
UNIT 3 GENERAL SAFETY AND SERVICE TIPS

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3.1 INTRODUCTION

Safety is very important which is often neglected at our workplaces. Small precautions if carried out regularly can ensure safe, hygienic and clean environment at our workplace. In this unit, we will learn about general service and safety tips. General safety is very important in the workshop. Exposure to engine oil, chemicals, vehicles exhaust and acids can have an adverse effect on the health of a technician. One should never work in unhygienic and unventilated conditions. The workshop should be properly illuminated and ventilated. If we follow these tips then, they will certainly reduce the chance of accidents and help us to be safe while working.

Objectives

After studying this unit, you should be able to

- appreciate the importance of safety precautions,
- accomplish the servicing work of motorcycle carefully and particularly, pay attention towards the points described in given service tips, and
- maintain necessary discipline and cleanliness in the workshop.

3.2 GENERAL SAFETY TIPS

Some of the motorcycle accessories and emission products may be hazardous, so we should be careful about them. Some of them are as follows :

Carbon Monoxide

If the engine has to be started make sure the area is well ventilated. Never start the engine in an enclosed area without using the exhaust duct, since exhaust gas contains poisonous carbon monoxide that can cause loss of consciousness and may lead to death.

Petrol

Work in a well-ventilated area. Keep flames or sparks away from the work area or where petrol is stored.

Battery Electrolyte and Gases

Battery emits explosive gases, keep sparks and flames away. Ensure adequate ventilation while charging the battery.

Brake Fluid

Spilling brake fluid on painted, plastic or rubber parts will lead to damage. Ensure proper protection while working on brake fluid. Brake dust can lead to respiratory diseases. Never use an air hose or dry brush to clean brake assemblies.

Used Engine Oil

Used engine oil may cause skin disease if repeatedly in contact with the skin for prolonged time. It is advisable to thoroughly wash the hands with soap and water as soon as possible.

Hot Engine Parts

Engine and exhaust system parts become very hot and remain hot for some time after the engine is switched off. Wear insulated gloves or wait until the engine and exhaust system have cooled.

3.3 GENERAL SERVICE TIPS

Following are some tips, which should be strictly followed in the workshop regarding the service activities:

Special Tools

Use special tools wherever applicable. Special tools are designed to dismantle or assemble a specific part or assemblies without causing damage to them.

Cleaning of Parts

Clean the outside of a part or assembly before removing it from the motorcycle or opening its cover for the service. Dirt, which has accumulated on the outside, may fall into the engine or brake system and cause damage. Clean parts with a high flash point solvent and dried with compressed air.

Control Cables

Never bend or distort control cables. This will lead to stiff operation and premature cable failure.

Rubber Parts

Beware of parts containing O-rings or oil seals since these are adversely affected by most of the cleaning solvents.

Loosening a Part with Multiple Fasteners

Loosening a part with multiple fasteners should be done from the outside to inside in a criss-cross pattern, loosening the small fasteners first. Loosening the big fasteners first will exert an excessive force on the smaller fasteners.

Reassembly Position of Critical Parts

Care should be taken to note the position of the unidirectional parts while dismantling the engine. This will ensure dimensions (depth, distance or position) to be correctly fitted while reassembling.

Non-reusable Parts

Always replace gaskets, O-rings, oil seals, metal sealing washers, cir-clip and cotter pins while reassembling the engine.

Greasing or Oiling of Parts before Assembly

It is important to apply recommended lubricant while assembling the engine parts to ensure better bedding in and preventing rapid wear out.

Torque of Multiple and Different Sized Fasteners

First tighten all fasteners by the help of free hand. Then torque big fasteners first followed by torque of smaller fasteners in criss-cross pattern from inner to outer to avoid any distortion in the assembly parts.

Oil Seals

New oil seals to be installed with multi purpose grease packed into the cavity. When installing seals always check that the shaft over which the seal fits is smooth and free of burrs, which could damage the seal.

Old Gasket and Sealants Removal

Old gasket and sealant material should be completely removed before re-assembly.

Rubber Hoses

Fuel or vacuum hoses should be installed so that end is bottomed into its fitting which would ensure adequate area for the hose clip to grip the hose beneath the flared end of the fitting.

SAQ 1



Briefly describe few general service tips.

3.4 GENERAL FACTORS BEHIND ACCIDENTS

Following are the factors, which may cause accidents in workshop, so we should take care of these factors :

- Insufficient light and ventilation at workplace.
- Restricted available tool.
- Use of prohibited items.
- Lack of concentration, confidence.
- Lack of motivation, honesty.

3.5 WORKSHOP DISCIPLINES

Following discipline tips should be made a part of life to become a good technician. These will certainly help in creating safe, friendly and clean environment.

- Always wear fit and proper dress, use gloves and do not wear rings, chains, etc.
- Always keep the workplace clean and tidy.
- Always keep the things at their proper place.
- Be careful and honest to your duty.
- Follow the instructions of your superior.
- Do not work on any machine, if you do not know its operations and other details.

SAQ 2



- (a) What is the importance of safety at workshop?
- (b) What problems may arise, if we do not take safety precautions in the workshop?

3.6 COMPETENCY STATEMENTS

In this programme, every learner shall be assessed on a continuous basis for his/her knowledge and skills during the programme duration. Learners' competencies and skills in motorcycle service, repair and maintenance, and troubleshooting shall be evaluated vis-à-vis the laid down competency statements. These competency statements for motorcycle service and repair are given in **Appendix A**.

3.7 SUMMARY

In this unit, you learnt about general service and safety tips those must be followed while working in workshop. Appendix A given at the end of this unit, gives the competency statements useful for the evaluation of your competencies as motorcycle technician.

3.8 ANSWERS TO SAQs

Refer the relevant preceding text in the unit or other useful books/manuals available on the topic at workshops to get the answers of the SAQs.

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**IGNOU-HHML Motorcycle Technician
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**Competency Statement for
Certificate in Motorcycle Service and Repair (CMSR)**

TRADE (SKILL DEVELOPMENT) AT COMPETENCY LEVEL – 1

COMPETENCE : MOTORCYCLE TECHNICIAN

(Service procedure, minor engine jobs and replacement of parts)

Performance Standard

The following is the illustrative list of different performance standards to be considered during Trade Test conducted for the award of Competency Certificate in Motorcycle Service and Repair :

- 1.1 Understand basic terms and definitions
- 1.2 Set tappet clearance
- 1.3 Air filter cleaning
- 1.4 Rotor and screen filter cleaning
- 1.5 Engine oil replacement
- 1.6 Drive chain cleaning, lubrication and adjustment
- 1.7 Stator plate and HT coil resistance value checking
- 1.8 Carburettor cleaning and tuning
- 1.9 Spark plug inspection, cleaning and adjustment
- 1.10 Battery electrolyte level, specific gravity and voltage checks
- 1.11 Cylinder head de-carbonising and valve lapping

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Performance Standard

1.1 Understand basic terms and definitions.

Performance Criteria

Able to explain/answer technical terms and definitions orally.

EVIDENCES

Performance Evidence

- Answered the questions asked on various terms and definitions.

Supplementary (Knowledge) Evidence

- Reads and writes in vernacular language.
- Possesses knowledge on basic terms and definitions.
- Possesses knowledge on four-stroke and two-stroke engine.

Prior Achievement Evidence

- Work experience of two months as a motorcycle technician.

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Performance Standard

1.2 Set tappet clearance

Performance Criteria

- (a) Ensures standard procedure is followed for adjusting the tappet clearance.
- (b) Proper tools are used.
- (c) Proper feeler gauge is used.

Evidences

Performance Evidence

- Ensured the engine was at room temperature.
- Removed the magneto cover and left side cover of cylinder head.
- Aligned the “T” Mark on the flywheel with the index mark on the crankcase by rotating the flywheel in the anti-clockwise direction.
- Aligned the “O” Mark on the camshaft sprocket with the index mark on the cylinder head.
- Loosened the tappet by adjusting screw lock nut of the inlet valve.
- Inserted 0.05 mm feeler gauge strip and adjusted the adjuster using special tool.
- Locked the lock nut after adjustment.
- Repeated the above process for the exhaust valve also.

Supplementary (Knowledge) Evidence

- Reads and writes in vernacular language.
- Possesses knowledge of using special tools and feeler gauge.

Prior Achievement Evidence

- Work experience of two months as a motorcycle technician.

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Performance Standard

1.3 Air filter cleaning

Performance Criteria

- (a) Ensures standard procedure is followed while cleaning the Air filter.
- (b) Proper solvent is used for cleaning the Air filter.
- (c) Proper oil is used to wet the Air filter.
- (d) Ensures air is sprayed properly in case of paper filter (in case of Karizma motorcycle).

Evidences

Performance Evidence

- Checked the air filter element condition.
- Ensured the air filter element was cleaned in kerosene oil.
- Air filter was squeezed by folding to remove kerosene oil.
- Air filter was air dusted after squeezing the kerosene oil.
- Dipped the air filter element in 90 grade oil and squeezed the excess oil.
- Checked the “O”-ring of the Air filter box before fitment.

Supplementary (Knowledge) Evidence

- Reads and writes in vernacular language.
- Possesses knowledge on importance of Air filter.
- Possesses knowledge on maintenance of Air filter.

Prior Achievement Evidence

- Work experience of two months as a motorcycle technician.

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Performance Standard

1.4 Rotor and screen filter cleaning

Performance Criteria

- (a) Rotor and Screen filter is cleaned at scheduled interval.
- (b) Drains the engine oil before removing the clutch cover.
- (c) Clutch cover is removed by loosening the fasteners in a criss-cross pattern.
- (d) Proper special tool is used to remove the Rotor filter.
- (e) Ensures that no kerosene enters the crankshaft while cleaning the Rotor filter.
- (f) Proper direction of screen filter is ensured while inserting it back in the crankcase.
- (g) Non-reusable items are replaced with new ones.
- (h) Clutch cover fasteners are tightened in a criss-cross pattern.
- (i) Usage of Torque Wrench while tightening the Rotor filter Castle nut.

Evidences

Performance Evidence

- Drained the engine oil before removing the clutch cover.
- Loosened the fasteners of clutch cover in a criss-cross pattern.
- Remained careful while cleaning the Rotor filter, so that kerosene did not enter the crankshaft.
- Ensured that rotor filter castle nut was tightened using torque wrench.
- Sharp edged portion of the screen filter was inserted inwards while installing the screen filter into the crankcase.
- Replaced the gaskets.
- Tightened the clutch cover bolts in a criss-cross pattern.

Supplementary (Knowledge) Evidence

- Reads and writes in vernacular language.
- Possesses knowledge on importance of oil (rotor) filter cleaning.
- Possesses knowledge on procedure of oil filter cleaning.
- Possesses knowledge on usage of special tools and torque wrench.

Prior Achievement Evidence

- Work experience of two months as a motorcycle technician.

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Performance Standard

1.5 Engine oil replacement

Performance Criteria

- (a) Awareness of recommended brand and grade of engine oil.
- (b) Recommended schedule of oil top-up/replacement.
- (c) Right procedure of engine oil replacement.

Evidences

Performance Evidence

- Replaced oil as per the recommended schedule.
- Ensured the dip-stick was removed while draining the engine oil.
- Ensured that the metal sealing washer of the drain plug was replaced each time the plug was opened.
- Ensured that the drain plug was tightened using a torque wrench.
- Refilled the right quantity of prescribed engine oil depending upon the model.
- Used the right/recommended oil as per the model.
- Ensured that the engine oil was drained on side stand in case of above 100 cc models.
- Ensured special tool was used to remove the drain plug in case of above 100 cc models.
- Ensured that the vehicle was tilted both the sides to ensure maximum draining.
- Ensured that the engine oil level was checked when the vehicle was put on the main stand.

Supplementary (Knowledge) Evidence

- Reads and writes in vernacular language.
- Possesses knowledge on importance of engine oil top-up/replacement.
- Possesses knowledge on procedure of engine oil top-up/replacement.
- Possesses knowledge on usage of torque wrench.

Prior Achievement Evidence

- Work experience of two months as a motorcycle technician.

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Performance Standard

1.6 Drive chain cleaning, lubrication and adjustment.

Performance Criteria

- (a) Drive chain is removed for cleaning and lubrication.
- (b) Proper solvent is used to clean the drive chain.
- (c) Proper lubricant is used to lubricate the drive chain.
- (d) Proper direction of drive chain lock plate fitment is ensured.
- (e) Drive chain is adjusted equally on both the sides.
- (f) Proper drive chain slackness is ensured.

Evidences

Performance Evidence

- Ensured the drive chain was removed and cleaned in kerosene.
- Ensured the chain was air dusted before dipping in SAE-90 grade oil.
- Ensured drive chain open end of lock plate was fitted in the opposite direction of the chain rotation.
- Drive chain was adjusted by loosening the drive sprocket sleeve nut and axle nut.
- Drive chain was adjusted equally on both the sides by ensuring the scale graduations on both the sides of the swing arm, coinciding with the notch on the adjusting plate.
- Ensured that chain slackness was within the recommended limits.

Supplementary (Knowledge) Evidence

- Reads and writes in vernacular language.
- Possesses knowledge on importance of drive chain cleaning, lubrication and adjustment.
- Possesses knowledge on fitment direction of drive chain lock plate.

Prior Achievement Evidence

- Work experience of two months as a motorcycle technician.

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Performance Standard

1.7 Stator plate and HT coil resistance value checking.

Performance Criteria

- (a) All coils wire colour code is known.
- (b) Resistance values of all coils are known.
- (c) Usage of Digital Multimeter.
- (d) Understands functions of all coils.

Evidences

Performance Evidence

- All coils wire colour code were known.
- All coils resistance values were known.
- Digital Multimeter was used by selecting the appropriate knob.
- Function of each coil was known.

Supplementary (Knowledge) Evidence

- Reads and writes in vernacular language.
- Possesses knowledge on function of all coils.
- Possesses knowledge on usage of Digital multimeter.

Prior Achievement Evidence

- Work experience of two months as a motorcycle technician.

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Performance Standard

1.8 Carburettor cleaning and tuning.

Performance Criteria

- (a) Proper tools and tray is taken for cleaning.
- (b) Identification of jet numbers, jet needle number and slide number model wise.
- (c) Identification of Y-2K and Pre-Y-2K parts of carburettor.
- (d) All the circuits of carburettor are known.
- (e) Knowledge to use Tachometer.

Evidences

Performance Evidence

- Proper tools were used for cleaning the carburettor.
- Checked each and every circuit of carburettor for their functioning.
- Checked for appropriate jet, jet needle, and slide number.
- Ensured that the “E” clip on the needle was in the appropriate groove.
- Ensured the “T” mark on the insulator carburettor was facing upwards during the fitment of carburettor to the inlet manifold.
- Ensured the hose clip of the hose connecting the carburettor and air filter was tightened properly.
- Adjusted the throttle free play as per recommendation.
- Tuned the carburettor when the engine was at normal operating temperature, using a Tachometer.

Supplementary (Knowledge) Evidence

- Reads and writes in vernacular language.
- Possesses knowledge on all circuits of carburettor.
- Possesses knowledge in identifying jet, jet needle, slide number model wise.
- Possesses knowledge on usage of tachometer to tune the carburettor.

Prior Achievement Evidence

- Work experience of two months as a motorcycle technician.

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Performance Standard

1.9 Spark plug inspection, cleaning and adjustment.

Performance Criteria

- (a) Identification of Spark Plug code, model wise.
- (b) Usage of Spark Plug cleaner and tester.
- (c) Spark plug electrode clearance setting model wise.

Evidences

Performance Evidence

- Spark plug cleaned in the tester and inspected for proper spark between the electrodes after adjusting the model specific electrode clearance.
- Demonstrated the operation of Spark Plug tester by using the sand blaster and air pressure setting.

Supplementary (Knowledge) Evidence

- Reads and writes in vernacular language.
- Possesses knowledge on Spark Plug code and electrode clearance model wise.
- Possesses knowledge on using Spark Plug tester and cleaner.

Prior Achievement Evidence

- Work experience of two months as a motorcycle technician.

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Performance Standard

1.10 Battery electrolyte level, specific gravity and voltage checks.

Performance Criteria

- (a) Proper inspection of electrolyte level and checking specific gravity of electrolyte using a hydrometer.
- (b) Checking battery voltage using a Digital Multimeter.

Evidences

Performance Evidence

- Checked the electrolyte level by referring to the “MIN” and “MAX” marks indicated on the battery.
- Checked the specific gravity of electrolyte by using a Hydrometer.
- Checked battery voltage using Digital Multimeter by selecting the appropriate knob and inserting the appropriate probe in the right slot of the Multimeter.

Supplementary (Knowledge) Evidence

- Reads and writes in vernacular language.
- Possesses knowledge on checking electrolyte level and specific gravity.
- Possesses knowledge on using a Hydrometer.
- Possesses knowledge on checking Battery voltage.
- Possesses knowledge on using a Digital Multimeter.

Prior Achievement Evidence

- Work experience of two months as a motorcycle technician.

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(Service procedure, minor engine jobs and replacement of parts)

Performance Standard

1.11 Cylinder head de-Carbonising and valve lapping.

Performance Criteria

- (a) Proper tools are selected for dismantling the Cylinder Head.
- (b) Required tools are ensured for Valve lapping.
- (c) Proper grinding paste is used in sequence for lapping the valves.
- (d) Proper precautions are taken during Valve lapping.
- (e) Non-reusable parts are replaced once removed/dismantled.

Evidences

Performance Evidence

- Ensured proper tools were selected for the job.
- Removed the cylinder head in a proper sequence.
- Placed the parts properly after dismantling.
- Dismantled the valve assembly after dismantling the related sub-assembly.
- Ensured the carbon was scraped from the combustion chamber without eroding the metal.
- Used appropriate grinding paste in sequence and lubricated the valve stem during lapping.
- Cleaned the head thoroughly before and after lapping.
- Lubricated the parts using recommended lubricant before assembling the subassembly.
- Assembled all the parts as per the recommended sequence.

- Checked for valve leak by “**Pour Test**”.
- Replaced all the non-reusable parts.
- Fitted the cylinder head and the cylinder head nuts and tightened them in a proper sequence using a torque wrench.

Supplementary (Knowledge) Evidence

- Reads and writes in vernacular language.
- Possesses knowledge on proper dismantling and assembling procedure for cylinder head.
- Possesses knowledge on using straight edge, feeler gauge and micrometer.

Prior Achievement Evidence

- Work experience of two months as a motorcycle technician.