer / component supplier specifications, invoicing complies with service / repair / parts order and contains sufficient details of labor and / or components used 4.2 Reported and diagnosed problems have been confirmed as rectified thru test procedures and presentation of the vehicle or equipment after service / repair meets manufacturer and Company standards
5. Communication	May include: 5.1 Verbal 5.2 Written 5.3 Telephone or Electronic means

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Observed safety procedures and requirements 1.2 Communicated effectively with others involved in or affected by the work 1.3 Applied OH&S policies and procedures 1.4 Identified quality procedures 1.5 Inspected work undertaken by others 1.5 Applied quality standards to work
2. Required knowledge	A working knowledge of: 2.1 Quality systems in a workplace 2.2 Common automotive terminology 2.3 Vehicle safety requirements 2.4 Work planning processes 2.5 OH&S regulations/requirements, equipment, material and personal safety requirements 2.6 Company quality systems and procedures 2.7 Worksite environmental control measures 2.8 Worksite reporting procedures
3. Required skills	3.1 Communicating ideas and information 3.2 Collecting, analyzing and organizing information 3.3 Planning and organizing activities 3.4 Working with others and in a team 3.5 Using mathematical ideas and techniques 3.6 Solving problems 3.7 Using technology
4. Resource implications	The following resources should be provided: 4.1 A workplace or simulated workplace 4.2 Situations requiring inspections of technical quality 4.3 Computer hardware and software, access to electronic communication
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Direct Observation 5.2 Oral interview 5.3 Written Evaluation 5.4 Third Party Report
6. Context of assessment	6.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions

UNIT OF COMPETENCY: MAINTAIN QUALITY SYSTEMS

UNIT CODE : ALT311208

UNIT DESCRIPTOR : This unit of competency covers the competence to conduct the final quality check on completed work or orders, report on the quality of processes and work outcomes, and implement improvements to work processes.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Conduct final quality check on completed work / orders	1.1. Completed work / orders are checked for compliance with supplier, company or customer specifications 1.2. Level of inspection conducted is appropriate to the size and importance of the job 1.3. Documentation is authorized in accordance with company requirements 1.4. Feedback is provided to staff on the quality of their work with equal emphasis on strengths and weaknesses and opportunities for development
2. Report on the quality of processes and work outcomes	2.1. ***Documents*** are kept according to company ***quality procedures*** on outcomes of quality checks 2.2. ***Quality problems*** are identified according to company ***performance indicators*** 2.3. ***Information*** relating to the quality of processes and work outcomes is provided to appropriate persons on a regular basis
3. Implement improvements to work processes	3.1. Staff input is encouraged to generate possible solutions to quality problems 3.2. Options for solving quality problems are generated and the costs and benefits of each option are evaluated 3.3. Recommended solutions to quality problems are discussed with management 3.4. Improvements to work processes are implemented according to company policies and procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. Quality procedures	May include: 1.1 Company quality system documentation 1.2 Work instructions 1.3 Safe work procedures 1.4 Product specifications 1.5 Equipment maintenance schedules 1.6 Technical procedures and adopted or specifically prepared standards
2. Performance indicators	May include: • account for issues of time, quantity, quality and cost factors and may include establishing time targets for own work, identifying reasonable criteria for evaluating own work outcomes, identifying measures to avoid wastage, identifying reasonable criteria to judge internal and/or external customer satisfaction
3. Quality problems	May include: 3.1 Misdiagnosed faults 3.2 Jobs requiring rework 3.3 Jobs which do not meet customer requirements 3.4 Repairs which do not fix the problem within the allocated timeframe
4. Communication	May include: 4.1 Verbal 4.2 Written 4.3 Telephone or other means
5. Information/documents	May include: 5.1 Vehicle manufacturer practices 5.2 Company operating procedures 5.3 Supplier directories 5.4 Parts catalogues 5.5 Customer orders and industry/workplace codes of practice 5.6 Material safety data sheets (MSDS)

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Communicated effectively with others involved in or affected by the work 1.2 Identified quality system procedures and needs 1.3 Identified performance indicators 1.4 Conducted final quality checks on completed work orders 1.5 Reported on the quality of processes and work outcomes 1.6 Monitored and adjusted performance indicators to meet changing circumstances 1.7 Processed and implemented recommendations for change
2. Required knowledge	Competency includes sufficient knowledge to: Knowledge of: • quality systems and application techniques in a work environment • typical loss and damage control systems • work planning and organization processes • occupational health and safety (OHS) regulations/requirements, equipment, material and personal safety requirements at the worksite • enterprise quality systems and procedures • worksite information management systems
3. Required skills	Required skills include the ability to: 3.1 Research and interpretive skills to locate, interpret and apply quality audit policies and procedures 3.2 Investigative and analytical skills required for identification and analysis of quality breaches, incidents or risks, and identification of quality related training needs 3.3 English literacy and communication skills in relation to dealing with customers and team members on worksite quality audit issues 3.4 Questioning and active listening skills 3.5 Written communication skills sufficient to prepare reports, document investigations and maintain worksite quality documents 3.6 Plan and organize activities for leadership skills required in organizing, implementing and promoting worksite quality systems and measures 3.7 Work with others and in a team by seeking advice and assistance from team members

	3.8 Use mathematical ideas and techniques to document quantities and company sampling procedures 3.9 Establish diagnostic processes which analyze problems and recommend solutions 3.10 Use the workplace technology related to document and analyze quality problems
4. Resource implications	The following resources should be provided: 4.1 A workplace or simulated workplace 4.2 Situations requiring worksite quality systems maintenance 4.3 Worksite quality policies and procedures 4.4 Worksite quality documents system 4.5 Materials, tooling and equipment
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Direct Observation 5.2 Oral interview 5.3 Written Evaluation 5.4 Third Party Report
6. Context of assessment	6.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions

UNIT OF COMPETENCY: PROVIDE WORK SKILL INSTRUCTION
UNIT CODE : ALT311209
UNIT DESCRIPTOR : This unit describes the performance outcomes, skills and knowledge required to conduct individual and group instruction and demonstrate work skills, using existing learning resources in a safe and comfortable learning environment. The unit also covers the skills and knowledge required to determine the success of both the training provided and one's own personal training performance. It emphasizes the training as being driven by the work process and context.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Organize instruction and demonstration	1.1 Gather information about ***learner characteristics*** and learning needs 1.2 Confirm a ***safe learning environment*** 1.3 Gather and check ***instruction and demonstration objectives*** and seek assistance if required 1.4 Access and review relevant ***learning resources*** and ***learning materials*** for suitability and relevance, and seek assistance to interpret the contextual application 1.5 Organize access to necessary equipment or physical resources required for instruction and demonstration 1.6. Notify learners of ***details*** regarding the implementation of the learning program and/or delivery plan
2. Conduct instruction and demonstration	2.1 Use interpersonal skills with learners to establish a safe and comfortable learning environment 2.2 Follow the learning program and/or delivery plan to cover all learning objectives 2.3 Brief learners on any ***OHS procedures*** and requirements prior to and during training 2.4 Use ***delivery techniques*** to structure, pace and enhance learning 2.5 Apply ***coaching*** techniques to assist learning 2.6 Use communication skills to provide information, instruct learners and demonstrate relevant work skills 2.7 Provide opportunities for practice during instruction and through work activities 2.8 Provide and discuss feedback on learner performance to support learning
3. Check training performance	3.1 Use ***measures*** to ensure learners are acquiring and can use new technical and generic skills and knowledge 3.2 Monitor learner progress and outcomes in consultation with learner 3.3 Review relationship between the trainer/coach and the learner and adjust to suit learner needs
4. Review personal training performance and finalize documentation	4.1 Reflect upon personal performance in providing instruction and demonstration, and document strategies for improvement 4.2 Maintain, store and secure learner records according to organizational and legal requirements

RANGE OF VARIABLES

VARIABLE	RANGE
1. Learner Characteristics	May include: 1.1 Language, literacy and numeracy levels 1.2 Learning styles 1.3 Past learning and work experiences 1.4 Specific needs 1.5 Workplace culture
2. Safe Learning Environment	May include: 2.1 Exit requirements 2.2 Personal protective equipment 2.3 Safe access 2.4 Safe use of equipment
3. Instruction and demonstration objectives	May include: 3.1 Competencies to be achieved 3.2 Generic and technical skills, which may be provided by the organization, developed by a colleague and individual or group objectives 3.3 Learning outcomes.
4. Learning resources	May include: 4.1 Learner and user guides 4.2 Trainer and Facilitator guides 4.3 Example training programs 4.4 Specific case studies 4.5 Professional development materials 4.6 Assessment materials 4.7 A variety of formats produced locally or acquired from other sources
5. Learning materials	May include: 5.1 Handouts for learners 5.2 Materials sourced from the workplace, like workplace documentation, operating procedures, and specifications
6. Details	May include: 6.1 Location and time 6.2 Outcomes of instruction or demonstration 6.3 Reason for instruction or demonstration 6.4 Who will be attending instruction session

VARIABLE	RANGE
7. OHS procedures	May include: 7.1 Emergency procedures 7.2 Hazards and their means of control 7.3 Incident reporting 7.4 Use of personal protective equipment 7.5 Safe work practices 7.6 Safety briefings 7.7 Site-specific safety rules
8. Delivery techniques	May include: 8.1 Coaching 8.2 Demonstration 8.3 Explanation 8.4 Group or pair work providing opportunities to practice skills and solve problems 8.5 Questions and answers
9. Coaching	May include: 9.1 Learning arrangements requiring immediate interaction and feedback 9.2 On-the-job instruction and 'buddy' systems 9.3 Relationships targeting enhanced performance 9.4 Short-term learning arrangements 9.5 Working on a one-to-one basis.
10. Measures	May include: 10.1 Informal review or discussion 10.2 Learner survey 10.3 On-the-job observation 10.4 Review of peer coaching arrangements.

EVIDENCE GUIDE

1. Critical aspects of competency	1.1 Carried out a minimum of three training sessions, involving demonstrating and instructing particular work skills for different groups; with each session addressing: 1.1.1 Different learning objectives 1.1.2 A range of techniques and effective communication skills appropriate to the audience
2. Required knowledge	2.1 Learner characteristics and needs 2.2 Content and requirements of the relevant learning program and/or delivery plan 2.3 Sources and availability of relevant learning resources and learning materials 2.4 Content of learning resources and learning materials 2.5 Training techniques that enhance learning and when to use them 2.6 Introductory knowledge of learning principles and learning styles 2.7 Key OHS issues in the learning environment, including: • roles and responsibilities of key personnel • responsibilities of learners • relevant policies and procedures, including hazard identification, risk assessment, reporting requirements, safe use of equipment and emergency procedures • risk controls for the specific learning environment
3. Required skills	3.1 Non-verbal communication techniques, such as: • asking relevant and appropriate questions • providing explanations • demonstrating • using listening skills • providing information clearly 3.1 Safety skills to implement OHS requirements, by acting and responding safely in order to: • identify hazards • conduct prestart-up checks if required • observe and interpret learner behaviour that may put people at risk 3.2 Time-management, skills to: • ensure all learning objectives are covered • pace learning 3.3 Reflection skills in order to: • identify areas for improvement • maintain personal skill development

	3.4 Literacy skills to: • complete and maintain documentation • read and follow learning programs and plans • read and analyze learner information 3.6 Technology skills to operate audio-visual and technical equipment 3.7 Interpersonal skills to: • engage, motivate and connect with learners • provide constructive feedback • maintain appropriate relationships • establish trust • use appropriate body language • maintain humor • demonstrate tolerance • manage a group • recognize and be sensitive to individual difference and diversity 3.8 Observation skills to: • monitor learner acquisition of new skills, knowledge and competency requirements • assess learner communication and skills in interacting with others • identify learner concerns • recognize learner readiness to take on new skills and tasks
4. Resource implications	The following resources should be provided: Evidence must be gathered in the workplace wherever possible. Where no workplace is available, a simulated workplace must be provided
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Direct Observation 5.2 Oral interview 5.3 Written Evaluation 5.4 Third Party Report
6. Context of assessment	6.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions

UNIT OF COMPETENCY: IDENTIFY AND SELECT ORIGINAL AUTOMOTIVE PARTS AND PRODUCTS

UNIT CODE : ALT723210

UNIT DESCRIPTOR : This unit of competency covers the competence required to identify original automotive parts and products based on evidence from customers and/or other sources which may include catalogue numbers or samples of parts/products or their purpose.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Identify the part/product and its end use	1.1 Available ***part/product information*** is gathered, documented and confirmed with customer 1.2 ***Information gathering techniques*** is established for proper identification of part/product 1.3 End user or host for the part/product, i.e. vehicle/unit assembly or vehicle/unit assembly options, is established from an analysis of available information
2. Identify details of the part/product	2.1 The ***parts/product cataloguing system*** is identified and accessed 2.2 Part/product is matched accurately with cataloguing information by accessing and using the catalogue system 2.3 Details of identity of the part/product are documented and processed
3. Part/product is supplied or ordered for customer	3.1 Customer accepts process used 3.2 Part/product is supplied or ordered if not available 3.3 Customer records are updated

RANGE OF VARIABLES

VARIABLE	RANGE
1. Part/product information	May include: 1.1 Manufacturer/component supplier specifications and technical documentation 1.2 Company procedures and documentation 1.3 Company or industry specifications, diagrams, sketches 1.4 Verbal descriptions and physical and visual evidence
2. Information gathering techniques	May include: 2.1 Common vehicle/unit model 2.2 Date of manufacture 2.3 Purpose and appearance of product and other tracking information
3. Parts/products cataloguing systems	May include: 3.1 Hard-copy (book-fast, loose-leaf) 3.2 Stand-alone computer or networked/online computer-supported services

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Elicited sufficient information from the customer and/or other sources to enable a confirmed identification of vehicle or unit the part/product intended 1.2 Accessed the parts/products catalogue systems associated with required vehicle/unit 1.3 Used both manual and computer-based parts/products catalogues and equivalent documentation to trace and identify common specific brand parts/products 1.4 Communicated effectively with others involved in or affected by the work.
2. Required knowledge	Competency includes sufficient knowledge to: 2.1 Structural of computer workstations 2.2 Common automotive terminology 2.3 Main automotive systems and assemblies and their functions 2.4 Parts/product catalogue systems, both brand-specific and general options 2.5 Legal issues associated with the supply and use of non-conforming parts/components/accessories 2.6 Company quality system 2.7 Work organization and planning processes
3. Required skills	Required skills include the ability to: 3.1 Apply research and interpretive skills sufficient to locate, interpret and apply manufacturer/component supplier procedures, workplace policies and procedures 3.2 Apply analytical skills required for identification and analysis of technical information 3.3 Apply plain English literacy and communication skills in relation to dealing with customer and team members 3.4 Apply questioning and active listening skills 3.5 Apply oral communication skills sufficient to convey information and concepts to customers 3.6 Apply planning and organizing skills to own work activities, including making good use of time and resources, sorting out priorities and monitoring own performance 3.7 Use mathematical ideas and techniques to correctly calculate material requirements, estimate and calculate costs and establish quality checks 3.8 Use workplace technology related to customer services, including use of measuring equipment, computerized technology, use of communication devices and reporting/ documenting of results

4	Resource implications	The following resources should be provided: 4.1 Workplace location or simulated workplace 4.2 Information and material identifying and selecting automotive parts and products 4.3 Equipment identifying and selecting automotive parts and products 4.4 Activities covering task requirements 4.5 Specifications and work instructions.
5	Method of assessment	Competency in the unit may be assessed through: 5.1 Direct Observation 5.2 Oral interview 5.3 Written Evaluation 5.4 Third Party Report
6	Context of assessment	6.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions

CORE COMPETENCIES

UNIT OF COMPETENCY : TEST AND REPAIR ELECTRICAL SECURITY SYSTEM/COMPONENTS

UNIT CODE : ALT 723316

UNIT DESCRIPTOR : This unit covers the competence required to carry out installation, testing and repair of automotive electrical security systems and components.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables (All standard of performance for Install, Test and Repair ***Electrical Security System/Components*** is in accordance with ***company standard operating procedure*** and manufacturer's specification *Manuals* using specified ***tools*** and ***equipment)***
1. Install electrical security system/ components.	1.1 Installation is completed without causing damage to any workplace property or vehicle. 1.2 Correct information is accessed and interpreted 1.3 Appropriate fittings/materials are selected. 1.4 Electrical security systems/components are installed and wired.
2. Test anti-theft system	2.1 Tests are completed without causing damage to any workplace property or vehicle. 2.2 Correct information is accessed and interpreted. 2.3 Tests are carried out to determine faults. 2.4 Faults are identified and preferred repair action determined.
3. Repair electrical security systems/ components.	3.1 Electrical security systems/ components are repaired without causing damage to any workplace property or vehicle. 3.2 Correct information is accessed and interpreted. 3.3 Necessary repairs, component replacement and adjustment are carried out.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Electrical Security System Components	May include: 1.1 Car alarm 1.2 Power window 1.3 Power lock
2. Manuals	May include: 2.1 Manufacturer Specification Manual 2.2 Maintenance Procedure Manual 2.3 Periodic Maintenance Data 2.4 Service Manual 2.5 Parts Checklist
3. Company Standard Operating Procedure	May include: 3.1 Job Order 3.2 Requisition slip 3.3 Wearing of Personal Protective Equipment such as • Apron • Goggles • Safety shoes • Gloves
4. Tools and equipment	May include: 4.1 Multimeter, test lamps, soldering gun 4.2 Power tools, air tools, special tools for removal adjustment

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Installed electrical security system/components 1.2 Test anti-theft system 1.3 Repair electrical security systems/components
2. Required knowledge	2.1 OH&S regulations 2.2 Electrical principles 2.3 Ohms law 2.3 Electrical Wiring codes 2.4 Electrical measuring and testing procedures 2.5 Vehicle safety requirements 2.6 Procedures to avoid damage to ECUs 2.7 Positive Work Values (Patience, Perseverance, Honesty, etc.) 2.8 Quality procedures, e.g., 5S 2.9 Environmental-conservation procedures, e.g., 3R (reduce, reuse, recycle)
3. Required skills	3.1 Removing/Installing electrical devices 3.2 Reading/Interpreting schematic diagrams 3.3 Using Testing Equipment 3.4 Using Mathematical Ideas and Techniques 3.5 Solving Problems 3.6 Repairing procedures 3.7 Soldering
4. Resource implications	The following resources should be provided: 4.1 Workplace: Real or simulated work area 4.2 Appropriate Tools & equipment 4.3 Materials relevant to the activity
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Observation or Demonstration with Questioning 5.2 Portfolio
6. Context of assessment	6.1 Competency must be assessed on the job or in a simulated environment. 6.2 The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

UNIT OF COMPETENCY : **SERVICE ELECTRONIC ENGINE MANAGEMENT SYSTEMS**

UNIT CODE : **ALT 723317**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to service/repair electronic fuel injection and electronic engine management systems and/or associated components. Engine management systems are systems where the ECU incorporates control over the fuel injection and ignition systems.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables (Note: All standard of performance for Service ***Electronic Engine Management Systems*** is in accordance with ***company standard operating procedure*** and manufacturer's specification ***manuals*** using specified ***tools and equipment***.)
1. Check electronic engine management systems and/or associated components.	1.1 Checking is completed without causing damage to any workplace property or vehicle. 1.2 Correct information is accessed and interpreted from appropriate manufacturer specifications. 1.3 Tests on electronic fuel injection and electronic engine management systems are carried out to determine faults 1.4 Appropriate servicing procedure is recommended.
2. Service electronic engine management systems and/or associated components.	2.1 Service is completed without causing damage to any workplace property or vehicle. 2.2 Correct information is accessed and interpreted from appropriate manufacturer specifications. 2.3 Necessary service and repairs, component replacement and adjustments are carried out using appropriate tools, techniques and materials. 2.4 Tests on electronic fuel injection and engine management systems are carried out to determine faults are corrected

RANGE OF VARIABLES

VARIABLE	RANGE
1. Electronic Engine Management Systems	May include: 1.1 Electronic fuel injection and electronic engine management systems fitted light vehicles outdoor power equipment. (Engine management systems are systems where the ECU incorporates control over the fuel injection and ignition systems.) Specific requirements: 1.2 Electronic engine management systems. The electronic/electrical system/components of controlling the engine's fuel and ignition requirements. Other variables may include: 1.3 Testing fuel pressure 1.4 Cleaning injectors
2. Manuals	May include: 2.1 Manufacturer's specification Manual 2.2 Maintenance Procedure Manual 2.3 Periodic Maintenance Data 2.4 Service Manual 2.5 Parts Checklist
3. Company standard operating procedure	May include: 3.1 Job Order 3.2 Requisition slip 3.3 Wearing of Personal Protective Equipment such as: • Safety shoes, Apron, Goggles, Hand Gloves
4. Tools and equipment	May include: 4.1 multimeter 4.2 exhaust gas analyzer 4.3 vacuum gauge 4.4 pressure gauge 4.5 tachometer 4.6 vehicle lifting equipment 4.7 power tools 4.8 air tools 4.9 special tools for removal/adjustment 4.10 specialized system testers

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Tested electronic engine management systems and identifying faults. 1.2 Serviced electronic engine management systems
2. Required knowledge	2.1 OH&S legislation 2.2 Service/repair, removal, replacement and adjustment procedures of engine management systems 2.3 Operating principles of electronic fuel injection and engine management systems/components 2.4 Construction and operation of electronic fuel injection engine management system/components relevant to application 2.5 Personal safety requirements 2.6 Equipment/vehicle safety requirements 2.7 Positive Work Values (Patience, Perseverance, Honesty, etc) 2.8 Quality procedures, e.g., 5S 2.9 Environmental-conservation procedures, e.g., 3R (reduce, reuse, recycle)
3. Required skills	3.1 Use of testing equipment 3.2 Analyzing and solving problems 3.3 Service and repair and/or replacement of system components 3.4 Removal, dismantling, re-assembly and refitting 3.5 Testing system operation 3.6 Retrieval and assessment of electronic systems data including fault codes 3.7 Testing, inspection and evaluation of fuel injection/engine management system/components
4. Resource implications	The following resources should be provided: 4.1 Workplace 4.2 Appropriate tools and equipment 4.3 Materials relevant to the proposed activity and tasks
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Observation or Demonstration with Questioning 5.2 Portfolio
6. Context of assessment	6.1 Competency elements must be assessed on the job or in a simulated environment. 6.2 The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

UNIT OF COMPETENCY : OVERHAUL ENGINE AND ASSOCIATED COMPONENTS

UNIT CODE : ALT 723318

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to overhaul engines and associated components of a removed engine. The task involves a complete dismantling and rebuilding of light/heavy vehicles, plant, motorcycles and marine on 2 and 4 stroke spark ignition and 2 and 4 stroke compression ignition engines.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables (Note: All standard of performance for ***Overhaul Engine and Associated Components*** is in accordance with ***Company standard operating procedure*** and Manufacturer's specification ***manuals*** using specified Tools and equipment.)
1. Analyze engine failure	1.1 Battery to be used is always fully charged 1.2 Cylinder compressor is checked 1.3 Valve timing is inspected 1.4 Oil pressure is checked 1.5 Cooling system (radiator or leak) is inspected 1.6 Valve clearance is inspected/adjusted 1.7 High tension cord is disconnected to the ignition coil during engine cranking
2. Pull down the engine	2.1 Vehicle is parked on designated area and wheel choked is applied 2.2 Disconnected wire harness is accurately marked 2.3 Battery is disconnected first before proceeding to remove other connection 2.4 Engine is securely fitted or bolt to the engine stand
3. Disassemble engine parts and components	3.1 Engine parts are checked for wear, damage and dirt 3.2 Head bolts is removed following sequence pattern 3.3 Engine is not turned upside down when the oil pan is removed 3.4 Crank shaft is removed in sequence pattern specified in the manufacturer's manual
4. Inspect engine parts and components	4.1 Timing belt is not bended, twisted or turned inside out 4.2 Belt is safeguarded not to get in contact with oil or other liquid chemical 4.3 Cylinder warpage is referred to manufacturer's manual 4.4 Crankshaft maximum run-out is 0.06m Inspection of the following should conform to Manufacturer's manual 4.5 Main journal diameter 4.6 Valve stem or valve bushing clearance 4.7 Valve face angle is 45.5º 4.8 Camshaft bore diameter oil clearance 4.9 Piston ring groove clearance 4.10 Piston ring end gap 4.11 Piston to cylinder bore clearance 4.12 Cylinder bore out of round & Taperness

	4.13 Cam Lobe diameter 4.14 Cam Lift 4.15 Crankshaft main journal/connecting rod journal out-of-round and taperness 4.16 Thrust clearance 4.17 Connecting Rod alignment 4.18 Value Spring Tension
5. Perform fitting & adjustment of engine parts	5.1 Fitting/Setting of valve to valve seat 5.2 Application of prussian blu to the valve face 5.3 If concentric 360º appearance of blu to the valve seat 5.4 If not using valve upper hand upper hand lap the valve 5.5 Camshaft is fitted to cylinder head 5.6 Lay a strip of plastic gage 5.7 Each cap bolt is tighten a little at a time in sequence specified in Manufacturer's manual 5.8 Camshaft is not rotated 5.9 Oversize piston is used only if clearance is excessive and if specified in the manufacturer manual 5.10 Oversize piston ring is used only if specified by manufacturer
6. Assemble engine parts/components	6.1 Bolt is tightening 6.2 Valve timing mark are aligned 6.3 Measurement of timing belt deflection is 5-6 mm at 2 kg. force 6.4 Valve clearance is adjusted
7. Mount engine	7.1 Position of engine to the vehicle must be supported by lifting equipment 7.2 Accurate and correct connection of engine wiring harness, fuel lines and battery 7.3 All mounting bolts are tightened as per specified torque

RANGE OF VARIABLES

VARIABLE	RANGE
1 Engine and Associated Components	May include: 1.1 Light, plant, 2 and 4 stroke spark ignition and 2 and 4 stroke compression ignition engines
2. Manual	May include: 2.1 Manufacturer's specification Manual 2.2 Maintenance Procedure Manual 2.3 Periodic Maintenance Data 2.4 Service Manual 2.5 Parts Checklist
3. Company Standard Operating Procedure	May include: 3.1 Job Order 3.2 Requisition slip 3.3 Wearing of Personal Protective Equipment such as: • Safety shoes • Apron • Goggles • Hand Gloves
4. Tools/ Equipment/ and other materials	May include: 4.1 Hand tools, power tools, lifting and jacking equipment, specialist tools, measuring equipment, tensioning equipment Other materials needed include: 4.2 Engine oils, moving part lubricants, replacement parts, gaskets and sealant

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Analyzed engine failure 1.2 Dismantled and assembled engine components 1.3 Performed fitting and adjustment of engine parts/components
2. Required knowledge	2.1 Engine overhaul procedures 2.2 Procedure for Dismantling, assembling and adjustment of components/parts 2.3 Measuring and testing procedures 2.4 Relevant technical information 2.5 Equipment safety requirements 2.6 Engine Component safety requirements 2.7 Relevant enterprise policies 2.8 Engine Parts/components handling techniques 2.9 Personal safety requirements 2.10 Positive Work Values (Patience, Perseverance, Honesty, etc.) 2.11 Quality procedures, e.g., 5S 2.12 Environmental-conservation procedures, e.g., 3R (reduce, reuse, recycle)
3. Required skills	3.1 Use of Repair Manual 3.2 Interpreting engine wiring diagram 3.3 Use of torque wrench & special service tools 3.4 Using mathematical ideas and techniques 3.5 Solving problems 3.6 Fitting/adjusting engine parts 3.7 Using measuring instrument
4. Resource implications	The following resources should be provided: 4.1 Workplace: Real or simulated work area 4.2 Appropriate Tools & equipment 4.3 Materials relevant to the activity
5. Method of assessment	Competency in this uniy may be assessed through: 5.1 Observation or Demonstration with Questioning 5.2 Portfolio
6. Context of assessment	6.1 Competency must be assessed on the job or in a simulated environment. 6.2 The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

UNIT OF COMPETENCY : SERVICE AUTOMATIC TRANSMISSION

UNIT CODE : ALT723319

UNIT DESCRIPTOR : This unit deals with overhauling automatic transmission (A/T). It also includes testing of A/T before and during road test.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables (Note: All standard of performance for Service ***Automatic Transmission*** is in accordance with ***company standard operating procedure*** and manufacturer's specification *Manuals* using specified ***tools*** and ***equipment***)
1. Diagnose automatic transmission (A/T)	1.1 Automatic transmission is tested for noise, shifting condition, leaks, contamination and fluid pressure 1.2 A/T is diagnosed as per Repair Manual to prevent seizure
2. Dismount A/T assembly	2.1 A/T fluid is drained thoroughly before transmission is removed 2.2 A/T cables and linkages is disconnected 2.3 Appropriate tools are used
3. Disassemble automatic transmission	3.1 Disassemble parts are accurately marked/tagged 3.2 Parts are cleaned as per Repair Manual
4. Conduct automatic transmission analysis	4.1 A/T parts-hydraulic valve body, clutch and disc, bearing and planetary gears are checked/inspected for worn-out, crack, backlash and end play 4.2 Inspection of parts is conducted 4.3 Corresponding Repair works are recommended
5. Assemble automatic transmission	5.1 Assembling procedure is followed 5.2 Assembled parts are lubricated
6. Mount/Install automatic transmission assembly	6.1 Bolts are tightened and must be in accordance with Manual torque specification, sequence and pattern 6.2 Transmission is connected/installed 6.3 Cables and linkages are adjusted 6.4 A/T fluid is refilled
7. Test automatic transmission	7.1 Stall Test and Lag test are conducted 7.2 Line pressure test is conducted
8. Road test automatic transmission	8.1 A/T fluid level, cable and linkages, engine operation are checked before road test 8.2 Report of test are completely accomplished and corresponding recommendation are given

RANGE OF VARIABLES

VARIABLE	RANGE
1. A/T (Transmission/ Transaxle)	May include: 1.1 Preliminary checks • Engine condition • Fluid level • Fluid condition • Control linkage • Vacuum modulator 1.2 Shop Testing • Pressure testing • Air checking 1.3 Road Test • Develop standard test route • Test route include level section, hills section and quite section • A/T must operate in each range to check shifting, check upshift and downshift speeds, and check for evidence of slippage Refer to a band chart • Isolate A/T noise from various chassis and body components noises such as –air-conditioning, alternator, power steering & fan by removal of drive belts of accessories and drive vehicle a short distance.
2. Manuals	May include: 2.1 Manufacturer's specification manual 2.2 Maintenance procedure manual 2.3 Periodic Maintenance Data 2.4 Service and Repair manual 2.5 Parts checklist
3. Company standard operating procedure	May include: 3.1 Job Order 3.2 Requisition slip 3.3 Wearing of personal protective equipment and clothing such as hand cleaner, hand gloves, safety shoes, skull guard, apron
4. Tools and equipment	May include: 4.1 Hydraulic lifter/Mechanical lifter 4.2 Support Stand 4.3 Transmission jack 4.4 Socket wrench 4.5 Snap ring expander 4.6 Snap ring compressor 4.7 Micrometer 4.8 Torch wrench 4.9 Allen wrench 4.10 Combination wrench 4.11 Basic handtools 4.12 A/T pressure gauge 4.13 Torque wrench 4.14 Dial indicator with stand 4.15 Air compressor 4.16 Hard rubber mallet 4.17 Ballpeen hammer

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Disassembled automatic transmission 1.2 Serviced Automatic Transmission 1.3 Performed Road Testing
2. Required knowledge	2.1 A/T Dismantling and assembling procedures (relevant to application) 2.2 A/T Component repair and adjustment procedures (relevant to application) 2.3 Component/unit test procedures and evaluation (relevant to application) 2.4 Equipment/Material safety requirements 2.5 Personal safety requirements 2.6 Manual handling procedures 2.7 Positive Work Values (Patience, Perseverance, Honesty, etc.) 2.8 Quality procedures, e.g., 5S 2.9 Environmental-conservation procedures, e.g., 3R (reduce, reuse, recycle)
3. Required skills	3.1 Access, interpret & apply technical information 3.2 Apply personal safety requirements 3.3 Use of relevant tools and equipment 3.4 Overhaul automatic transmissions and associated components 3.5 Apply component/unit test procedures an evaluation 3.6 Maintain customer records 3.7 Apply manual handling procedures
4. Resource implications	The following resources should be provided: 4.1 Workplace: Real or simulated work area 4.2 Appropriate Tools & equipment 4.3 Materials relevant to the activity
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Observation or Demonstration with Questioning 5.2 Portfolio
6. Context of assessment	6.1 Competency must be assessed on the job or in a simulated environment. 6.2 The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

UNIT OF COMPETENCY : PERFORM MAINTENANCE SERVICE CHECK UP AND REPAIR TO AIR CONDITIONING SYSTEMS

UNIT CODE : ALT723320

UNIT DESCRIPTOR : This unit identifies the competence required to maintain automotive air conditioner systems and record operating condition.

ELEMENT	PERFORMANCE CRITERIA *Italicized* ***terms*** are elaborated in the Range of Variable (All standard of performance for Perform Maintenance Service Check Up to *Air Conditioning system* is in accordance with *company standard operating procedure* and manufacturer's specification *Manuals* using specified *tools, equipment and* consumable materials.)
1. Diagnose AC system	1.1 Test is completed without causing damage to any workplace, property or vehicle. 1.2 Correct information is accessed/interpreted from appropriate manufacturer specifications 1.3 Correct information is recorded on the Service slip. 1.3 System performance is tested and the appropriate air conditioning service procedures are determined. 1.5 Service of the system and components are carried 1.7 System is tested and results are recorded
2. Perform general check up/service /repair and replacement of auto air-conditioning system components	2.1 Maintenance check-up and A/C General Service is performed 2.2 Correct information is accessed and interpreted from appropriate manufacturer specifications. 2.3 Air conditioning system components are dismantled, reassembled and tested 2.4 Worn, damaged, deteriorated or faulty components are identified and replaced/repaired. 2.5 System components are tested prior to placing into service and results are recorded 2.6 Air conditioning system components are overhauled 2.7 General servicing is completed without causing damage to any workplace property or air conditioning system component.

RANGE OF VARIABLES

VARIABLES	RANGE	
1. Air-Conditioning System	May include:	
	1.1 Compressor Assy. 1.2 Evaporators/Cooling coil 1.3 Condenser Assembly 1.4 Condenser Fan Assy 1.5 Pipes and Hoses/LS/HS 1.6 AC Idler Pulley Assy 1.7 AC Belt 1.8 Auto Controller/AC ECU 1.9 Aircon Auto Thermostat (Electronic/manual) 1.10 AC Blower Motor 1.11 Compressor Rotor/Bearing 1.12 Magnetic clutch armature plate 1.13 Manual switch & relays 1.14 Auto Aircon minor/major electrical harness/Fuse & relays	1.15 Circuit repairs and electronic 1.16 Automatic controls/damper motors/Air ventilation 1.17 Aircon electrical sensors (Thermo sensors) 1.18 Aircon Automatic control unit 1.19 Full AC switch & temp control switch assembly 1.20 Receiver, filter drier, 1.21 Expansion valve
2. Consumables Materials	May include: 2.1 Refrigerant 134-A/R-12 2.2 Sun Pag oil –134A 2.3 Compressor oil (Capella oil) R-12 2.4 O-ring 5/16, 5/8, ½	2.5 Insulation Tape 2.6 Flushing solution 2.7 Coil Cleaner 2.8 Nitrogen
3. Manuals	May include: 3.1 Maintenance Procedure Manual 3.3 Periodic Maintenance Data 3.4 Service Manual 3.5 Parts Checklist	
4. Company standard operating procedure	May include: 4.1 Job Order 4.2 Requisition slip 4.3 Wearing of Personal Protective Equipment such as • Gas mask, Goggles, Hand gloves, Safety shoes	
5. Tools and testing equipment	May include: 5.1 Hand tools (ex. allen wrench set), cleaning equipment, refrigeration oils, pressure testing equipment, sealing equipment 5.2 Evacuation equipment, heating/soldering equipment, refrigerant recovery and/or recycling equipment, refrigerant re-gassing equipment 5.3 Gauge manifold set 5.4 Electronic Leak tester/Halogen/Multigas leak detector 5.5 Charging cylinder- or with built in heater 5.6 Vacuum pump - ½ horsepower to ⅛ 5.7 Compressor pulley puller/special tool 5.8 Aircon performance tester with thermometer	

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate : 1.1 Diagnosed the AC system 1.2 Performed general check up/service /repair and replacement of auto air-conditioning system components
2. Required knowledge	2.1 Knowledge in appropriate amount of refrigerant aircon system compressor oil and other such consumables 2.2 OH&S legislation 2.3 Relevant technical information 2.4 Personal safety requirements 2.5 Equipment/component/material safety requirements 2.6 Measuring and testing procedures 2.7 Identification of air conditioning components/types 2.8 Air conditioning component operation 2.9 Component repair/overhauling procedures 2.10 Positive Work Values (Patience, Perseverance, Honesty, etc.) 2.11 Quality procedures, e.g., 5S 2.12 Environmental-conservation procedures, e.g., 3R (reduce, reuse, recycle)
3. Required skills	3.1 Work safely 3.2 Use tools and equipment 3.3 Use appropriate workshop manuals, technical publications, tools and equipment 3.4 Identify faults in air conditioning components 3.5 Clean, test, inspect and evaluate air conditioning components 3.6 Dismantle and reassemble air conditioning components 3.7 Repair and replace components as required 3.8 Test final product for return to service 3.9 Perform Diagnosis and Repair Auto Aircon System
4. Resource implications	The following resources should be provided: 4.1 Workplace: Real or simulated work area 4.2 Appropriate hand tools, Aircon Test equipment
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Observation or Demonstration with Questioning 5.2 Portfolio
6. Context of assessment	6.1 Competency must be assessed on the job or in a simulated environment. 6.2 The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

UNIT OF COMPETENCY: REMOVE AND REPLACE AUTOMOTIVE ENGINE AND ENGINE-RELATED SYSTEMS

UNIT CODE: ALT 723353

UNIT DESCRIPTOR: This unit covers the ability to remove and replace auto engine and engine-related system for re-powering the vehicle. The unit includes identification and confirmation work requirement, preparation for work, removal, replacement of engine and related systems and completion of work finalization processes, including clean-up and documentation.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables (NOTE: All standard of performance for this unit is in accordance with company standard operating procedure and manufacturer's specification manuals using specified tools and equipment)
1. Prepare for work	1.1 Work instructions are used to determine requirements, including methods, materials and equipment 1.2 Job specifications are read and interpreted 1.3 Occupational Health and Safety (***OH & S) requirements*** are observed throughout the work 1.4 Replacement engine and related mechanical units/assemblies and materials for work are selected, inspected and tested 1.5 Tools and equipment (including measuring/ test instruments) are identified and checked for safe operation 1.6 Procedures are determined to minimize wastage 1.7 Procedures are identified for maximizing energy efficiency while completing the job
2. Remove engine and/ or related systems	2.1 ***Engines*** and other ***related systems*** are removed using appropriate methods, tools and equipment 2.2 Engine and other related systems removal is completed without causing damage to component, system or injury to self or others 2.3 Task is carried out according to ***regulations***
3. Replace engine and/ or related systems	3.1 Engines and other related systems are replaced with recommended units using appropriate methods, tools and equipment 3.2 Replacement of engines and other related systems is completed without causing damage to component or system or injury to self or others 3.3 Inspection, testing and final adjustments is conducted according to company/manufacturer's procedures 3.4 Task is carried out according to regulations
4. Clean up work area	4.1 ***Materials*** that can be reused is collected and stored 4.2 Waste and scrap is removed/ disposed-off following workplace and environmental procedures 4.3 Equipment and work area are cleaned and inspected for serviceable condition in accordance with workplace procedures 4.4 Unserviceable equipment is identified, tagged and faults identified in accordance with workplace procedures 4.5 Tools and equipment, supplies and materials and accessories are stored in accordance with workplace procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. OH & S requirements	May include: 1.1 Workplace safety 1.1.1protective clothing and equipment 1.1.2 proper use of tools and equipment 1.1.3 handling of materials 1.1.4 use of fire fighting equipment 1.1.5 first-aid 1.2 Environment safety 1.2.1 hazard control 1.2.2 hazardous material and substances 1.2.3 waste disposal
2. Engine	May include: 2.1 Gasoline engine 2.2 Diesel engine 2.3 Liquefied Petroleum Gas (LPG) engine 2.3 Compressed Natural Gas (CNG) engine 2.4 Liquefied Natural Gas (LNG) engine
3. Related systems	May include: 3.1 Powertrain (Transmission, Differential, Driveshaft or propeller shaft, Clutch assembly, etc.) 3.2 Air-conditioning systems 3.3 Electrical/Electronic systems 3.4 Fuel system 3.5 Ignition system
4. Regulations	May include: 4.1 Industry regulations/guidelines 4.2 OH & S requirements 4.3 Legislations and local government codes 4.4 Company procedures/policies 4.5 Manufacturers/suppliers instructions/manuals 4.1 Philippine National Standards (PNS 115) 4.2 DILG Act of 1990 (RA 6975) Rule 8, Section 50 4.3 Fire Code of the Phils. (PD 1185) Sect.8 and Rule 28 4.4 LPG Gas Code (NFPA 58)
5. Materials	May include: 5.1 Spare parts 5.2 Lubricants 5.3 Fluids 5.4 Cleaning materials 5.5 Fuel

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Removed engine and related systems. 1.2 Replaced engine and related systems. 1.3 Observed OH & S regulations. 1.4 Cleaned up work area.
2. Required knowledge	2.1 Types of automotive engine, its parts and function 2.2 Types, characteristics, functions and specifications of engine and other related systems 2.3 OH & S regulations/requirements, equipment, materials and personal safety requirements 2.4 Types and layout of service/repair manuals (hard and soft copy) 2.4 Removal and replacement procedures for engine and other related system 2.5 Use of common automotive tools and equipment 2.6 Work organization and planning processes 2.7 Company/workshop quality processes 2.8 Types and uses of fuel or hazardous materials 2.9 Measuring instruments (Vernier caliper, feeler gauge, etc.) 2.10 Volumes and weights 2.11 Positive Work values (Perseverance, Honesty, Attention to details) 2.12 Quality procedures, e.g., 5S 2.13 Environmental-conservation procedures, e.g., 3R (reduce, reuse, recycle)
3. Required skills	3.1 Interpreting job specifications and manuals 3.2 Using automotive tools and equipment 3.3 Handling of parts and materials 3.4 Handling and using of fuel or hazardous materials 3.5 Handling of measuring/testing instruments/equipment 3.6 Using safety gadgets and accessories
4. Resource implications	The following resources should be provided: 4.1 Workplace: Real or simulated work area 4.2 Appropriate Tools & equipment 4.3 Materials relevant to the activity 4.4 Manufacturer's repair manual or related reference/ service materials or manuals 4.5 Motor vehicle 4.6 Replacement units
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Direct observation with questioning 5.2 Demonstration with questioning
6. Context of assessment	6.1 Competency may be assessed on the job or simulated environment. 6.2 The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

UNIT OF COMPETENCY: **SERVICE AND REPAIR ELECTRONICALLY CONTROLLED STEERING SYSTEMS**

UNIT CODE **:** **ALT 723358**

UNIT DESCRIPTOR **:**. This unit covers the competence to locate and rectify faults inelectronically controlled steering systems. It applies specifically to electrical/electronic control systems and components and does not cover systems which are electronically controlled and operated.
The unit includes identification and confirmation of work requirement, preparation for work, servicing and adjustment of systems, repair of faults, retesting of systems and completion of work finalization processes, including clean-up and documentation.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables (NOTE: All standard of performance for this unit is in accordance with company standard operating procedure and manufacturer's specification manuals using specified tools and equipment)
1. Prepare for work	1.1 Work instructions are used to determine job requirements, including quality, material, equipment quantities and service manuals. 1.2 Job specifications are read and interpreted 1.3 Occupational Health and Safety (***OH & S) requirements*** are observed throughout the work 1.4 Electronic system protection devices, processes and precautions are identified appropriate to the application 1.5 ***Tools and equipment*** (including measuring/ test instruments) are identified and checked for safe operation 1.6 Procedures are identified to minimize task time
2. Service and adjust electronically controlled steering systems	2.1 ***Service information*** is accessed and interpreted prior to commencing servicing procedures 2.2 ***Electronically controlled steering systems*** is determined in conjunction with the customer 2.3 Current status of the electronic system is confirmed through a road test program 2.4 Electronic system is serviced in accordance with manufacturer/component supplier specifications and enterprise procedures 2.5 Fluids and lubricants are used in accordance with OH&S and manufacturer/component supplier specifications 2.6 Used fluids and lubricants are disposed of according to enterprise and OH&S requirements

3. Rectify identified electronically controlled steering system faults	3.1 Road test results are interpreted to verify system ***fault*** diagnosis 3.2 Customer is notified of identified fault(s) and agreement is given before work is carried out 3.3 Faulty components are removed and refitted with approved replacement parts reference with approved workplace procedures and customer requirements 3.4 Faulty components are disposed of reference with approved workplace procedures and warranty requirements 3.5 System adjustments are completed for replaced components
4. Test and confirm system faults after rectification have been done	4.1 Test procedures are carried out to confirm rectification of system ***faults*** 4.2 Documentation is completed in accordance with workplace/customer requirements 4.3 Outcomes of rectification work is explained to the satisfaction of the customer to complete invoice documentation
5. Clean up work area and maintain equipment	5.1 ***Materials*** that can be reused is collected and stored 5.2 Waste and scrap is removed following workplace procedures 5.3 Equipment and work area are cleaned and inspected for serviceable conditions in accordance with workplace procedures 5.4 Serviceable equipment and faults identified are tagged in accordance with workplace procedures 5.5 Maintenance is completed in accordance with manufacturer/component supplier specifications and site procedures 5.6 Tooling is maintained in accordance with workplace procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. OH & S requirements	May include: 1.1 Workplace safety 1.1.1 protective clothing and equipment 1.1.2 proper use of tools and equipment 1.1.3 handling of materials 1.1.4 use of fire fighting equipment 1.1.5 first-aid 1.2 Environment safety 1,2,1 hazard control 1.2.2 hazardous material and substances 1.2.3 waste disposal
2. Tools and equipment	May include: 2.1 Hand tools 2.2 Testing equipment, including multi-meters 2.3 Power tools 2.4 Air tooling 2.5 Specialized tools for removal/adjustment 2.6 Specialized system testers, oscilloscopes, scanner and LED test lights
3. Service Information	May include: 3.1 Verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets, diagrams or sketches 3.2 Safe work procedures related to the service and repair of electronically controlled steering systems 3.3 Regulatory/legislative requirements pertaining to automotive industry practices 3.4 Vehicle maker's design specifications and instructions
4. Electronically controlled steering systems	May include: 2.1 Two - wheel steering systems and fitted to light vehicles and/or heavy commercial vehicles 2.2 Four - wheel steering systems and fitted to light vehicles and/or heavy commercial vehicles
5. Fault	May include: 5.1 Component malfunction 5.2 System adjustment 5.3 Open, short and grounded circuits
6. Materials	May include: 6.1 Spare parts 6.2 Lubricants 6.3 Fluids 6.4 Cleaning materials 6.5 Fuel

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Observed safety procedures and requirements 1.2 Communicated effectively with others involved in or affected by the work 1.3 Selected methods and techniques appropriate to the circumstances 1.4 Completed preparatory activity in a systematic manner 1.5 Serviced and adjusted electronic controls of steering systems to manufacturer/component supplier requirements 1.6 Determined the repair/replacement requirements to rectify faults 1.7 Repaired/rectified faults in electronic controls of steering systems to manufacturer/component supplier requirements 1.8 Tested, inspected and evaluated steering system/components to manufacturer/component supplier requirements 1.9 Completed workplace and equipment documents
2. Required knowledge	2.1 OH&S regulations/requirement, equipment, material and personal safety requirements 2.2 Operating principles of electronically controlled steering systems 2.3 Construction and operation of electronically controlled steering systems 2.4 Relationship to other electronically controlled system(s), including shared components (e.g. ECU, sensors)test, diagnosis and fault determination procedures 2.5 Types and layout of service/repair manuals either be a hard copy or electronic copy 2.6 Service/repair, removal, replacement and adjustment procedures 2.7 Post-repair test procedures 2.8 Work organization and planning processes 2.9 Company quality processes 2.10 Quality procedures, e.g., 5S 2.11 Environmental-conservation procedures, e.g., 3R (reduce, reuse, recycle)
3. Required skills	3.1 Collecting, organizing and understanding information related to work orders, plans and safety procedures for circuit and component testing, and major repairs / component replacement 3.2 Technical literacy and communication skills sufficient to interpret and apply common industry terminology, and interpret technical information and specifications 3.3 Interpreting and applying operational and safety Information

	3.4 Planning and organizing activities, including preparation and layout of worksite and obtaining of equipment and material to avoid backtracking or workflow interruptions 3.5 Using mathematical ideas and techniques to complete tests and measurements to determine electrical circuit/component major repair/replacement requirements 3.6 Manipulative and dexterity skills to perform electrical testing, and repair/replacement procedures 3.7 Problem-solving skills for a range of procedural issues 3.8 Using workplace technology related to the service and repair of electronically controlled steering systems, including the use of specialist tooling and equipment, measuring equipment, computerized technology and communication devices 3.9 Reporting/documenting of results
4 Resource implications	The following resources should be provided: 4.1 Workplace: Real or simulated work area 4.2 Appropriate Tools & equipment 4.3 Materials relevant to the activity 4.4 Manufacturer's repair manual or related reference/ service materials or manuals 4.5 Motor vehicle 4.6 Replacement units
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Direct observation with questioning 5.2 Demonstration with questioning
6. Context of assessment	6.1 Competency may be assessed on the job or simulated environment. 6.2 The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

UNIT OF COMPETENCY: **SERVICE AND REPAIR ELECTRONICALLY CONTROLLED SUSPENSION SYSTEMS**

UNIT CODE : **ALT 723359**

UNIT DESCRIPTOR : This unit covers the competence to locate and repair faults in electronically controlled suspension systems, including ride control systems and height control systems.The unit includes identification and confirmation of work requirement, preparation for work, servicing and adjusting of systems, repair of faults, retesting of systems and completion of work finalisation processes, including clean-up and documentation.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables (NOTE: All standard of performance for this unit is in accordance with company standard operating procedure and manufacturer's specification manuals using specified tools and equipment)
1. Prepare for work	1.1 Work instructions are used to determine job requirements, including quality, material, equipment quantities and service manuals. 1.2 Job specifications are read and interpreted 1.3 Occupational Health and Safety (***OH & S) requirements*** are observed throughout the work 1.4 Electronic system protection devices, processes and precautions are identified appropriate to the application 1.5 ***Tools and equipment*** (including measuring/ test instruments) are identified and checked for safe operation 1.6 Procedures are identified to minimize task time
2. Service and adjust electronically controlled suspension systems	2.1 ***Service information*** is accessed and interpreted prior to commencing servicing procedures 2.2 Current status and previous fault history of ***electronic suspension system*** is determined in conjunction with the customer 2.3 Current status of the electronic system is confirmed through a road test program 2.4 Electronic system is serviced in accordance with manufacturer/component supplier specifications and enterprise procedures 2.5 Fluids and lubricants are used in accordance with OH&S and manufacturer/component supplier specifications 2.6 Used fluids and lubricants are disposed of according to enterprise and OH&S requirements

3. Rectify identified electronically controlled suspension system faults	3.1 Road test results are interpreted to verify system ***fault*** diagnosis 3.2 Customer is notified of identified fault(s) and agreement is given before work is carried out 3.3 Faulty components are removed and refitted with approved replacement parts reference with approved workplace procedures and customer requirements 3.5 Faulty components are disposed of reference with approved workplace procedures and warranty requirements 3.6 System adjustments are completed for replaced components
4 Test and confirm system faults after rectification have been done	4.1 Test procedures are carried out to confirm rectification of system ***faults*** 4.2 Documentation is completed in accordance with workplace/customer requirements 4.3 Outcomes of rectification work is explained to the satisfaction of the customer to complete invoice documentation
5 Clean up work area and maintain equipment	5.1 ***Materials*** that can be reused is collected and stored 5.2 Waste and scrap is removed following workplace procedures 5.3 Equipment and work area are cleaned and inspected for serviceable conditions in accordance with workplace procedures 5.4 Serviceable equipment and faults identified are tagged in accordance with workplace procedures 5.5 Maintenance is completed in accordance with manufacturer/component supplier specifications and site procedures 5.6 Tooling is maintained in accordance with workplace procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. OH & S requirements	May include: 1.1 Workplace safety 1.1.1 protective clothing and equipment 1.1.2 proper use of tools and equipment 1.1.3 handling of materials 1.1.4 use of fire fighting equipment 1.1.6 first-aid 1.2 Environment safety 1,2,1 hazard control 1.2.2 hazardous material and substances 1.2.3 waste disposal
2. Tools and equipment	May include: 2.1 Hand tools 2.2 Testing equipment, including multi-meters 2.3 Power tools 2.4 Air tooling 2.5 Specialized tools for removal/adjustment 2.6 Specialized system testers, oscilloscopes, scanner and LED test lights
3. Service Information	May include: 3.1 Verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets, diagrams or sketches 3.2 Safe work procedures related to the service and repair of electronically controlled steering systems 3.3 Regulatory/legislative requirements pertaining to automotive industry practices 5.1 Vehicle maker's design specifications and instructions
4 Electronically controlled suspension systems	May include: Electronically controlled suspension systems include those fitted to light and heavy vehicles and include side control and side height
5 Fault	May include: 5.1 Component malfunction 5.2 System adjustment 5.3 Open, short and grounded circuits
6 Materials	May include: 6.1 Spare parts 6.2 Lubricants 6.3 Fluids 6.4 Cleaning materials 6.5 Fuel

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Observed safety procedures and requirements 1.2 Communicated effectively with others involved in or affected by the work 1.3 Selected methods and techniques appropriate to the circumstances 1.5 Completed preparatory activity in a systematic manner 1.5 Serviced and adjusted electronic controls of suspension systems to manufacturer/component supplier requirements 1.6 Determined the repair/replacement requirements to rectify faults 1.7 Repaired/rectified faults in electronic controls of suspension systems to manufacturer/component supplier requirements 1.8 Tested, inspected and evaluated suspension system/components to manufacturer/component supplier requirements 1.9 Completed workplace and equipment documents
2. Required knowledge	2.1 OH&S regulations/requirement, equipment, material and personal safety requirements 2.2 Operating principles of electronically controlled suspension systems 2.3 Construction and operation of electronically controlled suspension systems 2.4 Relationship to other electronically controlled system(s), including shared components (e.g. ECU, sensors)test, diagnosis and fault determination procedures 2.5 Types and layout of service/repair manuals either be a hard copy or electronic copy 2.6 Service/repair, removal, replacement and adjustment procedures 2.7 Post-repair test procedures 2.8 Work organization and planning processes 2.9 Company quality processes 2.10 Quality procedures, e.g., 5S 2.11 Environmental-conservation procedures, e.g., 3R (reduce, reuse, recycle)
3. Required skills	3.1 Collecting, organizing and understanding information related to work orders, plans and safety procedures for circuit and component testing, and major repairs / component replacement 3.2 Technical literacy and communication skills sufficient to interpret and apply common industry terminology, and interpret technical information and specifications 3.3 Interpreting and applying operational and safety Information

	3.4 Planning and organizing activities, including preparation and layout of worksite and obtaining of equipment and material to avoid backtracking or workflow interruptions 3.5 Using mathematical ideas and techniques to complete tests and measurements to determine electrical circuit/component major repair/replacement requirements 3.6 Manipulative and dexterity skills to perform electrical testing, and repair/replacement procedures 3.7 Problem-solving skills for a range of procedural issues 3.8 Using workplace technology related to the service and repair of electronically controlled suspension systems, including the use of specialist tooling and equipment, measuring equipment, computerized technology and communication devices 3.9 Reporting/documenting of results
4. Resource implications	The following resources should be provided: 4.1 Workplace: Real or simulated work area 4.2 Appropriate Tools & equipment 4.3 Materials relevant to the activity 4.4 Manufacturer's repair manual or related reference/ service materials or manuals 4.5 Motor vehicle 4.6 Replacement units
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Direct observation with questioning 5.2 Demonstration with questioning
6. Context of assessment	6.1 Competency may be assessed on the job or simulated environment. 6.2 The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

UNIT OF COMPETENCY : REPAIR INSTRUMENTS AND WARNING SYSTEMS
UNIT CODE : ALT 723360
UNIT DESCRIPTOR : This unit covers the competence to test and repair instrument and warning systems, including gauges, warning lights (including dash lamps), engine shutdown systems, and audible reverse warning systems.
The unit includes identification and confirmation of work requirement, preparation for work, testing of systems and identification of faults/causes, repair and retesting of instruments and warning systems and completion of work finalization processes, including clean-up and documentation.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables (NOTE: All standard of performance for this unit is in accordance with company standard operating procedure and manufacturer's specification manuals using specified tools and equipment)
1. Prepare for work	1.1 Work instructions are used to determine job requirements, including method, process and equipment 1.2 Job specifications are read and interpreted 1.3 Occupational Health and Safety (***OH & S) requirements*** are observed throughout the work 1.4 ***Tools and equipment*** (including measuring/ test instruments) are identified and checked for safe operation 1.5 Procedures are identified to minimize task time
2. Test systems / components and identify faults	2.1 Correct ***information*** is accessed and interpreted from manufacturer/component supplier specifications 2.2 Tests are carried out to determine faults using tooling and techniques 2.3 Tests are completed without causing damage to component or system 2.4 ***Faults*** are identified and necessary repair actions are determined 2.5 Tests are carried out according to industry regulations/guidelines, OH&S, legislation and enterprise procedures/policies
3. Repair instrument and warning systems and or associated components	3.1 Correct ***information*** is accessed and interpreted from manufacturer/component supplier specifications 3.2 Repairs, component replacement and adjustments are carried out using tooling, techniques and materials 3.3 Instrument and warning systems repairs are completed without causing damage to component or system 3.4 Retests are carried out to ensure correct and safe instrument and warning system operation 3.5 Repairs are carried out according to industry regulations/guidelines, OH&S, legislation and enterprise procedures/policies 3.6 Workplace and equipment documents are completed in accordance with site requirements
4. Clean up work area and maintain equipment	4.1 ***Materials*** that can be reused is collected and stored 4.2 Waste and scrap is removed following workplace procedures 4.3 Equipment and work area are cleaned and inspected for serviceable conditions in accordance with workplace procedures 4.4 Unserviceable equipment and faults identified are tagged in accordance with workplace procedures 4.5 Maintenance is completed in accordance with manufacturer/component supplier specifications and site procedures 4.6 Tooling and equipment are maintained in accordance with Workplace procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. OH & S requirements	May include: 1.1 Workplace safety 1.1.1 protective clothing and equipment 1.1.2 proper use of tools and equipment 1.1.3 handling of materials 1.1.4 use of fire fighting equipment 1.1.7 first-aid 1.2 Environment safety 1,2,1 hazard control 1.2.2 hazardous material and substances 1.2.3 waste disposal
2. Tools and equipment	May include: 2.1 Hand tools 2.2 Testing equipment, including multi-meters 2.3 Power tools 2.4 Air tools 2.5 Specialized tools for removal/adjustment 2.6 Specialized system testers, oscilloscopes, scanner and LED test lights
3. Fault	May include: 3.1 Gauge / instrument warning system not working 3.2 Incorrect gauge/instrument readings 3.3 Open, short and grounded circuits
4. Information	May include: 4.1 Verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets, diagrams or sketches 4.2 Safe work procedures related to the repair of instruments and warning systems 4.3 Regulatory/legislative requirements pertaining to automotive industry practices 4.4 Vehicle maker's design specifications and instructions
5. Materials	May include: 5.1 Spare parts 5.2 Cleaning materials

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Observed safety procedures and requirements 1.2 Communicated effectively with others involved in or affected by the work 1.3 Selected methods and techniques appropriate to the circumstances 1.4 Completed preparatory activity in a systematic manner 1.5 Tested and retested of instruments and warning systems 1.6 Repaired a range of instrument and warning systems to site and manufacturer / component supplier requirements 1.7 Completed workplace and equipment documents
2. Required knowledge	2.1 OH&S regulations/requirement, equipment, material and personal safety requirements 2.2 Interpretation of technical material, graphic symbols and diagrams 2.3 Construction and operation of instruments and warning systems relevant to application 2.4 Types and layout of service / repair manuals both hard and electronic copies 2.5 Repair and testing procedures 2.6 Enterprise quality processes 2.7 Quality procedures, e.g., 5S 2.8 Environmental-conservation procedures, e.g., 3R (reduce, reuse, recycle)
3. Required skills	3.1 Collecting, organizing and understanding information related to work orders, plans and safety procedures for the repair of instruments and warning systems 3.2 Technical literacy and communication skills sufficient to interpret and apply common industry terminology, and interpret technical information and specifications 3.3 Interpreting and applying operational and safety information 3.4 Planning and organizing activities, including preparation and layout of worksite and obtaining of equipment and material to avoid backtracking or workflow interruptions 3.5 Using mathematical ideas and techniques to correctly complete tests and measurements in order to determine electrical instrument and warning system repair/replacement requirements 3.6 Manipulative and dexterity skills to perform instrument and warning system testing and repair / replacement procedures 3.7 Problem-solving skills for a range of procedural issues 3.8 Using workplace technology related to the repair of instruments and warning systems, including the use of specialist tools and equipment, measuring equipment, computerized technology and communication devices 3.9 Reporting/documenting of results
4. Resource implications	The following resources should be provided: 4.1 Workplace: Real or simulated work area 4.2 Appropriate Tools & equipment 4.3 Materials relevant to the activity 4.4 Manufacturer's repair manual or related reference/ service materials or manuals 4.5 Motor vehicle 4.6 Replacement units
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Direct observation with questioning 5.2 Demonstration with questioning
6. Context of assessment	6.1 Competency may be assessed on the job or simulated environment. 6.2 The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

UNIT OF COMPETENCY : CARRY OUT DIAGNOSTIC PROCEDURES

UNIT CODE : ALT 723361

UNIT DESCRIPTOR : This unit covers the competence required to diagnose component / equipment faults from different symptoms and to nominate repair action.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables (NOTE: All standard of performance for this unit is in accordance with company standard operating procedure and manufacturer's specification manuals using specified tools and equipment)
1. Prepare to diagnose faults	1.1. ***Information*** is accessed from appropriate sources 1.2. Differentiate between "symptoms" and "causes" 1.3. Identify fault diagnosis as a process 1.4. Familiarization of system(s) from the area of the fault's origin
2. Apply technology to isolate fault(s)	2.1. ***Diagnosis strategy*** is developed in order to determine a fault within the component / equipment 2.2. Measuring equipment like meters / gauges is applied to isolate fault 2.3. Identification of fault(s) are made from test results 2.4. Findings are confirmed by an alternate route/plan 2.5. Faults are diagnosed without causing damage to workplace property, component or equipment 2.6. Inspections are carried out according to industry regulations/guidelines, ***OH&S*** legislation, legislation and enterprise procedures/policies
3. Recommend rectification method(s)	3.1. Report of findings is completed in workplace approved format 3.2. Rectification strategy is identified with the use of appropriate ***tools and equipment*** 3.3. Consequences of ignoring strategy are identified 3.4. Any faults in conflict with roadworthiness or safe operation of component/equipment are immediately brought to the attention of the supervisor for action
4. Component / equipment is prepared for customer use	4.1. Work schedule documentation is completed 4.2. Final inspection is made to ensure safety features are in place 4.3. Final inspection is made to ensure work is done according to workplace expectations 4.4. Job card is completed and delivered to appropriate staff

RANGE OF VARIABLES

VARIABLE	RANGE
1. Information	May include: 1.1 Verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets, diagrams or sketches 1.2 Safe work procedures related to the carry out diagnostic procedures 1.3 Regulatory/legislative requirements pertaining to automotive industry practices 1.4 Vehicle maker's design specifications and instructions
2. Diagnosis strategy	May include: 2.1 Removal and replacement, dismantling, adjusting 2.2 Visual and aural identification and testing 2.3 Performance comparison of component/equipment 2.4 Variable diagnosis like on-and off-site, indoor and outdoor and on-and off-shore
3. OH & S requirements	May include: 3.1 Workplace safety 3.1.1 protective clothing and equipment 3.1.2 proper use of tools and equipment 3.1.3 handling of materials 3.1.4 use of fire fighting equipment 3.1.5 first-aid 3.2 Environment safety 3,2,1 hazard control 3.2.2 hazardous material and substances 3.2.3 waste disposal
4. Tools and equipment	May include: 4.1 Hand tools 4.2 Testing equipment, including multi-meters 4.3 Power tools 4.4 Air tools 4.5 Specialized tools for removal/adjustment 4.6 Specialized system testers, oscilloscopes, scanner and LED test lights 4.7 Computer software and hardware
5. Materials	May include: 5.1 Spare parts 5.2 Cleaning materials

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Observed safety procedures and requirements 1.2 Communicated effectively with others involved in or affected by the work 1.3 Selected methods and techniques appropriate to the Circumstances 1.4 Completed preparatory activity in a systematic manner 1.5 Conducted diagnosis of a range of faults in accordance with workplace requirements to test and verify symptoms 1.6 Interpreted results 1.7 Confirmed diagnosis of fault(s) 1.8 Completed diagnosis within workplace timeframes 1.9 Presented component / equipment to customer in compliance with workplace requirements
2. Required knowledge	2.1 OH&S regulations/requirement, equipment, material and personal safety requirements 2.2 Diagnostic procedures and problem-solving techniques 2.3 Documenting procedures 2.4 Symptom and cause differentiation 2.5 Documenting responsibilities 2.6 Work organization and planning processes 2.7 Enterprise quality procedures 2.8 Quality procedures, e.g., 5S 2.9 Environmental-conservation procedures, e.g., 3R (reduce, reuse, recycle)
3. Required skills	3.1 Applying research and interpretive skills sufficient to locate, interpret and apply manufacturer/component supplier procedures, workplace policies and procedures 3.2 Applying analytical skills for identification and analysis of technical information 3.3 Applying questioning and active listening skills 3.4 Applying oral communication skills sufficient to convey information and concepts to customers 3.5 Applying planning and organizing skills to work activities, 3.6 Using mathematical ideas and techniques to correctly calculate time, assess tolerances, apply accurate measurements, calculate material requirements and establish quality checks 3.7 Applying problem-solving strategies in purposeful ways 3.8 Using workplace technology related to the diagnosis of faults, including the use of specialist tooling and equipment, measuring equipment, computerized technology and communication devices and the documenting / recording of results
4. Resource implications	The following resources should be provided: 4.1 Workplace: Real or simulated work area 4.2 Appropriate Tools & equipment 4.3 Materials relevant to diagnosis of faults 4.4 Manufacturer's repair manual or related reference/ service materials or manuals 4.5 Motor vehicle 4.6 Replacement units
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Direct observation with questioning 5.2 Demonstration with questioning
6. Context of assessment	6.1 Competency may be assessed on the job or simulated environment. 6.2 The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

ELECTIVE COMPETENCIES

UNIT OF COMPETENCY: INSTALL LPG CONVERSION KIT

UNIT CODE: ALT 723350

UNIT DESCRIPTOR: This competency unit covers the ability to install the component of LPG Conversion Kit to include the multi valve, tank, change over switch, vaporizer assembly, piping/hoses and safety gadgets.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables (NOTE: All standard of performance for *Installing the LPG Conversion Kit* is in accordance with *company standard operating procedure* and manufacturer's specification *manuals* using specified *tools and equipment)*
1. Perform vehicle test	1.1 Vehicle ***engine condition*** is checked 1.2 Appropriate test instruments, ***tools and equipment*** are selected 1.3 Installation plan and design is checked 1.4 Findings is reported and recommendation is made to direct supervisor
2. Mount and install conversion kit	2.1 ***LPG Conversion kit*** is checked and tested 2.2 Installation plan is checked 2.3 Installation information of LPG tank is accessed and interpreted based on manufacturers specification 2.4 Mounting and installation is performed 2.5 Wiring installation is performed
3. Install piping/hoses and safety features of the kit	3.1 Piping/tubes, hoses and fittings are checked and ***tested*** 3.2 Piping lay out is performed at the front, underneath and rear of the vehicle 3.3 Information is accessed and interpreted based on the piping installation specifications and safety rules 3.4 Mounting and installation is performed based on procedures ***manual***, safety handbook, manufacturer's instruction and ***occupational health and safety*** (***OH&S***) requirements

RANGE OF VARIABLES

VARIABLE	RANGE
1. Engine Condition	May include: 1.1 Timing 1.2 Compression
2. Tools and equipment	May include: 2.1 Common hand tools Screwdriver, Hand drill, Pliers, Wrenches 2.2 Testing instrument Battery load tester, Compression tester, Timing light 2.5 Cleaning tools Steel brush, Air compressor, Hand cleaner, rags, etc.
3. LPG Conversion Kit	May include: 3.1 Multi Valves Carburetor Type, Electronic Fuel Injector (EFI) and Sequential Gas Injector (SGI) 3.2 Change Over Switches - Auto or Manual Type 3.3 Vaporizer, Mixer and Tank 3.4 Valves (Solenoid, safety, emergency shut-off, etc) 3.5 Tubes and Fittings
4. Tested	May include: 4.1 Compression Test 4.2 Leak Test
5. Manuals	May include: 5.1 Philippine National Standards (PNS 115) 5.2 DILG Act of 1990 (RA 6975) Rule 8, Section 50 5.3 Fire Code of the Phils. (PD 1185) Sect.8 and Rule 28 5.4 LPG Gas Code (NFPA 58) 5.5 Manufacturer specification manual 5.6 Maintenance procedure manual 5.7 Periodic maintenance manual 5.8 Service manual 5.9 Parts Checklist 5.10 LPG Conversion Kit Manual
6. OH & S requirements	May include: 6.1 Workplace safety 6.1.1protective clothing and equipment 6.1.2 proper use of tools and equipment 6.1.3 handling of materials 6.1.4 use of fire fighting equipment 6.1.5 first-aid 6.2 Environment safety 6.2.1 hazard control 6.2.2 hazardous material and substances 6.2.3 waste disposal

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Performed vehicle test 1.2 Installed multi valves 1.3 Mounted and installed LPG tank 1.4 Installed change over switch 1.5 Installed vaporizer assembly 1.6 Installed piping/hoses and safety features of the kit
2. Required knowledge	2.1 Types of automotive engine, its parts and function 2.2 Types, characteristics, functions and specifications of engine and other related systems 2.3 OH & S regulations/requirements, equipment, materials and personal safety requirements 2.4 Installation Kit procedure and safety precaution 2.5 Multi Valve, Vaporizer, Tank and Change Over Switch Parts and nomenclatures 2.6 Analysis in Working Plan for Piping Lay out 2.7 Types of LPG Safety accessories 2.8 Installation procedure of Valves, Vaporizer change over switch, piping and safety gadgets 2.9 Special tools in setting and installing the LPG Conversion Kit 2.10 Procedure in installing the LPG Tank 2.11 Use of common automotive tools and equipment 2.12 Work organization and planning processes 2.13 Company/workshop quality processes 2.14 Types and uses of fuel or hazardous materials 2.15 Measuring instruments (Battery load tester, Compression tester, Timing light, etc.) 2.16 Positive Work values (Perseverance, Honesty, Attention to details) 2.17 Quality procedures, e.g., 5S 2.18 Environmental-conservation procedures, e.g., 3R (reduce, reuse, recycle)
3. Required skills	3.1 Installing the Multi Valve, Vaporizer, Tank and Change Over Switch 3.2 Interpreting installation plans and designs 3.3 Handling of parts, cleaning tools and chemicals, sealant Gaskets and piping tubes 3.4 Handling special tools equipment such as tester 3.5 Handling of safety gadgets and accessories 3.6 Interpreting job specifications and manuals 3.7 Using automotive tools and equipment 3.8 Handling of measuring/testing instruments/equipment 3.9 Using safety gadgets and accessories
4.Resource implications	The following resources should be provided: 4.1 Workplace: Real or simulated work area 4.2 Appropriate Tools & equipment 4.3 Materials relevant to the activity 4.4 Manufacturer's repair manual or related reference materials
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Direct observation while the tasks are being performed 5.2 Demonstration with questioning 5.3 Written/Oral test
6. Context of assessment	6.1 Competency may be assessed on the job or simulated environment. 6.2 The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

UNIT OF COMPETENCY: TEST AND ADJUST LPG CALIBRATION

UNIT CODE: ALT 723351

UNIT DESCRIPTOR: This unit identifies the competence required to test and adjust Auto LPG Calibration to include electrical system, ignition and starting, vaporizer or mixer.

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables (NOTE: All standard of performance for Test/Adjust *LPG Calibration is* in accordance with *company standard operating procedure* and Manufacturer's Specification manuals using specified tool***s*** *and equipment*.)
1. Test electrical connections	1.1 ***Tests*** are completed without causing damage to workplace property or vehicle. 1.2 Information is accessed and interpreted from appropriate manufacturer specifications. 1.3 Tests are carried out to determine faults using appropriate ***tools and techniques***. 1.4 Faults are identified and preferred repair action is determined.
2. Adjust ignition system	2.1 ***Ignition system*** components are cleaned 2.2 Engine is started as per standard operating procedures. 2.3 Ignition system is ***checked/tested*** 2.4 Ignition timing is adjusted 2.5 Ignition system/components are repaired without causing damage to any other vehicle parts
3. Adjust/Tune up vaporizer	3.1 Tests are carried out to tune the vaporizer or mixer using appropriate tools and techniques. 3.2 Information is accessed and interpreted from appropriate manufacturer specifications and ***manuals*** 3.3 Tests are completed without causing damage to any workplace property or vehicle. 3.4 Vehicle is test driven and final tuning is performed.
4. Check /test LPG fuel system	4.1 ***LPG fuel system components*** are checked according to the ***manual*** 4.2 Fuel piping lines are checked and tested for leaks 4.3 LPG fuel tank is checked 4.4 ***Occupational Health and Safety*** (***OH & S) requirements*** are observed throughout the work

RANGE OF VARIABLES

VARIABLE	RANGE
1. Test	May include: 1.2 Leak Test 1.3 Ignition/Timing Test
2. Tools and equipment	May include: 2.1 Hand tools (Screwdriver, Pliers, Wrenches, Feeler gauge) 2.2 Measuring instrument (multitester, timing light,) 2.3 Lifting equipment (Jack, hydraulic lifter)
3. Ignition system components	May include: 3.1 Spark plug 3.1 Contact points 3.2 Rotor 3.3 Distributor cap 3.4 Ignition switch 3.6 High tension cables
4. Checked/tested	May include: 4.1 Spark test 4.2 Ignition coil resistance test 4.3 Ballast resistance test 4.4 Parts condition
5. LPG fuel system components	May include: 5.1 Fuel filter and air cleaner 5.2 Carburetor/EFI & SGI system 5.3 Fuel piping lines and Fittings 5.4 LPG fuel tank 5.5 Valves (Solenoid, safety, emergency shut-off, etc)
6. Manual	May include: 6.1 Philippine National Standards (PNS 115) 6.2 DILG Act of 1990 (RA 6975) Rule 8, Section 50 6.3 Fire Code of the Phils. (PD 1185) Sect.8 and Rule 28 6.4 LPG Gas Code (NFPA 58) 6.5 Manufacturer specification manual 6.6 Maintenance procedure manual 6.7 Periodic maintenance manual 6.8 Service manual 6.9 Parts Checklist 6.10 LPG Conversion Kit Manual
7. OH & S requirements	May include: 7.1 Workplace safety 7.1.1protective clothing and equipment 7.1.2 proper use of tools and equipment 7.1.3 handling of materials 7.1.4 use of fire fighting equipment 7.1.5 first-aid 7.2 Environment safety 7.2.1 hazard control 7.2.2 hazardous material and substances 7.2.3 waste disposal

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: Tested and adjusted LPG Calibration
2. Required knowledge	2.1 Types of automotive engine, its parts and function 2.2 Types, characteristics, functions and specifications of engine and other related systems 2.3 OH & S regulations/requirements, equipment, materials and personal safety requirements 2.4 Installation Kit procedure and safety precaution 2.5 Multi Valve, Vaporizer, Tank and Change Over Switch Parts and nomenclatures 2.6 Analysis in Working Plan for Piping Lay out 2.7 Types of LPG Safety accessories 2.8 Installation procedure of Valves, Vaporizer change over switch, piping and safety gadgets 2.9 Special tools in setting and installing the LPG Conversion Kit 2.10 Procedure in installing the LPG Tank 2.11 Use of common automotive tools and equipment 2.12 Work organization and planning processes 2.13 Company/workshop quality processes 2.14 Types and uses of fuel or hazardous materials 2.15 Measuring instruments (Battery load tester, Timing light, etc.) 2.16 Positive Work values (Perseverance, Honesty, Attention to details) 2.17 Types of Ignition System, Carburetor, SGI and EFI 2.18 Equipment safety requirements 2.19 Relevant company policies 2.20 Personal safety requirements 2.21 Types of Leak Test and Instruments 2.22 Principle of LPG Engine operation 2.23 Quality procedures, e.g., 5S 2.24 Environmental-conservation procedures, e.g., 3R (reduce, reuse, recycle)
3. Required skills	3.1 Accessing, interpreting and applying technical information 3.2 Using relevant tools in tuning vaporizer and equipment safely 3.3 Maintaining customer records 3.4 Applying maintenance procedures 3.5 Following servicing/inspection job order 3.6 Speaking and listening skills 3.7 Reading and writing skills 3.8 Using and interpreting measurements
4. Resource implications	The following resources should be provided: 4.1 Workplace: Real or simulated work area 4.2 Appropriate Tools & equipment 4.3 Materials relevant to the activity 4.4 Repair manuals and related reference materials
5. Method of assessment	Competency in this unit may be assessed through: 5.1 Direct observation with questioning 5.2 Demonstration with questioning
6. Context of assessment	6.1 Competency may be assessed on the job or Simulated environment. 6.2 The assessment of practical skills must take place after a Period of supervised practice and repetitive experience.

UNIT OF COMPETENCY : SERVICE AUTO LPG SYSTEM

UNIT CODE : ALT 723352

UNIT DESCRIPTOR: This unit identifies the competence required to service Auto LPG System to include electrical system, ignition and starting, vaporizer or mixer.

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables (NOTE: All standard of performance for *Service Auto LPG System* is in accordance with *company standard operating procedure* and Manufacturer's Specification *manuals* using specified *tools and equipment*.)
1. Service electrical system	1. 1 Servicing of electrical system such as starting/ ignition system and its component is performed as per manufacturer's ***manual*** using specified ***tools and equipment*** 1.2 Servicing are completed without causing damage to workplace property or vehicle.
2. Service ignition components	2.1 Servicing of spark plug, contact points, rotor, distributor cap, ignition switch is performed as per manufacturer's specifications/procedures 2.2 Engine is started as per standard operating procedure. 2.3 Servicing of ignition coil resistance is completed 2.4 Servicing of ignition timing is performed 2.5 Ignition system/components are repaired without causing damage to other vehicle parts
3. Service vaporizer/mixer	3.1 Servicing are carried out to tune the vaporizer or mixer using appropriate tools and techniques. 3.2 Information is accessed and interpreted from appropriate manufacturer specifications 3.3 Servicing are completed without causing damage to workplace property or vehicle.
4. Service LPG fuel system	4.1 ***LPG fuel system components*** are serviced according to manual and specifications 4.2 Fuel filter is replaced according to manufacturer's instructions, as needed 4.3 Servicing are completed without causing damage to any workplace property or vehicle. 4.3 Occupational Health and Safety (***OH & S) requirements*** are observed throughout the work

RANGE OF VARIABLES

VARIABLE	RANGE
1. Manual	May include: 1.1 Philippine National Standards (PNS 115) 1.2 DILG Act of 1990 (RA 6975) Rule 8, Section 50 1.3 Fire Code of the Phils. (PD 1185) Sect.8 and Rule 28 1.4 LPG Gas Code (NFPA 58) 1.5 Manufacturer specification manual 1.6 Maintenance procedure manual 1.7 Periodic maintenance manual 1.8 Service manual 1.9 Parts Checklist 1.10 LPG Conversion Kit Manual
3. Tools and equipment	May include: 3.1 Hand tools, power tools, 3.2 Special equipment, measuring, testing and lifting equipment, 3.3 Testing instrument
4. LPG fuel system components	May include: 4.1 Fuel filter and air cleaner 4.2 Carburetor/EFI & SGI systems 4.3 Fuel pump 4.4 LPG Fuel Tank and Piping Line
5. OH & S requirements	May include: 4.1 Workplace safety 4.1.1protective clothing and equipment 4.1.2 proper use of tools and equipment 4.1.3 handling of materials 4.1.4 use of fire fighting equipment 4.1.5 first-aid 4.2 Environment safety 4.2.1 hazard control 4.2.2 hazardous material and substances 4.2.3 waste disposal

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: Performed servicing of LPG fuel system
2. Required knowledge	2.1 Types of automotive engine, its parts and function 2.2 Types, characteristics, functions and specifications of engine and other related systems 2.3 OH & S regulations/requirements, equipment, materials and personal safety requirements 2.4 Installation Kit procedure and safety precaution 2.5 Multi Valve, Vaporizer, Tank and Change Over Switch Parts and nomenclatures 2.6 Analysis in Working Plan for Piping Lay out 2.7 Types of LPG Safety accessories 2.8 Installation procedure of Valves, Vaporizer change over switch, piping and safety gadgets 2.9 Special tools in setting and installing the LPG Conversion Kit 2.10 Procedure in installing the LPG Tank 2.11 Use of common automotive tools and equipment 2.12 Work organization and planning processes 2.13 Company/workshop quality processes 2.14 Types and uses of fuel or hazardous materials 2.15 Measuring instruments (Battery load tester, Timing light, etc.) 2.16 Positive Work values (Perseverance, Honesty, Attention to details) 2.17 Types of Ignition System, Carburetor, SGI and EFI 2.18 Equipment safety requirements 2.19 Relevant company policies 2.20 Personal safety requirements 2.21 Types of Leak Test and Instruments 2.22 Principle of LPG Engine operation 2.23 Quality procedures, e.g., 5S 2.24 Environmental-conservation procedures, e.g., 3R (reduce, reuse, recycle)
3. Required skills	3.1 Accessing, interpreting and applying technical information 3.2 Using relevant tools in tuning vaporizer and equipment safely 3.3 Maintaining customer records 3.4 Applying maintenance procedures 3.5 Following servicing/inspection job order 3.6 Speaking and listening skills 3.7 Reading and writing skills 3.8 Using and interpreting measurements
4 Resource implications	The following resources must be provided: 4.1 Workplace: Real or simulated work area 4.2 Appropriate Tools & equipment 4.3 Materials relevant to the activity 4.4 Repair manuals and related reference materials
5 Method of assessment	Competency in this unit must be assessed through: 5.1 Direct observation with questioning 5.2 Demonstration with questioning
6 Context of assessment	6.1 Competency may be assessed on the job or simulated environment. The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

SECTION 3. TRAINING STANDARDS

These standards are set to provide technical and vocational education and training (TVET) providers with information and other important requirements to consider when designing training programs for Automotive Servicing NC III.

3.1 CURRICULUM DESIGN

Course Title: **AUTOMOTIVE SERVICING** NC Level **NC III**

Nominal Training Duration: 20 Hours (Basic Competencies)
40 Hours (Common Competencies)
466 Hours (Core Competencies)
526 Hrs.

(Elective Competencies)
70 Hours

Course Description:

This course is designed to enhance the knowledge, skills and attitudes of an individual in the field of automotive servicing in accordance with industry standards. It covers core competencies such as; check, test, replace and repair electrical and mechanical system components of a motor vehicle such as auto air-conditioning and the automatic transmission systems; It also covers testing and replacing electronic components or devices in security and engine management systems. In addition LPG-fuel conversion competencies were included such as: Install LPG conversion kit; Test and adjust LPG calibration; service auto LPG system; and Remove and replace auto engine and engine-related system for re-powering the vehicle.

This course is also designed to enhance the basic and common knowledge, skills and attitudes of an individual in the field of automotive servicing.

To obtain this, all units prescribed for this qualification must be achieved.

BASIC COMPETENCIES

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Lead workplace communication	1.1 Communicate information about workplace processes. 1.2 Lead workplace discussions. 1.3 Identify and communicate issues arising in the workplace	• Group discussion • Role Play • Brainstorming	• Observation • Interviews
2. Lead small teams	2.1 Provide team leadership. 2.2 Assign responsibilities among members. 2.3 Set performance expectation for team members. 2.4 Supervise team performance	• Lecture • Demonstration • Self-paced (modular)	• Demonstration • Case studies

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
3. Develop and practice negotiation skills	3.1 Identify relevant information in planning negotiations 3.2 Participate in negotiations 3.3 Document areas for agreement	• Direct observation • Simulation/role playing • Case studies	• Written test • Practical/ performance test
4. Solve workplace problem related to work activities	4.1 Explain the analytical techniques. 4.2 Identify the problem. 4.3 Determine the possible cause/s of the problem.	• Direct observation • Simulation/role playing • Case studies	• Written test • Practical/ performance test
5. Use mathematical concepts and techniques	5.1 Identify mathematical tools and techniques to solve problem 5.2 Apply mathematical procedures/solution 5.3 Analyze results	• Direct observation • Simulation/role playing • Case studies	• Written test • Practical/ performance test
6. Use relevant technologies	6.1 Identify appropriate technology 6.2 Apply relevant technology 6.3 Maintain/enhance relevant technology	• Direct observation • Simulation/role playing • Case studies	• Written test • Practical/ performance test

COMMON COMPETENCIES

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Apply appropriate sealant/ adhesive	1.1 Identify appropriate sealant/ adhesive 1.2 Prepare surface for sealant / adhesive application 1.3 Store unused and dispose used sealant/adhesive	• Lecture/ Demonstration • Dual training • Self-paced (modular) • Distance learning	• Written test • Oral questioning • Direct observation • Project method • Interview
2. Move and position vehicle	2.1 Prepare vehicle for driving 2.2 Move and position vehicle 2.3 Check the vehicle	• Lecture/ Demonstration • Dual training • Self-paced (modular) • Distance learning	• Written test • Oral questioning • Direct observation • Project method • Interview
3. Perform mensuration and calculation	3.1 Select measuring instrument and carry out measurement and calculations 3.2 Maintain measuring instruments	• Lecture/ Demonstration • Dual training • Self-paced (modular) • Distance learning	• Written test • Oral questioning • Direct observation • Project method • Interview

4. Read, interpret and apply specifications and manual	4.1 Identify/access manuals and interpret data and specification 4.2 Apply information accessed in manual 4.3 Store manual	• Lecture/ Demonstration • Dual training • Self-paced (modular) • Distance learning	• Written test • Oral questioning • Direct observation • Project method • Interview
5. Use and apply lubricant/ coolant	5.1 Identify type of lubricant/ coolant 5.2 Use and apply lubricant	• Lecture/ Demonstration • Dual training • Self-paced (modular) • Distance learning	• Written test • Oral questioning • Direct observation • Project method • Interview
6. Perform shop maintenance	6.1 Inspect/clean tools and work area 6.2 Store/arrange tools and shop equipment 6.3 Dispose waste/used lubricants 6.4 Report damaged tools/equipment	• Lecture/ Demonstration • Dual training • Self-paced (modular) • Distance learning	• Written test • Oral questioning • Direct observation • Project method • Interview
7.Prepare job estimates	7.1 Identify nature/scope of work 7.2 Prepare and present estimates	• Lecture/ Demonstration • Dual training • Self-paced (modular) • Distance learning	• Written test • Oral questioning • Direct observation • Project method • Interview
8. Interpret/Draw technical drawing	8.1 Interpret technical drawing 8.2 Select correct technical drawing 8.3 Apply freehand sketching	• Lecture/ Demonstration • Dual training • Self-paced (modular) • Distance learning	• Written test • Oral questioning • Direct observation • Project method • Interview
9.Practice health, safety and environment procedures	9.1 Apply basic safety procedures 9.2 Apply emergency procedures	• Lecture/ Demonstration • Dual training • Self-paced (modular) • Distance learning	• Written test • Oral questioning • Direct observation • Project method • Interview
10.Inspect technical quality of work	10.1 Gather information to carry out inspection 10.2 Inspect and apply quality standards to work 10.3 Achieve quality work outcomes	• Lecture/ Demonstration • Dual training • Self-paced (modular) • Distance learning	• Written test • Oral questioning • Direct observation • Project method • Interview

11.Maintain quality systems	11.1 Conduct final quality check on completed work/ orders 11.2 Report on the quality of processes and work outcomes 11.3 Implement improvements to work processes	• Lecture/ Demonstration • Dual training • Self-paced (modular) • Distance learning	• Written test • Oral questioning • Direct observation • Project method • Interview
12.Provide work skill instructions	12.1 Organize instruction and demonstration 12.2 Conduct instruction and demonstration 12.3 Check training performance 12.4 Review personal training performance and finalize documentation	• Lecture/ Demonstration • Dual training • Self-paced (modular) • Distance learning	• Written test • Oral questioning • Direct observation • Project method • Interview
13.Identify and select original automotive parts and products	13.1 Identify the part/ product and its end use 13.2 Identify details of the part/ product 13.3 part/ product is supplied or ordered for customer	• Lecture/ Demonstration • Dual training • Self-paced (modular) • Distance learning	• Written test • Oral questioning • Direct observation • Project method • Interview

CORE COMPETENCIES

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Test and repair electrical security system/ components	1.1 Install electrical security system/components 1.2 Test and repair anti-theft system and components	• Discussion • Dual training • Distance learning	• Written examination • Demonstration of practical skills • Interview
2. Service electronic engine management system	2.1 Check electronic engine management system and/or associated components. 2.2 Service electronic engine management associated parts	• Discussion • Dual training • Distance learning	• Written examination • Demonstration of practical skills • Interview
3. Overhaul engine and associated components	3.1 Analyze engine failure. 3.2 Pull down the engine. 3.3 Disassemble engine parts and components. 3.4 Inspect engine parts and components. 3.5 Perform fitting of engine parts. 3.6 Assemble engine parts and components. 3.7 Mount and test run engine.	• Discussion • Dual training • Distance learning	• Written examination • Demonstration of practical skills • Interview

4 Service automatic transmission	4.1 Troubleshoot automatic transmission (A/T) 4.2 Dismount automatic transmission assembly. 4.3 Disassemble automatic transmission. 4.4 Conduct automatic transmission parts analysis. 4.5 Replace automatic transmission parks. 4.6 Assemble automatic transmission. 4.7 Mount install automatic transmission assembly 4.8 Test automatic transmission 4.9 Road test automatic transmission.	• Discussion • Dual training • Distance learning	• Written examination • Demonstration of practical skills • Interview
5 Perform maintenance service check-up and repair air conditioning system	5.1 Diagnose AC system 5.2 Service auto air conditioning system components.	• Discussion • Dual training • Distance learning	• Written examination • Demonstration of practical skills • Interview
6. Remove and Replace automotive engine and engine-related systems	6.1 Prepare for work 6.2 Remove engine and/or related systems 6.3 Replace engine and/or related systems 6.4 Clean up work area	• Lecture/ Discussion • Demonstration • Observation	• Interview • Written exam • Practical Demonstration • Direct Observation
7. Service and repair electronically controlled steering systems	7.1 Prepare for work 7.2 Service and adjust electronically controlled steering systems 7.3 Rectify identified electronically controlled steering system faults 7.4 Test and confirm system faults after rectification have been done 7.5 Clean up work area and maintain equipment	• Lecture/ Discussion • Demonstration • Observation	• Interview • Written exam • Practical Demonstration • Direct Observation
8. Service and repair electronically controlled suspension systems	8.1 Prepare for work 8.2 Service and adjust electronically controlled suspension systems 8.3 Rectify identified electronically controlled suspension system faults 8.3 Test and confirm system faults after rectification have been done 8.5 Clean up work area and maintain equipment	• Lecture/ Discussion • Demonstration • Observation	• Interview • Written exam • Practical Demonstration • Direct Observation

9. Repair Instruments and warning systems	9.1 Prepare for work 9.2 Test systems/components and identify faults 9.3 Repair instrument and warning systems and or associated components 9.4 Clean up work area and maintain equipment	• Lecture/ Discussion • Demonstration • Observation	• Interview • Written exam • Practical Demonstration • Direct Observation
10. Carry out diagnostic procedures	10.1 Prepare to diagnose faults 10.2 Apply technology to isolate fault(s) 10.3 Recommend rectification method(s) 10.4 Component / equipment is prepared for customer use	• Lecture/ Discussion • Demonstration • Observation	• Interview • Written exam • Practical Demonstration • Direct Observation

ELECTIVE COMPETENCIES

1. Install LPG conversion kit	1.1 Perform vehicle test 1.2 Mount and install LPG Conversion kit 1.3 Install piping/hoses and safety features of the kit	• Lecture/ Discussion • Demonstration • Observation	• Interview • Written exam • Practical Demonstration • Direct Observation
2. Test and adjust LPG calibration	2.1 Test electrical connections 2.2 Adjust ignition system 2.3 Adjust/Tune up vaporizer 2.4 Check/Test LPG fuel system	• Lecture/ Discussion • Demonstration • Observation	• Interview • Written exam • Practical Demonstration • Direct Observation
3. Service Auto LPG System	3.1 Service electrical system 3.2 Service ignition components 3.3 Service vaporizer/mixer 3.4 Service LPG fuel system	• Lecture/ Discussion • Demonstration • Observation	• Interview • Written exam • Practical Demonstration • Direct Observation

3.2 TRAINING DELIVERY

The delivery of training should adhere to the design of the curriculum. Delivery should be guided by the 10 basic principles of competency-based TVET.

- The training is based on curriculum developed from the competency standards;
- Learning is modular in its structure;
- Training delivery is individualized and self-paced;
- Training is based on work that must be performed;
- Training materials are directly related to the competency standards and the curriculum modules;
- Assessment is based in the collection of evidence of the performance of work to the industry required standard;
- Training is based both on and off-the-job components;
- Allows for recognition of prior learning (RPL) or current competencies;
- Training allows for multiple entry and exit; and
- Approved training programs are nationally accredited.

The competency-based TVET system recognizes various types of delivery modes, both on and off-the-job as long as the learning is driven by the competency standards specified by the industry. The following training modalities may be adopted when designing training programs:

- The dualized mode of training delivery is preferred and recommended. Thus programs would contain both in-school and in-industry training or fieldwork components. Details can be referred to the Dual Training System (DTS) Implementing Rules and Regulations.
- Modular/self-paced learning is a competency-based training modality wherein the trainee is allowed to progress at his own pace. The trainer facilitates the training delivery
- Peer teaching/mentoring is a training modality wherein fast learners are given the opportunity to assist the slow learners.
- Supervised industry training or on-the-job training is an approach in training designed to enhance the knowledge and skills of the trainee through actual experience in the workplace to acquire specific competencies prescribed in the training regulations.
- Distance learning is a formal education process in which majority of the instruction occurs when the students and instructor are not in the same place. Distance learning may employ correspondence study, or audio, video or computer technologies.

3.3 TRAINEE ENTRY REQUIREMENTS

Trainees or students should possess the following requirements:

- Holder of Automotive Servicing NC II
- can communicate both oral and written;
- can perform basic mathematical computation.

Additional requirements for LPG Retrofitting/Conversion or LPG Re-powering:

- holder of Automotive Servicing NC II or equivalent qualification; or
- with at least two (2) years work experience in automotive servicing

This list does not include specific institutional requirements such as educational attainment, appropriate work experience, and others that may be required of the trainees by the school or training center delivering the TVET program.

3.4 TOOLS, EQUIPMENT AND MATERIALS

AUTOMOTIVE SERVICING NC III

Recommended list of tools, equipment and materials for the training of 25 trainees for Automotive Servicing NC III

TOOLS		EQUIPMENT			MATERIALS
QTY		**QTY**		**QTY**	
4 units	Soldering gun/iron	4 units	Power window assembly	4 units	Car alarm
25 pcs.	Goggles	4 units	Multimeter	5 rolls	Automotive wire, # 16 AWG
1 pc	Oil filter remover (strap type)	1 unit	Injector cleaner	10 rolls	Electrical tape .16mmx 19mmx 16m
6 pcs	Screw driver, one of each kind	1 unit	Vehicle lifting equipment	1 kg.	Hand cleaning detergents
2 sets	Box wrench of 28 pcs, 4mm-32mm	4 units	Creeper	10 kg	Rugs
2 sets	Open end wrench of 28 pcs, 4mm-32mm	4 units	Automatic transmission	20 L	A/T fluid
2 sets	Socket wrench 22 pcs.per set 6mm-26 mm	2 units	Transmission jack	20 L	Engine oil
6 pcs	Pliers(one in each kind)	1 unit	Air compressor with accessories	10 tube	Sealant /adhesive

TOOLS		EQUIPMENT			MATERIALS
QTY		QTY		QTY	
2 units	Fuel pressure gauge	2 units	Electronic Engine scanner	2 sets	Overhauling gasket (per engine model)
4 pcs	LED tester	2 units	Laptop with engine analysis software	20 pcs	Valve lapper
10 pcs	Test light	2 units	Hydraulic jack/lift	4 cans	Grinding compound
4 pcs	Wire stripper	1 unit	Floor crane	15 pcs	Plastic gauge, green, red, blue
2 units	Torque wrench, click type	1 unit	Oxyacetylene welding torch and gas regulators	30 L	Diesel fuel
2 pcs	Dial gauge with magnetic stand	1 unit	Arc welding machine	5 cans	Penetrating oil
		1 unit	Hydraulic or Mechanical Crimping press	50 ft.	Copper tubing 3/8, 5/16, 1/4
4 pcs	Micrometer (25mm-100mm)	2 unit	Vacuum pump	5 pcs	Discharge Flexible hose & fittings
1 init	A/T pressure gage	5 sets	Manifold gauge	5 pcs	Suction Flexible hose & fittings
2 sets	Allen wrench	2 units	Portable electric drill	5 sets	O - rings kit
2 sets	Combination wrench, 12 pcs, 6mm- 32mm	1 unit	Charging machine	5 pcs.	Liquid receiver with sight glass
2 pcs	Snap ring pliers, internal	1 unit	Recovery machine		
2 pcs	Snap ring pliers, external	2 sets	Digital thermometer	5 pcs	High pressure switch
2 pcs	Magnetic pick-up	2 sets	Anemometer	5 pcs	AC relay
2 pcs.	Tube bender	1 unit	Refractometer	2 pcs	AC belt
2 sets	Flaring tools	4 units	AC compressor	5 pcs	Belt adjuster
2 units	Tube cutter	4 units	Evaporator assembly	4 units	Magnetic clutch coil
2 units	Swaging tool	4 units	Condenser with auxiliary fan	1gal.	AC compressor oil
2 sets	Ac special service tool (SST)	2 sets	Nitrogen regulator	25 pcs	Silver rod
2 sets	Impact wrench	1 unit	Parts washing machine	25 pcs	Bronze rod
2 pcs	Hard rubber mallet	2 units	Overhauling stand	1 can (each)	Bronze, silver, aluminum- flux
4 pcs	Oiler	4 units	Working table (4 X8 ft metal top) with	1 box	Eye terminal end
2 sets	Piston ring compressor	2 units	Bench vise	2 boxs	Male & female terminal end
2 sets	Piston ring expander	1 unit	Chain block (1.5 Tons)	5 pcs	AC thermostat
2 sets	Valve spring compressor	1 unit	Hydraulic press	3 pcs	Electronic thermostat
		1 unit	Valve seat grinder (offset)	5 pcs	Rotary switch
4 pcs	Trouble light	1 unit	Connecting rod aligner	5 pcs	Slide switch
2 sets	Engine Overhauling & automatic transmission (SST) per model	1 unit	Cylinder ridge remover	5 units	Expansion valve
2 sets	Leaf feeler gauge	1 unit	Valve spring tester	1 box	Fuse (blade, 15, 30 amp)

TOOLS		EQUIPMENT			MATERIALS
QTY		**QTY**		**QTY**	
2 pcs	Vernier caliper			2 cyl. tanks	Refrigerant (134A 11 kg.)
2 sets	Outside micrometer			5 cylinder tanks	Nitrogen gas
2 sets	Cylinder bore gauge			4 pcs	Fender cover
1 set	Easy –out (8 pcs)				
2 pcs	Straight edge			2 cylinder tanks	acetylene
1 set	Small hole gauge			2 cylinder tanks	Oxygen
1 set	Telescopic gauge			25pairs	Gloves
2 sets	Pulley fuller			25 pcs	Mask
2 sets	Mechanic hammer (4 pcs. per set)			25 pcs.	Apron
1 set	Depth micrometer			2 rolls	AC Insulation tape
FOR LPG RETROFITTING/CONVERSION AND VEHICLE RE-POWERING					
QTY	**TOOLS**	**QTY**	**EQUIPMENT**	**QTY**	**MATERIALS**
2 sets	Wrenches	1 unit	Motor Vehicle	2 unit	LPG fuel tank (1 of each kind)
2 sets	Hand drills	1 unit	LPG conversion kit	1 set	Fuel piping lines and fittings
2 sets	Set of pliers	1 unit	Battery load tester	2 pcs.	Solenoid valves
2 sets	Set of screw driver	1 unit	Compression tester	2 pcs.	Safety valve
3 pcs.	Steel brush	1 pc	Timing light	2 pcs.	Emergency shut-off valve
	Feeler gauge	1 unit	Hydraulic lifter	1 pair/ pax	Gloves
		1 unit	Air compressor	2 pcs.	Fender cover
	Manuals	1 unit	Hydraulic jack	2 pcs/ pax	Rags
1 pc	• Philippine National Standards (PNS 115)	1 units	Multitester	1 pc/ pax	Apron
1 pc	• DILG Act of 1990 RA 6975 Rule 8 Sec.50	1 unit	Chain block	1 gal.	Hand cleaner
1 pc	• Fire Code of the Phils. (PD1185) Sec.8 and Rule 28		**Engines**	1 unit	Carburetor/EFI & SGI system
1 pc	• LPG Gas Code (NFPA 58)	1 unit	• Liquefied Petroleum Gas (LPG) engine	1set	Ignition system components (spark plug, contact points, rotor, distributor cap, ignition switch and high tension cables
1 pc	• Manufacturer's specification manual				
1 pc	• Maintenance procedure manual				
	• Periodic maintenance manual				
	• Service manual Parts checklist			1 pc	Fuel filter and air cleaner
	• LPG conversion kit manual			1 liter	Lubricant cleaning materials
				10 liters	LPG Fuel

3.5 TRAINING FACILITIES

AUTOMOTIVE SERVICING NC III

The automotive workshop must be made of reinforced concrete or steel structure. The size must be suited on the requirements of the competencies. The class size of 25 students/trainees is reserved for the lecture room and the practical demonstration area for carrying out servicing of minor automotive parts. Most of the learning activities such as on-vehicle servicing are performed in the workshop.

SPACE REQUIREMENT	SIZE IN METERS	AREA IN SQ. METERS	TOTAL AREA IN SQ. METERS
Workshop/Laboratory area			150
Lecture Room		28.00	28.00
Learning Resource Center		20.00	20.00
Wash/Comfort room		10	10
Storage/Tool room		20	20
Circulation Area			60
Total Area			**288**

Working Area for LPG Retrofitting/Conversion and Vehicle Re-powering

Name/Description	AREA IN SQ. METERS	TOTAL AREA IN SQ. METERS
Working Area	(at least 4m x 5m)	20
• Open and well ventilated		
• Well lighted (Explosion proof)		
• Power Supply (220 volts) (Explosion proof)		
Working Table with bench grinder	(1m x 2m)	
Fire extinguisher 20 lbs dry chemical		
Water Supply		

3.6 TRAINERS' QUALIFICATION

AUTOMOTIVE/LAND TRANSPORT SECTOR
AUTOMOTIVE SERVICING NC III

- Holder of National TVET Trainers Certificate (NTTC) Level 1 - Automotive Servicing NC III
- Must be computer literate
- *Must have at least 2 years job/industry experience

Additional requirements for trainor in LPG Retrofitting/Conversion or LPG Re-powering:

- holder of a COC in LPG Retrofitting and/or LPG Re-powering

3.7 INSTITUTIONAL ASSESSMENT

Institutional assessment is undertaken by trainees to determine their achievement of units of competency. A certificate of achievement is issued for each unit of competency.

SECTION 4 NATIONAL ASSESSMENT AND CERTIFICATION ARRANGEMENTS

4.1 To attain the National Qualification of Automotive Servicing NC III, the candidate must demonstrate competence through project-type assessment covering all the units listed in Section 1. Successful candidates shall be awarded a National Certificate signed by the TESDA Director General.

4.2 Individual aspiring to be awarded the qualification of Automotive Servicing NC III must acquire Certificates of Competency in all the following core units of the Qualification. Candidates may apply for assessment in any accredited assessment center.

4.2.1 Perform Engine Overhauling
- Overhaul Engines and Associated Components

4.2.2 Service Automotive Electrical Security and Electronic Components
- Test and Repair Electrical Security System/Components
- Service Electronic Engine Management
- Service and repair electronically controlled steering systems
- Service and repair electronically controlled suspension systems
- Repair Instruments and warning systems
- Carry out diagnostic procedures

4.2.3 Perform Servicing to Automatic Transmission
- Service Automatic Transmission

4.2.4 Service Automotive Air-Conditioning
- Perform Maintenance Service Check Up and Repair to Auto AC System

(ELECTIVE COMPETENCIES)

4.2.5 Perform LPG Retrofitting/Conversion
- Install LPG Conversion Kit
- Test/Adjust LPG Calibration
- Service Auto LPG System

4.2.6 Perform Motor Vehicle Re-powering
- Remove and Replace Automotive Engine and Engine-Related Systems

Successful candidates shall be awarded Certificates of Competency (COC).

4.3 Accumulation and submission of all COCs acquired for the relevant units of competency comprising a qualification, an individual shall be issued the corresponding National Certificate.

4.4 Assessment shall focus on the core units of competency. The basic and common units shall be integrated or assessed concurrently with the core units.

4.5 The following are qualified to apply for assessment and certification:

4.5.1 Graduates of formal, non-formal and informal including enterprise-based training programs.

4.5.2 Experienced workers (wage employed or self employed)

4.6 The guidelines on assessment and certification are discussed in detail in the "Procedures Manual on Assessment and Certification" and " Guidelines on the Implementation of the Philippine TVET Qualification and Certification System (PTOQCS)".

COMPETENCY MAP - AUTOMOTIVE SERVICING NC III

CORE COMPETENCIES

Remove and replace automotive engine and engine related systems	Service and repair electronically controlled steering systems	Service and repair electronically controlled suspension systems	Repair instruments and warning systems	Carry out diagnostic procedures
Test and Repair Electrical Security System/Components	Service electronic engine management system	Service Automatic Transmission	Overhaul engines and associated components	Perform maintenance service check up and repair to Auto AC system

COMMON COMPETENCIES

Practice health safety and environment procedures	Inspect technical quality of work	Maintain quality systems	Provide work skill instructions	Identify and select original automotive parts and products	Read, interpret and apply specification and manuals	Interpret/draw technical drawing	Prepare job estimate/costing
Perform mensuration and calculation	Move and position vehicle	Apply appropriate sealant/adhesive	Use and apply lubricant/coolant	Perform shop maintenance			

BASIC COMPETENCIES

Receive and respond workplace communication	Work with Other	Demonstrate work values	Practice basic housekeeping procedures	Lead in workplace communication	Develop and practice negotiation skills	Use relevant technologies	Solve problems related to work activities	
Participate in workplace communication	Work in team environment	Practice career professionalism	Practice occupational health and safety procedures	Lead small Team	Use mathematical concepts and techniques			
Plan and organize work	Utilize specialist communication skills	Promote environmental Protection	Develop team and individual	Apply problem solving techniques in the workplace	Collect, analyze and organize work			

DEFINITION OF TERMS

1. **Light Duty Vehicles**	These are motor vehicles whose gross vehicle weight is equal or less than 3,500 kgs. Powered by a gas or diesel engine.
2. **Automotive Service Technician**	Refers to an all around auto serviceman that can perform both mechanical and electrical as well as auto electronics maintenance checking and inspection of motor vehicle. Assesses vehicle problems, perform all necessary diagnostic test or installation of accessories and competently repairs or replaces faulty parts.
3. **Adhesives**	Substance used to hold gasket in place during assembly. It also maintains a tight seal by filling in small irregularities on a surface and prevents gasket from shifting due to vibration.
4. **Anti-Lock Braking System**	System that automatically controls wheel slip or prevents sustained wheel locking on braking
5. **Automatic Transmission**	A transmission in which gear or ratio changes are self-activated, eliminating the necessity of hand shifting gears
6. **Backlash**	The amount of clearance or play between two meshed gears
7. Catalytic Converter	Emission The control device fitted in the exhaust system of an internal combustion engine. The converter reduces the toxicity of products of combustion by catalytic re-combination
8. **Charcoal Canister**	Trap containing charcoal granules to store fuel evaporating from a fuel system and prevent its loss to atmosphere, particularly from a carburetor and fuel tank.
9. **Electronics**	Electrical assemblies, circuit and system that use electronic devices such as transistors and diodes.
10. **Emissions**	Any air contaminant, pollutant, gas stream from a known source which is introduced into the atmosphere.
11. **Final Drive**	The end of the drive train before power is transmitted to the wheels**.**
12. **Fuel Injection**	An electronic system that increases the performance ad fuel economy because it monitors engine conditions and provides the correct air/fuel mixture based on the engine's demand. It injects fuel directly into the cylinder head enabling more precise control over the quantity used.

13. **Governor**	A speed sensing device that employs centrifugal force and spring tension to govern engine speed.
14. **Hotchkiss Drive**	The type of rear suspension in which leaf springs absorbs the rear axle housing torque.
15. **Intake Manifold**	Tubing attached to the engine through which the air/fuel mixture reaches the cylinder.
16. **Ignition System**	Electrical system devised to produce timed sparks from engine spark plug. Consisting of a battery, induction coil, capacitor, distributor, spark plugs and relevant switches and wiring.
17. **Master Cylinder**	The liquid-filled cylinder in the hydraulic brake system or clutch, where hydraulic pressure is developed when depresses a foot pedal.
18. **Periodic Maintenance Service**	The regular servicing prescribed by manufacturer to maintain the vehicle's top performance.
19. **Positive Crank Ventilation**	Emission control system that prevents crank case gases from entering the atmosphere, usually by drawing the gases from the crank case and feeding them into the engine's induction system.
20. **Power Steering**	Steering that has been designed to make the wheel move more easily than in a manual steering system. Hydraulic assists the process utilizing hydraulic fluid. The fluid increases pressure in the power steering pump and aids in the movement of the steering mechanism. This fluid, called power steering fluid, is what is replaced at regular intervals to keep steering soft and comfortable.
21. **Super Charged Engine**	An engine that is similar to a turbo-charged engine which uses a series of belts or chains from the crankshaft to turn the turbines that forces the air/fuel mixture into the cylinder heads under pressure creating a bigger explosion which generates more power. A turbocharger uses the exhaust gases to turn the turbines to create the same effect.
22. **Transaxle**	Type of construction in which the transmission and differential are combined in one unit.
23. **Thermostat**	A device for automatic regulation of temperature

24. **Turbo Charged Engine**	A performance-increasing turbine positioned in the exhaust system. Expanding exhaust gases spin an impeller (very small fan-type blades) at speeds up to 25 thousand rpm, driving a similar compressing impeller. Compressed air from the driven impeller is forced into the induction system, which squeezes more air/fuel mixture into the combustion chambers. With the greater charge of air and fuel, a more powerful combustion burn results, thus more power. The big advantage of the turbo over directly driven superchargers is the increased efficiency, although there is a slight lag before the turbine spins up and increases the power output. Originally turbo were developed to enable aircraft to fly at high altitudes, then they found use in diesel trucks and train engines to increase their torque.
25. **U-joint**	A four-joint cross-connected to two U-shaped yokes that serve as a flexible coupling between shafts.
26. **Liquefied petroleum gas (LPG)**	Means any product essentially composed of the following hydrocarbons: propane, propene (propylene), normal butane, isobutene, isobutylene, butane (butylenes) and ethane.
27**. Multi valves**	Means a device consisting of all or part of the accessories including 80 percent stop valve, level indicator, pressure relief valve (discharge valve) or power supply bushing (fuel pump/actuators/fuel level sensor)
28. **Vaporizer**	A device intended to vaporize LPG from a liquid to a gaseous state
29. **LPG conversion kit**	A LPG fuel conversion kit usually include multi-valves, tank, change over switch, vaporizer assembly, piping/hoses and safety gadgets
30. **SGI**	Sequential Gas Injector
31. **Retrofitting**	A modification of equipment to incorporate changes made in later production of similar equipment
32. **Re-powering**	Replacing the engine with a new, remanufactured or rebuilt engine.

ACKNOWLEDGEMENTS

The Technical Education and Skills Development Authority (TESDA) wishes to extend thanks and appreciation to the many representatives of business, industry, academe and government agencies who rendered their time and expertise to the development and validation of these Training Regulations.

THE TECHNICAL ADVISORY PANEL (TAP)

MR. ALLEN RAYMUND A. RUFO TAP Chairman – Automotive Sector TOYOTA Motors Philippines, Corp. Parañaque city Automotive Industry Board Foundation (AIBFI) Suite 1206, 12 th flr. Jollibee Center San Miguel Avenue, Pasig city	**MS. MA. CLARISSA V. FUNESTO** TAP Alternate Chairperson – Automotive Sector HONDA Phils. Inc. Parañaque city Automotive Industry Board Foundation (AIBFI) Suite 1206, 12 th flr. Jollibee Center San Miguel Avenue, Pasig city
MR. SIXTO D. CAYPUNO TAP Member – Academe Samson Technical College Cubao, Quezon City	**MR. ANGEL DIMALANTA** TAP Member – Labor TOYOTA Motors Phils., Parañaque city

THE TECHNICAL AND INDUSTRY EXPERT PANEL		
AUTOMOTIVE SERVICING		
EFREN D. BISMONTE **ERNESTO L. ALMAZORA** **ELMER B. DEL ROSARIO** **BENIGNO AQUINO JR.** TOYOTA Motors Phils. Corp. Sta. Rosa Laguna	**RONNIE A. TRANCE** CITIMOTORS Pasong Tamo, Makati	**UNDRICO D. CORPUZ JR.** Monark Foundation Tech. Institute Libis, Quezon city
ALVIN F. ABIAS Don Bosco Technical Institute Makati city	**ANTONIO D. AGALOOS** **JOSE B. TORRES** Samson Technical College Quezon City	
The PARTICIPANTS in the National Validation of these Training Regulations		
TESDA III **TESDA VI** **TESDA VIII**	**TESDA 10** **TESDA XII**	
The Members of the TESDA Board The TESDA Executive Committee The MANAGEMENT and STAFF of the TESDA Secretariat		
SSCO	**NITVET**	**OFTVET**

ACKNOWLEDGEMENTS

The Technical Education and Skills Development Authority (TESDA Region VII – RTC Cebu) wishes to extend thanks and appreciation to the many representatives of business, industry, academe and government agencies who rendered their time and expertise to the development and validation of additional Core Units for Automotive LPG-Fuel Conversion/Retrofitting and Re-powering Technician of these Training Regulations.

ADVISORY PANEL

MR. ALLAN V. MERCADO PRESIDENT Automotive Service Association Incorporated - Cebu	**DIR. ASTER CABERTE** REGIONAL DIRECTOR Department of Trade and Industry Region VII
MR. JOSEMARIE VASQUEZ VICE PRESEIDENT Automotive Service Association Incorporated - Cebu	**DIR. ANTONIO LABIOS** REGIONAL DIRECTOR Department of Energy Region VII
MR. CHARLIE C. TAGUIAM TREASURER Automotive Service Association Incorporated - Cebu	**DIR. ROSANNA A. URDANETA** OIC-REGIONAL DIRECTOR Technical Education and Skills Development Authority Reg VII

TECHNICAL AND INDUSTRY EXPERT PANEL

Mr. RICHARD COROMINAS RPSAMC	Mr. JONATHAN GESALEM ECONOGAS	ENGR. FREDIE C. DIEZ OIC-CHIEF RTC VII Cebu
Ma. PAMELA C. TANEO PETRONAS	Mr. AGUSTIN MARAMARA FIRST AUTO GAS	ENGR. RAINERO TOMAS JAYME Trainor, RTC VII Cebu
PAMELA OLIVER FIRST AUTO GAS	Mr. RICHARD CABUCOS RICHELDA	OFELIA LABRA Department of Energy Region VII
Technician	Mr. HECTOR ALMARIO FIRST AUTO GAS	OSEAS B. LONGAKIT Department of Energy Region VII
JENLY LONZAGA FIRST AUTO GAS	LOEY GENTULAN FIRST AUTO GAS	THERESO P. MACAPAZ Department of Energy Region VII
DANILO SOLIVIO HANA LPG KITS	MERCY BARING KEN TRANS LPG TAXI	JESSIE UY Department of Trade and Industry Region VII
FELIX TAGUIAM DECO SALES	NORY SAMPLAN KEN TRANS LPG TAXI	
VINCENT A. DOLMIGUEZ ECONOGAS	RUBEN GUMBOC ECONOGAS	
GEORGE G. UY INTERPHIL MARKETING		

The Members of the TESDA Board
The TESDA Executive Committee (Qualifications and Standards Office (QSO) and Office of TESDA Technology Institute (OTI)
The MANAGEMENT and STAFF of the TESDA Secretariat Reg VII RTC Cebu

ACKNOWLEDGEMENTS

The Technical Education and Skills Development Authority wishes to extend thanks and appreciation to the many representatives of business, industry, academe and government agencies who rendered their time and expertise to the development and validation of additional Core Units for Automotive LPG-Fuel Conversion/Retrofitting and Re-powering Technician of these Training Regulations.

INDUSTRY TECHNICAL EXPERTS

Messrs. Alex F. Reyes and Michael Cruz Automotive Technicians DAVID Motors and Marketing Corp	**Mr. Ricardo David** Associate Vice President DAVID Motors and Marketing Corp	**Mr. Antonio DE Guzman** Automotive Technician GREENGAS, Inc.	**Ms. Sharon Siy** GREENGAS, Inc.
Mr. Masuyoshi Mizuno **Mr. Syuichi Tajima** Consultants, ECOS			

INTER-AGENCY/GOVERNMENT TECHNICAL EXPERTS			
Messrs. Jason Camba **Bryan Joseph S. Oriondo** **Eleuterio C. Galvante, Jr.** **Department of Transportation and Communication (DOTC)**		**Messrs. Angelito C. Ansay** **Benedicto R. Mamayson** **Michael B. Renolayan** **Gerald Venezuela** Bureau of Fire Protection (**BFP**), Department of Interior and Local Government (DILG)	
The Members of the TESDA Board			
The MANAGEMENT and STAFF of the TESDA Secretariat			
TESDA EXCOM			
DDG Milagros Dawa Hernandez Deputy Director for Sectoral TVET		**DDG Rogelio C. Peyuan** Deputy Director General for Field Operation	
Ms. Irene M. Isaac Executive Director Qualifications and Standards Office (QSO/TESDA)	**Mr. Ernesto A. Beltran** Executive Director Regional Coordinating Office (RCO/TESDA)	**Mr. Teodoro S. Sanico** Executive Director Office of Training Institutions (OTI/TESDA)	**Mr. Gabriel Genaro H. Bordado, IV** Executive Director Competency Assessment and Certification Office (CACO/TESDA)
Competency Standards Division **Florante P. Inoturan** **Agnes P. Panem**		Curriculum and Training Aids Division (CTAD) **Clodualdo V. Paiton** **Abel B. Elpedes**	

FOR THE REVISION STAGE

- **THE TECHNICAL EXPERT COMMITTEE**

ANTONIO A. GIMENEZ
Executive Director
Philippine Automotive Federation, Inc.

CELSO LIBRANDO
Maintenance Manager, Victory Liner
(Former Service Manager, Toyota)

RODOLFO NUNEZ
Consultant, Bataan Automotive Manufacturing Corporation
(Formerly with Ford and Nissan)

MARIO GUEVARRA
Technical Services Manager, Nissan

The PARTICIPANTS in the Validation of these Training Regulations

LEONARDO GARI
Technical Service Manager
Nissan Motor Phils.

ALFREDO MAGPAYO
Manager
Honda Phils.

BONIFACIO FAJUTNAO
Owner
Poctoy Motor Repair Shop

DENNIS MATA
Fleet Maintenance Supvr.
Marycheck Trading

- **THE TESDA BOARD - STANDARDS SETTING AND SYSTEMS DEVELOPMENT COMMITTEE**
- **THE MANAGEMENT AND STAFF OF THE TESDA SECRETARIAT**
    - **Qualifications and Standards Office (QSO)**
        - Zoilo C.Galang - TESDA-QSO-CSD
        - Florante P. Inoturan - TESDA-QSO-CSD
        - Abel B. Elpedes - TESDA-QSO-CTAD
        - Howard Mark N. Plete - TESDA-QSO-CSD