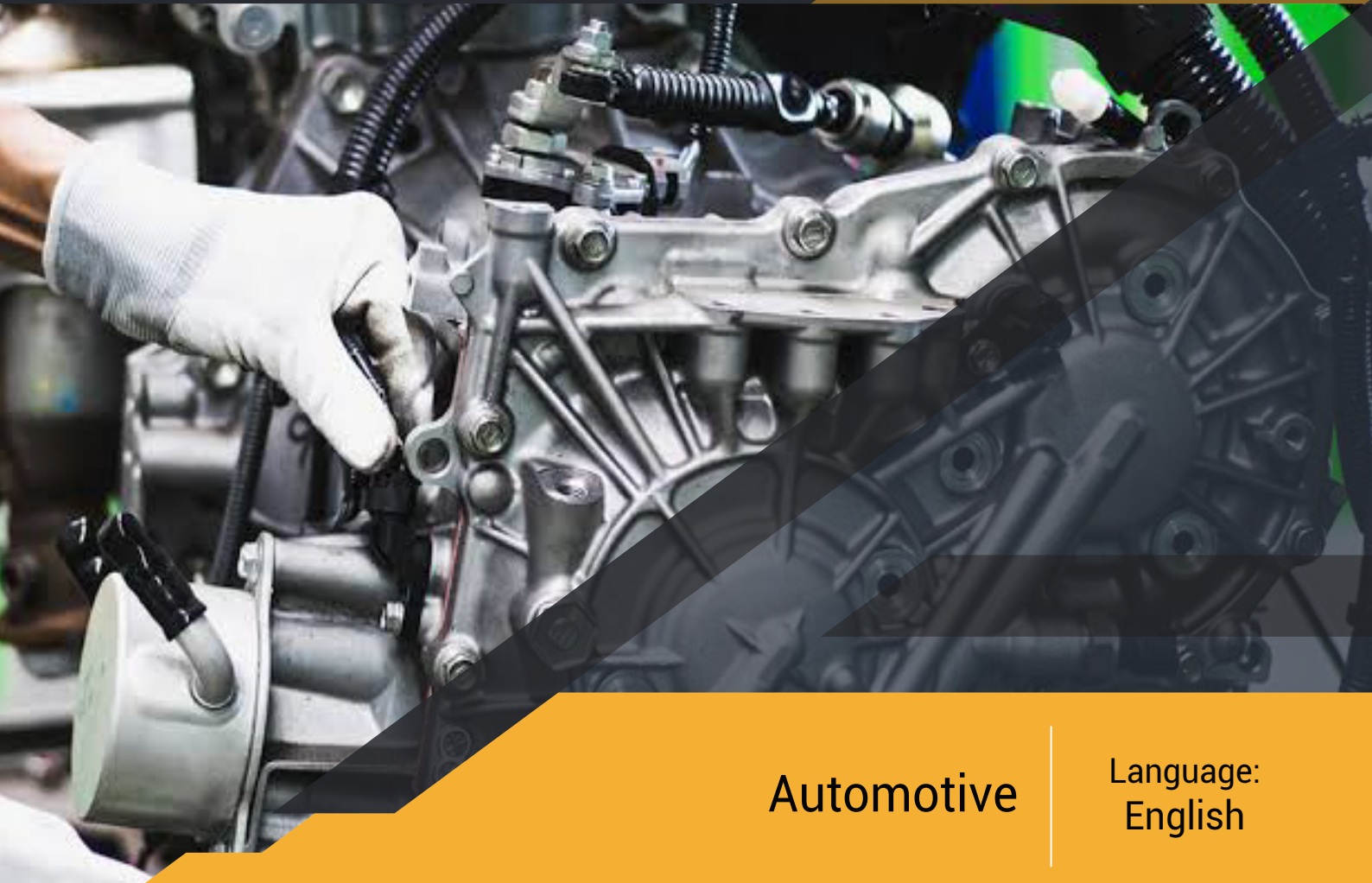




PARTICIPANT HANDBOOK



Automotive

Language:
English

Basic Automotive Service Technician (2 and 3 Wheelers)

Basic Automotive Service Technician (2 & 3 Wheelers)



Orion House, 28, Chinar Park, Rajarhat Road
Kolkata – 700157, Ph.: +91 33 40051635

www.orionedutech.com

Welcome Note

Dear Participant,

Welcome to the "**Basic Automotive Service Technician (2 & 3 Wheelers)**" training programme. On completion of this programme, it is expected that you will join the automobile industry as an LMV Driver, Commercial Vehicle Driver, Taxi Driver or Driving Assistant. As a driving assistant or mechanic, you would be able to lubricate the parts of the vehicle, locate the defects and attend to the minor maintenance of different types of light motor vehicles.

Read each module, log in your key learnings and attempt the worksheet questions at the end.

General Instructions to Trainee:

- 1.** Greet your instructor and the other participants when you enter the class.
- 2.** Always be punctual in every class.
- 3.** Be regular. Candidates, who fall short of the required attendance, will not be certified.
- 4.** Inform your instructor if you need to miss a class for any reason/s.
- 5.** Pay attention to what your instructor is saying or showing.
- 6.** If you do not understand anything, put up your hand and seek clarification without any hesitation.
- 7.** Make sure you do all the exercises at the end of each module in this book. It will help you understand the concepts better.
- 8.** Practice any new skills you have learnt as many times as possible. Seek the help of your Trainer or co-participant for practice.
- 9.** Take all necessary precautions, as instructed by your Trainer, while working with electricity and with tools.
- 10.** Make sure you are neatly attired and presentable at all times.
- 11.** Participate actively in all the activities, discussions and games during training.
- 12.** Always take a bath, wear clean clothes and comb your hair before you come to class.
- 13.** The three most important words you must always remember and use in your daily conversations are PLEASE, THANK YOU and SORRY.

Introduction

Driving safely through chaotic Indian roads requires more precautions than one can imagine. When you take your vehicle out on the streets, the first thing you see is how vehicles attempt to overtake each other from different sides. Hence, safety becomes the first priority when you get behind the wheels of a vehicle.

What is therefore essential is an effective training programme that would let one drive light motor vehicles like 2 & 3 wheelers with absolute safety. Driving in traffic is more than just knowing how to operate the mechanisms that control the vehicle; it requires knowing how to apply the rules of the road, which ensures safe and efficient driving.

An educated driver will always have an intuitive understanding of the basics of vehicle handling that would keep him/her not only safe and alert but also quite confident while driving on the roads. One will also know everything about driving heavy as well as light motor vehicles on different kinds of roads and surfaces keeping in mind the traffic rules

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CHAPTER - 1

GENERAL SERVICE INFORMATION

LEARNING OUTCOMES:



- Getting knowledge about the job role of Automotive Service Technician
- Gathering knowledge on general service information
- Knowing different general safety tips
- Identifying 2 and 3 wheeler components

PRE-SESSION ACTIVITY

- The trainer will ask the trainees to share their ideas on how to maintain road safety. The trainees will one by one share their ideas on the same.

1.1 General introduction of an Automotive Service Technician:

1.1.1 Who is an Automotive Service Technician?

A: Like the other technicians, an automotive service technician also inspects, maintains and repairs electric, gas, hybrid and alternative fuel vehicles. In smaller businesses, their duties may include a full range of repair and maintenance services.

1.1.2 Job duties of an Automotive Service Technician:

- The main duty is to identify mechanical problems. They can often use computerized diagnostic equipment.
- They have to test all parts and systems to ensure that they are working properly.
- They have to follow the checklists to ensure that all critical parts are examined.
- They have to perform basic care and maintenance, including changing oil, giving tune-ups, checking fluid levels, and rotating tyres.
- They have to repair or replace worn parts, such as brake pads and wheel bearings.
- In addition to that, they do disassemble and reassemble parts of a vehicle.
- They also use testing equipment to ensure that repairs and maintenance are effective.
- Lastly, they explain to the clients about their automotive vehicle/s problems and the repairs that should be done.

1.1.3 Other job responsibilities:

- Beside these, Service technicians work on traditional mechanical components such as engines, transmissions and drive belts. However, they must be familiar with a growing number of electronic systems, like braking, transmissions, and steering systems, which are controlled primarily by computers and electronic components.
- Other integrated electronic systems, such as accident-avoidance sensors, are becoming common as well. In addition, a growing number of technicians are required to work on vehicles that run on alternative fuels, such as ethanol and electricity.
- Service technicians use many different tools, including computerized diagnostic tools and power tools such as pneumatic wrenches, lathes, welding torches, and jacks and hoists. These tools usually are owned by their employers.
- Service technicians also use many common hand tools, such as sockets and ratchets, wrenches and pliers. These tools are generally owned by service technicians.

1.2 General Service Information:

1.2.1 Important facts about vehicle maintenance:

When a vehicle is properly maintained, it will be more dependable, safer, last longer and increase the satisfaction with the product. The owners also have a responsibility towards the environment and make sure that they give equal importance to the emission control. Regular service and regular maintenance helps to accomplish these goals by keeping the engine running efficiently.

1.2.2 The effects of maintaining a vehicle properly:

- More dependable vehicle
- Less chance of a costly breakdown
- A safer vehicle and goods
- Cleaner and environment friendly vehicle
- Higher resale value at the time of trade in or sale
- An intact warranty

1.2.3 Manufacturer maintenance schedules:

It is prescribed to maintain a proper schedule for outlining specific operations so that the various components and systems can work properly. This is done at different mileage intervals to ensure proper operation and prevent premature wear.

1.2.4 Safety and Scheduled Maintenance:

The safety aspect of properly maintaining a vehicle, especially when it has a high mileage, should not be ignored. Failing brakes and other problems can be prevented by following Vehicle Preventive Maintenance & care practices.

- **High mileage inspection and evaluation:**

If the vehicle has passed the 100,000 mile mark and the owner wants to prolong its useful life, then it is the time to have it thoroughly evaluated by a trained technician who can recommend needed repairs or service. It is a technician's job to guide the owner using factory-level information detailing the vehicle's service requirements.

- **Recommendations for changing filters:**

It is best to follow the Service maintenance schedules found in most new vehicle owner's manuals, with a few exceptions:

- ✓ Air filters need to be inspected regularly and replaced as often as needed. Dirty air filters can increase fuel consumption and exhaust emissions.
- ✓ Fuel filters should be replaced as per our recommended schedule. If the tank is dirty or rusty, constant fuel recirculation can pick up a lot of debris that ends up in the filter.
- ✓ If the filter plugs, the engine is starved for fuel or unfiltered fuel and later on this can damage injectors.
- ✓ Owners' manuals have a suggested change interval for the transmission fluids which should be followed and known to the technician.

- **Cooling System:**

- ✓ Replacing coolant on a regular basis will extend the life of the radiator and other cooling system components.
- ✓ Whenever a fluid comes in contact with metal, electro-chemical degradation occurs. This results in an increase in the level of acid. This higher acid level, if left unchanged, can result in costly repairs.
- ✓ Regular change helps in reducing the acid level and extends the life of key cooling system parts like the water pump, radiator, hoses, heater core and more.
- ✓ When coolant is changed, the system should be reverse flushed rather than simply drained. This helps dislodge and remove accumulated debris and debris in the system. It also removes old coolant that would otherwise remain in the engine block.

- **Brake Fluid:**

Brake fluid, just like any other fluid in the vehicle, needs to be tested every year and replaced at least every 2 years. The main problem with brake fluid is that it absorbs moisture (hygroscopic) from the air. This reduces the boiling point of the brake fluid, causing the fluid to boil under heavy braking, affecting hydraulic operation of the brake system. This results in a spongy brake pedal and reduced braking effectiveness. See the owner's manual for more information.



DO YOU KNOW?

The first road-worthy vehicles used a lever instead of a steering wheel to steer.

• **Other preventive maintenance tips:**



- ✓ Inspect windshield wiper blades for cracks, tears and windshield smearing.
- ✓ Check tyre inflation weekly. Under-inflated tyres waste fuel and cause uneven tyre wear.
- ✓ Under-inflated tyres can lead to tyre overheating and complete tyre failure.
- ✓ Inspect drive belts every time the oil is changed and replace when they show any signs of cracking or wear.

- ✓ Check battery cables and connections for corrosion and clean if needed.
- ✓ Check all vehicle lights, including headlights, brake lights, turn signals, parking lights, license plate lights and marker lights.

1.3 General Safety:

Following are some of the safety rules every person should follow:

Awareness of traffic signs includes-

- Hand Signals
- Direction Indicators
- Traffic Signs and Signals
- Lanes of the Road



Speeding limit-

- Install Speed Witness Radars
- Always wear your shields



Seat belts-

- Always wear seat belts in a four wheeler
- Always wear helmet on a two wheeler

Awareness through hoardings –

- While driving, keep an eye on the hoardings that are often quite helpful for drivers.



Insurance covers for all drivers –

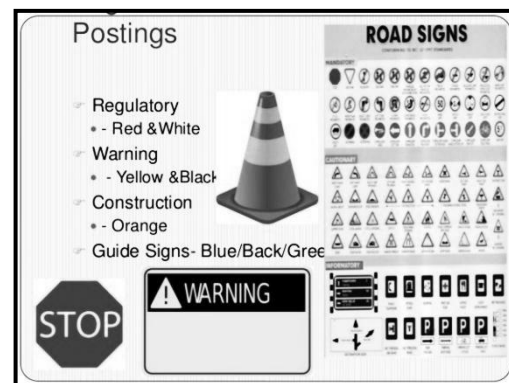
- All drivers must ensure that they have driving insurance policies.

Design feature of the vehicles –

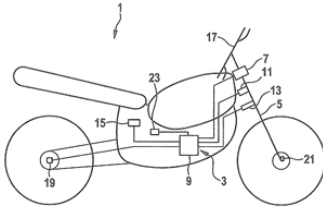
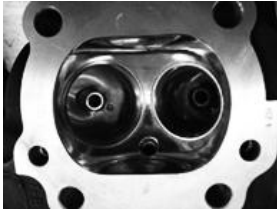
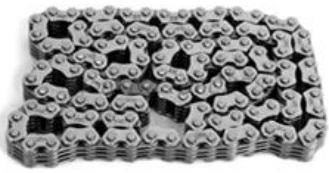
- It is very important for any driver to check the design of the driving area so that he/she can drive with ease.

Proper road maintenance and warnings –

- One of the most important safety rules is to follow the road signs and symbols so that there is no possibility of accidents.



1.4 Handling of 2 wheeler components:

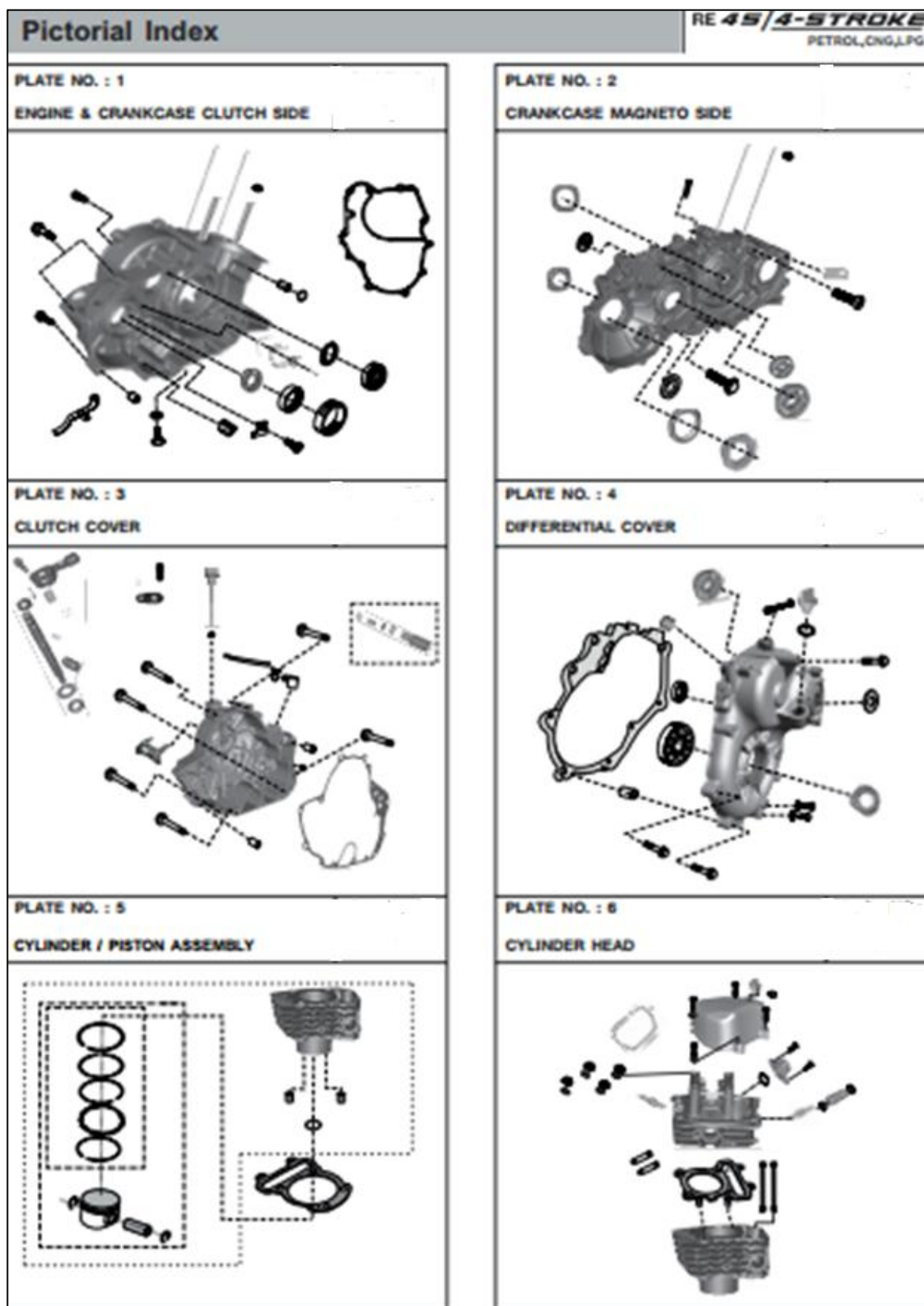
Air filter assembly 	Chassis frame 
Auto valve 	Clutch assembly 
Brake pedal 	Clutch cover 
Camshafts 	Control cables 
Carburettor 	Crank case 

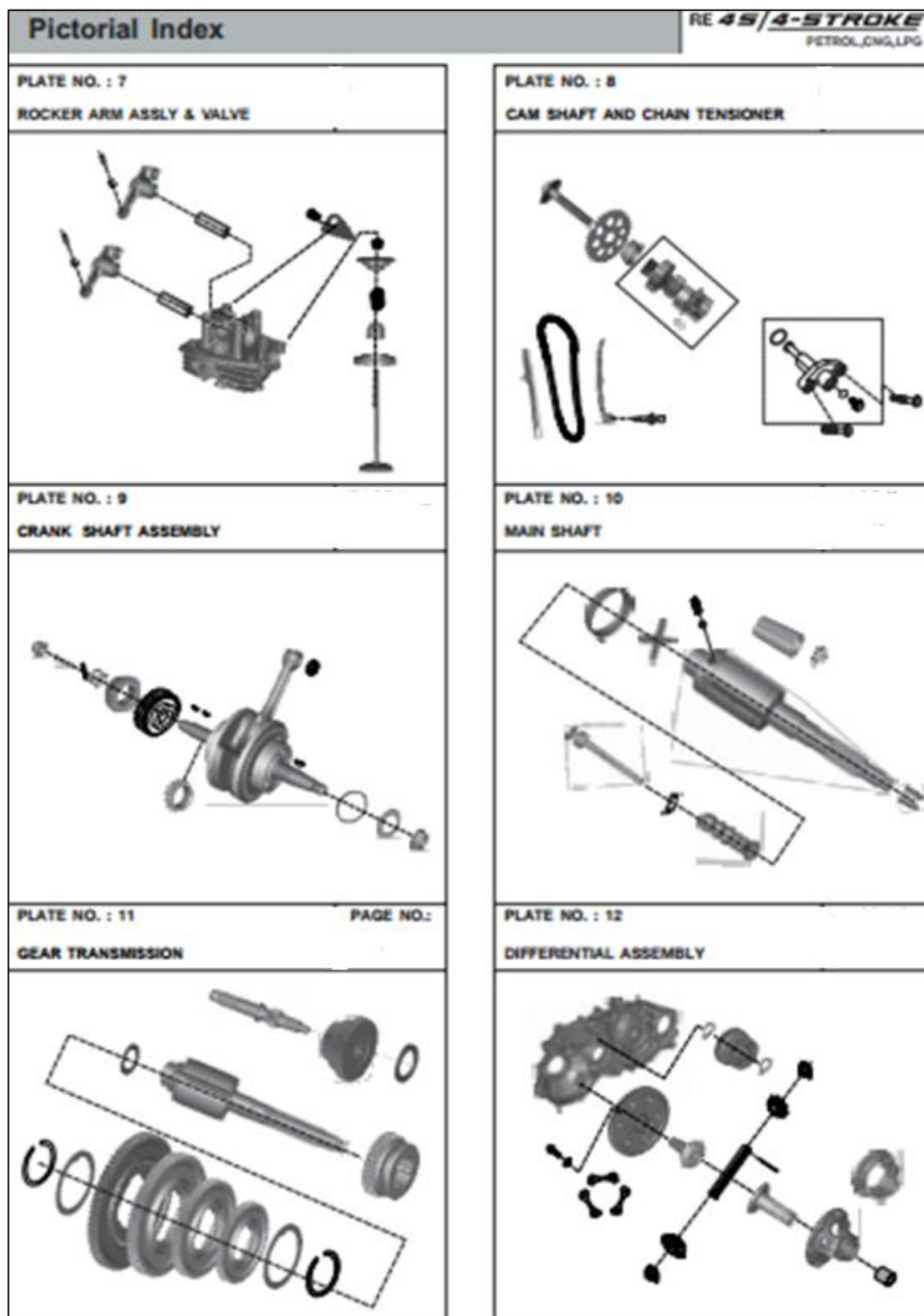
Chain case 	Crankshaft 
Chain cover 	Cylinder and piston assembly 
Vehicle number plate	Fuel tank cap
Electrical equipment	Handle bar
Fork front	Handle lamp assembly
Front fender	Kick starter
Front hub	Meter assembly

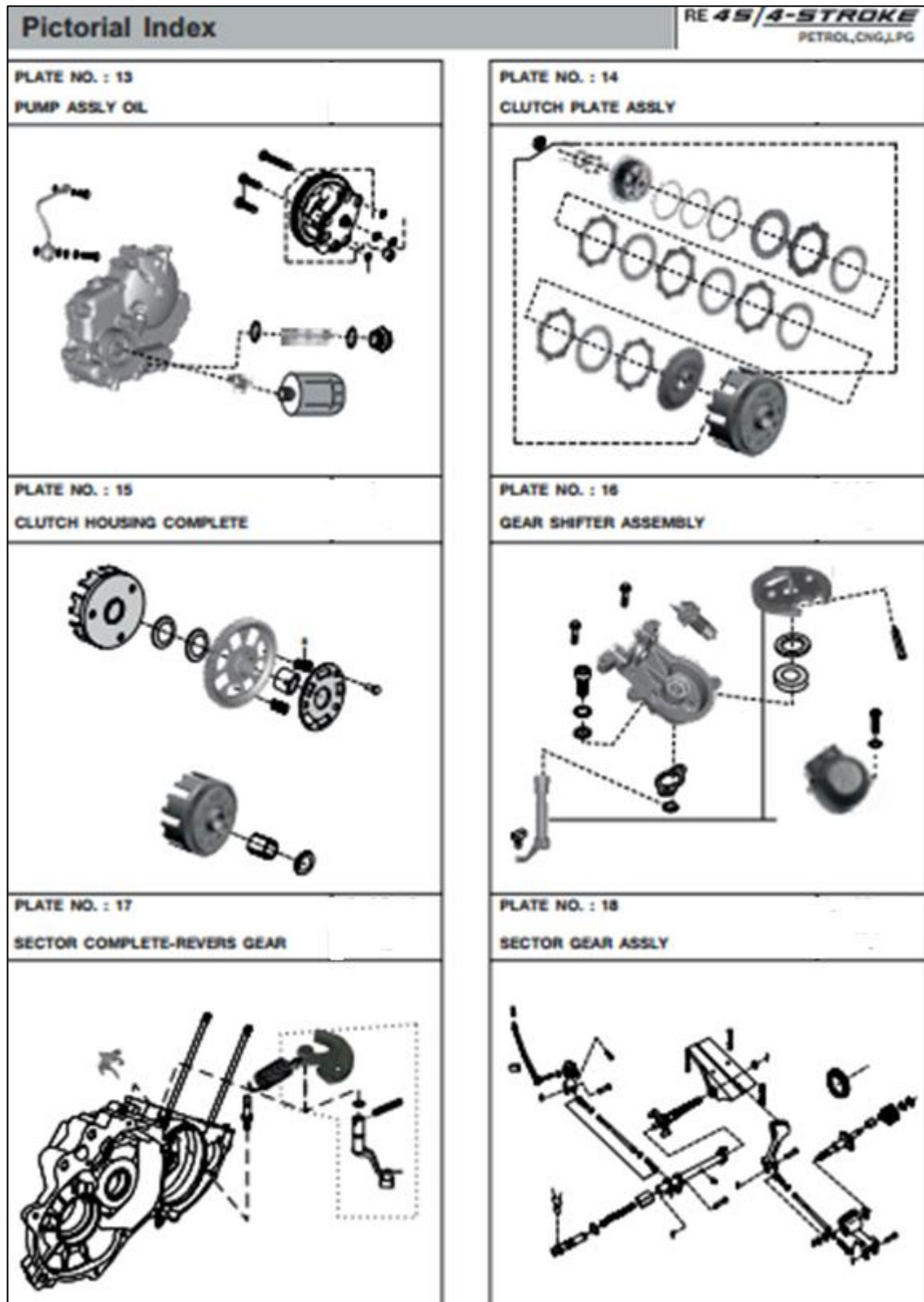
1.5 Handling of 3 wheeler components:

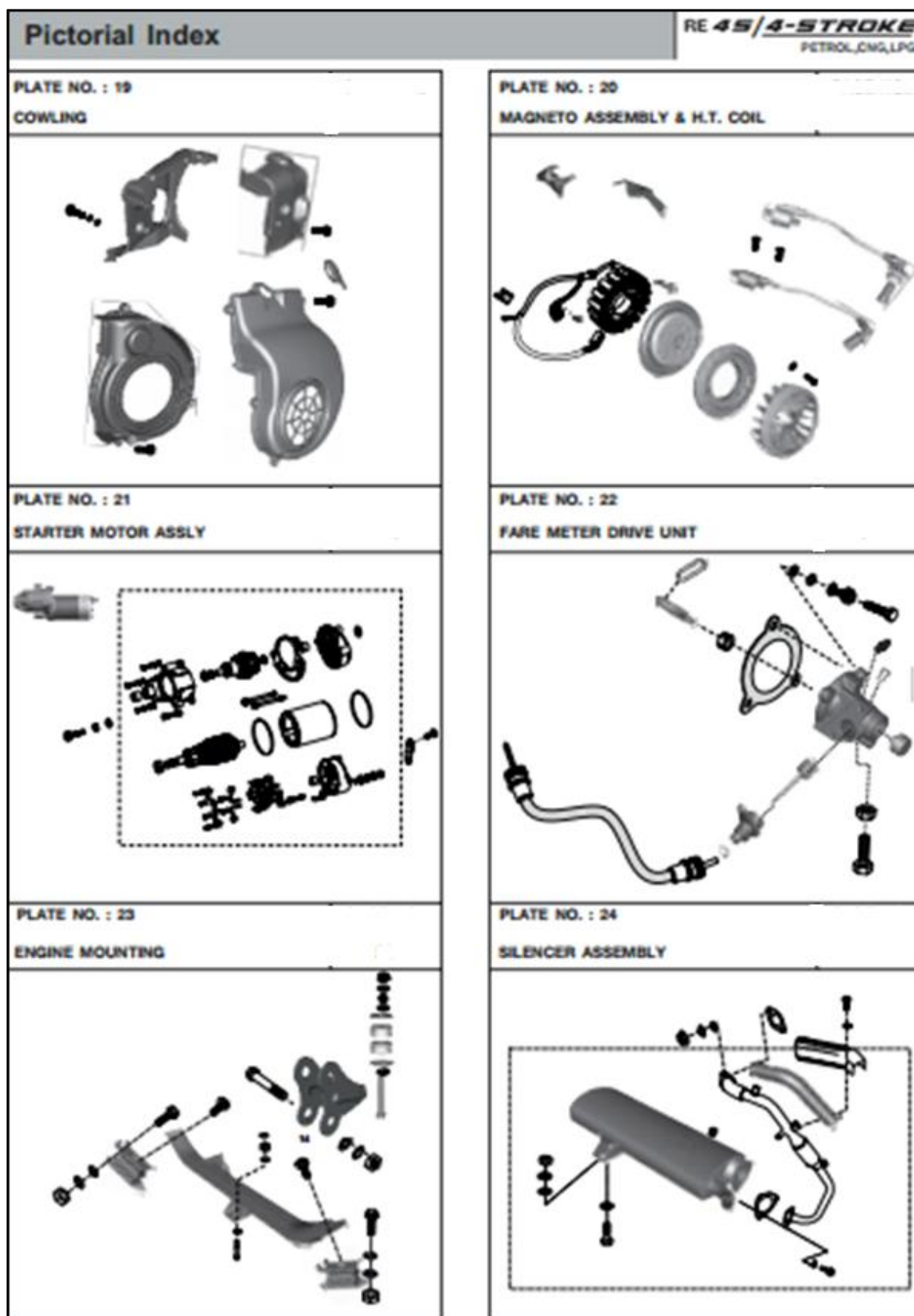
S.N.	Description
1	Engine & Crankcase Clutch Side
2	Crank Case Magneto Side
3	Clutch Cover
4	Differential Cover
5	Cylinder / Piston Assembly
6	Cylinder Head
7	Rocker Arm Assly & Valve
8	Cam Shaft & Chain Tensioner
9	Crank Shaft Assembly
10	Main Shaft
11	Gear Transmission
12	Differential Assembly
13	Pump Assly Oil
14	Clutch Plate Assly
15	Clutch Housing Comp
16	Gear Shifter Assly
17	Sector Complete - Revers Gear
18	Sector Gear Assly
19	Cowling
20	Magneto Assembly & H.T. Coil
21	Starter Motor Assly
22	Fare Meter Drive Unit
23	Engine Mounting
24	Silencer Assembly
25	Carburettor
26	Air Filter Complete
26a	Air Filter Complete
27	Pipe air intake
28	Oil Cooler
29	Petrol Tank & Petrol Cock Assly.
29a	Petrol Tank & Petrol Cock Assly.
29b	Petrol Tank & Petrol Cock Assly.
30	Propeller Shaft / Flanges
31	CV Shaft
32	Training Arm Assly.
32a	Training Arm Assly.

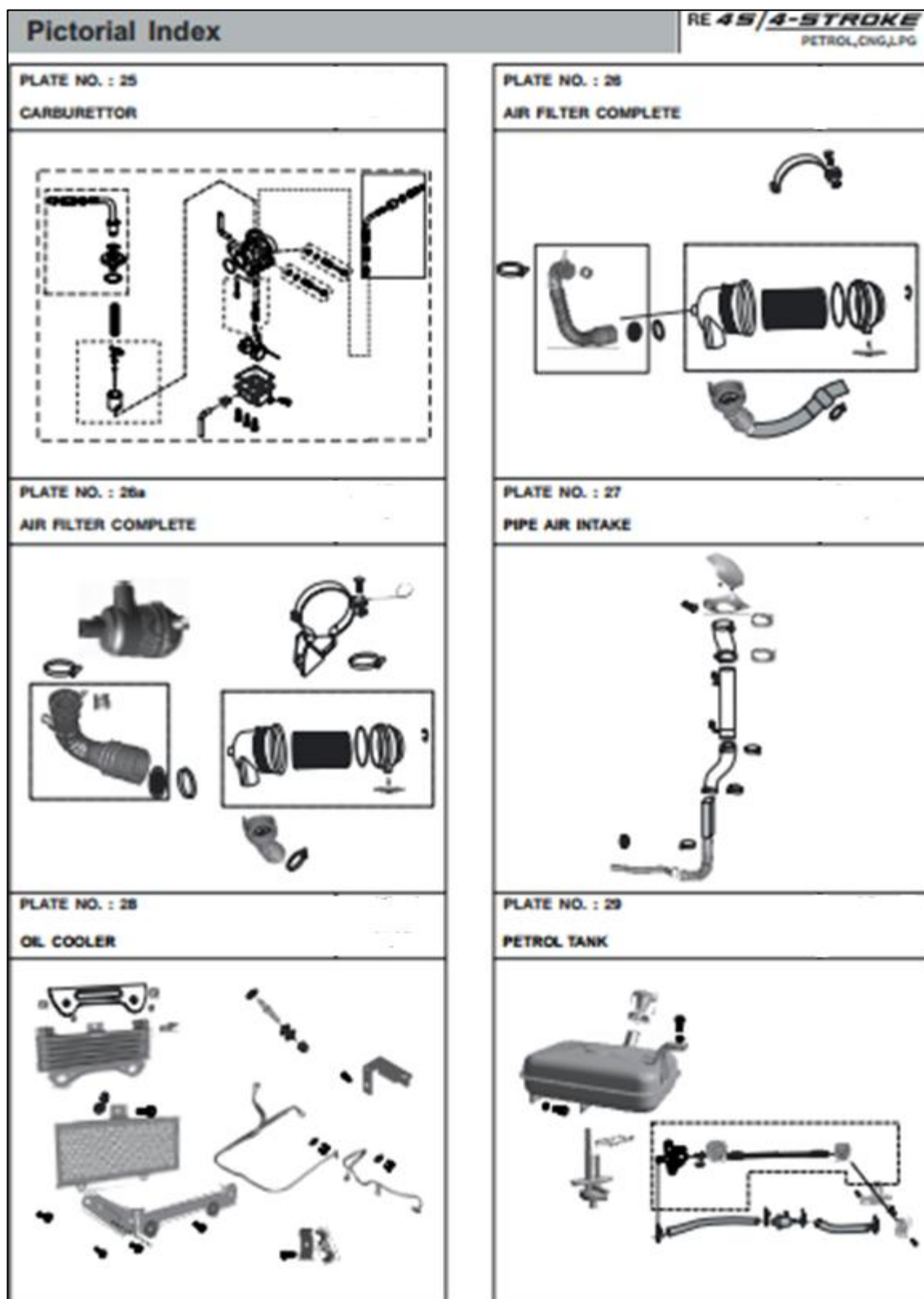
S.N.	Description
33	Rear Wheel exle
33a	Rear Wheel exle
34	Front Shock Absorber & Drum
35	Front Shock Absorber & linkage
36	Front Hub
37	Front brake drum
40	Front Mudguard
39	Auto Adjuster Brake System
40	Steering Column Assly.
41	Brake Pipe
42	Tandon Master Cylinder
43	Brake Pedal
44	Clutch Pedal
45	Handle Bar Assly.
46	Control Cables
47	Frame Chassis Assly
48	Harness Wiring
49	Dashboard Assembly
50	Wind Shield & Wiper Motor
51	Steering & Head Lamp cover
52	Passenger Body
52a	Passenger Body
53	Hood Frame Assly & Seat Assly.
53a	Hood Frame Assly & Seat Assly.
54	Head Light Assly & Blinkers
55	Tail Lamp Assly
56	Switches & Horn
57	Electrical Units
58	Cylinder for CNG & LPG Vehicle
59	Hoses
60	Relay & Solenoid
51	Filter Valve
62	1st Stage Reduction Unit
63	Regulator
64	Multi Valve(Zero Deg)
65	Battery

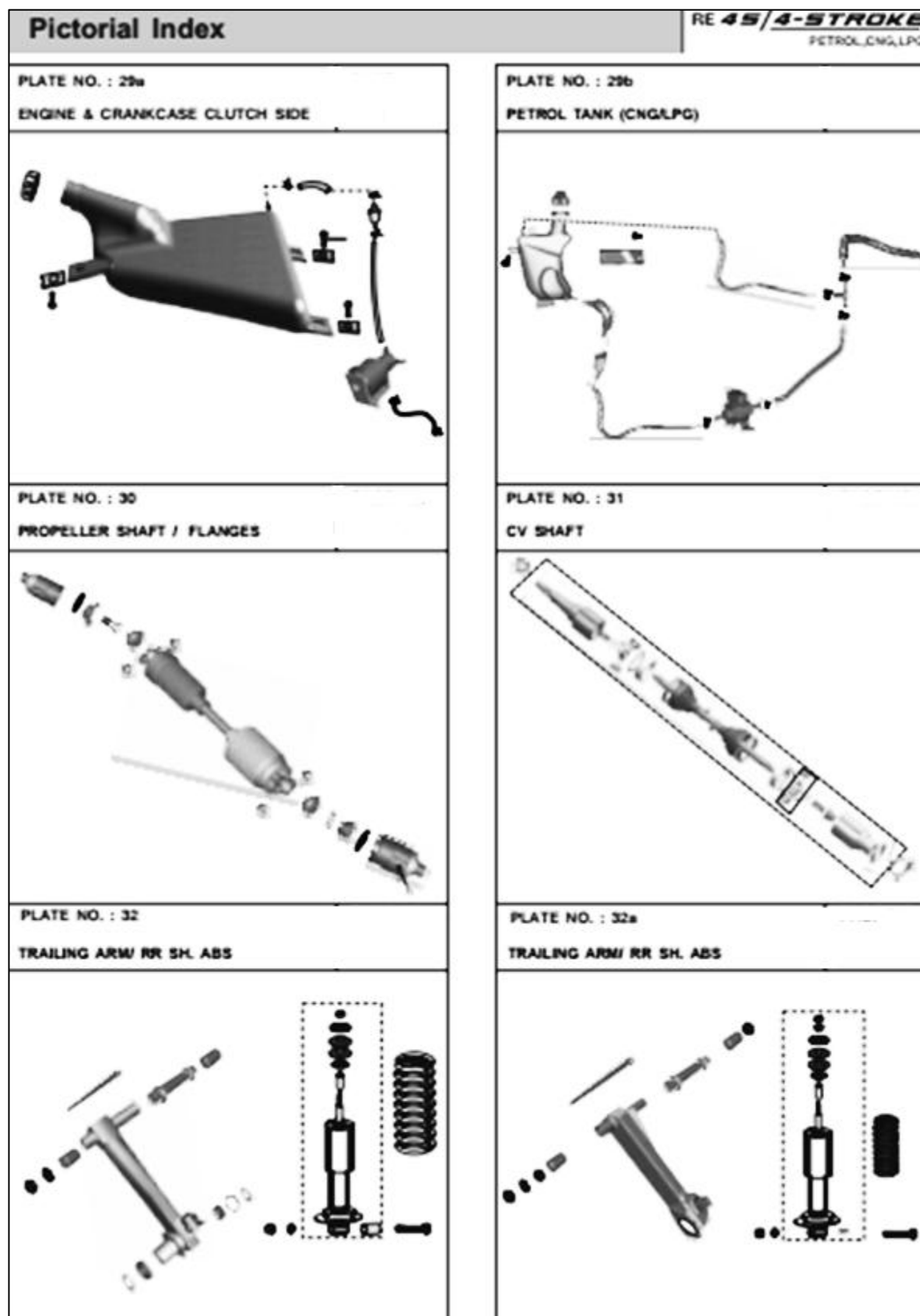


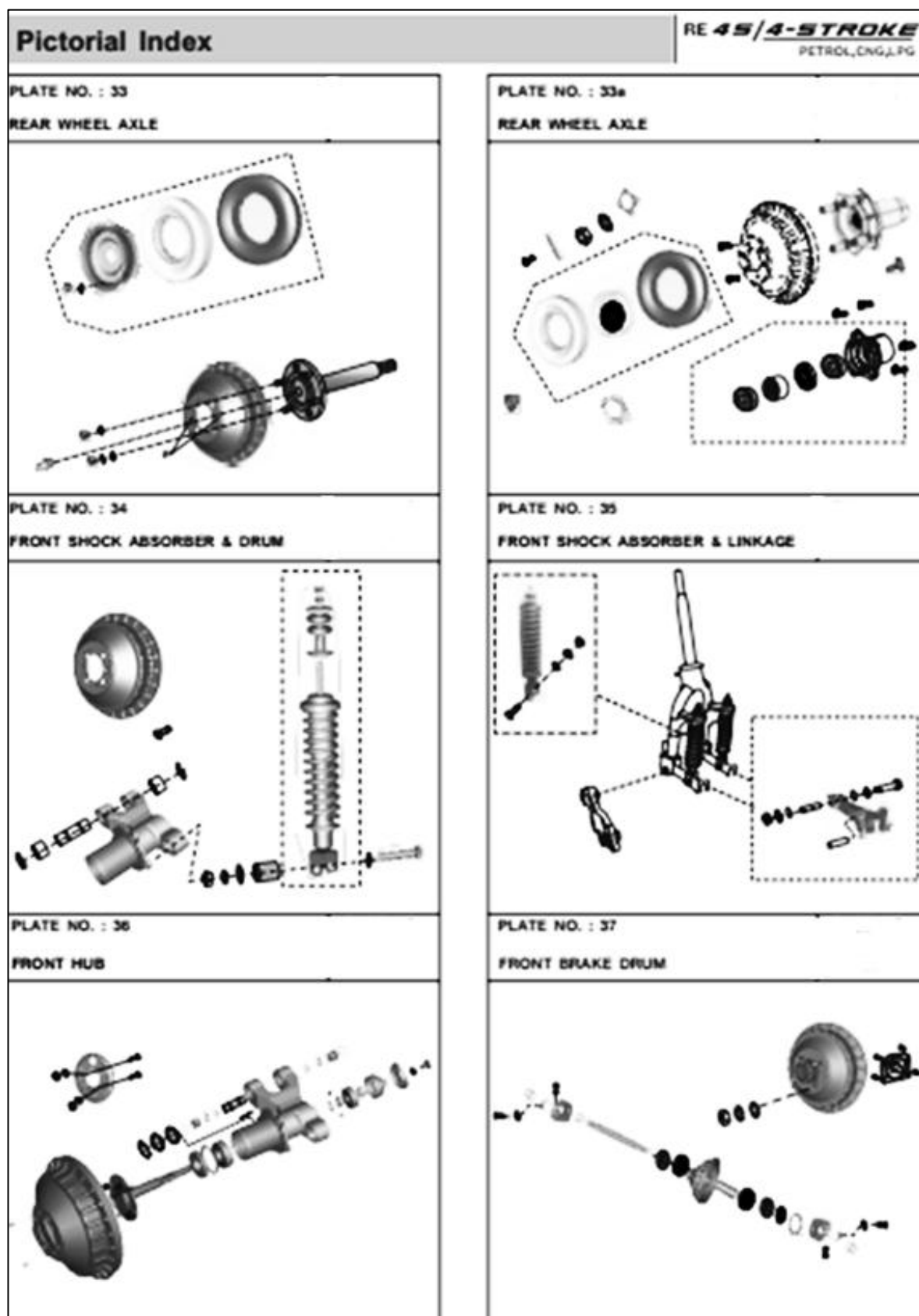


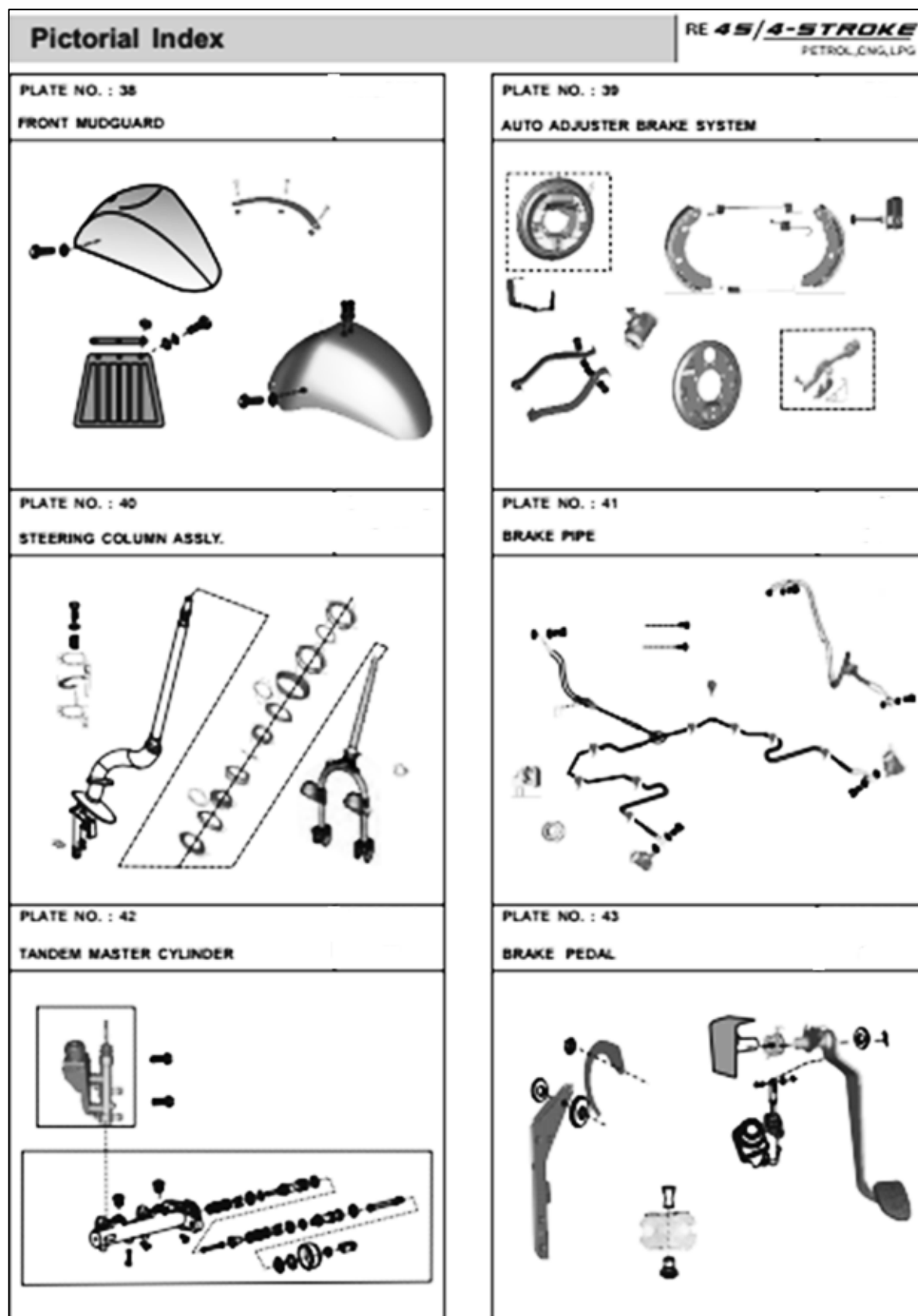














THE INSTITUTE OF THE MOTOR INDUSTRY

Maintenance & Repair – Motorcycle (Nov 2013 Draft)

Technical NOS Titles and URN's

MC01	Carry out routine motorcycle maintenance
MC02	Remove and replace motorcycle engine units and components
MC03	Fit and test motorcycle enhancements and accessories
MC04	Remove and replace motorcycle steering, brakes and suspension units and components
MCQ04	Remove and replace quad bike steering, brakes and suspension units and components
MC05	Carry out motorcycle preparation and inspections
MC06	Diagnose and rectify motorcycle electrical faults
MC07	Diagnose and rectify motorcycle engine and component faults
MC08	Diagnose and rectify motorcycle steering, brakes and suspension system faults
MCQ08	Diagnose and rectify quad bike steering, brakes and suspension system faults
MC09	Remove, store and fit non-welded, non-structural motorcycle body panels
MC10	Inspect, repair and replace motorcycle tyres
MC11	Overhaul motorcycle mechanical units
MC12	Diagnose and rectify motorcycle transmission and drive system faults
MC13	Remove and replace motorcycle drive units and components



Overview

This NOS is about conducting routine examination, adjustment and replacement activities as part of the periodic servicing of motorcycles, including scooters, mopeds, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride.

Performance criteria

- You must be able to:
- P1 use suitable personal protective equipment and motorcycle coverings (where applicable) throughout all motorcycle maintenance activities
 - P2 use suitable **sources of technical information** to support all your motorcycle maintenance activities
 - P3 ensure the motorcycle and the work area is safe prior to work commencing
 - P4 use the correct specifications and tolerances for the motorcycle when making **assessments** of system and component performance
 - P5 record details accurately, where the customer's motorcycle falls outside the manufacturer's original specification, and use this modified specification as the basis for your examination and assessment
 - P6 examine the motorcycle's systems and components following:
 - P6.1 the manufacturer's approved **examination methods**
 - P6.2 your workplace procedures
 - P6.3 health and safety requirements
 - P7 ensure your **examination methods** identify accurately any motorcycle system and component problems falling outside the servicing schedule specified
 - P8 retrieve, record and act on onboard data where applicable
 - P9 carry out adjustments, replacement of motorcycle components and replenishment of consumable materials following the manufacturer's current specification for:
 - P9.1 the particular service interval
 - P9.2 working methods and procedures
 - P9.3 use of equipment
 - P9.4 the tolerances for the motorcycle
 - P10 record the details accurately and take action which complies with the customer's instructions where system adjustments cannot be made within the manufacturer's specification
 - P11 work in a way which minimises the risk of damage to the motorcycle and its systems
 - P12 use suitable testing methods to evaluate the performance of all replaced and adjusted components and systems accurately, prior to returning the motorcycle



-
- to the customer
- P13 report any problems or issues relating to the motorcycle's condition or conformity to the relevant person(s) promptly
 - P14 ensure your maintenance records are accurate, complete and passed to the relevant person(s) promptly in the format required
 - P15 complete all motorcycle maintenance activities within the agreed timescale
 - P16 report any anticipated delays in completion to the relevant persons(s) promptly

Knowledge and understanding

Legislative and organisational requirements and procedures

You need to know and understand:

- K1 the manufacturer's and legal requirements relating to routine maintenance activities for motorcycle systems and components
- K2 the legal requirements relating to the motorcycle (including road safety requirements)
- K3 the health and safety legislation, environmental requirements and workplace procedures relevant to motorcycle maintenance activities and personal and motorcycle protection
- K4 your workplace procedures for:
 - K4.1 recording motorcycle maintenance work and any variations from the original motorcycle specification
 - K4.2 the referral of problems
 - K4.3 reporting delays to the completion of work
- K5 the importance of documenting motorcycle maintenance information
- K6 the importance of working to agreed timescales and keeping others informed of progress
- K7 the relationship between time and costs
- K8 the importance of reporting anticipated delays to the relevant person(s) promptly

Use of technical information

You need to know and understand:

- K9 how to find, interpret and use **sources of current technical information** for scheduled maintenance activities, including on-board diagnostic displays
- K10 the importance of using the correct **sources of technical information**
- K11 the purpose of and how to use identification codes

Motorcycle system operation

You need to know and understand:

- K12 how engines, cooling systems, intake and exhaust systems, fuel systems and ignition systems operate for the type(s) of motorcycle on which you are working
- K13 how clutch assemblies, clutch operating systems, manual gear boxes,

- automatic gear boxes, constantly variable transmission, drivelines and hubs (if appropriate) and final drive assemblies operate for the type of motorcycle on which you are working
- K14 how suspension systems, steering systems, braking systems, non-electrical body systems, wheels and tyres operate for the type of motorcycle on which you are working
- K15 how batteries, starting systems, charging systems, lighting systems and ancillary equipment operate for the type of motorcycle on which you are working
- K16 the operating specifications and tolerances for the type(s) of motorcycles on which you are working

Routine maintenance requirements

You need to know and understand:

- K17 how to conduct scheduled, routine **examination methods** and **assessments** against motorcycle specifications to identify damage, corrosion, inadequate fluid levels, leaks, wear, security problems and general condition and serviceability
- K18 how to check and make adjustments to clearances, gaps, settings, alignment, pressures, tension, speeds and levels relevant to the engine area, transmission area, frame area and electrical area
- K19 the difference between a faulty component and a dangerous component
- K20 how to remove, store, replace and inspect fairings, tanks, seats and guards
- K21 how to replenish and replace routine service components and materials, including filters, drive systems, lubricants and fluids
- K22 how to recognise cosmetic damage to motorcycle components and units outside normal service items
- K23 how to identify codes and grades of lubricants
- K24 how to work safely avoiding damage to the motorcycle and its systems

Additional information

Scope/range

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

1. Sources of technical information are:

- 1.1 motorcycle technical data
- 1.2 schedules of inspection
- 1.3 regulations
- 1.4 onboard data

2. Examination methods are:

- 2.1 aural
- 2.2 visual
- 2.3 functional
- 2.4 measurements

3. Assessments are for:

- 3.1 malfunction
- 3.2 damage
- 3.3 fluid levels
- 3.4 leaks
- 3.5 wear
- 3.6 security
- 3.7 condition and serviceability
- 3.8 conformity
- 3.9 necessity for adjustment(s)

Glossary**Agreed timescales**

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

Adjustments

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

Components

Examples include: filters, drive chains and belts, brake linings and pads, lubricants and fluids

Conformity

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

Systems testing equipment

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

Maintenance records

Examples include: records of motorcycle inspection, manufacturers, fleet company or customer job cards

Major service

As defined by manufacturer's specifications appropriate to the motorcycle being



worked upon

Motorcycles

These can be any of the following – motorcycles, scooters, mopeds, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride

Routine motorcycle maintenance

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

Motorcycle technical data

Examples include: hard copy manuals, data on computer and data obtained from on-board diagnostic displays

IMIMC01

Carry out routine motorcycle maintenance



Developed by	IMI
Version number	2
Date approved	February 2014
Indicative review date	February 2017
Validity	Current
Status	Original
Originating organisation	IMI Ltd
Original URN	MC01
Relevant occupations	Engineering; Vehicle Trades; Motorcycle Service Technician; ATV Service Technician
Suite	Maintenance and Repair - Motorcycle
Key words	Motorcycle; maintenance; repair; ATV; routine; service; inspection



Overview

This NOS is about removing and replacing motorcycle units and components previously identified as faulty, damaged, deteriorating or where a customer has requested a replacement, where dismantling and re-assembly of engine systems is required. It is also about evaluating the performance of replaced units and components. The units and components concerned are those outside those replaced as part of normal routine, motorcycle maintenance (servicing) activities.

For the purposes of this standard a motorcycle is defined as any of the following: motorcycle, moped, scooter, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride.

Performance criteria

- You must be able to:
- P1 wear suitable personal protective equipment and use motorcycle coverings (where applicable) throughout all removal and replacement activities
 - P2 ensure the motorcycle and the work area is safe prior to work commencing
 - P3 support your removal and replacement activities by reviewing:
 - P3.1 motorcycle technical data
 - P3.2 removal and replacement procedures
 - P3.3 legal requirements
 - P4 prepare, test and use all the **equipment** required following manufacturer's instructions
 - P5 carry out all removal and replacement activities following:
 - P5.1 manufacturer's instructions
 - P5.2 your workplace procedures
 - P5.3 health and safety requirements
 - P6 work in a way which minimises the risk of:
 - P6.1 damage to other motorcycle systems
 - P6.2 damage to other motorcycle components and units
 - P6.3 contact with leakage
 - P6.4 contact with hazardous substances
 - P6.5 electric shock
 - P7 ensure replaced engine **units and components** conform to the motorcycle operating specification and any legal requirements
 - P8 record and report any additional faults you notice during the course of your work promptly
 - P9 use suitable **testing methods** to evaluate the performance of the reassembled system accurately
 - P10 ensure the reassembled **engine system** performs to the motorcycle operating specification and meets any legal requirements prior to return to the customer
 - P11 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required
 - P12 complete all removal and replacement activities within the agreed timescale
 - P13 report any expected delays in completion to the relevant person(s) promptly

Knowledge and understanding

Legislative and organisational requirements and procedures

You need to know and understand:

- K1 the legal requirements relating to the motorcycle (including road safety requirements)
- K2 the health and safety legislation, environmental requirements and workplace procedures relevant to motorcycle maintenance activities and personal and motorcycle protection
- K3 your workplace procedures for:
 - K3.1 recording removal and replacement information
 - K3.2 the referral of problems
 - K3.3 reporting delays to the completion of work
- K4 the importance of documenting removal and replacement information
- K5 the importance of working to agreed timescales and keeping others informed of progress, to include delays
- K6 the relationship between time and costs

Use of technical information

You need to know and understand:

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

Engine system operation and construction

You need to know and understand:

- K10 **how engine systems** and their related **units and components** are constructed and their operation for those motorcycles worked upon
- K11 electrical and electronic principles associated with fuel and ignition systems, including types of sensors and actuators, their application and operation
- K12 how **engine systems** and their related **units and components** are dismantled and reassembled for those motorcycles worked upon

Equipment

You need to know
and understand:

- K13 how to prepare, test and use all the removal and replacement **equipment** required

Engine unit and component removal and replacement

You need to know
and understand:

- K14 how to remove and replace **engine system** mechanical and electrical **units and components** for those motorcycles worked upon
- K15 how to file, fit, tap, thread, cut and drill plastics and metals
- K16 how to select and fit gaskets, shims, sealants, fittings and fasteners
- K17 how to test and evaluate the performance of replacement engine and electrical **units and components** and the reassembled system against the motorcycle operating specifications and any legal requirements
- K18 the relationship between **testing methods** and the **units and components** replaced – the use of appropriate test methods
- K19 the properties of jointing and locking materials and when and where they should be used
- K20 the manufacturer's specification for the engine and electrical **units and components** to be used
- K21 how to work safely avoiding damage to other motorcycle systems, components and units, contact with leakage and hazardous substances and electric shock

Electrical unit and component operation and construction

You need to know
and understand:

- K22 how electrical **units and components** are constructed and their operation for those motorcycles worked upon
- K23 how electrical **units and components** are removed and replaced for those motorcycles worked upon

Electrical and electronic principles

You need to know
and understand:

- K24 electrical and electronic principles associated with starting and charging
- K25 types of circuit protection and why they are necessary
- K26 electrical safety procedures



-
- K27 how electrical circuits work
 - K28 electric symbols, units and terms
 - K29 the hazards associated with high energy electrical systems

Additional information

Scope/range

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

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

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

- 3 **Units and components** are:
 - 3.1. mechanical
 - 3.2. electrical
 - 3.3. fluid systems

- 4 **Engine systems** are:
 - 4.1. engine mechanical systems
 - 4.2. cooling systems
 - 4.3. intake and exhaust systems
 - 4.4. fuel and ignition systems
 - 4.5. lubrication systems
 - 4.6. clutch
 - 4.7. transmission and final drive
 - 4.8. starting and charging

Glossary

Agreed timescales

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

Units and components

Any unit or component from the engine system as defined in the Scoping Statement above

Motorcycles

These can be any of the following – motorcycles, scooters, mopeds, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride

IMIMC02

Remove and replace motorcycle engine units and components



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Originating organisation	IMI Ltd
Original URN	MC02
Relevant occupations	Engineering; Vehicle Trades; Motorcycle Service Technician; ATV Service Technician
Suite	Maintenance and Repair - Motorcycle
Key words	Remove; replace; motorcycle; engine; units; ATV; components; starting; charging; battery



Overview

This NOS is about fitting and testing enhancements and accessories to new and used motorcycles. This covers electrical items, exhausts, suspension components and luggage carriers/panniers. It is also about evaluating the performance of the fitted enhancements and accessories where applicable.

The enhancements and accessories are those not fitted as standard equipment when the motorcycle was manufactured.

Performance criteria

- You must be able to:
- P1 wear suitable personal protective equipment and use motorcycle coverings (where applicable) throughout all the fitting and testing activities
 - P2 ensure the motorcycle and the work area is safe prior to work commencing
 - P3 support your fitting and testing activities by reviewing:
 - P3.1 motorcycle technical data
 - P3.2 fitting and testing procedures
 - P3.3 legal requirements
 - P4 prepare, test and use all **equipment** required following manufacturer's instructions
 - P5 carry out fitting and testing activities following:
 - P5.1 manufacturer's instructions
 - P5.2 your workplace procedures
 - P5.3 health and safety requirements
 - P6 work in a way which minimises the risk of:
 - P6.1 damage to other motorcycle systems
 - P6.2 damage to other motorcycle units and components
 - P6.3 contact with leakage
 - P6.4 contact with hazardous substances
 - P6.5 electric shock
 - P7 ensure fitted **enhancements and accessories** conform to the motorcycle operating specification and any legal requirements
 - P8 record and report any fitted **enhancement** or **accessory** that does not conform to legal requirements
 - P9 record and report any additional faults you notice during the course of your work promptly
 - P10 use suitable **testing methods** to evaluate the performance of the fitted **enhancement** or **accessory** accurately
 - P11 demonstrate and explain the operation or effect of the enhancement or accessory fitted
 - P12 ensure all your records are accurate, complete and passed to the relevant person(s) promptly in the format required



P13 complete all fitting and testing activities within the agreed timescale

P14 report any expected delays in completion to the relevant person(s) promptly

Knowledge and understanding

Legislative and organisational requirements and procedures

You need to know and understand:

- K1 the legal requirements relating to the motorcycle
- K2 the health and safety legislation, environmental requirements and workplace procedures relevant to motorcycle enhancement and accessory fitting and testing activities, and personal and motorcycle protection
- K3 your workplace procedures for:
 - K3.1 recording fitting and testing information
 - K3.2 the referral of problems
 - K3.3 reporting delays to the completion of work
- K4 the importance of documenting fitting and testing information
- K5 the importance of working to agreed timescales and keeping others informed of progress
- K6 the relationship between time and cost
- K7 the importance of reporting anticipated delays to the relevant person(s) promptly

Use of technical information

You need to know and understand

- K8 how to find, interpret and use sources of information applicable to fitting and testing motorcycle **enhancements and accessories** to include:
 - K8.1 electrical units and components
 - K8.2 exhaust components
 - K8.3 suspension components
 - K8.4 luggage accessories
 - K8.5 body accessories
 - K8.6 wheels, tyres and steering
- K9 the importance of using the correct sources of technical information

Equipment

You need to know and understand

- K10 how to prepare, test and use all the fitting and testing **equipment** required
- K11 how to calibrate any testing or measuring **equipment** required for the fitting

and testing activity

K12 how to clean and store all the fitting and testing **equipment** after use

Electrical and electronic principles

You need to know
and understand

K13 electrical and electronic principles associated with electrical systems, including types of sensors and actuators, their application and operation

K14 types of circuit protection and why these are necessary

K15 electrical safety procedures

K16 how electrical circuits work

K17 electric symbols, units and terms

K18 motorcycle earthing principles and methods

K19 the hazards associated with high energy electrical systems and components

Enhancements and accessories fitting and testing

You need to know
and understand

K20 how to fit **enhancements and accessories** for those motorcycles worked upon, to include:

K20.1 electrical **enhancements and accessories**

K20.2 exhaust components

K20.3 suspension components

K20.4 luggage accessories

K20.5 body accessories

K20.6 wheels and steering

K21 how to test and evaluate the performance of the fitted **enhancements and accessories**, to include:

K21.1 electrical **enhancements and accessories**

K21.2 exhaust components

K21.3 suspension components

K21.4 luggage accessories

K21.5 body accessories

K21.6 wheels and steering

K22 the manufacturer's specification for the fitted **enhancements and accessories**

K23 the motorcycle manufacturer's requirements relating to any remaining warranty



K24 how to work safely, avoiding damage to other motorcycle systems, components and units, contact with leakage and hazardous substances and electric shock

Additional information

Scope/range

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

1 Equipment is:

- 1.1. hand tools
- 1.2. special workshop tools
- 1.3. general workshop equipment
- 1.4. electrical testing equipment
- 1.5. lifting equipment
- 1.6. measuring equipment

2 Testing methods are:

- 2.1. visual
- 2.2. aural
- 2.3. functional
- 2.4. measuring

3 Enhancements and accessories are:

- 3.1. electrical enhancements and accessories
- 3.2. exhaust components, not fitted as standard equipment
- 3.3. suspension components, not fitted as standard equipment
- 3.4. luggage accessories, not fitted as standard equipment
- 3.5. body accessories, not fitted as standard equipment
- 3.6. wheel, tyre and steering, not fitted as standard equipment

Glossary**Agreed timescales**

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

Electrical enhancements and accessories

Examples include: heated grips, heated seats, audio systems, intercom systems, integrated satellite navigation, cameras, monitoring systems, lighting systems (additional to any factory fitted items), security and alarm systems; electrical rider safety systems

Motorcycles

These can be any of the following that you sit astride: motorcycles, scooters, mopeds, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride

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Originating organisation	IMI Ltd
Original URN	MC03
Relevant occupations	Engineering; Vehicle Trades; Motorcycle Service Technician; ATV Service Technician
Suite	Maintenance and Repair - Motorcycle
Key words	Motorcycle; enhancements; accessories; ATV; electrical; fitting; testing; exhausts; suspension; luggage



Overview

This NOS is about removing and replacing units and components where dismantling and re-assembly of steering, brakes and suspension systems is required. It is also about evaluating the performance of replaced units and components. The units and components concerned are those outside those replaced as part of normal routine, motorcycle maintenance (servicing) activities.

For the purposes of this standard a motorcycle is defined as any of the following: motorcycle, moped, scooter and those with a third wheel.

Performance criteria

- You must be able to:
- P1 wear suitable personal protective equipment and use motorcycle coverings (where applicable) throughout all removal and replacement activities
 - P2 ensure the motorcycle and the work area is safe prior to work commencing
 - P3 support your removal and replacement activities by reviewing:
 - P3.1 motorcycle technical data
 - P3.2 removal and replacement procedures
 - P3.3 legal requirements
 - P4 prepare, test and use all the **equipment** required following manufacturer's instructions
 - P5 carry out all removal and replacement activities following:
 - P5.1 manufacturer's instructions
 - P5.2 your workplace procedures
 - P5.3 health and safety requirements
 - P6 work in a way which minimises the risk of:
 - P6.1 damage to other motorcycle systems
 - P6.2 damage to other motorcycle components and units
 - P6.3 contact with leakage
 - P6.4 contact with hazardous substances
 - P6.5 electric shock
 - P7 ensure replaced **steering, braking and suspension units and components** conform to the motorcycle operating specification and any relevant legal requirements
 - P8 record and report any additional faults you notice during the course of your work promptly
 - P9 use suitable **testing methods** to evaluate the performance of the reassembled system accurately
 - P10 ensure the reassembled system performs to the motorcycle operating specification and meets any legal requirements prior to return to the customer
 - P11 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required
 - P12 complete all removal and replacement activities within the agreed timescale

IMIMC04

Remove and replace motorcycle steering, brakes and suspension units and components



P13 report any expected delays in completion to the relevant person(s) promptly

Knowledge and understanding

Legislative and organisational requirements and procedures

You need to know and understand:

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

Use of technical information

You need to know and understand:

- K8 how to find, interpret and use sources of information applicable to **unit and component** removal and replacement within the **steering, brakes** and **suspension** systems
- K9 the importance of using the correct sources of technical information
- K10 the purpose of and how to use identification codes

Electrical and electronic principles

You need to know and understand:

- K11 electrical and electronic principles associated with motorcycle ABS systems, traction control, electronically linked brakes including types of sensors, actuators and motors
- K12 types of circuit protection and why these are necessary
- K13 electrical safety procedures

- K14 how electrical circuits work
- K15 electrical symbols, units and terms
- K16 the operation of electrical and electronic control systems
- K17 the hazards associated with high energy electrical systems

Steering, brakes and suspension system operation and construction

You need to know
and understand:

- K18 how **steering** systems and their related **units and components** (including wheels) are constructed and their operation for those motorcycles worked upon
- K19 how **braking** systems and their related **units and components** are constructed and their operation for those motorcycles worked upon
- K20 how **suspension** systems and their related **units and components** are constructed and their operation for those motorcycles worked upon

Equipment

You need to know
and understand:

- K21 how to prepare, test and use all the removal and replacement **equipment** required

Steering, braking and suspension system unit and component removal and replacement

You need to know
and understand:

- K22 how to remove and replace **steering, braking and suspension** system mechanical, electrical and hydraulic **units and components** (including wheels)
- K23 how to file, fit, tap, thread, cut and drill plastics and metals
- K24 how to select and use gaskets, sealants, seals, fittings, fasteners and locking devices
- K25 how to test and evaluate the performance of replacement **steering, braking and suspension** system **units and components** and how to compare the reassembled system against the motorcycle operating specifications and any legal requirements
- K26 the relationship between **testing methods** and the **steering, braking and suspension** system **units and components** replaced – the use of appropriate test methods



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- K27 when replacement units and components must meet the original equipment specification (OES) for warranty or other requirements
 - K28 how to work safely avoiding damage to other motorcycle systems, components and units, contact with leakage and hazardous substances and electric shock

Additional information

Scope/range

- 1 **Equipment** is:
 - 1.1. hand tools
 - 1.2. special workshop tools
 - 1.3. general workshop equipment
- 2 **Testing methods** are:
 - 2.1. visual
 - 2.2. aural
 - 2.3. functional
 - 2.4. measurement
 - 2.5. simulated
- 3 **Steering units and components** are:
 - 3.1. steering dampers
 - 3.2. head bearings
 - 3.3. steering stems and associated components
 - 3.4. flexible handlebar mountings
 - 3.5. lock stops
- 4 **Brake units and components** are:
 - 4.1. brake linings/pads
 - 4.2. hydraulic brake lines/pipes
 - 4.3. brake cables
 - 4.4. brakes linkages/rods (this does not include operating levers)
 - 4.5. brake master cylinder
- 5 **Suspension units and components** are:
 - 5.1. front forks
 - 5.2. fork seals
 - 5.3. swinging arms
 - 5.4. trailing arms
 - 5.5. dampers

IMIMC04

Remove and replace motorcycle steering, brakes and suspension units and components



5.6. road springs

Glossary

Agreed timescales

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

Units and components

Any unit or component from the steering, braking or suspension systems defined in the Scoping Statement above

Functional testing

Examples include: use of brake tester, road test, bounce test

Steering and suspension system

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

Motorcycles

These can be any of the following – motorcycles, scooters, mopeds and those with a third wheel

IMIMC04

Remove and replace motorcycle steering, brakes and suspension units and components



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Originating organisation	IMI Ltd
Original URN	MC04
Relevant occupations	Engineering; Vehicle Trades; Motorcycle Service Technician
Suite	Maintenance and Repair - Motorcycle
Key words	Motorcycle; maintenance; remove; replace; steering; brakes; suspension; units; components



Overview

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

For the purposes of this standard a quad bike is an all terrain vehicle (ATV) which you sit astride with four or more wheels.

Performance criteria

- You must be able to:
- P1 wear suitable personal protective equipment and use quad bike coverings (where applicable) throughout all removal and replacement activities
 - P2 ensure the quad bike and the work area is safe prior to work commencing
 - P3 support your removal and replacement activities by reviewing:
 - P3.1 quad bike technical data
 - P3.2 removal and replacement procedures
 - P3.3 legal requirements
 - P4 prepare, test and use all the **equipment** required following manufacturer's instructions
 - P5 carry out all removal and replacement activities following:
 - P5.1 manufacturer's instructions
 - P5.2 your workplace procedures
 - P5.3 health and safety requirements
 - P6 work in a way which minimises the risk of:
 - P6.1 damage to other quad bike systems
 - P6.2 damage to other quad bike components and units
 - P6.3 contact with leakage
 - P6.4 contact with hazardous substances
 - P6.5 electric shock
 - P7 ensure replaced **steering, braking and suspension units and components** conform to the quad bike operating specification and any relevant legal requirements
 - P8 record and report any additional faults you notice during the course of your work promptly
 - P9 use suitable **testing methods** to evaluate the performance of the reassembled system accurately
 - P10 ensure the reassembled system performs to the quad bike operating specification and meets any legal requirements prior to return to the customer
 - P11 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required
 - P12 complete all removal and replacement activities within the agreed timescale

IMIMCQ04

Remove and replace quad bike steering, brakes and suspension units and components



P13 report any expected delays in completion to the relevant person(s) promptly

Knowledge and understanding

Legislative and organisational requirements and procedures

You need to know and understand:

- K1 the legal requirements relating to the quad bike (including road safety requirements)
- K2 the health and safety legislation, environmental requirements and workplace procedures relevant to quad bike maintenance activities and personal and quad bike protection
- K3 your workplace procedures for:
 - K3.1 recording removal and replacement information
 - K3.2 the referral of problems
 - K3.3 reporting delays to the completion of work
- K4 the importance of documenting removal and replacement information
- K5 the importance of working to agreed timescales and keeping others informed of progress
- K6 the relationship between time and costs
- K7 the importance of reporting anticipated delays to the relevant person(s) promptly

Use of technical information

You need to know and understand:

- K8 how to find, interpret and use sources of information applicable to **unit and component** removal and replacement within the **steering, brakes and suspension** systems
- K9 the importance of using the correct sources of technical information
- K10 the purpose of and how to use identification codes

Electrical and electronic principles

You need to know and understand:

- K11 electrical and electronic principles associated with quad bike ABS systems, traction control, electronically linked brakes including types of sensors, actuators and motors
- K12 types of circuit protection and why these are necessary
- K13 electrical safety procedures

- K14 how electrical circuits work
- K15 electrical symbols, units and terms
- K16 the operation of electrical and electronic control systems
- K17 the hazards associated with high energy electrical systems

Steering, brakes and suspension system operation and construction

You need to know
and understand:

- K18 how **steering** systems and their related **units and components** (including wheels) are constructed and their operation for those quad bikes worked upon
- K19 how **braking** systems and their related **units and components** are constructed and their operation for those quad bikes worked upon
- K20 how **suspension** systems and their related **units and components** are constructed and their operation for those quad bikes worked upon

Equipment

You need to know
and understand:

- K21 how to prepare, test and use all the removal and replacement **equipment** required

Steering, braking and suspension system unit and component removal and replacement

You need to know
and understand:

- K22 how to remove and replace **steering, braking and suspension** system mechanical, electrical and hydraulic **units and components** (including wheels)
- K23 how to file, fit, tap, thread, cut and drill plastics and metals
- K24 how to select and use gaskets, sealants, seals, fittings, fasteners and locking devices
- K25 how to test and evaluate the performance of replacement **steering, braking and suspension** system **units and components** and how to compare the reassembled system against the quad bike operating specifications and any legal requirements
- K26 the relationship between **testing methods** and the **steering, braking and suspension** system **units and components** replaced – the use of appropriate test methods



- K27 when replacement units and components must meet the original equipment specification (OES) for warranty or other requirements
- K28 how to work safely avoiding damage to other quad bike systems, components and units, contact with leakage and hazardous substances and electric shock

Additional information

Scope/range

- 1 **Equipment** is:
 - 1.1. hand tools
 - 1.2. special workshop tools
 - 1.3. general workshop equipment
- 2 **Testing methods** are:
 - 2.1. visual
 - 2.2. aural
 - 2.3. functional
 - 2.4. measurement
 - 2.5. simulated
- 3 **Steering units and components** are:
 - 3.1. steering dampers
 - 3.2. head bearings
 - 3.3. steering arms/rods
 - 3.4. steering knuckle
 - 3.5. steering gaiters
 - 3.6. steering yoke
 - 3.7. lock stops
- 4 **Brake units and components** are:
 - 4.1. brake linings/pads
 - 4.2. hydraulic brake lines/pipes
 - 4.3. brake cables
 - 4.4. brakes linkages/rods (this does not include operating levers)
 - 4.5. brake master cylinder
- 5 **Suspension units and components** are:
 - 5.1. A arms
 - 5.2. suspension arms
 - 5.3. trailing arms



- 5.4. dampers
- 5.5. road springs
- 5.6. strut assemblies
- 5.7. suspension bushes
- 5.8. ball joints

Glossary

Agreed timescales

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

Units and components

Any unit or component from the steering, braking or suspension systems defined in the Scoping Statement above

Functional testing

Examples include: use of brake tester, road test, bounce test

Steering and suspension system

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

Quad bike

These are all terrain vehicles (ATVs) which you sit astride and have at least four wheels

IMIMCQ04

Remove and replace quad bike steering, brakes and suspension units and components



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Original URN	MC04
Relevant occupations	Engineering; Vehicle Trades; ATV Service Technician
Suite	Maintenance and Repair - Motorcycle
Key words	ATV; maintenance; remove; replace; steering; brakes; suspension; units; components



Overview

This NOS is about carrying out motorcycle preparation activities and a range of inspections using a variety of testing methods and equipment. It also covers removing a new motorcycle from a crate and assembling it.

For the purpose of this standard a motorcycle is defined as any of the following: motorcycle, scooter, moped, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride.

Performance criteria

- You must be able to:
- P1 use suitable personal and vehicle (where applicable) protective equipment throughout all motorcycle inspection activities
 - P2 use suitable sources of technical information to support your motorcycle inspection activities
 - P3 ensure the motorcycle and the work area is safe prior to work commencing
 - P4 confirm that equipment has been calibrated to meet manufacturer's and legal requirements, where necessary
 - P5 carry out systematic motorcycle preparation and inspections following:
 - P5.1 your workplace procedures
 - P5.2 health and safety requirements
 - P5.3 manufacturer's guidelines
 - P6 conduct all motorcycle testing following:
 - P6.1 the manufacturer's instructions
 - P6.2 the recognised test methods
 - P6.3 your workplace procedures
 - P6.4 health and safety requirements
 - P7 ensure your comparison of the motorcycle against specification accurately identifies any:
 - P7.1 differences from the motorcycle specification
 - P7.2 motorcycle appearance and condition faults
 - P7.3 non-compliance with statutory requirements
 - P8 prepare motorcycles for sale to meet your organisation's, manufacturer's and legal requirements
 - P9 work in a way which minimises the risk of damage to the motorcycle and its systems, other people and their property
 - P10 make suitable recommendations for future action based upon the results of your tests and inspections
 - P11 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required
 - P12 complete all inspection activities within the agreed timescale and to specification



P13 report any anticipated delays in completion to the relevant person(s) promptly

Knowledge and understanding

Legislative and organisational requirements and procedures

You need to know and understand:

- K1 the health and safety legislation, environmental requirements and workplace procedures relevant to conducting motorcycle preparation and inspections and personal and motorcycle protection
- K2 the legislation relevant to the types of **motorcycle preparation and inspections** described in the Scoping Statement for this NOS
- K3 your workplace procedures for:
 - K3.1 recording **motorcycle preparation and inspections** and any variations from acceptable tolerances
 - K3.2 the referral of problems
 - K3.3 reporting delays to the completion of work
- K4 the importance of making accurate records of the results of your tests and inspections and interpreting them correctly
- K5 the importance of working to agreed timescales and keeping others informed of progress
- K6 the relationship between time, costs and profitability
- K7 the importance of reporting anticipated delays to the relevant person(s) promptly

Sources of information

You need to know and understand:

- K8 how to find, interpret and use technical information
- K9 the importance of using technical information to inform your inspection and testing of motorcycles

Preparation, testing methods and the conduct of inspections

You need to know and understand:

- K10 how motorcycle systems operate (including the engine area, transmission area, steering, brakes, suspension and electrical area) and the operational tolerances for the motorcycle(s) on which you are working
- K11 how to follow procedures for the systematic inspection and preparation of motorcycles



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- K12 how to test the operation of motorcycle systems and motorcycle condition, including workshop based and road tests
 - K13 how to compare test and inspection results against motorcycle specifications and legal requirements
 - K14 how to record test and inspection results in the format required
 - K15 how to make recommendations based upon the results of your inspections
 - K16 the implications of failing to carry out an inspection correctly
 - K17 how to safely un-crate and assemble motorcycles following manufacturer's instructions and procedures
 - K18 the differences between preparation of motorcycles for the showroom and for the customer
 - K19 how to minimise the likelihood of corrosion when assembling and reassembling motorcycles

Additional information

Scope/range

- 1 **Motorcycle preparation and inspection** can cover:
 - 1.1. pre-work
 - 1.2. post-work
 - 1.3. pre-delivery
 - 1.4. pre-MOT test
 - 1.5. safety inspections
 - 1.6. un-crate and assembly

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

- 3 **Equipment** is:
 - 3.1. emissions testers
 - 3.2. brake testers
 - 3.3. headlamp alignment
 - 3.4. wheel alignment
 - 3.5. torque setting/testing
 - 3.6. diagnostic equipment
 - 3.7. battery charging
 - 3.8. lifting and support equipment
 - 3.9. measuring
 - 3.10. tyre inflation

Glossary

Agreed timescales

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

Motorcycles

These can be any of the following – motorcycles, scooters, mopeds, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride

Preparation

Examples include – making seat, handlebar and or foot peg adjustments to suit the customer, un-crating and assembly

Sources of technical information

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

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Validity	Current
Status	Original
Originating organisation	IMI Ltd
Original URN	MC05
Relevant occupations	Engineering; Vehicle Trades; Motorcycle Service Technician; Motorcycle Diagnostic Technician; ATV Service Technician; ATV Diagnostic Technician
Suite	Maintenance and Repair – Motorcycle
Key words	Motorcycle; preparation; inspections; ATV; pre-delivery; PDI; pre-work; post-work; safety



Overview

This NOS is about identifying and rectifying electrical faults occurring within a variety of electrical systems within motorcycle equipment. This includes faulty components, wiring and connections.

For the purposes of this standard a motorcycle is defined as any of the following: motorcycle, scooter, moped, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride.

Performance criteria

- You must be able to:
- P1 wear suitable personal protective equipment and use motorcycle coverings (where applicable) when using electrical **testing techniques** and carrying out **rectification activities**
 - P2 ensure the motorcycle and the work area is safe prior to commencing with any diagnostic or rectification activity
 - P3 support the identification of **complex electrical faults** by reviewing motorcycle:
 - P3.1 technical data
 - P3.2 diagnostic test procedures
 - P4 prepare, connect and test all the required **electrical and electronic testing equipment** following manufacturer's instructions prior to use
 - P5 use **electrical and electronic testing techniques**, tests and processes which are relevant to the symptoms presented
 - P6 collect sufficient diagnostic information in a systematic way to enable an accurate diagnosis of **electrical system** faults
 - P7 identify and record any system deviation from acceptable limits accurately
 - P8 make cost effective recommendations for rectification based upon your analysis of the diagnostic information gained
 - P9 use the **tools and equipment** required correctly and safely throughout all diagnostic and **rectification activities**
 - P10 carry out all **rectification activities** following:
 - P10.1 manufacturer's instructions
 - P10.2 your workplace procedures
 - P10.3 health and safety requirements
 - P11 work in a way which minimises the risk of:
 - P11.1 damage to other motorcycle systems
 - P11.2 damage to other components and units
 - P11.3 contact with leakages
 - P11.4 contact with hazardous substances
 - P11.5 electric shock
 - P12 ensure all repaired and replaced electrical components, wiring and units conform to the motorcycle operating specification and any legal requirements



-
- P13 adjust components and units correctly to ensure that they operate to meet system requirements, when necessary
 - P14 ensure the **electrical system** rectified performs to the motorcycle operating specification and any legal requirements prior to returning it to the customer
 - P15 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required
 - P16 complete all diagnostic and **rectification activities** within the agreed timescale
 - P17 report any anticipated delays in completion to the relevant person(s) promptly

Knowledge and understanding

Legislative and organisational requirements and procedures

You need to know and understand:

- K1 the health and safety legislation, environmental requirements and workplace procedures relevant to workshop practices and personal and motorcycle protection when diagnosing and rectifying **complex** electrical equipment **electrical faults**
- K2 legal requirements relating to motorcycle electrics (including road safety requirements)
- K3 your workplace procedures for:
 - K3.1 recording fault location and **rectification activities**
 - K3.2 the referral of problems
 - K3.3 reporting delays to the completion of work
- K4 the importance of documenting diagnostic and rectification information
- K5 the importance of working to agreed timescales and keeping others informed of progress
- K6 the relationship between time, costs and profitability
- K7 the importance of reporting anticipated delays to the relevant person(s) promptly

Electrical and electronic principles

You need to know and understand:

- K8 electrical and electronic principles, including Ohms Law, voltage, power, current (AC/DC), resistance, magnetism, electromagnetism and electromagnetic induction and digital principles
- K9 electrical symbols, units and terms
- K10 electrical safety procedures
- K11 the hazards associated with high energy electrical systems and components
- K12 how electrical and electronic equipment and systems are constructed, dismantled, reassembled and re-programmed
- K13 how electrical and electronic equipment and systems operate, including electrical component function, electrical inputs, outputs, voltages and wave form patterns
- K14 the interaction between electrical, electronic and mechanical components

within the **electrical systems** defined in the Scoping Statement below

- K15 how equipment and **electrical systems** interlink and interact, including multiplexing

Use of electrical testing equipment

You need to know
and understand:

- K16 how to prepare and test the accuracy of diagnostic testing equipment
K17 how to use **electrical and electronic testing equipment**

Motorcycle electrical equipment and wiring faults, their diagnosis and rectification

You need to know
and understand:

- K18 the types and causes of electrical equipment system faults and failures
K19 the types and causes of electrical wiring faults and failures
K20 electrical equipment component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action
K21 electrical wiring and connection repair procedures, the circumstances which will necessitate replacement and other courses of action
K22 how to find, interpret and use sources of information on electrical equipment, electrical operating specifications, diagnostic test procedures, repair procedures and legal requirements
K23 how to carry out systematic diagnostic testing of electrical equipment, electrical and electronic systems and wiring using **electrical testing techniques**
K24 how to select the most appropriate diagnostic testing method for the symptoms presented
K25 how to interpret test results and motorcycle data in order to identify the location and cause of motorcycle **complex electrical faults**
K26 how to rectify electrical and electronic faults in **electrical systems** within electrical equipment (i.e. lighting systems, security and alarm systems, electrical rider safety, monitoring and instrumentation systems and enhancements and accessories which are not factory fitted)
K27 how to make suitable adjustments to components and units
K28 how to make cost effective recommendations for rectification

Additional information

Scope/range

- 1 **Electrical systems** includes:
 - 1.1. lighting systems
 - 1.2. auxiliary systems
 - 1.3. security and alarm systems
 - 1.4. electrical rider safety systems
 - 1.5. monitoring and instrumentation systems
 - 1.6. enhancements and accessories (not factory fitted)
- 2 **Electrical and electronic testing equipment** covers:
 - 2.1. multi-meters
 - 2.2. battery testing equipment
 - 2.3. dedicated diagnostic equipment
 - 2.4. computer based diagnostic equipment
 - 2.5. oscilloscopes
 - 2.6. amp clamps
- 3 **Tools and equipment** are:
 - 3.1. hand tools
 - 3.2. special purpose tools
 - 3.3. general workshop equipment
- 4 **Electrical and electronic testing techniques** are:
 - 4.1. aural
 - 4.2. voltage, resistance and current measuring
 - 4.3. frequency measuring
 - 4.4. visual
 - 4.5. dedicated and computer based testing
 - 4.6. guided fault finding (systematic approach)
- 5 **Rectification activities** are:
 - 5.1. replacing electrical components
 - 5.2. repairing wiring and connectors

5.3. replacing wiring and connectors

5.4. re-programming

6 **Complex electrical faults** are:

6.1. poor/corroded connections

6.2. short circuits

6.3. high resistance

6.4. open circuits

6.5. voltage drop

6.6. current drain

6.7. component and unit failure

Glossary**Agreed timescales**

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

Electrical rider safety systems

Examples are traction control, power mode selection, starter inhibit systems

Electrical testing equipment

Examples are multi-meter, hydrometer, battery tester, oscilloscope, amp clamp, computer based diagnostic equipment

Electrical faults

These are faults that require a two or more step inspection and a series of test results to identify the cause. They include poor connections, short circuits, high resistances, open circuits, volt drops, current drain and faulty components

Motorcycles

These can be the following – motorcycles, scooters, mopeds, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride

Enhancements and accessories: (not fitted at the factory)

Heated seats, heated grips, communication systems, additional lighting, monitoring systems

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Originating organisation	IMI Ltd
Original URN	MCAE06
Relevant occupations	Engineering; Vehicle Trades; Motorcycle Diagnostic Technician; ATV Diagnostic Technician
Suite	Maintenance and Repair – Motorcycle
Key words	Motorcycle; remove; replace; repair; components; electrical; electronic; diagnose; ATV; rectify; faults; short; circuits; resistance; voltage



Overview

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

For the purpose of this standard a motorcycle is defined as any of the following: motorcycle, scooter, moped, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride.

Performance criteria

- You must be able to:
- P1 wear suitable personal protective equipment and use motorcycle coverings (where applicable) when using **diagnostic methods** and carrying out **rectification activities**
 - P2 ensure the motorcycle and the work area is safe prior to commencing with any diagnostic or rectification activity
 - P3 support the identification of **faults** by reviewing motorcycle:
 - P3.1 technical data
 - P3.2 diagnostic test procedures
 - P4 prepare, connect and test all the required **equipment** following manufacturer's instructions prior to use
 - P5 use **diagnostic methods** which are relevant to the symptoms presented
 - P6 collect sufficient diagnostic information in a systematic way to enable an accurate diagnosis of **engine system** faults
 - P7 correctly interpret test results from engine mechanical, electrical, electronic, hydraulic, fluid and lubrication systems
 - P8 identify and record any system deviation from acceptable limits accurately
 - P9 ensure your assessment of dismantled sub-assemblies, components and units identifies their condition and suitability for repair or replacement accurately
 - P10 inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform
 - P11 use the **equipment** required, correctly and safely throughout all **diagnostic** and **rectification activities**
 - P12 carry out all **rectification activities** following:
 - P12.1 manufacturer's instructions
 - P12.2 your workplace procedures
 - P12.3 health and safety requirements
 - P13 work in a way which minimises the risk of:
 - P13.1 damage to other motorcycle systems
 - P13.2 damage to other components and units
 - P13.3 contact with leakages
 - P13.4 contact with hazardous substances

-
- P13.5 electric shock
 - P14 ensure all repaired and replaced components and units conform to the motorcycle operating specification and any legal requirements
 - P15 adjust components and units correctly to ensure that they operate to meet system requirements, when necessary
 - P16 record and report any additional faults you notice during the course of work promptly
 - P17 use **testing methods** which are suitable for assessing the performance of the system rectified
 - P18 ensure the **engine system** rectified performs to the motorcycle operating specification and any legal requirements prior to return to the customer
 - P19 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required
 - P20 complete all system diagnostic activities within the agreed timescale
 - P21 report any anticipated delays in completion to the relevant person(s) promptly

Knowledge and understanding

Legislative and organisational requirements and procedures

You need to know and understand:

- K1 the health and safety legislation environmental requirements and workplace procedures relevant to workshop practices and personal and motorcycle protection when diagnosing and rectifying engine faults
- K2 legal requirements relating to the motorcycle (including road safety requirements)
- K3 your workplace procedures for:
 - K3.1 recording **diagnostic** and **rectification activities**
 - K3.2 the referral of problems
 - K3.3 reporting delays to the completion of work
- K4 the importance of documenting **diagnostic** and rectification information
- K5 the importance of working to agreed timescales and keeping others informed of progress
- K6 the relationship between time, costs and profitability
- K7 the importance of reporting anticipated delays to the relevant person(s) promptly

Electrical and electronic principles

You need to know and understand:

- K8 electrical and electronic principles associated with engine systems, including types of sensors and actuators, their application and operation
- K9 how electrical and electronic engine systems operate, including electrical component function, electrical inputs, outputs, voltages, oscilloscope patterns and digital principles
- K10 the interaction between electrical, electronic and mechanical components within motorcycle engine systems
- K11 electrical symbols, units and terms
- K12 electrical safety procedures
- K13 the hazards associated with high energy electrical systems and components

Use of diagnostic and rectification equipment

You need to know
and understand:

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

Engine electrical faults, their diagnosis and correction

You need to know
and understand:

- K16 how engine mechanical, electrical, electronic and hydraulic and fluid systems are constructed, operate, dismantled and reassembled
- K17 the types and causes of engine mechanical, electrical, electronic and hydraulic and fluid system, component and unit faults and failures
- K18 engine mechanical, electrical, electronic and hydraulic and fluid component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action
- K19 how to find, interpret and use sources of information on engine electrical and electronic operating specifications, diagnostic test procedures, repair procedures and legal requirements
- K20 motorcycle operating specifications for limits, fits and tolerances relating to engine mechanical, electrical, electronic and hydraulic and fluid systems for the motorcycle(s) on which you work
- K21 how to select and carry out the correct diagnostic testing method
- K22 how to assess and interpret results of the condition of components
- K23 how to make cost effective recommendations for rectification
- K24 how to carry out the **rectification activities** listed in the Scoping Statement for this unit in order to correct faults in the engine mechanical, electrical, electronic and hydraulic and fluid systems
- K25 the relationship between test methodology and the faults repaired – the use of appropriate testing methods

Additional information

Scope/range

- 1 **Faults occur** within:
 - 1.1. the engine mechanical system
 - 1.2. the engine electrical system
 - 1.3. the engine electronic system
 - 1.4. the engine hydraulic and fluid systems
- 2 **Diagnostic methods** are:
 - 2.1. visual
 - 2.2. aural
 - 2.3. measurement
 - 2.4. functional testing
 - 2.5. electrical systems testing
 - 2.6. electronic systems testing
- 3 **Equipment** is:
 - 3.1. diagnostic and rectification equipment for engine mechanical systems
 - 3.2. diagnostic and rectification equipment for engine electrical systems
 - 3.3. diagnostic and rectification equipment for engine electronic systems
 - 3.4. diagnostic and rectification equipment for engine hydraulic and fluid systems
 - 3.5. specialist repair tools
 - 3.6. general workshop equipment
- 4 **Rectification activities** are:
 - 4.1. dismantling
 - 4.2. replacement of units and components
 - 4.3. adjustment of units and components
 - 4.4. repairs to wiring and connectors
 - 4.5. re-programming motorcycle systems
 - 4.6. reassembly
 - 4.7. functional testing

-
- 5 **Engine systems** are:
 - 5.1. engine mechanical
 - 5.2. starting
 - 5.3. charging
 - 5.4. ignition
 - 5.5. fuel
 - 5.6. engine management

Glossary**Agreed timescales**

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

Diagnostic information

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

Engine Area

Engine mechanical, cooling systems, electronic ignition, petrol fuel injection, lubrication, engine management systems, emissions control systems, starting and charging

Engine and component faults

These are faults that require a two or more step diagnostic activity using a prescribed process or format to identify the cause

Functional testing

Examples include: intake system balance, performance testing and road testing where relevant

Hydraulic and fluid systems

These are fuel, oil, lubrication and cooling

Recommendations



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

Motorcycles

These can be any of the following – motorcycles, scooters, mopeds, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride

IMIMC07

Diagnose and rectify motorcycle engine and component faults



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Status	Original
Originating organisation	IMI Ltd
Original URN	MC07
Relevant occupations	Engineering; Vehicle Trades; Motorcycle Diagnostic Technician; ATV Diagnostic Technician
Suite	Maintenance and Repair – Motorcycle
Key words	Motorcycle; rectify; diagnose; engine; ATV; component; faults; units; starting; charging; electronic; electrical



Overview

This NOS is about diagnosing and rectifying faults occurring within motorcycle steering, brakes and suspension systems.

For the purpose of this standard a motorcycle is defined as any of the following: motorcycle, scooter, moped and those with a third wheel.

Performance criteria

- You must be able to:
- P1 wear suitable personal protective equipment and use motorcycle coverings (where applicable) when using **diagnostic methods** and carrying out **rectification activities**
 - P2 ensure the motorcycle and the work area is safe prior to commencing with any diagnostic or rectification activity
 - P3 support the identification of **faults** by reviewing motorcycle:
 - P3.1 technical data
 - P3.2 diagnostic test procedures
 - P4 prepare, connect and test all the required **equipment** following manufacturer's instructions prior to use
 - P5 use **diagnostic methods** which are relevant to the symptoms presented
 - P6 collect diagnostic information in a systematic way relevant to the diagnostic methods used
 - P7 collect sufficient diagnostic information to enable an accurate diagnosis of steering, brakes and suspension system **faults**
 - P8 identify and record any system deviation from acceptable limits accurately
 - P9 ensure your assessment of dismantled sub-assemblies, components and units identifies their condition and suitability for repair or replacement, accurately
 - P10 inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform
 - P11 use the **equipment** required correctly and safely throughout all **rectification activities**
 - P12 carry out all **rectification activities** following:
 - P12.1 manufacturer's instructions
 - P12.2 your workplace procedures
 - P12.3 health and safety requirements
 - P13 work in a way which minimises the risk of:
 - P13.1 damage to other motorcycle systems
 - P13.2 damage to other components and units
 - P13.3 contact with leakages
 - P13.4 contact with hazardous substances

-
- P13.5 electric shock
- P14 ensure all repaired and replaced components and units conform to the motorcycle operating specification and any legal requirements
- P15 adjust components and units correctly to ensure that they operate to meet system requirements, when necessary
- P16 record and report any additional **faults** you notice during the course of work promptly
- P17 use testing methods which are suitable for assessing the performance of the system rectified
- P18 ensure the steering, brakes or suspension system rectified performs to the motorcycle operating specification and any legal requirements prior to it being returned to the customer
- P19 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required
- P20 complete all system diagnostic activities within the agreed timescale
- P21 report any anticipated delays in completion to the relevant person(s) promptly

Knowledge and understanding

Legislative and organisational requirements and procedures

You need to know and understand:

- K1 the health and safety legislation, environmental requirements and workplace procedures relevant to workshop practices and personal and motorcycle protection when diagnosing and rectifying steering, brakes and suspension **faults**
- K2 legal requirements relating to the motorcycle (including road safety requirements)
- K3 your workplace procedures for:
 - K3.1 recording diagnostic and rectification activities
 - K3.2 the referral of problems
 - K3.3 reporting delays to the completion of work
- K4 the importance of documenting diagnostic and rectification information
- K5 the importance of working to agreed timescales and keeping others informed of progress
- K6 the relationship between time, costs and profitability
- K7 the importance of reporting anticipated delays to the relevant person(s) promptly

Electrical and electronic principles

You need to know and understand:

- K8 electrical and electronic principles associated with steering, brakes and suspension systems, including types of sensors and actuators, their application and operation
- K9 how electrical and electronic brake systems operate, including electrical component function, electrical inputs, outputs, voltages, wave forms and digital principles
- K10 the interaction between electrical, electronic and mechanical components within motorcycle brake systems
- K11 electrical symbols, units and terms
- K12 electrical safety procedures
- K13 the hazards associated with high energy electrical components and systems

Use of diagnostic and rectification equipment

You need to know
and understand:

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

Steering, brakes and suspension faults, their diagnosis and rectification

You need to know
and understand:

- K16 how steering, brakes and suspension mechanical (including wheels), electrical, electronic and hydraulic systems are constructed, dismantled, reassembled and operate
- K17 the types and causes of steering, brakes and suspension mechanical (including wheels), electrical, electronic and hydraulic system, component and unit **faults** and failures
- K18 steering, brakes and suspension mechanical, electrical and hydraulic component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action
- K19 how to minimise the likelihood of corrosion when assembling and reassembling motorcycles
- K20 how to find, interpret and use sources of information on electrical operating specifications, diagnostic test procedures, repair procedures and legal requirements relating to brake systems
- K21 motorcycle operating specifications for limits, fits and tolerances relating to steering, brakes and suspension mechanical, electrical, electronic and hydraulic systems for the motorcycle(s) on which you work
- K22 how to select and carry out the correct diagnostic testing method
- K23 how to assess and interpret results of the condition of components
- K24 how to make cost effective recommendations for rectification
- K25 the correct choice and applications of lubricants and fluids
- K26 how to carry out the rectification activities listed in the Scoping statement for this standard in order to correct **faults** in the steering, brakes and suspension mechanical, electrical, electronic and hydraulic systems
- K27 the relationship between test methodology and the **faults** repaired – the use of

IMIMC08

Diagnose and rectify motorcycle steering, brakes and suspension system faults



appropriate testing methods

Additional information

Scope/range

- 1 **Faults** are:
 - 1.1. brakes (mechanical)
 - 1.2. brakes (hydraulic)
 - 1.3. braking efficiency
 - 1.4. ABS (electrical/electronic)
 - 1.5. steering control
 - 1.6. steering alignment
 - 1.7. suspension (mechanical)
 - 1.8. suspension (hydraulic)
 - 1.9. wheels and tyres
- 2 **Diagnostic methods** are:
 - 2.1. visual
 - 2.2. aural
 - 2.3. measurement
 - 2.4. functional testing
 - 2.5. electrical and electronic systems testing
- 3 **Equipment** is:
 - 3.1. diagnostic and rectification equipment for steering, brakes and suspension mechanical systems
 - 3.2. diagnostic and rectification equipment for steering, brakes and suspension electrical and electronic systems
 - 3.3. diagnostic and rectification equipment for hydraulic braking systems
 - 3.4. specialist repair tools
 - 3.5. general workshop equipment
- 4 **Rectification activities** are:
 - 4.1. dismantling
 - 4.2. replacement of units and components
 - 4.3. adjustment of units and components
 - 4.4. repairs to wiring and connectors

4.5. re-programming motorcycle systems

4.6. reassembly

4.7. functional testing

Glossary

Agreed timescales

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

Steering, brakes and suspension system faults

These are faults that require a two or more step diagnostic activity using a prescribed process or format to identify the cause

Diagnostic information

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

Functional testing

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

Recommendations

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

Motorcycles

These can be any of the following – motorcycles, scooters, mopeds and those with a third wheel

IMIMC08

Diagnose and rectify motorcycle steering, brakes and suspension system faults



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Originating organisation	IMI Ltd
Original URN	MC08
Relevant occupations	Engineering; Vehicle Trades; Motorcycle Diagnostic Technician
Suite	Maintenance and Repair – Motorcycle
Key words	Motorcycle; diagnose; rectify; brakes; steering; suspension; system; faults; mechanical; ABS; electrical; electronic; hydraulic



Overview

This NOS is about diagnosing and rectifying faults occurring within quad bike steering, brakes and suspension systems.

For the purposes of this standard a quad bike is an all terrain vehicle (ATV) which you sit astride with four or more wheels.

Performance criteria

- You must be able to:
- P1 wear suitable personal protective equipment and use quad bike coverings (where applicable) when using **diagnostic methods** and carrying out **rectification activities**
 - P2 ensure the quad bike and the work area is safe prior to commencing with any diagnostic or rectification activity
 - P3 support the identification of **faults** by reviewing quad bike:
 - P3.1 technical data
 - P3.2 diagnostic test procedures
 - P4 prepare, connect and test all the required **equipment** following manufacturer's instructions prior to use
 - P5 use **diagnostic methods** which are relevant to the symptoms presented
 - P6 collect diagnostic information in a systematic way relevant to the diagnostic methods used
 - P7 collect sufficient diagnostic information to enable an accurate diagnosis of steering, brakes and suspension system **faults**
 - P8 identify and record any system deviation from acceptable limits accurately
 - P9 ensure your assessment of dismantled sub-assemblies, components and units identifies their condition and suitability for repair or replacement accurately
 - P10 inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform
 - P11 use the **equipment** required correctly and safely throughout all **rectification activities**
 - P12 carry out all **rectification activities** following:
 - P12.1 manufacturer's instructions
 - P12.2 your workplace procedures
 - P12.3 health and safety requirements
 - P13 work in a way which minimises the risk of:
 - P13.1 damage to other quad bike systems
 - P13.2 damage to other components and units
 - P13.3 contact with leakages
 - P13.4 contact with hazardous substances

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- P13.5 electric shock
- P14 ensure all repaired and replaced components and units conform to the quad bike operating specification and any legal requirements
 - P15 adjust components and units correctly to ensure that they operate to meet system requirements, when necessary
 - P16 record and report any additional **faults** you notice during the course of work promptly
 - P17 use testing methods which are suitable for assessing the performance of the system rectified
 - P18 ensure the steering, brakes or suspension system rectified performs to the quad bike operating specification and any legal requirements prior to it being returned to the customer
 - P19 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required
 - P20 complete all system diagnostic activities within the agreed timescale
 - P21 report any anticipated delays in completion to the relevant person(s) promptly

Knowledge and understanding

Legislative and organisational requirements and procedures

You need to know and understand:

- K1 the health and safety legislation, environmental requirements and workplace procedures relevant to workshop practices and personal and quad bike protection when diagnosing and rectifying steering, brakes and suspension **faults**
- K2 legal requirements relating to the quad bike (including road safety requirements)
- K3 your workplace procedures for:
 - K3.1 recording diagnostic and rectification activities
 - K3.2 the referral of problems
 - K3.3 reporting delays to the completion of work
- K4 the importance of documenting diagnostic and rectification information
- K5 the importance of working to agreed timescales and keeping others informed of progress
- K6 the relationship between time, costs and profitability
- K7 the importance of reporting anticipated delays to the relevant person(s) promptly

Electrical and electronic principles

You need to know and understand:

- K8 electrical and electronic principles associated with steering, brakes and suspension systems, including types of sensors and actuators, their application and operation
- K9 how electrical and electronic brake systems operate, including electrical component function, electrical inputs, outputs, voltages, wave forms and digital principles
- K10 the interaction between electrical, electronic and mechanical components within quad bike brake systems
- K11 electrical symbols, units and terms
- K12 electrical safety procedures
- K13 the hazards associated with high energy electrical components and systems

Use of diagnostic and rectification equipment

You need to know
and understand:

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

Steering, brakes and suspension faults, their diagnosis and rectification

You need to know
and understand:

- K16 how steering, brakes and suspension mechanical (including wheels), electrical, electronic and hydraulic systems are constructed, dismantled, reassembled and operate
- K17 the types and causes of steering, brakes and suspension mechanical (including wheels), electrical, electronic and hydraulic system, component and unit **faults** and failures
- K18 steering, brakes and suspension mechanical, electrical and hydraulic component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action
- K19 how to minimise the likelihood of corrosion when assembling and reassembling quad bikes
- K20 how to find, interpret and use sources of information on electrical operating specifications, diagnostic test procedures, repair procedures and legal requirements relating to brake systems
- K21 quad bike operating specifications for limits, fits and tolerances relating to steering, brakes and suspension mechanical, electrical, electronic and hydraulic systems for the quad bike(s) on which you work
- K22 how to select and carry out the correct diagnostic testing method
- K23 how to assess and interpret results of the condition of components
- K24 how to make cost effective recommendations for rectification
- K25 the correct choice and applications of lubricants and fluids
- K26 how to carry out the rectification activities listed in the Scoping statement for this standard in order to correct **faults** in the steering, brakes and suspension mechanical, electrical, electronic and hydraulic systems
- K27 the relationship between test methodology and the **faults** repaired – the use of

IMIMCQ08

Diagnose and rectify quad bike steering, brakes and suspension system faults



appropriate testing methods

Additional information

Scope/range

- 1 **Faults** are:
 - 1.1. brakes (mechanical)
 - 1.2. brakes (hydraulic)
 - 1.3. braking efficiency
 - 1.4. ABS (electrical/electronic)
 - 1.5. steering control
 - 1.6. steering alignment
 - 1.7. suspension (mechanical)
 - 1.8. suspension (hydraulic)
 - 1.9. wheels and tyres
- 2 **Diagnostic methods** are:
 - 2.1. visual
 - 2.2. aural
 - 2.3. measurement
 - 2.4. functional testing
 - 2.5. electrical and electronic systems testing
- 3 **Equipment** is:
 - 3.1. diagnostic and rectification equipment for steering, brakes and suspension mechanical systems
 - 3.2. diagnostic and rectification equipment for steering, brakes and suspension electrical and electronic systems
 - 3.3. diagnostic and rectification equipment for hydraulic braking systems
 - 3.4. specialist repair tools
 - 3.5. general workshop equipment
- 4 **Rectification activities** are:
 - 4.1. dismantling
 - 4.2. replacement of units and components
 - 4.3. adjustment of units and components
 - 4.4. repairs to wiring and connectors

4.5. re-programming quad bike systems

4.6. reassembly

4.7. functional testing

Glossary

Agreed timescales

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

Steering, brakes and suspension system faults

These are faults that require a two or more step diagnostic activity using a prescribed process or format to identify the cause

Diagnostic information

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

Functional testing

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

Recommendations

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

Quad bikes

These are all terrain vehicles (ATVs) which you sit astride and have at least four wheels

IMIMCQ08

Diagnose and rectify quad bike steering, brakes and suspension system faults



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Originating organisation	IMI Ltd
Original URN	MC08
Relevant occupations	Engineering; Vehicle Trades; ATV Diagnostic Technician
Suite	Maintenance and Repair – Motorcycle
Key words	ATV; diagnose; rectify; brakes; steering; suspension; system; faults; mechanical; ABS; electrical; electronic; hydraulic



Overview

This NOS is about removing, storing safely and fitting basic non-welded, non-structural panels such as front fairings, seat cowlings, screens, mirrors and luggage fittings on motorcycles.

For the purposes of this standard a motorcycle is defined as any of the following: motorcycle, scooter, moped, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride.

**Performance
criteria**

- You must be able to:
- P1 use the appropriate personal protective equipment when removing, storing and fitting **motorcycle non-welded, non-structural body panels**
 - P2 ensure the motorcycle and the work area is safe prior to work commencing
 - P3 protect the motorcycle and its contents effectively when removing and fitting **motorcycle non-welded, non-structural body panels**
 - P4 store motorcycle **non-welded, non-structural body panels** safely, to minimise the risk of damage, in the correct location
 - P5 select and use the correct **tools and equipment** for the panels you are going to remove or fit
 - P6 ensure that the **tools and equipment** you require are in a safe working condition
 - P7 remove, store and fit motorcycle **non-welded, non-structural body panels** following:
 - P7.1 removal and fitting procedures
 - P7.2 manufacturer's instructions
 - P7.3 your workplace procedures
 - P7.4 health, safety and legal requirements
 - P8 avoid damaging other components, units and panels on the motorcycle whilst carrying out the removal, storage and fitting activities
 - P9 realign the panels you have fitted correctly in a way which regains their original manufactured gaps
 - P10 check that the components you have fitted operate correctly following the manufacturer's specification
 - P11 report any additional faults you notice during the course of your work to the relevant person(s) promptly
 - P12 report any delays in completing your work to the relevant person(s) promptly
 - P13 remove, store and fit **motorcycle non-welded, non-structural body panels** within the agreed timescale
 - P14 complete work records accurately, in the format required and pass them to the relevant person(s) promptly

Knowledge and understanding

Legislative and organisational requirements and procedures

You need to know and understand:

- K1 the health, safety and legal requirements relating to the removal, storage and fitting of motorcycle **non-welded, non-structural body panels**
- K2 your workplace procedures for:
 - K2.1 the referral of problems
 - K2.2 reporting of delays to the completion of work
 - K2.3 completion of work records
- K3 the work that needs to be done and the standard required
- K4 the requirements for protecting the motorcycle and contents from damage before, during and after removing and fitting activities
- K5 the importance of selecting, using and maintaining the appropriate personal protective equipment when removing, storing and fitting **motorcycle non-welded, non-structural body panels**

Removing, storing and fitting motorcycle non-structural body panels

You need to know and understand:

- K6 how to find, interpret and use sources of information applicable to the removal, storage and fitting of basic **motorcycle non-welded, non-structural body panels**
- K7 how to select, check and use all the tools and equipment required to remove and fit basic motorcycle **non-welded, non-structural body panels**
- K8 the different types of mechanical fixings for **motorcycle non-welded, non-structural body panels** and when and why they should be used
- K9 the correct procedures and processes for removing, storing and fitting **motorcycle non-welded non-structural body panels**
- K10 the need for correct alignment of panels and the methods used to achieve this
- K11 the types of quality control checks that can be used to ensure correct alignment and contour of panels and operation of components to manufacturer's specification
- K12 the methods of storing removed panels and the importance of storing them correctly

Additional information

Scope/range

- 1 **Non-welded, non-structural body panels** are:
 - 1.1. front fairings
 - 1.2. seat cowlings
 - 1.3. mudguards
 - 1.4. screens
 - 1.5. mirrors
 - 1.6. luggage fittings
- 2 **Tools and equipment** are:
 - 2.1. hand tools
 - 2.2. general workshop tools



Glossary

Agreed timescales

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

Motorcycles

These can be the following – motorcycles, scooters, mopeds, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride

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Originating organisation	IMI Ltd
Original URN	MCBP03
Relevant occupations	Engineering; Vehicle Trades; Motorcycle Service Technician; ATV Service Technician
Suite	Maintenance and Repair – Motorcycle
Key words	Motorcycle; remove; replace; components; fairings; cowlings; mudguards; ATV; screens; mirrors; luggage; fittings; store



Overview

This NOS is about inspecting motorcycle tyres on wheels not fitted to a machine, to assess their condition and suitability for repair. It also covers carrying out necessary repair, replacement or refitting activities.

For the purposes of this standard a motorcycle is defined as any of the following: motorcycle, scooter, moped, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride.

**Performance
criteria**

- You must be able to:
- P1 use suitable personal protective equipment throughout all motorcycle tyre **inspection**, repair and replacement activities
 - P2 use suitable sources of technical information to support your **inspection**, repair and replacement of **motorcycle tyres**
 - P3 work in a way which minimises the risk of damage to the motorcycle and its systems
 - P4 confirm that all the **tools and equipment** required are safe prior to use
 - P5 ensure your **inspection techniques** are sufficiently in depth to identify the severity of all tyre, valve, inner tube and wheel defects
 - P6 conduct all **inspection**, repair and replacement activities following:
 - P6.1 manufacturer's instructions
 - P6.2 your workplace procedures
 - P6.3 health and safety requirements
 - P6.4 the current industry standard for tyre repair
 - P7 carry out all **inspection**, repair and replacement activities using:
 - P7.1 suitable **tools and equipment**
 - P7.2 the correct **inspection techniques**
 - P7.3 the correct type and size of component
 - P8 clearly identify and record the cause of any tyre, valve, inner tube or wheel faults following your normal workplace procedures
 - P9 make clear and accurate recommendations for further action to the relevant person(s), when necessary
 - P10 ensure that replaced and refitted **motorcycle tyres**, valves and any inner tubes are correctly fitted and balanced and conform to legal requirements prior to releasing the motorcycle to the customer
 - P11 dispose of removed components safely to meet legal, environmental and your workplace requirements
 - P12 complete all activities within the agreed timescale
 - P13 report any anticipated delays in completion and any additional faults identified to the relevant person(s) promptly

Knowledge and understanding

Legislative and organisational requirements and procedures

You need to know and understand:

- K1 the health and safety legislation, environmental requirements and workplace procedures relevant to workshop practices and personal and motorcycle protection
- K2 the legal requirements for motorcycle tyres, and the relevant parts of the prevailing British and or European standard for the repair of **motorcycle tyres**
- K3 how to isolate scrapped tyres and dispose of waste materials in your workplace following environmental requirements
- K4 the importance of disposing of waste correctly and the consequences of not doing so to others, the business and the environment
- K5 the importance of selecting, using and maintaining the appropriate personal protective equipment when inspecting, repairing and replacing **motorcycle tyres**
- K6 the agreed work specification
- K7 your workplace procedures for:
 - K7.1 the referral of problems
 - K7.2 reporting of delays to the completion of work
 - K7.3 personal protection
- K8 the requirements for protecting the motorcycle and contents from damage before, during and after removing and replacing wheels
- K9 the importance of working to agreed timescales and keeping others informed of progress
- K10 the relationship between time and cost
- K11 the importance of reporting anticipated delays to the relevant person(s) promptly

Tools and equipment

You need to know and understand:

- K12 how to select, prepare and use the **tools and equipment** necessary for inspecting, repairing, replacing and refitting **motorcycle tyres**

Materials

You need to know
and understand:

- K13 the types of tyre repair materials available (i.e. rubber only plug patch unit and rubber only patch and filler material)
- K14 the repair material manufacturer's instructions for the application of repair materials for the type(s) of tyres on which you are working

Tyre inspection, removal, repair and replacement

You need to know
and understand:

- K15 how to find and use suitable sources of information on **motorcycle tyres**
- K16 the purpose, function and construction of **motorcycle tyres**
- K17 the types of valves used in **motorcycle tyres** and their installation techniques
- K18 the common faults associated with **motorcycle tyres** and their causes (e.g. normal wear; abnormal wear due to misalignment; incorrect inflation, adjustment, installation and application damage)
- K19 the manufacturer's recommendations on the 'repair ability' of their tyres
- K20 what a tyre **inspection** should cover
- K21 the **inspection techniques** associated with **motorcycle tyres** and how to conduct them
- K22 the importance of taking accurate measurements and ensuring any adjustments are within acceptable tolerances for the motorcycle
- K23 the importance of basing your decision to replace or repair tyres upon the results of your inspection
- K24 how to remove, repair, replace and refit **motorcycle tyres**, wheels, tubes and valves
- K25 the importance of checking the safety and operation of equipment prior to use
- K26 how to work safely avoiding injury to yourself, others and damage to wheels when removing and refitting **motorcycle tyres**

Additional information

Scope/range

- 1 **Motorcycle tyres** are:
 - 1.1. tube
 - 1.2. tubeless

- 2 **Tools and equipment** are:
 - 2.1. lifting and supporting equipment
 - 2.2. tyre removal and refitting tools and equipment
 - 2.3. measuring equipment
 - 2.4. tyre inflation equipment
 - 2.5. wheel balancing equipment
 - 2.6. tyre repair tools

- 3 **Inspection** covers:
 - 3.1. wheel rim and fixings
 - 3.2. tyres
 - 3.3. valves
 - 3.4. inner tubes

- 4 **Inspection techniques** are:
 - 4.1. visual
 - 4.2. measurements of tread depth
 - 4.3. tyre pressures
 - 4.4. balance



Glossary

Agreed timescales

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

Sources of information

Examples include: hard copy manuals, computer based data, specific manufacturer's instructions

Motorcycles

These can be any of the following – motorcycles, scooters, mopeds, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride

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Originating organisation	IMI Ltd
Original URN	MCVF04
Relevant occupations	Engineering; Vehicle Trades; Motorcycle Service Technician; Specialist Tyre Fitting Operations (Automotive); Tyre Fitting Operations (Automotive); Vehicle Fitters; Vehicle Fitting Operations (Automotive); ATV Service Technician
Suite	Maintenance and Repair – Motorcycle; Vehicle Fitting
Key words	Motorcycle; ATV; inspect; repair; tyres; tube; tubeless; balance; puncture; tread; replace



Overview

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

For the purpose of this standard a motorcycle is defined as any of the following: motorcycle, scooter, moped, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride.

Performance criteria

- You must be able to:
- P1 wear suitable personal protective equipment throughout all **overhauling activities**
 - P2 use suitable sources of technical information to support your **overhauling activities**
 - P3 assess and prepare all the equipment required, following manufacturer's instructions, prior to use
 - P4 use the tools and equipment required correctly and safely throughout all **overhauling activities**
 - P5 carry out all **overhauling activities** following:
 - P5.1 the manufacturer's instructions
 - P5.2 your workplace procedures
 - P5.3 health and safety requirements
 - P6 work in a way which minimises the risk of:
 - P6.1 damage to other components
 - P6.2 leakages
 - P6.3 contact with hazardous substances
 - P7 ensure your assessment of the dismantled unit identifies accurately its condition and suitability for overhaul
 - P8 inform the relevant person(s) promptly where an overhaul is uneconomic or unsatisfactory to perform
 - P9 use testing methods which comply with the manufacturer's requirements
 - P10 adjust the unit's components correctly to ensure that they operate to meet the motorcycle operating requirements, when necessary
 - P11 ensure the overhauled units and assemblies conform to the motorcycle operating specification and any legal requirements
 - P12 ensure your overhaul records are accurate, complete and passed to the relevant person(s) promptly in the format required
 - P13 complete all **overhauling activities** within the agreed timescale
 - P14 report any anticipated delays in completion to the relevant person(s) promptly

Knowledge and understanding

Legislative and organisational requirements and procedures

You need to know and understand:

- K1 the legal requirements applicable to the motorcycle units and assemblies overhauled (including road safety requirements)
- K2 the health and safety legislation, environmental requirements and workplace procedures relevant to workshop practices and personal and motorcycle protection
- K3 your workplace procedures for:
 - K3.1 recording **overhaul activities**
 - K3.2 the referral of problems
 - K3.3 reporting delays to the completion of work
- K4 the importance of documenting repair information
- K5 the importance of working to agreed timescales and keeping others informed of progress
- K6 the importance of reporting any anticipated delays to the relevant person(s) promptly

Equipment

You need to know and understand:

- K7 how to prepare and assess the accuracy and operation of all the overhauling and testing equipment required
- K8 how to use all the overhauling and testing equipment required

Motorcycle Mechanical unit overhauling activities

You need to know and understand:

- K9 how to find, interpret and use sources of information on motorcycle overhauling procedures and statutory requirements
- K10 how motorcycle mechanical units and assemblies are constructed and their operation
- K11 how motorcycle mechanical units and assemblies are dismantled and reassembled
- K12 the types and possible causes of faults in motorcycle mechanical units and assemblies and how to identify them



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- K13 motorcycle operating specification for limits, fits and tolerances and where this information can be sourced
 - K14 how to assess the condition evident within unit motorcycle sub-assemblies and components
 - K15 the cost-benefit relationship between the reconditioning, repair and replacement of components within units and assemblies
 - K16 how to carry out **overhauling activities** for the type(s) of motorcycle unit worked upon
 - K17 the relationship between test methodology and the faults repaired – the use of appropriate testing methods
 - K18 how to test and evaluate the performance of overhauled units against the operating specification
 - K19 how to interpret test results and make recommendations
 - K20 how to make suitable adjustments to motorcycle components and units
 - K21 how to work safely avoiding personal injury, damage to components, leakage and hazardous substances

Additional information

Scope/range

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

- 2 **Mechanical units** are:
 - 2.1. engines
 - 2.2. transmission and drive systems
 - 2.3. steering
 - 2.4. suspension

Glossary

Adjustments

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

Agreed timescales

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

Assessments

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

Equipment

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

Functional testing

This refers to any applicable functional tests carried out after overhaul

Motorcycles

These can be any of the following – motorcycles, scooters, mopeds, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride

Testing methods

As prescribed by the appropriate technical literature

IMIMC11

Overhaul motorcycle mechanical units



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Status	Original
Originating organisation	IMI Ltd
Original URN	MC11
Relevant occupations	Engineering; Vehicle Trades; Motorcycle Diagnostic Technician; ATV Diagnostic Technician
Suite	Maintenance and Repair – Motorcycle
Key words	Motorcycle; ATV; overhaul; mechanical; units; assemblies; steering; suspension; engine; transmission; driveline; measure; tolerances; repair; replace; test



Overview

This NOS is about diagnosing and rectifying faults occurring within motorcycle gearboxes, hubs and bearings, drive and clutches.

For the purposes of this standard a motorcycle is defined as any of the following: motorcycle, scooter, moped, those with a third wheel, ATVs (all terrain vehicles/quads) which you sit astride.

Performance criteria

- You must be able to:
- P1 wear suitable personal protective equipment and use motorcycle coverings when using **diagnostic methods** and carrying out **rectification activities**
 - P2 ensure the motorcycle and the work area is safe prior to work commencing
 - P3 support the identification of **faults** by reviewing motorcycle:
 - P3.1 technical data
 - P3.2 diagnostic test procedures
 - P4 prepare, connect and test all the required **equipment** following manufacturer's instructions prior to use
 - P5 use **diagnostic methods** which are relevant to the symptoms presented
 - P6 collect diagnostic information in a systematic way relevant to the diagnostic methods used
 - P7 collect sufficient diagnostic information to enable an accurate diagnosis of transmission and drive system faults
 - P8 identify and record any system deviation from acceptable limits accurately
 - P9 ensure your assessment of dismantled sub-assemblies, components and units identifies their condition and suitability for repair or replacement, accurately
 - P10 inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform
 - P11 use the **equipment** required correctly and safely throughout all **rectification activities**
 - P12 carry out all **rectification activities** following:
 - P12.1 manufacturer's instructions
 - P12.2 your workplace procedures
 - P12.3 health and safety requirements
 - P12.4 environmental requirements
 - P13 work in a way which minimises the risk of:
 - P13.1 damage to other motorcycle systems
 - P13.2 damage to other components and units
 - P13.3 contact with leakages
 - P13.4 contact with hazardous substances
 - P13.5 electric shock

-
- P14 ensure all repaired and replaced components and units conform to the motorcycle operating specification and any legal requirements
 - P15 adjust components and units correctly to ensure that they operate to meet system requirements, when necessary
 - P16 record and report any additional faults you notice during the course of work promptly
 - P17 use testing methods which are suitable for assessing the performance of the system rectified
 - P18 ensure the transmission and drive system rectified performs to the motorcycle operating specification and any legal requirements prior to returning it to the customer
 - P19 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required
 - P20 complete all system diagnostic activities within the agreed timescale
 - P21 report any anticipated delays in completion to the relevant person(s) promptly

Knowledge and understanding

Legislative and organisational requirements and procedures

You need to know and understand:

- K1 the health and safety legislation, environmental requirements and workplace procedures relevant to workshop practices and personal and motorcycle protection when diagnosing and rectifying transmission and drive system faults
- K2 legal requirements relating to the motorcycle (including road safety requirements)
- K3 your workplace procedures for:
 - K3.1 recording diagnostic and **rectification activities**
 - K3.2 the referral of problems
 - K3.3 reporting delays to the completion of work
- K4 the importance of documenting diagnostic and rectification information
- K5 the importance of working to agreed timescales and keeping others informed of progress
- K6 the relationship between time, costs and profitability
- K7 the importance of reporting anticipated delays to the relevant person(s) promptly

Use of diagnostic and rectification equipment

You need to know and understand:

- K8 how to prepare and test the accuracy of diagnostic testing equipment
- K9 how to use diagnostic and rectification **equipment** for transmission and drive mechanical and hydraulic systems, specialist repair tools and general workshop equipment

Transmission and drive faults, their diagnosis and correction

You need to know and understand:

- K10 how motorcycle transmission and drive mechanical and hydraulic systems are constructed, dismantled, reassembled and operate
- K11 the types and causes of motorcycle transmission and drive mechanical and hydraulic system component and unit faults and failures
- K12 transmission and drive mechanical and hydraulic component and unit replacement procedures, the circumstances which will necessitate replacement

-
- and other possible courses of action
- K13 how to find, interpret and use sources of information on transmission and drive system operating specifications, diagnostic test procedures, repair procedures and legal requirements
 - K14 motorcycle operating specifications for limits, fits and tolerances relating to transmission and drive mechanical and hydraulic systems for the motorcycle(s) on which you work
 - K15 how to select and carry out the correct diagnostic testing method
 - K16 how to assess and interpret results of the condition of components
 - K17 how to make cost effective recommendations for rectification
 - K18 how to carry out the **rectification activities** listed in the Scoping Statement for this unit in order to correct faults in the transmission and drive mechanical and hydraulic systems
 - K19 the relationship between test methodology and the faults repaired – the use of appropriate testing methods

Additional information

Scope/range

- 1 **Transmission and drive systems** are:
 - 1.1. gearbox
 - 1.2. hubs and bearings
 - 1.3. drive belts/shafts
 - 1.4. clutch
- 2 **Diagnostic methods** are:
 - 2.1. visual
 - 2.2. aural
 - 2.3. measurement
 - 2.4. functional testing
- 3 **Equipment** is:
 - 3.1. diagnostic and rectification equipment for transmission mechanical systems
 - 3.2. specialist repair tools
 - 3.3. general workshop equipment
- 4 **Faults** are:
 - 4.1. mechanical
 - 4.2. hydraulic
- 5 **Rectification activities** are:
 - 5.1. dismantling
 - 5.2. replacement of units and components
 - 5.3. adjustment of units and components
 - 5.4. reassembly
 - 5.5. functional testing

Glossary

Agreed timescales

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

Transmission and drive system faults

These are faults that require a two or more step diagnostic activity using a prescribed process or format to identify the cause

Diagnostic information

This relates to mechanical condition, including wear, run out and any electrical measurements

Functional testing

Examples include performance testing and road testing where relevant

Transmission Area

Clutch assemblies, clutch operating systems, gear boxes, drives, hubs and final drive assemblies

Recommendations

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

Motorcycles

These can be any of the following – motorcycles, scooters and mopeds, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride

IMIMC12

Diagnose and rectify motorcycle transmission and drive system faults



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Status	Original
Originating organisation	IMI Ltd
Original URN	MC12
Relevant occupations	Engineering; Vehicle Trades; Motorcycle Diagnostic Technician; ATV Diagnostic Technician
Suite	Maintenance and Repair – Motorcycle
Key words	Motorcycle; ATV; diagnose; rectify; transmission; drive; system; faults; clutch; remove; replace; hubs; bearings



Overview

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

For the purposes of this standard a motorcycle is defined as any of the following: motorcycle, scooter, moped, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride.

Performance criteria

- You must be able to:
- P1 wear suitable personal protective equipment and use motorcycle coverings throughout all removal and replacement activities
 - P2 ensure the motorcycle and the work area is safe prior to work commencing
 - P3 support your removal and replacement activities by reviewing:
 - P3.1 motorcycle technical data
 - P3.2 removal and replacement procedures
 - P3.3 legal requirements
 - P4 prepare, test and use all the **equipment** required following manufacturer's instructions
 - P5 carry out all removal and replacement activities following:
 - P5.1 manufacturer's instructions
 - P5.2 your workplace procedures
 - P5.3 health and safety requirements
 - P5.4 environmental requirements
 - P6 work in a way which minimises the risk of:
 - P6.1 damage to other motorcycle systems
 - P6.2 damage to other motorcycle components and units
 - P6.3 contact with leakage
 - P6.4 contact with hazardous substances
 - P7 ensure replaced drive **units and components** conform to the motorcycle operating specification and any legal requirements
 - P8 record and report any additional faults you notice during the course of your work promptly
 - P9 use suitable **testing methods** to evaluate the performance of the reassembled system accurately
 - P10 ensure the reassembled **drive system** performs to the motorcycle operating specification and meets any legal requirements prior to returning it to the customer
 - P11 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required
 - P12 complete all removal and replacement activities within the agreed timescale



P13 report any expected delays in completion to the relevant person(s) promptly

Knowledge and understanding

Legislative and organisational requirements and procedures

You need to know and understand:

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

Use of technical information

You need to know and understand:

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

Drive system operation and construction

You need to know and understand:

- K11 how drive systems and their related units and components are constructed and their operation for those motorcycles worked upon
- K12 how drive systems and their related units and components are removed and replaced for those motorcycles worked upon

Equipment

You need to know
and understand:

- K13 how to prepare, test and use all the removal and replacement equipment required

Drive system unit and component removal and replacement

You need to know
and understand:

- K14 the hazards associated with high energy electrical systems and components
- K15 how to remove and replace drive system mechanical components for those motorcycles worked upon
- K16 how to file, fit, tap, thread, cut and drill plastics and metals
- K17 how to select and use gaskets, sealants, seals, fittings, fasteners and locking devices
- K18 how to test and evaluate the performance of replacement drive system units and components and the reassembled system against the motorcycle operating specifications and any legal requirements
- K19 the relationship between testing methods and the drive system units and components replaced – the use of appropriate test methods
- K20 when replacement units and components must meet the original equipment specification (OES) for warranty or other requirements
- K21 how to work safely avoiding damage to other motorcycle systems, components and units and contact with leakage and hazardous substances

Additional information

Scope/range

- 1 **Equipment** is:
 - 1.1. hand tools
 - 1.2. special workshop tools
 - 1.3. general workshop equipment

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

- 3 **Drive systems** are:
 - 3.1. chain and sprockets
 - 3.2. wheel bearings and seals
 - 3.3. drive shafts
 - 3.4. gear drive
 - 3.5. belts and pulleys



Glossary

Agreed timescales

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

Units and components

Any unit or component from the drive system defined in the Scoping Statement above

Motorcycles

These can be any of the following – motorcycles, scooters, moped, those with a third wheel and ATVs (all terrain vehicles/quads) which you sit astride

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