| **COMPETENCY BASED LEARNING MATERIAL** | |  |
| --- | --- | --- |
|  | |  |
| steering system | | | |
| *Sector:* AUTOMOTIVE/LAND TRANSPORT SECTOR | | | |
| *Distinctive Area of Competence and Qualifications:* **Automotive Servicing NC I** | | | |
| *Unit of Competency:* Perform Periodic Maintenance of Steering System | | | |
| Module Title:  **Performing Periodic Maintenance of Steering System** | | | |
| C:\Users\AIT\Desktop\logo.jpg | **AUTOHUB INSTITUTE OF TECHNOLOGY** | | |

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**NATIONAL CERTIFICATE LEVEL 1**

**QUALIFICATION LEVEL**

**COMPETENCY-BASED LEARNING MATERIALS**

| **No.** | **Basic Competencies** | **Module Title** | **Code** |
| --- | --- | --- | --- |
|  | Receive and Response to Workplace Communication | Receiving and Responding to Workplace Communication | 500311101 |
|  | Work with Others | Working with Others | 500311102 |
|  | Demonstrate Work Values | Demonstrating Work Values | 500311103 |
|  | Practice Housekeeping Procedures | Practicing Housekeeping Procedures | 500311104 |

| **No.** | **Common Competencies** | **Module Title** | **Code** |
| --- | --- | --- | --- |
|  | Validate Vehicle Specification | Applying Appropriate Sealant/Adhesive | ALT723201 |
|  | Move and Position Vehicle | Moving and Positioning Vehicle | ALT832212 |
|  | Utilize Automotive Tools | Performing Housekeeping | ALT723214 |
|  | Perform Mensuration and Calculation | Performing Mensuration and Calculation | ALT723215 |
|  | Utilize Workshop Facilities And Equipment | Performing Safety Practices | ALT723216 |
|  | Prepare Servicing Parts and Consumables | Reading, Interpreting and Applying Specifications and Manuals | ALT723217 |
|  | Prepare Vehicle For Servicing and Releasing | Using and applying Lubricant/Coolant | ALT723218 |

| **No.** | **Core Competencies** | **Module Title** | **Code** |
| --- | --- | --- | --- |
|  | Perform Pre-Delivery Inspection | Performing Pre-Delivery Inspection | ALT723372 |
|  | Perform Periodic Maintenance of Engine | Performing Periodic Maintenance of Engine | ALT723373 |
|  | Perform Periodic Maintenance of Drive Train | Performing Periodic Maintenance of Drive Train | ALT723374 |
|  | Perform Periodic Maintenance of Brake System | Performing Periodic Maintenance of Brake System | ALT723375 |
|  | Perform Periodic Maintenance of Suspension System | Performing Periodic Maintenance of Suspension System | ALT723376 |
|  | **Perform Periodic Maintenance of Steering System** | **Performing Periodic Maintenance of Steering System** | **ALT723377** |

**HOW TO USE THIS COMPETENCY BASED LEARNING MODULE**

Welcome to the Module: **Performing Periodic Maintenance of Sterring System**. This module contains training materials and activities for you to complete.

The unit of competency ***Perform Periodic Maintenance of Steering System*** contains the knowledge, skills and attitudes required for ***Automotive Servicing NC I*** . It is one of the Core Modules at ***National Certificate Level I (NC I )***.

You are required to go through a series of learning activities in order to complete each learning outcome of the module. In each learning outcome there are Information Sheets, Resource Sheets and Reference Materials for further reading to help you better understand the required activities. Follow these activities on your own and answer the self-check at the end of each learning outcome. Get the answer key from your instructor and check your work honestly. If you have questions, please don’t hesitate to ask your facilitator for assistance.

**Recognition of Prior Learning (RPL)**

You may already have some or most of the knowledge and skills covered in this module because you have:

* been working for someone
* already completed training in this area

If you can demonstrate to your trainer that you are competent in a particular skill or skills, talk to him/her about having them formally recognized so you won’t have to do the same training again. If you have qualifications or Certificates of Competency from previous trainings, show them to your trainer. If the skills you acquired are still relevant to this module, they may become part of the evidence you can present for RPL.

At the end of this learning material is a Learner’s Diary, use this diary to record important dates, jobs undertaken and other workplace events that will assist you in providing further details to your trainer or assessors. A Record of Achievement is also provided for your trainer to complete once you completed the module.

This learning material was prepared to help you achieve the required competency, in **Performing Periodic Maintenance of Steering System NC I**. This will be source of information for you to acquire the knowledge and skills in this particular trade independently and your own pace with minimum supervision or help from your instructor.

In doing the activities to complete the requirements of this module, please be guided by the following:

* Talk to your trainer and agree on how you will both organize the training under this module. Read through the module carefully. It is divided into sections that cover all the skills and knowledge you need to successfully complete.
* Work through all information and complete the activities in each section. Read the information sheets and complete the self-checks provided in this module.
* Most probably your trainer will also be your supervisor or manager. He/She is there to support you and show you the correct way to do things. Ask for help.
* Your trainer will tell you about the important things you need to consider when you are completing the activities and it is important that you listen and take notes.
* You will be given plenty of opportunities to ask questions and practice on the job. Make sure you practice your new skills during regular work shifts. This way you will improve both your speed and memory and also your confidence.
* Talk to more experienced work mates and ask for their guidance.
* Use self-check questions at the end of each section to test your own progress.
* When you are ready, ask your trainer to watch you perform the activities outlined in this module.
* As you work through the activities, ask for written feedback on your progress. Your trainer keeps feedback/pre-assessment reports for this reason. When you have completed this learning material and feel confident that you have had sufficient knowledge and skills, your trainer will arrange an appointment with a registered assessor to assess you. The results of the assessment will be recorded in your Competency Achievement Record.

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QUALIFICATION : Automotive Servicing NC I

UNIT OF COMPETENCY : Perform Periodic Maintenance of Steering System

MODULE TITLE : Performing Periodic Maintenance of Steering

System

PERFORMANCE CRITERIA:

1. **LO 1: Perform Pre-Periodic Maintenance of Steering System**
   1. Pre Job requirements are determined based on steering system repair order
   2. Servicing information is sourced from service manual.
   3. Tools, equipment and materials are prepared based on steering system repair

order.

* 1. Hazard and risk associated in the workplace are manage following OSHS
  2. Protective covers are installed based on standard operating procedure.

1. **LO 2: Apply Periodic Maintenance Procedure**

2.1 Steering system components are inspected according to manufacturer’s

service workshop manual.

2.2 Findings and recommendations are reported to the immediate superior

following company’s standard procedures.

2.3 Power steering fluid is replace based on manufacturer’s service workshop

manual

* 1. Steering wheel free-play inspection is conducted based on manufacturer’s

service workshop manual.

* 1. Defects and damages are reported to the to the immediate supervisor.
  2. Safety practices are applied following OSHS.

.

1. **LO 3: Perform work to Completion**

3.1 Wastes are disposed according to good housekeeping practices

3.2 Initial quality inspection is performed based on workplace procedure

3.3 Job done is written down in the repair order.

3.4 Workplace is restored according to company’s standard procedure..

3.5 Safety practices are applied following OSHS.

3.6 Tools and equipment are checked, cleaned and stored following 5s

.

**RESOURCES:**

Jack Erjavec & Robert scharff, **Automotive Technology, A system Approach**, 2nd Ed.

Crouse, W.H. and Anglin, D.L., **Automotive Mechanics,** 10th Ed.,

Santos, G.N. and Lebron G.B., **Chemistry.**

Don Kowels, **Basic Automotive Service and Maintenance.**

QUALIFICATION : Automotive Servicing NC I

UNIT OF COMPETENCY : Perform Periodic Maintenance of Steering System

MODULE TITLE : Performing Periodic Maintenance of Steering

System

**LEARNING OUTCOME 1 : Perform Pre-Periodic Maintenance of Steering**

**System**

PERFORMANCE CRITERIA

**LO 1: Perform Pre-Periodic Maintenance of Steering System**

* 1. Pre Job requirements are determined based on steering system repair order
  2. Servicing information is sourced from service manual.
  3. Tools, equipment and materials are prepared based on steering system

repair order.

* 1. Hazard and risk associated in the workplace are manage following OSHS

1.5 Protective covers are installed based on standard operating procedure.

RESOURCES:

1. Jack Erjavec and Robert scharff, **Automotive Technology, A system Approach**, 2nd Ed.
2. Crouse, W.H. and Anglin, D.L., **Automotive Mechanics,** 10th Ed.,
3. Santos, G.N. and Lebron G.B., **Chemistry.**
4. Don Kowels, **Basic Automotive Service and Maintenance.**

QUALIFICATION : Automotive Servicing NC I

UNIT OF COMPETENCY : Perform Periodic Maintenance of Steering

System

MODULE TITLE : Performing Periodic Maintenance of Steering

System

**LEARNING OUTCOME 1 : Perform Pre-Periodic Maintenance of Steering System**

**Contents:**

1. Steering system fundamentals
2. Using of Service information resources
3. Tools, equipment and materials preparation based on steering system repair order
4. Installation of protective covers
5. OSHS

**Assessment Criteria**

1. Job requirements are determined based on steering system repair order.
2. Servicing information is sourced from service manual.
3. Tools, equipment and materials are prepared based on suspension system repair order.
4. Hazards and risks associated in the workplace are managed following OSHS.
5. Protective covers are installed based on standard operating procedure

**Conditions**

The following resources should be provided

1.Workplace: Real or simulated work area

2. Appropriate Tools & equipment

3. Materials relevant to the activity

4. Repair manuals and related reference materials

**Assessment Method**

1. Demonstration with oral questioning
2. Written exam
3. Interview

INFORMATION **SHEET 6.1-1**

QUALIFICATION : Automotive Servicing NC I

UNIT OF COMPETENCY : Perform Periodic Maintenance of Steering System

MODULE TITLE : Performing Periodic Maintenance of Steering

System

**LEARNING OUTCOME 1 : Perform Pre-Periodic Maintenance of Steering**

**System**

**Steering Fundamentals**

**Function of Steering System**

1. Control of front wheel (sometimes rear wheel) direction.
2. Transmit road feel (slight steering wheel pull caused by the road surface) to the driver’s hand.
3. Maintain the correct amount of effort needed to turn the wheels.
4. Absorb most of the shock going to the steering wheel as the tire hits holes and bumps in the road

**Types according to steering Force**

1. Manual steering system – relies solely on the driver to provide steering force
2. Power assist – (power steering) – uses hydraulic or electric power to help the driver apply steering force

Both manual and power steering systems have common components.

Input components:

* Steering wheel
* Steering column
* Steering shaft Steering column and Wheel

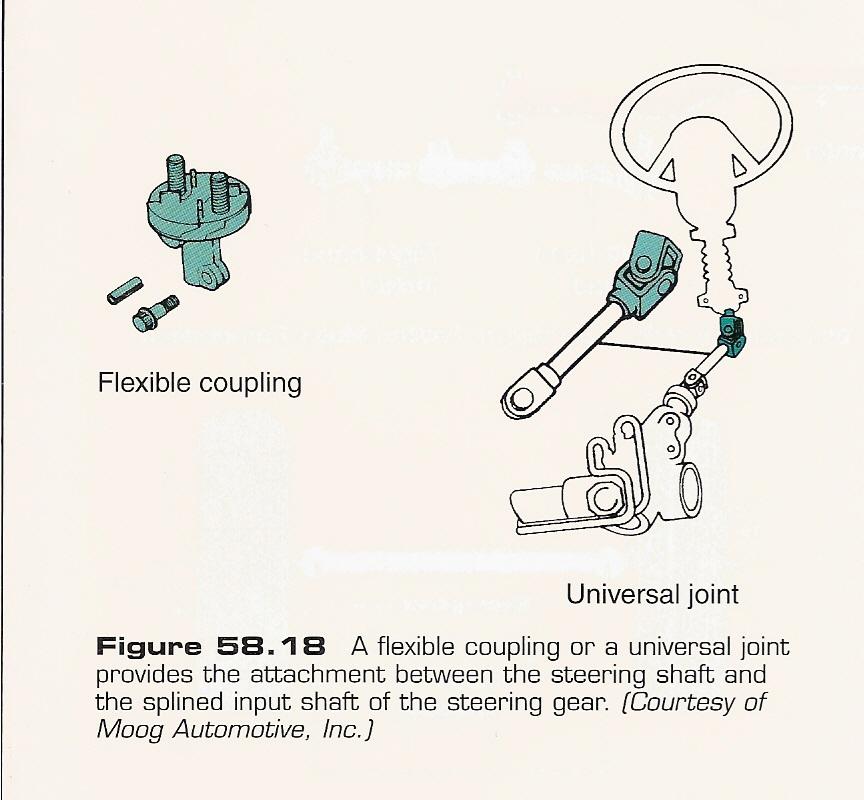


Steering Shaft



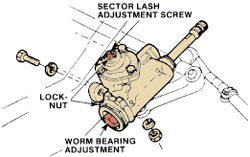
The steering shaft connects to the steering gear through one or more:

* + - * Universal joints
      * Flexible steering coupler

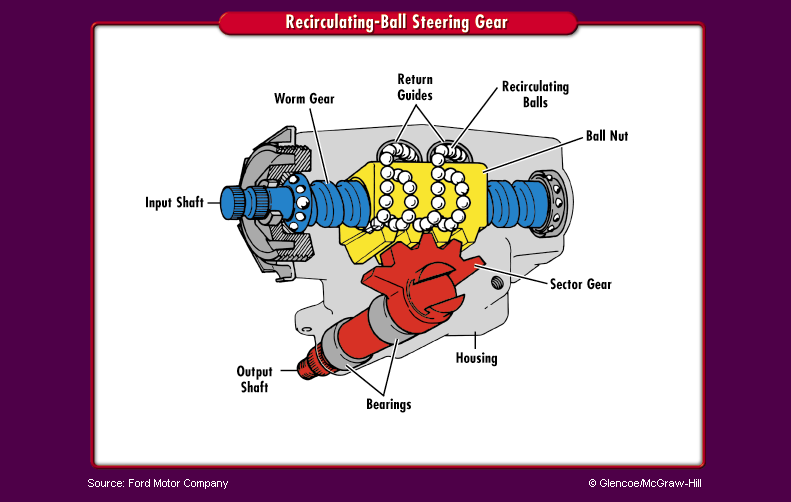


**Steering Gear**

The steering gear changes the rotary axis motion of the steering wheel and covert the motion into a linear motion with the help of steering linkages.



**Recirculating ball Steering Gear**



Connects the linear motion of the steering gear to the steering arms.

Parallelogram type linkage (typical) –

Pitman arm

Idler arm

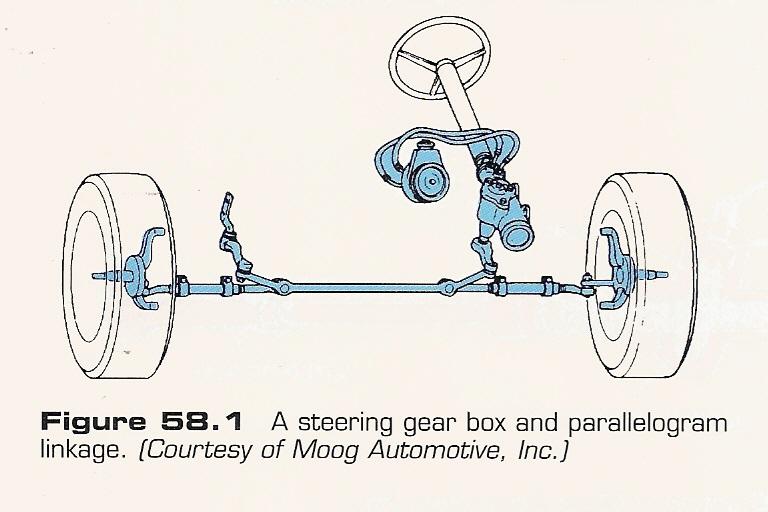
Center link

Inner tie rod

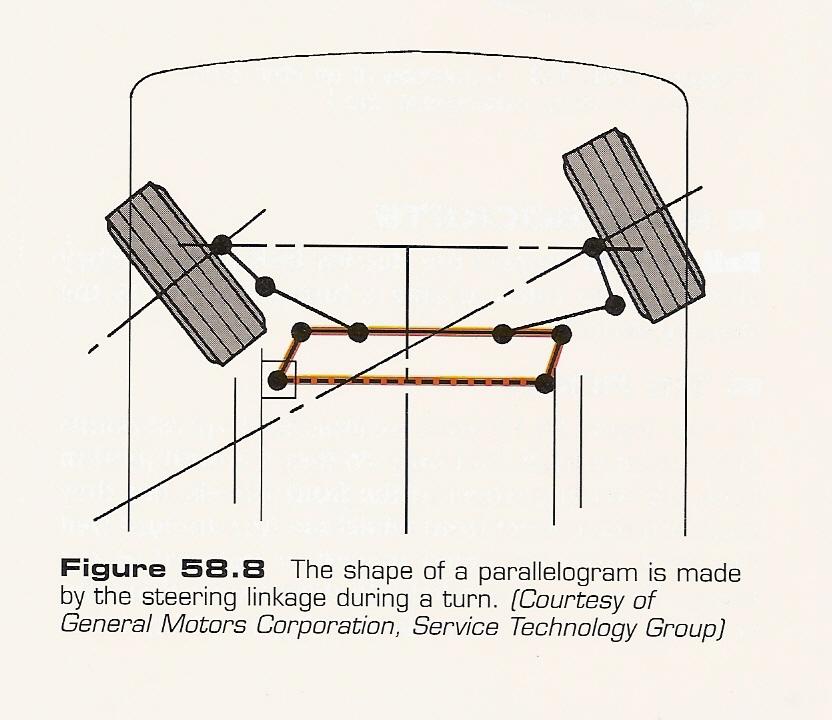
Outer tie rod

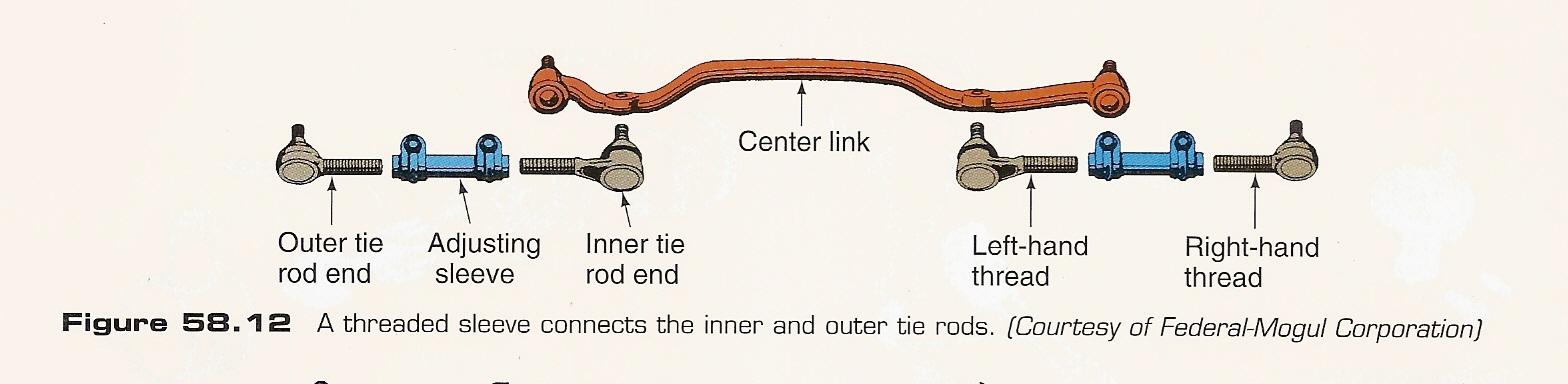
Tie rod adjustment sleeve

**Typical Steering Gear with Parallelogram linkage**



“Parallelogram” refers to the shape that the linkage makes on a turn.





Idler Arm



Pitman’s Arm





SELFCHECK : 6.1-1

QUALIFICATION : Automotive Servicing NC I

UNIT OF COMPETENCY : Perform Periodic Maintenance of Steering System

MODULE TITLE : Performing Periodic Maintenance of Steering

System

**LEARNING OUTCOME 1 : Perform Pre-Periodic Maintenance of Steering**

**System**

**ANSWER SHEET : 6.1-1**

QUALIFICATION : Automotive Servicing NC I

UNIT OF COMPETENCY : Perform Periodic Maintenance of Steering System

MODULE TITLE : Performing Periodic Maintenance of Steering

System

**LEARNING OUTCOME 1 : Perform Pre-Periodic Maintenance of Steering**

**System**

QUALIFICATION : Automotive Servicing NC I

UNIT OF COMPETENCY : Perform Periodic Maintenance of Steering System

MODULE TITLE : Performing Periodic Maintenance of Steering

System

**LEARNING OUTCOME 2 : Apply Periodic Maintenance Procedure**

PERFORMANCE CRITERIA

**LO 2: Apply Periodic Maintenance Procedure**

2.1 Steering system components are inspected according to manufacturer’s

service workshop manual.

2.2 Findings and recommendations are reported to the immediate superior

following company’s standard procedures.

2.3 Power steering fluid is replace based on manufacturer’s service workshop

manual

* 1. Steering wheel free-play inspection is conducted based on manufacturer’s

service workshop manual.

* 1. Defects and damages are reported to the to the immediate supervisor.
  2. Safety practices are applied following OSHS.

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Don Kowels, **Basic Automotive Service and Maintenance.**

INFORMATION SHEET : 6.2-1

QUALIFICATION : Automotive Servicing NC I

UNIT OF COMPETENCY : Perform Periodic Maintenance of Steering System

MODULE TITLE : Performing Periodic Maintenance of Steering

System

**LEARNING OUTCOME 2 : Apply Periodic Maintenance Procedure**

SELFCHECK : 6.2-1

QUALIFICATION : Automotive Servicing NC I

UNIT OF COMPETENCY : Perform Periodic Maintenance of Steering System

MODULE TITLE : Performing Periodic Maintenance of Steering

System

**LEARNING OUTCOME 2 : Apply Periodic Maintenance Procedure**

**ANSWER SHEET : 6.2-1**

QUALIFICATION : Automotive Servicing NC I

UNIT OF COMPETENCY : Perform Periodic Maintenance of Steering System

MODULE TITLE : Performing Periodic Maintenance of Steering

System

**LEARNING OUTCOME 2 : Apply Periodic Maintenance Procedure**

QUALIFICATION : Automotive Servicing NC I

UNIT OF COMPETENCY : Perform Periodic Maintenance of Steering System

MODULE TITLE : Performing Periodic Maintenance of Steering

System

**LEARNING OUTCOME 3 : Perform work to completion**

PERFORMANCE CRITERIA

**LO 3: Perform work to Completion**

3.1 Wastes are disposed according to good housekeeping practices

3.2 Initial quality inspection is performed based on workplace procedure

3.3 Job done is written down in the repair order.

3.4 Workplace is restored according to company’s standard procedure..

3.5 Safety practices are applied following OSHS.

3.6 Tools and equipment are checked, cleaned and stored following 5s

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Santos, G.N. and Lebron G.B., **Chemistry.**

Don Kowels, **Basic Automotive Service and Maintenance.**

INFORMATION SHEET : 6.3.1

QUALIFICATION : Automotive Servicing NC I

UNIT OF COMPETENCY : Perform Periodic Maintenance of Steering System

MODULE TITLE : Performing Periodic Maintenance of Steering

System

**LEARNING OUTCOME 3 : Perform work to completion**

**SELF CHECK : 6.3-3**

QUALIFICATION : Automotive Servicing NC I

UNIT OF COMPETENCY : Perform Periodic Maintenance of Steering System

MODULE TITLE : Performing Periodic Maintenance of Steering

System

**LEARNING OUTCOME 3 : Perform work to completion**

**ANSWER KEY : 6.3-3**

UNIT OF COMPETENCY : PERFORM DIESEL ENGINE TUNE UP

MODULE TITLE : Tuning Up Diesel Engine

**LEARNING OUTCOME 1 : Inspect Injection Timing**