Please Note: Apprenticeship Training and Curriculum Standards were developed by the Ministry of Training, Colleges and Universities (MTCU). As of April 8th, 2013, the Ontario College of Trades (College) has become responsible for the development and maintenance of these standards. The College is carrying over existing standards without any changes.

However, because the Apprenticeship Training and Curriculum Standards documents were developed under either the Trades Qualification and Apprenticeship Act (TQAA) or the Apprenticeship and Certification Act, 1998 (ACA), the definitions contained in these documents may no longer be accurate and may not be reflective of the Ontario College of Trades and Apprenticeship Act, 2009 (OCTAA) as the new trades legislation in the province. The College will update these definitions in the future.

Meanwhile, please refer to the College’s website (http://www.collegeoftrades.ca) for the most accurate and up-to-date information about the College. For information on OCTAA and its regulations, please visit: http://www.collegeoftrades.ca/about/legislation-and-regulations
CONTENTS

Competency Analysis Profile

Preface..............................................................................................................................................1
Important Directions to Employers/Sponsors and Trainers.............................................................2
Important Directions to the Apprentice ...........................................................................................3
Notice/Declaration for Collection of Personal Information ............................................................4
Apprentice Record ...........................................................................................................................5
Employer/Sponsor Information ................................................................................................... 6-7
Apprentice Completion Form ..........................................................................................................8
Training Unit Completion Form..........................................................................................................9

SKILL SETS

NUMBER   TITLE

U 5160.0   Occupational Health and Safety Procedures................................................................. 10-12
U 5161.0   Engine Systems........................................................................................................ 13-19
U 5162.0   Electrical Systems - Starting and Charging .............................................................. 19-21
U 5163.0   Engine Management Systems.................................................................................. 22-26
U 5164.0   Electrical Systems – Body .................................................................................... 27-29
U 5165.0   Fuel Delivery Systems............................................................................................. 30-32
U 5166.0   Transmission Systems.............................................................................................. 33-38
U 5167.0   Drive Shafts, Differentials, and Drive Axle Assemblies ............................................ 39-40
U 5168.0   Suspension Systems and Frames ............................................................................ 41-42
U 5169.0   Steering Systems....................................................................................................... 43-44
U 5170.0   Braking Systems ........................................................................................................ 45-49
U 5171.0   Tires, Wheels, Rims, and Hubs................................................................................ 50-51
U 5172.0   Heating, Ventilation, and Air-Conditioning Systems................................................. 52-54
U 5173.0   Body and Trim............................................................................................................ 55-56
U 5174.0   Exhaust, Intake, and Emission Control Systems......................................................... 57-61
## Skill Sets

### Occupational Health & Safety Practices

<table>
<thead>
<tr>
<th>Skill</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>U5160.0</td>
<td>Identify potential workplace health and safety hazards</td>
</tr>
<tr>
<td>5160.01</td>
<td>Handle, store and dispose of hazardous materials</td>
</tr>
<tr>
<td>5160.02</td>
<td>Wear and maintain personal protective equipment</td>
</tr>
<tr>
<td>5160.03</td>
<td>Comply with workplace-related legislation</td>
</tr>
<tr>
<td>5160.04</td>
<td>Interpret and apply service related information</td>
</tr>
<tr>
<td>5160.06</td>
<td>Practice good housekeeping in the workplace</td>
</tr>
<tr>
<td>5160.07</td>
<td>Comply with WHMIS guidelines</td>
</tr>
</tbody>
</table>

### Engine Systems

<table>
<thead>
<tr>
<th>Skill</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>U5161.0</td>
<td>Perform visual inspection</td>
</tr>
<tr>
<td>5161.01</td>
<td>Diagnose and troubleshoot cooling system and components</td>
</tr>
<tr>
<td>5161.02</td>
<td>Repair cooling system and components</td>
</tr>
<tr>
<td>5161.03</td>
<td>Verify repair of cooling system and components</td>
</tr>
<tr>
<td>5161.04</td>
<td>Diagnose and troubleshoot engine lubricating systems and components</td>
</tr>
<tr>
<td>5161.05</td>
<td>Repair engine lubricating system and components</td>
</tr>
<tr>
<td>5161.06</td>
<td>Verify repair of engine lubricating system and components</td>
</tr>
<tr>
<td>5161.07</td>
<td>Diagnose and troubleshoot cylinder head and components</td>
</tr>
<tr>
<td>5161.08</td>
<td>Repair cylinder head and components</td>
</tr>
<tr>
<td>5161.09</td>
<td>Verify repair of cylinder head and components</td>
</tr>
<tr>
<td>5161.10</td>
<td>Diagnose and troubleshoot engine block and components</td>
</tr>
<tr>
<td>5161.11</td>
<td>Repair engine block and components</td>
</tr>
<tr>
<td>5161.12</td>
<td>Verify repair of engine block and components</td>
</tr>
<tr>
<td>5161.13</td>
<td></td>
</tr>
</tbody>
</table>

### Electrical Systems - Starting and Charging

<table>
<thead>
<tr>
<th>Skill</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>U5162.0</td>
<td>Perform visual inspection</td>
</tr>
<tr>
<td>5162.01</td>
<td>Diagnose and troubleshoot batteries</td>
</tr>
<tr>
<td>5162.02</td>
<td>Service and boost/charge batteries</td>
</tr>
<tr>
<td>5162.03</td>
<td>Diagnose and troubleshoot starting system and components</td>
</tr>
<tr>
<td>5162.04</td>
<td>Repair starting system and components</td>
</tr>
<tr>
<td>SKILL SETS</td>
<td>COMPETENCY ANALYSIS PROFILE</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>AUTOMOTIVE SERVICE TECHNICIAN</td>
<td>ON-THE-JOB TRAINING STANDARDS</td>
</tr>
<tr>
<td>SKILLS</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENGINE MANAGEMENT SYSTEMS</th>
<th>Perform visual inspection</th>
<th>Diagnose and troubleshoot fuel control system and components</th>
<th>Repair fuel control system and components</th>
<th>Verify repair of fuel control system and components</th>
<th>Diagnose and troubleshoot ignition system and components</th>
</tr>
</thead>
<tbody>
<tr>
<td>5163.0</td>
<td>5163.01</td>
<td>5163.02</td>
<td>5163.03</td>
<td>5163.04</td>
<td>5163.05</td>
</tr>
<tr>
<td>Repair ignition system and components</td>
<td>5163.06</td>
<td>5163.07</td>
<td>5163.08</td>
<td>5163.09</td>
<td>5163.10</td>
</tr>
<tr>
<td>Perform gasoline engine tune-ups</td>
<td>5163.11</td>
<td>Perform electronic diesel engine tune-ups</td>
<td>Perform mechanical diesel engine tune-ups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELECTRICAL SYSTEMS - BODY</td>
<td>Perform visual inspection</td>
<td>Diagnose and troubleshoot body electrical &amp; computer-controlled systems and components</td>
<td>Repair body electrical and computer-controlled systems and components</td>
<td>Verify repair of body electrical and computer-controlled systems and components</td>
<td>Diagnose and troubleshoot supplemental restraint systems and components</td>
</tr>
<tr>
<td>U5164.0</td>
<td>5164.01</td>
<td>5164.02</td>
<td>5164.03</td>
<td>5164.04</td>
<td>5164.05</td>
</tr>
<tr>
<td>Repair supplemental restraint systems and components</td>
<td>5164.06</td>
<td>5164.07</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FUEL DELIVERY SYSTEMS</td>
<td>Perform visual inspection</td>
<td>Diagnose and troubleshoot gasoline fuel systems and components</td>
<td>Repair gasoline fuel systems and components</td>
<td>Verify repair of gasoline fuel systems and components</td>
<td>Diagnose and troubleshoot diesel fuel systems and components</td>
</tr>
<tr>
<td>U5165.0</td>
<td>5165.01</td>
<td>5165.02</td>
<td>5165.03</td>
<td>5165.04</td>
<td>5165.05</td>
</tr>
</tbody>
</table>
### SKILL SETS

#### COMPETENCY ANALYSIS PROFILE

##### AUTOMOTIVE SERVICE TECHNICIAN

##### ON-THE-JOB TRAINING STANDARDS

#### SKILLS

**TRANSMISSION SYSTEMS**

<table>
<thead>
<tr>
<th>Skill Description</th>
<th>Code</th>
<th>Code</th>
<th>Code</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repair diesel fuel systems and components</td>
<td>5165.06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verify repair of diesel fuel systems and components</td>
<td>5165.07</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TRANSMISSION SYSTEMS</strong></td>
<td>5166.01</td>
<td>5166.02</td>
<td>5166.03</td>
<td>5166.04</td>
</tr>
<tr>
<td>Perform visual inspection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnose and troubleshoot clutch systems and components</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repair clutch systems and components</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verify repair of clutch system and components</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnose and troubleshoot manual transmissions/ transaxles and components</td>
<td></td>
<td></td>
<td></td>
<td>5166.05</td>
</tr>
<tr>
<td>Repair manual transmissions/ transaxles and components</td>
<td>5166.06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verify repair of manual transmissions/ transaxles and components</td>
<td>5166.07</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnose and troubleshoot automatic transmissions/ transaxles and components</td>
<td></td>
<td></td>
<td>5166.08</td>
<td></td>
</tr>
<tr>
<td>Repair automatic transmissions/ transaxles and components</td>
<td></td>
<td></td>
<td></td>
<td>5166.09</td>
</tr>
<tr>
<td>Verify repair of automatic transmissions/ transaxles and components</td>
<td></td>
<td></td>
<td></td>
<td>5166.10</td>
</tr>
<tr>
<td>Diagnose and troubleshoot computer-controlled systems and components</td>
<td>5166.11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repair computer-controlled systems and components</td>
<td>5166.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verify repair of computer-controlled systems and components</td>
<td>5166.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repair transfer cases and components</td>
<td></td>
<td></td>
<td></td>
<td>5166.14</td>
</tr>
<tr>
<td>Verify repair of transfer cases and components</td>
<td></td>
<td></td>
<td></td>
<td>5166.15</td>
</tr>
<tr>
<td><strong>DRIVE SHAFTS, DIFFERENTIALS, AND DRIVE AXLE ASSEMBLIES</strong></td>
<td>5167.01</td>
<td>5167.02</td>
<td>5167.03</td>
<td>5167.04</td>
</tr>
<tr>
<td>Perform visual inspection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnose and troubleshoot drive shafts, differentials, drive axle assemblies and components</td>
<td></td>
<td></td>
<td>5167.02</td>
<td></td>
</tr>
<tr>
<td>Repair drive shafts, differentials, drive axle assemblies and components</td>
<td></td>
<td></td>
<td></td>
<td>5167.03</td>
</tr>
<tr>
<td>Verify repair of drive shafts, differentials, drive axle assemblies and components</td>
<td></td>
<td></td>
<td></td>
<td>5167.04</td>
</tr>
<tr>
<td><strong>SUSPENSION SYSTEMS AND FRAMES</strong></td>
<td>5168.01</td>
<td>5168.02</td>
<td>5168.03</td>
<td>5168.04</td>
</tr>
<tr>
<td>Perform visual inspection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnose and troubleshoot suspension systems, frames/ sub-frames, and components</td>
<td></td>
<td></td>
<td>5168.02</td>
<td></td>
</tr>
<tr>
<td>Repair suspension systems, frames/ sub-frames, and components</td>
<td></td>
<td></td>
<td></td>
<td>5168.03</td>
</tr>
<tr>
<td>Verify repair of suspension systems, frames/ sub-frames, and components</td>
<td></td>
<td></td>
<td></td>
<td>5168.04</td>
</tr>
</tbody>
</table>

---

*Ontario College of Trades ©*
<table>
<thead>
<tr>
<th>SKILL SETS</th>
<th>COMPETENCY ANALYSIS PROFILE</th>
<th>AUTOMOTIVE SERVICE TECHNICIAN</th>
<th>ON-THE-JOB TRAINING STANDARDS</th>
<th>SKILLS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STEERING SYSTEMS</strong></td>
<td><strong>PERFORM VISUAL INSPECTION</strong></td>
<td>5169.01</td>
<td><strong>DIAGNOSE AND TROUBLESHOOT STEERING SYSTEMS AND COMPONENTS</strong></td>
<td>5169.02</td>
</tr>
<tr>
<td></td>
<td><strong>REPAIR STEERING SYSTEMS AND COMPONENTS</strong></td>
<td>5169.03</td>
<td><strong>VERIFY REPAIR OF STEERING SYSTEMS AND COMPONENTS</strong></td>
<td>5169.04</td>
</tr>
<tr>
<td></td>
<td><strong>ALIGN STEERING, AXLES, AND SUSPENSION</strong></td>
<td>5169.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BRAKING SYSTEMS</strong></td>
<td><strong>PERFORM VISUAL INSPECTION</strong></td>
<td>5170.01</td>
<td><strong>DIAGNOSE AND TROUBLESHOOT HYDRAULIC BRAKING SYSTEMS AND COMPONENTS</strong></td>
<td>5170.02</td>
</tr>
<tr>
<td></td>
<td><strong>REPAIR HYDRAULIC BRAKING SYSTEMS AND COMPONENTS</strong></td>
<td>5170.03</td>
<td><strong>VERIFY REPAIR OF HYDRAULIC BRAKING SYSTEMS AND COMPONENTS</strong></td>
<td>5170.04</td>
</tr>
<tr>
<td></td>
<td><strong>DIAGNOSE AND TROUBLESHOOT ANTI-LOCK BRAKING SYSTEMS (ABS) AND COMPONENTS</strong></td>
<td>5170.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>REPAIR ANTI-LOCK BRAKING SYSTEMS (ABS) AND COMPONENTS</strong></td>
<td>5170.06</td>
<td><strong>VERIFY REPAIR OF ANTI-LOCK BRAKING SYSTEMS (ABS) AND COMPONENTS</strong></td>
<td>5170.07</td>
</tr>
<tr>
<td></td>
<td><strong>DIAGNOSE AND TROUBLESHOOT AIR BRAKING SYSTEMS AND COMPONENTS</strong></td>
<td>5170.08</td>
<td><strong>REPAIR ANTI-SKID/TRACTION CONTROL SYSTEMS AND COMPONENTS</strong></td>
<td>5170.09</td>
</tr>
<tr>
<td></td>
<td><strong>VERIFY REPAIR OF ANTI-SKID/TRACTION CONTROL SYSTEMS AND COMPONENTS</strong></td>
<td>5170.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TIRES, WHEELS, RIMS, AND HUBS</strong></td>
<td><strong>PERFORM VISUAL INSPECTION</strong></td>
<td>5171.01</td>
<td><strong>DIAGNOSE AND TROUBLESHOOT TIRES AND COMPONENTS</strong></td>
<td>5171.02</td>
</tr>
<tr>
<td></td>
<td><strong>REPAIR TIRES AND COMPONENTS</strong></td>
<td>5171.03</td>
<td><strong>VERIFY REPAIR OF TIRES AND COMPONENTS</strong></td>
<td>5171.04</td>
</tr>
<tr>
<td></td>
<td><strong>BALANCE TIRES AND COMPONENTS</strong></td>
<td>5171.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HEATING, VENTILATION AND AIR CONDITIONING SYSTEMS</strong></td>
<td><strong>PERFORM VISUAL INSPECTION</strong></td>
<td>5172.01</td>
<td><strong>DIAGNOSE AND TROUBLESHOOT AIR-CONDITIONING SYSTEMS AND COMPONENTS</strong></td>
<td>5172.02</td>
</tr>
<tr>
<td></td>
<td><strong>REPAIR AIR-CONDITIONING SYSTEMS AND COMPONENTS</strong></td>
<td>5172.03</td>
<td><strong>VERIFY REPAIR OF AIR-CONDITIONING SYSTEMS AND COMPONENTS</strong></td>
<td>5172.04</td>
</tr>
<tr>
<td></td>
<td><strong>DIAGNOSE AND TROUBLESHOOT HEATING AND VENTILATION SYSTEMS AND COMPONENTS</strong></td>
<td>5172.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>REPAIR HEATING AND VENTILATION SYSTEMS AND COMPONENTS</strong></td>
<td>5172.06</td>
<td><strong>VERIFY REPAIR OF HEATING AND VENTILATION SYSTEMS AND COMPONENTS</strong></td>
<td>5172.07</td>
</tr>
</tbody>
</table>
## SKILL SETS

### COMPETENCY ANALYSIS PROFILE

#### AUTOMOTIVE SERVICE TECHNICIAN

#### ON-THE-JOB TRAINING STANDARDS

### SKILLS

#### BODY AND TRIM

<table>
<thead>
<tr>
<th>U5173.0</th>
<th>5173.01</th>
<th>5173.02</th>
<th>5173.03</th>
<th>5173.04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perform visual inspection</td>
<td>Diagnose and troubleshoot body and trim</td>
<td>Repair body and trim</td>
<td>Verify repair of body and trim</td>
<td></td>
</tr>
</tbody>
</table>

#### EXHAUST, INTAKE AND EMISSION CONTROL SYSTEMS

<table>
<thead>
<tr>
<th>U5174.0</th>
<th>5174.01</th>
<th>5174.02</th>
<th>5174.03</th>
<th>5174.04</th>
<th>5174.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perform visual inspection</td>
<td>Diagnose and troubleshoot exhaust, and intake systems and components</td>
<td>Repair exhaust and intake systems and components</td>
<td>Verify repair of exhaust and intake systems and components</td>
<td>Diagnose and troubleshoot turbocharger/supercharger system and components</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5174.06</th>
<th>5174.07</th>
<th>5174.08</th>
<th>5174.09</th>
<th>5174.10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repair turbocharger, supercharger system and components</td>
<td>Verify repair of turbocharger/supercharger system and components</td>
<td>Diagnose and troubleshoot Level I emission control systems and components</td>
<td>Repair Level I emission control systems and components</td>
<td>Verify repair of Level I emission control systems and components</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5174.11</th>
<th>5174.12</th>
<th>5174.13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnose and troubleshoot Level II emission control systems and components</td>
<td>Repair Level II emission control systems and components</td>
<td>Verify repair of Level II emission control systems and components</td>
</tr>
</tbody>
</table>

### SPECIAL INSTRUCTIONS

**NOTE ON SHADED PERFORMANCE OBJECTIVES AND SKILLS:**
Shaded performance objectives and skills are optional, that is, they do not have to be completed or signed-off for the apprentice to complete his or her apprenticeship.
PREFACE

This training document was developed by the Workplace Support Services Branch of the Ministry of Training, Colleges and Universities (MTCU) in consultation with representatives from the industry. These Training Standards are intended to be used by the apprentice, trainers and employers/sponsors as a "blueprint" for training or as a prerequisite for government accreditation/certification.

The care and maintenance of this book is the joint responsibility of the apprentice and the employer/sponsor. The Training Standards were developed specifically for documenting the apprentice's acquisition of skills.

The book becomes the only record of an apprentice's training.
IMPORTANT DIRECTIONS TO EMPLOYERS/SPONSORS AND TRAINERS

The Training Standards identify skills required for this occupation and its related training program.

These Training Standards have been written in concise statements which describe how well an apprentice must perform each skill in order to become competent. Competence means being able to do the performance to the required standard on request.

In using these Training Standards, trainers will be able to ensure that the apprentice is developing skills detailed for the occupation.

Trainners and apprentices are required to sign off and date the skills following each successful acquisition.

Employers/Sponsors participating in this training program will be designated as the Signing Authority and are required to attest to successful achievement by signing the appropriate box included at the end of each unit.
IMPORTANT DIRECTIONS TO THE APPRENTICE

1. All hours working for each employer/sponsor(s) should be recorded in the Employer/Sponsor Information section. All Performance Objectives and skills completed while working for each Employer/Sponsor(s) should be recorded.

2. The "Summary of Hours" should be completed, signed and dated by both the apprentice and employer/sponsor when either all terms of the training agreement have been completed or the apprentice leaves the employer/sponsor.

3. It is the responsibility of the apprentice to inform the local Apprenticeship Client Services office regarding the following changes:
   - change of employer/sponsor address;
   - change of apprentice name or address;
   - transfer to a new employer/sponsor.

4. At the fulfilment of all terms of the Training Agreement, the Apprentice Completion Form must be completed and signed by the current employer/sponsor. Present these completed and authorized Training Standards and the Apprentice Completion Form to your local Apprenticeship Client Services office.
NOTICE OF COLLECTION OF PERSONAL INFORMATION

1. At any time during your apprenticeship training, you may be required to show this training standard to the Ministry of Training, Colleges and Universities (the Ministry). You will be required to disclose the signed Apprenticeship Completion form to the Ministry in order to complete your program. The Ministry will use your personal information to administer and finance Ontario’s apprenticeship training system, including confirming your completion and issuing your certificate of apprenticeship.

2. The Ministry will disclose information about your program completion and your certificate of apprenticeship to the Ontario College of Trades, as it is necessary for the College to carry out its responsibilities.

3. Your personal information is collected, used and disclosed by the Ministry under the authority of the Ontario College of Trades and Apprenticeship Act, 2009.

4. Questions about the collection, use and disclosure of your personal information by the Ministry may be addressed to the:

   Manager, Employment Ontario Contact Centre
   Ministry of Training, Colleges and Universities
   33 Bloor St. E, 2nd floor, Toronto, Ontario M7A 2S3
   Toll-free: 1-800-387-5656; Toronto: 416-326-5656
# APPRENTICE RECORD

Apprentice Name: _______________________________________________

# EMPLOYER/SPONSOR INFORMATION

Training Agreement Number:  ____________________________________

Name:   ______________________________________________________________________

Address:  ______________________________________________________________________

Telephone:  __________________________________________________________

Summary of Training:

Dates of Employment:  

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Performance Objectives signed off:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Employer/Sponsor Signature   Date  Apprentice Signature    Date

You will be required to disclose this signed form to the Ministry of Training, Colleges and Universities in order to complete your program. The Ministry will use your personal information to administer and finance Ontario’s apprenticeship training system.

For further information please see the notice/declaration for collection of personal information that is referenced in the table of contents of this training standard.
APPRENTICE RECORD

Apprentice Name: ___________________________________________

EMPLOYER/SPONSOR INFORMATION

Training Agreement Number: __________________________________

Name: ____________________________________________________________

Address: ____________________________________________________________

____________________________________________________________________

Telephone: ____________________________________________________________

Summary of Training:

Dates of Employment: ______________________  _______________________

From     To

Performance Objectives signed off:

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

__________________________________________

Employer/Sponsor Signature   Date  Apprentice Signature   Date
APPRENTICE RECORD

Apprentice Name: ___________________________________________

EMPLOYER/SPONSOR INFORMATION

Training Agreement Number: ___________________________________

Name: _________________________________________________________

Address: _________________________________________________________

_________________________________________________________________

Telephone: _________________________________________________________

Summary of Training:

Dates of Employment: _________________________  _____________________

From     To

Performance Objectives signed off:

_____________________________________________________________

Employer/Sponsor Signature   Date   Apprentice Signature   Date
APPRENTICE COMPLETION FORM

Apprentice Name: ___________________________________
  Print
  ___________________________________
  Signature

Social Insurance Number: ________________________________

Training Units when completed should be signed off by the Employer/Sponsor on the following page and presented with this completion form to your local Apprenticeship Client Services office. Any supporting documentation should also be attached.

In-School Completed: Yes (  )   No (  )   Not Applicable (  )
(proof to be provided)

Hours completed as per Training Agreement:
Yes (  )   No (  )   Not Applicable (  )

Employer/Sponsor Name: ___________________________________
Address: ___________________________________
Telephone: ___________________________________
  ___________________________________
  Signature

MTCU USE ONLY:

Recommended for Exam: Yes (  )   No (  )

________________________________________
Signature
  Consultant/Office Code
# TRAINING UNIT COMPLETION FORM

<table>
<thead>
<tr>
<th>SKILL SETS</th>
<th>TITLE</th>
<th>SIGNING AUTHORITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>U5160.0</td>
<td>Occupational Health and Safety Procedures</td>
<td></td>
</tr>
<tr>
<td>U5161.0</td>
<td>Engine Systems</td>
<td></td>
</tr>
<tr>
<td>U5162.0</td>
<td>Electrical Systems-Starting and Charging</td>
<td></td>
</tr>
<tr>
<td>U5163.0</td>
<td>Engine Management Systems</td>
<td></td>
</tr>
<tr>
<td>U5164.0</td>
<td>Electrical Systems - Body Electrical</td>
<td></td>
</tr>
<tr>
<td>U5165.0</td>
<td>Fuel Delivery Systems</td>
<td></td>
</tr>
<tr>
<td>U5166.0</td>
<td>Transmission Systems</td>
<td></td>
</tr>
<tr>
<td>U5167.0</td>
<td>Drive Shafts, Differentials, and Drive Axle Assemblies</td>
<td></td>
</tr>
<tr>
<td>U5168.0</td>
<td>Suspension Systems and Frames</td>
<td></td>
</tr>
<tr>
<td>U5169.0</td>
<td>Steering Systems</td>
<td></td>
</tr>
<tr>
<td>U5170.0</td>
<td>Braking Systems</td>
<td></td>
</tr>
<tr>
<td>U5171.0</td>
<td>Tires, Wheels, Rims and Hubs</td>
<td></td>
</tr>
<tr>
<td>U5172.0</td>
<td>Heating, Ventilation and Air Conditioning Systems</td>
<td></td>
</tr>
<tr>
<td>U5173.0</td>
<td>Body and Trim</td>
<td></td>
</tr>
<tr>
<td>U5174.0</td>
<td>Exhaust, Intake, and Emission Control Systems</td>
<td></td>
</tr>
</tbody>
</table>

## SPECIAL INSTRUCTIONS

**NOTE ON SHADED PERFORMANCE OBJECTIVES AND SKILLS:**

Shaded performance objectives and skills are optional, that is, they do not have to be completed or signed-off for the apprentice to complete his or her apprenticeship.
U5160.0 OCCUPATIONAL HEALTH AND SAFETY PROCEDURES

GENERAL PERFORMANCE OBJECTIVE

Comply with occupational health and safety procedures by: identifying potential workplace health and safety hazards; handling, storing and disposing of hazardous materials; wearing and maintaining personal protective equipment; complying with workplace-related legislation; interpreting and applying service-related information; practising good housekeeping in the workplace; complying with Workplace Hazardous Materials Information System (WHMIS) guidelines, according to the Occupational Health and Safety Act, government regulations, company policy and manufacturer’s recommendations.

PERFORMANCE OBJECTIVES

SKILLS

5160.01 Identify potential workplace health and safety hazards, including: excessive exhaust and/or explosive fumes, dust, sound levels, electrical and mechanical hazards (i.e., damaged or faulty air lines and/or inadequate ventilation); so that the potential for personal injury, damage to equipment, vehicles, and the environment are minimized; according to government regulations and company policy.

Date Completed                  Trainer Signature        Apprentice Signature

5160.02 Handle, store and dispose of hazardous materials, including: cleaning solvents, anti-freeze, transmission and brake fluids, engine oil, brake dust, battery acid, refrigerants, and gases; using personal protective equipment and specified handling and storage equipment; so that individuals are protected from injury, the environment from contamination and safety procedures are followed; according to government regulations and company policy.

Date Completed                  Trainer Signature        Apprentice Signature
U5160.0  OCCUPATIONAL HEALTH AND SAFETY PROCEDURES - Contd.

5160.03 Wear and maintain personal protective equipment, including: eye, ear, hand, respiratory, body, and foot protection; ensuring that correct fit and optimum protection is provided to the wearer for the specific task performed; according to the government regulations, manufacturer’s specifications and company policy.

Date Completed                   Trainer Signature      Apprentice Signature
______________________________________________________________

5160.04 Comply with workplace-related legislation, relating to highway traffic safety, parts, warranties, occupational health/safety, environmental protection, and business and trade practices, including: Occupational Health and Safety Act, Motive Vehicle Repair Act, Highway Traffic Act and the Environmental Protection Act; by identifying the personal and legal liabilities of technicians, and vehicle owners, when performing and/or conducting vehicle safety inspections, emissions tests, work estimates and repairing and/or replacing defective parts; according to government regulations.

Date Completed                   Trainer Signature      Apprentice Signature
______________________________________________________________

5160.05 Interpret and apply service-related information, including: service bulletins, manuals, and parts catalogues, by: locating and identifying vehicle identification number (VIN), accessing microfiche and computerized service information systems, so that service/repair is performed; according to company policy and/or manufacturer’s recommendations.

Date Completed                   Trainer Signature      Apprentice Signature
______________________________________________________________

5160.06 Practice good housekeeping in the workplace, by: applying fire hazard prevention methods, including: maintaining a clean and orderly work area; identifying, removing and disposing of potential fire hazards; cleaning up grease, oil spills and/or fluids; ensuring work area is free of obstructions; and safely storing tools and shop equipment, to minimize accident or injury to self and others; according to according to government regulations and company policy.

Date Completed                   Trainer Signature      Apprentice Signature
______________________________________________________________
AUTOMOTIVE SERVICE TECHNICIAN

U5160.0 OCCUPATIONAL HEALTH AND SAFETY PROCEDURES - Contd.

5160.07 Comply with Workplace Hazardous Materials Information System (WHMIS) guidelines, including; reading and interpreting labels and Material Safety Data Sheets (MSDS), ensuring receipt of training in WHMIS regulations and practices; according to the Occupational Health and Safety Act.

Date Completed    Trainer Signature    Apprentice Signature

__________________________  ___________________________  ___________________________

Employer/Sponsor Name    Employer/Sponsor Signature

__________________________  ___________________________
U5161.0 ENGINE SYSTEMS

GENERAL PERFORMANCE OBJECTIVE

Diagnose and repair engines, by: performing a visual inspection; diagnosing and troubleshooting cooling systems and components; repairing cooling systems and components, verifying repairs of cooling systems and components, diagnosing and troubleshooting engine lubricating systems and components; repairing engine lubricating systems and components; verifying repair of engine lubricating systems and components; diagnosing and troubleshooting cylinder heads and components; repairing cylinder heads and components; verifying repair of cylinder heads and components; diagnosing and troubleshooting engine blocks and components, repairing engine blocks and components, and verifying repair of engine blocks and components; according to manufacturer’s recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5161.01 Perform visual inspection, identifying system types and applications, by: checking for: worn, loose, damaged, missing, leaking, or defective components, including: coolant, radiators, reservoirs, surge tanks, coolant fans, hubs, pumps, controls, actuators, belts, hoses, lines, fittings, heat exchangers, gaskets, O-rings, seals, pipes, valves, sensors, temperature control devices, drive mechanisms, wiring harnesses, and fastening and mounting devices; according to manufacturer's recommendations, specifications, and safety requirements.
U5161.0 ENGINE SYSTEMS - Contd.

5161.02 *Diagnose and troubleshoot cooling systems and components*, including: coolant, radiators, reservoirs, surge tanks, fans, hubs, coolant pump, controls, actuators, belts, hoses, lines, fittings, heat exchangers, seals, gaskets, O-rings, pipes, valves, sensors, relays, temperature control devices, drive mechanisms, wiring harnesses, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function; checking for: leaks, odour, temperature, corrosion, colour, vibration/noise, coolant type, quantity and condition; using: hand, power, electronic service and specialized tools, and lifting, rigging, and blocking devices; according to manufacturer’s recommendations, specifications and safety requirements.

Date Completed          Trainer Signature          Apprentice Signature
____________________  _____________________  ______________________

5161.03 *Repair cooling systems and components*, including: coolant, radiators, reservoirs, surge tanks, fans, hubs, coolant pumps, controls, actuators, belts, hoses, lines, fittings, heat exchangers, seals, gaskets, O-rings, pipes, valves, sensors, relays, temperature control devices, drive mechanisms, wiring harnesses, and fasteners and mounting devices; by: exchanging, reconditioning, or servicing; using: hand, power, electronic service, and specialized tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed          Trainer Signature          Apprentice Signature
____________________  _____________________  ______________________

5161.04 *Verify repair of cooling systems and components*, including: coolant, radiators, reservoirs, surge tanks, fans, hubs, coolant pumps, controls, actuators, belts, hoses, lines, fittings, heat exchangers, seals, gaskets, O-rings, pipes, valves, sensors, temperature control devices, drive mechanisms, wiring harnesses, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function; using: hand, power, electronic service and specialized tools; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed          Trainer Signature          Apprentice Signature
____________________  _____________________  ______________________
U5161.0 ENGINE SYSTEMS - Contd.

5161.05 **Diagnose and troubleshoot engine lubricating systems and components**, including: oil, pumps, filters, housings, lines, fittings, seals, lubrication jets, gaskets, O-rings, heat exchangers, bypass valves, auxiliary devices, sensors, wiring harnesses, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function; checking for: leaks, odour, temperature, distortion, corrosion, colour, vibration/noise, pressure, contamination, oil type and condition; using: hand, power, electronic service, and specialized tools; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed: ___________________   Trainer Signature: ___________________   Apprentice Signature: ___________________

5161.06 **Repair engine lubricating systems and components**, including: oil, pumps, filters, housings, lines, fittings, seals, lubrication jets, gaskets, O-rings, heat exchangers, bypass valves, auxiliary devices, sensors, wiring harnesses, and fastening and mounting devices, by: exchanging, reconditioning, or servicing; using: hand, power, electronic service, and specialized tools; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed: ___________________   Trainer Signature: ___________________   Apprentice Signature: ___________________

5161.07 **Verify repair of engine lubricating systems and components**, including: oil, pumps, filters, housings, lines, fittings, seals, lubrication jets, gaskets, O-rings, heat exchangers, bypass valves, auxiliary devices, sensors, wiring harnesses, and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function; using: hand, power, electronic and specialized tools; according to manufacturer=s recommendations, specifications, and safety requirements.

Date Completed: ___________________   Trainer Signature: ___________________   Apprentice Signature: ___________________
U5161.0 ENGINE SYSTEMS - Contd.

5161.08 Diagnose and troubleshoot cylinder head and components, including: seats, guides, seals, gaskets, O-rings, springs, retainers, rotors, injector tubes, expansion plugs, valves, actuating mechanisms, camshafts, drive mechanisms, and fasteners and mounting devices; by: testing, and analysing performance and function, checking for: corrosion, erosion, vibration/noise, carbon build-up, fractures, leaks, distortion, temperature and pressure, using hand, power, electronic service and specialized tools; according to manufacturer's recommendations, specifications, and safety requirements.

5161.09 Repair cylinder head and components, including: cylinder heads, seats, guides, seals, gaskets, O-rings, springs, retainers, rotors, injector tubes, expansion plugs, valves and actuating mechanisms, camshafts, drive mechanisms, and fastening and mounting devices; by: exchanging, reconditioning, or servicing; using: hand, power, electronic service and specialized tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

5161.10 Verify repair of cylinder heads and components, including: cylinder heads, seats, guides, seals, O-rings, springs, retainers, rotors, injector tubes, expansion plugs, valves and actuating mechanisms, camshafts, drive mechanisms, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function; using: hand, power, electronic service, and specialized tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.
U5161.0 ENGINE SYSTEMS - Contd.

5161.11 Diagnose and troubleshoot engine blocks and components, including: engine blocks, expansion plugs, piston assemblies, connecting rods, bearings, seals, gaskets, liners, counter balancers, crankshafts, flywheel assemblies, balance shafts, gear trains, camshafts, follower assemblies, harmonic balancers, pulleys, auxiliary drives, oil pans, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function, checking for: temperature, corrosion, erosion, vibration/noise, carbon build-up, fractures, distortion, alignment, leaks and pressure, using: hand, power, electronic service, specialized and precision measuring tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature
_______________   _____________________  ______________________

5161.12 Repair engine blocks and components, including: engine blocks, expansion plugs, piston and connecting rod assemblies, bearings, seals, gaskets, sealants, liners, counter balancers, crankshafts, flywheel assemblies, balance shafts, gear trains, camshafts and follower assemblies, harmonic balancers, pulleys, auxiliary drives, oil pans, and fastening and mounting devices; by: exchanging, reconditioning, or servicing, using hand, power, electronic service, specialized and precision measuring tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature
_______________   _____________________  ______________________
5161.13 Verify repair of engine blocks and components, including: engine blocks, expansion plugs, piston and connecting rod assemblies, bearings, seals, gaskets, sealants, liners, counter balancers, crankshafts, flywheel assemblies, balance shafts, gear trains, camshafts and follower assemblies, harmonic balancers, pulleys, auxiliary drives, oil pans, and mounts, by: visually inspecting, testing, and analyzing performance and function; using: hand, power, electronic service, specialized and precision measuring tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed    Trainer Signature    Apprentice Signature
________________    __________________    __________________

Employer/Sponsor Name    Employer/Sponsor Signature
____________________    ______________________
U5162.0 ELECTRICAL SYSTEMS - STARTING AND CHARGING

GENERAL PERFORMANCE OBJECTIVE

Diagnose and repair electrical systems - starting and charging, by: performing a visual inspection; diagnosing and troubleshooting batteries; servicing and boosting, or charging batteries; diagnosing and troubleshooting starting systems and components; repairing starting systems and components; verifying repair of starting systems and components; diagnosing and troubleshooting charging systems and components; repairing charging systems and components, and verifying repair of charging systems and components, according to manufacturer’s recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5162.01 Perform visual inspection, identifying system types and applications, by: checking for worn, damaged, corroded, loose, or defective components, including: batteries, starters, cables, connectors, solenoids, relays, sensors, modules, regulators, circuit protection devices, wiring harnesses, gauges, alternating current (AC) generators (alternators), drive mechanisms, and fastening and mounting devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature
__________________________   ____________________  ______________________

5162.02 Diagnose and troubleshoot batteries, by testing, and analyzing performance and function, checking for: corrosion, distortion, contamination, state of charge, voltage, amperage, temperature, and leaks, using: electronic service tools, load testers, chargers, and hydrometers; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature
__________________________   ____________________  ______________________
Service and boost/charge batteries, including: single- and multi battery group, by: removing, cleaning, charging and/or replacing; using: hand tools, booster cables, booster packs, chargers, pullers, special cleaning tools and approved battery water; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature

Diagnose and troubleshoot starting systems and components, including: batteries, cables, connectors, circuit protection devices, neutral safety devices, solenoids, relays, switches, starting motors, drive mechanisms, wiring harnesses, and fasteners and mounting devices, by: visually inspecting, testing, and analysing performance and function; checking for: wear, noise, odour, corrosion, temperature, opens/shorts/grounds, resistance, voltage and amperage; using: hand, power, and electronic service tools, load testers, and stethoscopes; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature

Repair starting systems and components, including: batteries, cables, connectors, circuit protection devices, solenoids, relays, switches, starting motors, drive mechanisms, wiring harnesses, and fastening and mounting devices, by: exchanging, reconditioning or servicing; using: hand, power, specialized, electronic service tools, and lifting, rigging and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature

Verify repair of starting systems and components, including: batteries, cables, connectors, circuit protection devices, solenoids, relays, switches, starting motors, drive mechanisms, wiring harnesses, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function; using: hand, power, specialized, and electronic service tools; according to manufacturer's recommendations, specifications, and safety requirements.
5162.07 Diagnose and troubleshoot charging systems and components, including: alternating current (AC) generators (alternators), drive mechanisms, batteries, cables, terminals, wiring harnesses, voltage regulators, relays, switches, sensors, modules, warning devices, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function; checking for: opens/shorts/grounds, voltage, amperage, resistance, vibration/noise, alignment, odour, corrosion and temperature; using: amperes, volts, resistance (AVR) testers, electronic service tools, and stethoscopes; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

5162.08 Repair charging systems and components, including: alternating current (AC) generators (alternators), drive mechanisms, batteries, cables, hardware, voltage regulators, switches, relays, sensors, modules, wiring harnesses, and fastening and mounting devices, by: exchanging, reconditioning, or servicing; using: hand, power, electronic service, and specialized tools; according to manufacturer's recommendations, specifications, and safety requirements.

5162.09 Verify repair of charging systems and components, including: alternating current (AC) generators (alternators), drive mechanisms, batteries, cables, hardware, voltage regulators, switches, relays, sensors, modules, wiring harnesses, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function; using: hand, power, electronic service, and specialized tools; according to manufacturer's recommendations, specifications, and safety requirements.
U5163.0 ENGINE MANAGEMENT SYSTEMS

GENERAL PERFORMANCE OBJECTIVE

Diagnose and repair engine management systems, by: performing a visual inspection; diagnosing and troubleshooting fuel control systems and components; repairing fuel control systems and components; verifying repair of fuel control systems and components; diagnosing and troubleshooting ignition systems and components; repairing ignition systems and components; verifying repair of ignition systems and components; diagnosing and troubleshooting computer-controlled systems and components; repairing computer-controlled systems and components; verifying repair of computer-controlled systems and components; performing gasoline engine tune-ups; performing electronic diesel engine tune-ups and compression tests, and performing mechanical diesel engine tune-ups, according to manufacturer’s recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5163.01 Perform visual inspection, identifying system types and applications, by: checking: for worn, loose, damaged, leaking, missing, or defective components, including: mechanically and electronically-controlled gasoline and diesel engines, carburetors, electronic fuel injection, ignition systems, switches, resistors, sensors, modules, information/warning displays, wiring harnesses, and fastening and mounting devices; according to manufacturer’s recommendations, specifications and safety requirements.

Date Completed Trainer Signature Apprentice Signature

_________________________ ________________________ ________________________
5163.0  ENGINE MANAGEMENT SYSTEMS - Contd.

5163.02  **Diagnose and troubleshoot fuel control systems and components**, including: fuel, malfunction indicator lights, warning devices, solenoids, relays, sensors, modules, injectors, pumps, actuator modules, interfaces, data links, wiring harnesses, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function; checking for: odour, temperature, corrosion, colour, vibration/ noise, pressure, diagnostic codes, and leaks, using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed

____________________

Trainer Signature

____________________

Apprentice Signature

5163.03  **Repair fuel control systems and components**, including: fuel, malfunction indicator lights, warning devices, sensors, wiring harnesses, modules, solenoids, relays, injectors, pumps, actuator modules, interfaces, data links, and fastening and mounting devices; by: exchanging, reconditioning, or servicing, using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications and safety requirements.

Date Completed

____________________

Trainer Signature

____________________

Apprentice Signature

5163.04  **Verify repair of fuel control systems and components**, including: fuel, malfunction indicator lights, warning devices, sensors, wiring harnesses, modules, solenoids, relays, injectors, pumps, actuator modules, interfaces, data links, and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function; using: hand, power, specialized, and electronic service tools; according to manufacturer's recommendations, specifications and safety requirements.

Date Completed

____________________

Trainer Signature

____________________

Apprentice Signature
U5163.0  ENGINE MANAGEMENT SYSTEMS - Contd.

5163.05  **Diagnose and troubleshoot ignition systems and components**, including: system voltage, distributor components, coils, resistors, ignition modules, switches, sensors, wiring harnesses, ignition timing, spark advance, high tension wires, spark plugs, data links, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function, checking for: voltage, amperage, opens/shorts/grounds, diagnostic codes, resistance, pressure, temperature, corrosion and vibration/noise; using: hand, power, specialized, and electronic service, and precision measuring tools; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature

5163.06  **Repair ignition systems and components**, including: system voltage, distributor components, coils, resistors, ignition modules, switches, sensors, modules, wiring harnesses, ignition timing, spark advance mechanisms, high tension wires, spark plugs, data links, and fastening and mounting devices, by: exchanging, reconditioning, or servicing, using: hand, power, specialized, electronic service and precision measuring tools; according to manufacturer's recommendations, specifications and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature

5163.07  **Verify repair of ignition systems and components**, including: system voltage, distributor components, coils, resistors, ignition modules, switches, sensors, modules, wiring harnesses, ignition timing, spark advance mechanisms, high tension wires, spark plugs, data links, and fastening and mounting devices; by: visually inspecting, testing, analysing performance and function, using: hand, power, specialized, and electronic service and precision measuring tools; according to manufacturer's recommendations, specifications and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature

Ontario College of Trades ©
U5163.0 ENGINE MANAGEMENT SYSTEMS - Contd.

5163.08 Diagnose and troubleshoot computer-controlled systems and components, including: system voltage, data re-programming, sensors, fuses, fusible links, wiring harnesses, data links, modules, drivers, and fastening and mounting devices, by: visually inspecting, testing, and analysing performance and function, checking for: temperature, corrosion, diagnostic codes, and vibration/noise; using hand, power, specialized, electronic service and precision measuring tools; according to manufacturer's recommendations, specifications, schematic diagrams, safety requirements, and the Society of Automotive Engineers (SAE) code standards.

Date Completed Trainer Signature Apprentice Signature

5163.09 Repair computer-controlled systems and components, including: system voltage, data re-programming, actuators, sensors, modules, circuit protection devices, wiring harnesses, connectors, and fastening and mounting devices, by: exchanging, reconditioning, or servicing; using: hand, power, specialized, and electronic service and precision measuring tools; according to manufacturer's recommendations, specifications and safety requirements.

Date Completed Trainer Signature Apprentice Signature

5163.10 Verify repair of computer-controlled systems and components, including: system voltage, data re-programming, actuators, sensors, modules, circuit protection devices, wiring harnesses, connectors, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function, using: specialized, electronic service and precision measuring tools; according to manufacturer's recommendations, specifications and safety requirements.

Date Completed Trainer Signature Apprentice Signature
**ENGINE MANAGEMENT SYSTEMS - Contd.**

### 5163.11 Perform gasoline engine tune-ups

By: testing compression/vacuum, and checking and/or replacing spark plugs, air filters and intake systems, high-tension wires, exhaust restriction, distributor components, fuel filters, and positive crankcase ventilation (PCV) valves; checking and/or adjusting ignition timing, timing control, governors, idle speed, and emission control devices; using: hand, power, specialized, and electronic service tools; according to manufacturer's recommendations, specifications and safety requirements.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5163.12 Perform electronic diesel engine tune-ups

By: testing compression and checking and/or replacing: fuel filters, air filters and intake system components, exhaust restriction, manifold boost pressure, electrical system and valve adjustment, including: electronic unit injectors (EUI), and electronic unit pump (EUP); checking and/or adjusting injection timing, governors, idle speed, and emission control devices; using: hand, power, specialized, and electronic service tools; according to manufacturer's recommendations, specifications and safety requirements.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5163.13 Perform mechanical diesel engine tune-ups

By: checking and/or replacing: fuel and air filters, intake system components, exhaust restriction, manifold boost pressure and controls, and valve adjustment, including: mechanical unit injectors, valves, pressure-time injectors, set-up governors, and injection pump static timing; testing and reconditioning injectors, fuel return system, distributor pumps, glow plugs, and pre-heat systems; using: hand, power, specialized, and electronic service tools; according to manufacturer's recommendations, specifications and safety requirements.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Employer/Sponsor Name  
Employer/Sponsor Signature
U5164.0 ELECTRICAL SYSTEMS - BODY

GENERAL PERFORMANCE OBJECTIVE

Diagnose and repair electrical systems - body electrical; by: performing a visual inspection; diagnosing and troubleshooting body electrical and computer-controlled systems and components; repairing body electrical and computer-controlled systems and components; verifying repair of body electrical and computer-controlled systems and components; diagnosing and troubleshooting supplemental restraint systems (SRS) and components; repairing supplementary restraint systems (SRS) and components, verifying repair of supplementary restraint systems (SRS) and components, according to manufacturer’s recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5164.01 Perform visual inspection, identifying system types and applications, by:
checking for worn, loose, damaged, missing, or defective components, including:
batteries, relays, boards/blocks, connectors, cables, sensors, wiring harnesses,
modules, lighting/illumination, circuit protection and theft-deterrent devices,
electrical accessories, and fastening and mounting devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed Trainer Signature Apprentice Signature

________________ _______________ ______________________

5164.02 Diagnose and troubleshoot body electrical and computer-controlled systems and components, including: batteries, boards/blocks, cables, connectors, display panels, switches, relays, solenoids, motors, sensors, modules, wiring harnesses, data links, proximity warning devices, buzzers, auditory alarms, diagnostic lights, lighting/illumination, circuit protection, theft-deterrent devices, electrical accessories, and fastening and mounting devices; by: visually inspecting, testing, testing programming, re-programming, and analysing performance and function; checking for: opens/shorts/grounds, corrosion, vibration/noise, and parasitic draw; using: hand, power, specialized, electrical service and precision measuring tools; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed Trainer Signature Apprentice Signature

________________ _______________ ______________________
U5164.0 ELECTRICAL SYSTEMS - BODY - Contd.

5164.03 Repair body electrical and computer-controlled systems and components, including: batteries, boards/blocks, cables, connectors, display panels, switches, relays, solenoids, motors, sensors, modules, wiring harnesses, data links, proximity warning devices, buzzers, auditory alarms, diagnostic lights, lighting/illumination, circuit protection, theft-deterrent devices, electrical accessories, and fastening and mounting devices, by: exchanging, reconditioning, or servicing; using: hand, power, electronic service, specialized and precision measuring tools; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed          Trainer Signature  Apprentice Signature
_________________________  _____________________  ______________________

5164.04 Verify repair of body electrical and computer-controlled systems and components, including: batteries, boards/blocks, cables, connectors, display panels, switches, relays, solenoids, motors, sensors, modules, wiring harnesses, data links, proximity warning devices, buzzers, auditory alarms, diagnostic lights, lighting/illumination, circuit protection, theft-deterrent devices, electrical accessories, and fastening and mounting devices; by: visually inspecting, testing, testing programming and analyzing performance and function; using: hand, power, electronic service, specialized and precision measuring tools; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed          Trainer Signature  Apprentice Signature
_________________________  _____________________  ______________________

5164.05 Diagnose and troubleshoot supplemental restraint systems (SRS) and components, including: batteries, air bag assemblies, activating and shorting devices, sensors, modules, wiring harnesses, and fastening and mounting devices; by visually inspecting, testing, and analyzing performance and function; using: hand, power, electronic service, and specialized service tools; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed          Trainer Signature  Apprentice Signature
_________________________  _____________________  ______________________
U5164.0  ELECTRICAL SYSTEMS - BODY - Contd.

5164.06 Repair supplemental restraint systems (SRS) and components, including: batteries, air bag assemblies, activating and shorting devices, sensors, modules, wiring harnesses, and fastening and mounting devices, by: exchanging; using: hand, power, electronic service, and specialized kits and tools; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed    Trainer Signature    Apprentice Signature
________________    __________________    ___________________

5164.07 Verify repair of supplemental restraint system (SRS) and components, including: batteries, air bag assemblies, activating and shorting devices, sensors, modules, wiring harnesses, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function; using: hand, power, electronic service, and specialized kits and tools; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed    Trainer Signature    Apprentice Signature
________________    __________________    ___________________

Employer/Sponsor Name    Employer/Sponsor Signature
________________    __________________

Ontario College of Trades ©
U5165.0 FUEL DELIVERY SYSTEMS

GENERAL PERFORMANCE OBJECTIVE

Diagnose and repair fuel delivery systems, by: performing a visual inspection; diagnosing and troubleshooting gasoline fuel systems and components; repairing gasoline fuel systems and components; verifying repair of gasoline fuel systems and components; diagnosing and troubleshooting diesel fuel systems and components, repairing diesel fuel systems and components, and verifying repair of diesel fuel systems and components, according to manufacturer’s recommendation, specification, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5165.01 Perform visual inspection, identifying system types and applications, by: checking for: worn, loose, damaged, leaking, missing, or defective components, including: pumps, carburetors, injectors, routing of lines and hoses, fittings, filters, vents, tanks, heaters, sensors, modules, wiring harnesses, mechanical controls, and fastening and mounting devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed               Trainer Signature               Apprentice Signature
_____________________________  ________________________________  ______________________

5165.02 Diagnose and troubleshoot gasoline fuel systems and components, including: fuel, tanks, vents, pumps, filters, routing of lines and hoses, fittings, switches, solenoids, relays, sensors, modules, wiring harnesses, pressure control mechanisms, linkages, accumulators, carburetors, fuel injectors, throttle bodies, gauges, and fastening and mounting devices, by: visually inspecting, testing, and analysing performance and function; checking for: odour, temperature, corrosion, vibration/noise, pressure, leaks, flow, and fuel condition; using: hand, power, specialized, and electronic service tools, vacuum and pressure gauges; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed               Trainer Signature               Apprentice Signature
_____________________________  ________________________________  ______________________

Ontario College of Trades ©
**U5165.0 FUEL DELIVERY SYSTEMS** - Contd.

**5165.03** Repair gasoline fuel systems and components, including: fuel, tanks, vents, pumps, filters, routing of lines and hoses, fittings, switches, solenoids, relays, sensors, modules, wiring harnesses, pressure control mechanisms, linkages, accumulators, carburetors, fuel injectors, throttle bodies, gauges, and fastening and mounting devices; by: exchanging, reconditioning, or servicing, using: hand, power, electronic service, and specialized tools; according to manufacturer's recommendations, specifications and safety requirements.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**5165.04** Verify repair of gasoline fuel systems and components, including: fuel, tanks, vents, pumps, filters, routing of lines and hoses, fittings, switches, solenoids, relays, sensors, modules, wiring harnesses, pressure control mechanisms, linkages, accumulators, carburetors, fuel injectors, throttle bodies, gauges, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function; using: hand, power, electronic service, and specialized tools; according to manufacturer's recommendations, specifications and safety requirements.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**5165.05** Diagnose and troubleshoot diesel fuel systems and components, including: fuel, tanks, routing of hoses and lines, fittings, filters, heaters, valves, injection pressure pumps, linkages, cables, air throttles, hydraulic injectors, electronic and mechanical unit injectors, sensors, modules, wiring harnesses, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function; checking for: odour, temperature, colour, corrosion, noise, fuel condition, and leaks; using: pressure and vacuum gauges, hand, power, electronic service, and specialized tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 5165.06 Repair diesel fuel systems and components

Repair diesel fuel systems and components, including: fuel, tanks, routing of hoses and lines, fittings, filters, heaters, valves, injection pressure pumps, linkages, cables, air throttles, hydraulic injectors, electronic and mechanical unit injectors, sensors, modules, wiring harnesses, and fastening and mounting devices; by: exchanging, reconditioning, servicing, or programming; using: hand, power, electronic service, and specialized tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5165.07 Verify repair of diesel fuel systems and components

Verify repair of diesel fuel systems and components, including: fuel, tanks, routing of hoses and lines, fittings, filters, heaters, valves, injection pressure pumps, linkages, cables, air throttles, hydraulic injectors, electronic and mechanical unit injectors, sensors, modules, wiring harnesses, and fastening and mounting devices; by: visually inspecting, testing, testing programming, and analysing performance and function; using: hand, power, electronic service, and specialized tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Employer/Sponsor Name

<table>
<thead>
<tr>
<th>Employer/Sponsor Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
U5166.0 TRANSMISSION SYSTEMS

GENERAL PERFORMANCE OBJECTIVE

Diagnose and repair transmission systems, by: performing a visual inspection; diagnosing and troubleshooting clutch systems and components; repairing clutch systems and components; verifying repair of clutch system and components; diagnosing and troubleshooting manual transmissions/transaxles, and components; repairing manual transmissions/transaxles, and components; verifying repair of manual transmissions/transaxles and components; diagnosing and troubleshooting automatic transmissions/transaxles, and components; repairing automatic transmissions/transaxles, and components; diagnosing and troubleshooting computer-controlled systems and components; repairing computer-controlled systems and components; verifying repair of computer-controlled system and components; diagnosing and troubleshooting transfer cases and components, repairing transfer cases and components, and verifying repair of transfer cases and components, according to manufacturer’s recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5166.01 Perform visual inspection, identifying system types and applications, by: checking for: worn, loose, damaged, leaking, missing, or defective components, including: housings, shafts, gears, bearings, seals, bushings, linkages, cables, controls, actuators, clutches, pressure plates, flywheels, sensors, modules, wiring harnesses, fluids/lubricants, coolers, power take-off units (PTO), pumps, filters, level indicators, tubes, yokes, flanges, data displays, and fastening and mounting devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed    Trainer Signature    Apprentice Signature

__________________________ ___________________________ ___________________________
Diagnose and troubleshoot clutch systems and components, including: pressure plate assemblies, friction materials, cables, linkages, release mechanisms, bearings, hydraulic cylinders, lines, fluids, flywheel assemblies, pilot bearings, input (pilot) shafts, intermediate plates, drive mechanisms, switches, solenoids, sensors, concentric alignment, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function; checking for: odour, temperature, corrosion, contamination, vibration/noise, colour, fluid level/condition, pressure, free play, internal adjustments, slippage, disengagement and dragging; using: hand, power, electronic service, and specialized tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed: ___________________  Trainer Signature: ___________________  Apprentice Signature: ___________________

Repair clutch systems and components, including: pressure plate assemblies, friction materials, cables, linkages, release mechanisms, bearings, hydraulic cylinders, lines, fluids, flywheel assemblies, pilot bearings, input (pilot) shafts, intermediate plates, drive mechanisms, switches, solenoids, sensors, concentric alignment, and fastening and mounting devices; by: exchanging, reconditioning, or servicing; using: hand, power, electronic service, and specialized tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed: ___________________  Trainer Signature: ___________________  Apprentice Signature: ___________________

Verify repair of clutch systems and components, including: pressure plate assemblies, friction materials, cables, linkages, release mechanisms, bearings, hydraulic cylinders, lines, fluids, flywheel assemblies, pilot bearings, input (pilot) shafts, intermediate plates, drive mechanisms, switches, solenoids, sensors, concentric alignment, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function; using: hand, power, electronic service, and specialized tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed: ___________________  Trainer Signature: ___________________  Apprentice Signature: ___________________
### 5166.05 Diagnose and troubleshoot manual transmissions/transaxles and components

- Housings, gear trains, synchronizers, differentials, shift mechanisms, power take-off (PTO) units, speedometer drives, alignment, sensors, modules, switches, bearings, seals, lubrication systems, wiring harnesses, and fastening and mounting devices, by:
  - Visually inspecting, testing, and analyzing performance and function, checking for: odour, temperature, corrosion, colour, fluid level/condition, leaks, vibration/noise, wear, and gear clash.
  - Using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5166.06 Repair manual transmissions/transaxles and components

- Housings, gear trains, synchronizers, differentials, shift mechanisms, power take-off (PTO) units, speedometer drives, alignment, sensors, modules, switches, bearings, seals, lubrication systems, wiring harnesses, and fastening and mounting devices, by: exchanging, reconditioning, or servicing, using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5166.07 Verify repair of manual transmissions/transaxles and components

- Housings, gear trains, synchronizers, differentials, shift mechanisms, power take-off (PTO) units, speedometer drives, alignment, sensors, modules, switches, bearings, seals, lubrication systems, wiring harnesses, and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function, using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
AUTOMOTIVE SERVICE TECHNICIAN

U5166.0 TRANSMISSION SYSTEMS - Contd.

5166.08 Diagnose and troubleshoot automatic transmissions/transaxles and components, including: housings, oils, differentials, power take-off (PTO) units, torque converter assemblies, modulators/throttles, governor circuits, solenoids, sensors, modules, wiring harnesses, valve bodies, gear trains, shafts, bearings, seals, clutch packs, one-way clutches, band and servo assemblies, data links, diagnostic lights and codes, and fastening and mounting devices; by: stall testing, and analysing performance and function, checking for: odour, temperature, slippage, shift points and quality, vibration/noise, corrosion, colour, fluid level/condition, leaks, contamination, pressure, alignment and wear; using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature

5166.09 Repair automatic transmissions/transaxles and components, including: housings, oils differentials, power take-off (PTO) units, torque converter assemblies, shift points and quality, modulators/throttles, governor circuits, solenoids, sensors, modules, wiring harnesses, valve bodies, clutch packs, one-way clutches, band and servo assemblies, data links, diagnostic lights and codes, and fastening and mounting devices; by: exchanging, reconditioning, or servicing, using hand, power, specialized, electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer’s recommendations, specifications and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature

5166.10 Verify repair of automatic transmissions/transaxles and components, including: housings, oils, differentials, power take-off (PTO) units, torque converter assemblies, modulators/throttles, governor circuits, solenoids, sensors, modules, wiring harnesses, valve bodies, clutch packs, one-way clutches, band and servo assemblies, data links, diagnostic lights and codes, and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function; using: hand, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer’s recommendations, specifications and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature
U5166.0 TRANSMISSION SYSTEMS - Contd.

5166.11 **Diagnose and troubleshoot computer-controlled systems and components**, including: diagnostic codes, warning devices, relays, solenoids, sensors, modules, wiring harnesses, controls, actuators, data links, and fastening and mounting devices, by: visually inspecting, testing, and analysing performance and function, checking for: colour, temperature, vibration/noise, and corrosion, using: hand, power, specialized, and electronic service tools; according to manufacturer’s recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature

5166.12 **Repair computer-controlled systems and components**, including: warning devices, relays, solenoids, sensors, modules, wiring harnesses, controls, actuators, data links, and fasteners and mounting hardware; by: exchanging, reconditioning, data reprogramming, or servicing; using: hand, specialized, and electronic service tools; according to manufacturer’s recommendations, specifications and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature

5166.13 **Verify repair of computer-controlled systems and components**, including: warning devices, relays, solenoids, sensors, modules, wiring harnesses, controls, actuators, data links, and fasteners and mounting hardware; by: visually inspecting, testing, and analysing performance and function; using: hand, specialized, and electronic service tools; according to manufacturer’s recommendations, specifications and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature

5166.14 **Diagnose and troubleshoot transfer cases and components**, including: housings, linkages, bearings, seals, gear trains, locking devices, viscous couplings, lubrication systems, warning devices, relays, solenoids, controls, actuators, sensors, wiring harnesses, modules, information/warning displays, data links, and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function, checking for: temperature, colour, fluid level/condition, leaks, odour, vibration/noise, corrosion, and diagnostic codes; using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer’s recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature
5166.15 **Repair transfer cases and components**, including: housings, linkages, bearings, seals, gear trains, locking devices, viscous couplings, lubrication systems, warning devices, relays, solenoids, controls, actuators, sensors, wiring harnesses, modules, information/warning displays, data links, and fastening and mounting devices, by: exchanging, reconditioning, or servicing, using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5166.16 **Verify repair of transfer cases and components**, including: housings, linkages, bearings, seals, gear trains, locking devices, viscous couplings, lubrication systems, warning devices, relays, solenoids, controls, actuators, sensors, wiring harnesses, modules, information/warning displays, data links, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function, using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Employer/Sponsor Name: ____________________

Employer/Sponsor Signature: ____________________
U5167.0  DRIVE SHAFTS, DIFFERENTIALS, AND DRIVE AXLE ASSEMBLIES

GENERAL PERFORMANCE OBJECTIVE

Diagnose and repair drive shafts, differentials, and drive axle assemblies, by: performing a visual inspection; diagnosing and troubleshooting drive shaft, differential and drive assemblies, and components, repairing drive shafts, differential, drive assemblies, and components, and verifying repair of drive shafts, differential, drive assemblies, and components, according to manufacturer’s recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5167.01  Perform visual inspection, identifying system types and applications, by:
checking for: worn, loose, damaged, leaking, missing, or defective components,
including: drive shafts, universal and constant velocity (CV) joint assemblies,
hanger bearing and locking hub assemblies, lubrication systems, flanges, yokes,
housings, vents, carriers, differentials, axle shafts, gear sets, bearings, seals,
wheel end assemblies, controls, actuators, sensors, and wiring harnesses, and
fastening and mounting devices; according to manufacturer’s recommendations,
specifications, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature

5167.02  Diagnose and troubleshoot drive shafts, differentials, drive axle assemblies,

and components, including: housings, vents, hanger bearing assemblies, flanges,
yokes, carriers and differentials, universal and constant velocity (CV) joints, axle
shafts, bearings, seals, locking hub assemblies, controls, actuators, sensors,
modules, wiring harnesses, fluids/lubricants, and fastening and mounting devices;
by: visually inspecting, testing, and analyzing performance and function,
checking for: wear, temperature, colour, fluid level/condition, tolerances,
vibration/noise, leaks, gear clash, run out, phasing, and corrosion; using: hand,
power, contamination, specialized, and electronic service tools, and lifting,
rigging, and blocking devices; according to manufacturer’s recommendations,
specifications, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature
U5167.0 DRIVE SHAFTS, DIFFERENTIALS, AND DRIVE AXLE ASSEMBLIES - Contd.

5167.03 Repair drive shafts, differentials, drive axle assemblies, and components, including: housings, vents, hanger bearing assemblies, flanges, yokes, carriers, differentials, universal and constant velocity (CV) joints, axle shafts, bearings, seals, locking hub assemblies, controls, actuators, sensors, modules, wiring harnesses, fluids/lubricants, and fastening and mounting devices; by: reconditioning, exchanging, or servicing, using: hand, power, specialized, and electronic service tools; according to manufacturer’s recommendations, specifications, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature
_________________________    _____________________  ______________________

5167.04 Verify repair of drive shafts, differentials, drive axle assemblies, and components, including: housings, vents, hanger bearing assemblies, flanges, yokes, carriers and differentials, universal and constant velocity (CV) joints, axle shafts, bearings, seals, locking hub assemblies, controls, actuators, sensors, modules, wiring harnesses, fluids/lubricants, and fastening and mounting devices; by: visually inspecting, testing, analyzing performance and function; using: hand, power, specialized, and electronic service tools; according to manufacturer’s recommendations, specifications, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature
_________________________    _____________________  ______________________

Employer/Sponsor Name  Employer/Sponsor Signature
_________________  ___________________
U5168.0  SUSPENSION SYSTEMS AND FRAMES

GENERAL PERFORMANCE OBJECTIVE

Diagnose and repair suspension systems and frames, by: performing a visual inspection; diagnosing and troubleshooting suspension systems and components; repairing suspension systems, frames/sub-frames, and components, and verifying repair of suspension systems, frames/sub-frames and components, according to manufacturer’s recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5168.01  Perform visual inspection, identifying system types and applications, by checking for: worn, loose, missing, leaking, damaged, or defective components; including: frames/sub-frames, control arms, I-beams, shock absorbers, springs (leaf, rubber block, air, and torsion bar), equalizers, shackles, bushings, air suspension, electronic level controls, strut assemblies, sway bars, hangers, lines, fittings, gauges, valves, controls, radius/torque rods, controls, actuators, sensors, modules, data links, wiring harnesses, and fastening and mounting devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature

5168.02  Diagnose and troubleshoot suspension systems, frames/sub-frames and components, including: frames/sub-frames, control arms, I-beams, shock absorbers, springs (leaf, rubber block, air, and torsion bar), equalizers, shackles, bushings, air suspension, electronic level controls, strut assemblies, sway bars, hangers, lines, valves, controls, radius/torque rods, controls, actuators, sensors, modules, information/warning displays, data links, wiring harnesses, and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function, checking for: vibration/noise, corrosion, fractures, leaks, pressure, colour, alignment, stability, ride height, load distribution, controls, and diagnostic codes; using: hand, power, and specialized electronic service tools, and lifting, rigging, and blocking devices, according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature
5168.03 Repair suspension systems, frames/sub-frames and components, including: control arms, I-beams, shock absorbers, springs (leaf, rubber block, air, and torsion bar), equalizers, shackles, bushings, air suspension, electronic level controls, strut assemblies, sway bars, hangers, lines, fittings, valves, controls, radius/torque rods, controls, actuators, sensors, modules, information/warning displays, data links, wiring harnesses, and fastening and mounting devices, by: exchanging, reconditioning, aligning, or servicing, using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices, and heating, welding and cutting equipment; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature
_____________________________   _____________________  ______________________

5168.04 Verify repair of suspension systems, frames/sub-frames, and components, including: control arms, I-beams, shock absorbers, springs (leaf, rubber block, air, and torsion bar), equalizers, shackles, bushings, air suspension, electronic level controls, strut assemblies, sway bars, hangers, lines, fittings, valves, controls, radius/torque rods, controls, actuators, sensors, modules, information/warning displays, data links, wiring harnesses, and mounting hardware, by: visually inspecting, testing, and analyzing performance and function, using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature
_____________________________   _____________________  ______________________

Employer/Sponsor Name  Employer/Sponsor Signature
_________________  ____________________
5169.0 STEERING SYSTEMS

GENERAL PERFORMANCE OBJECTIVE

Diagnose and repair steering systems, by: performing a visual inspection; diagnosing and troubleshooting steering systems and components; repairing steering systems and components, verifying repair of steering systems and components, and aligning steering axles and suspensions, according to manufacturer’s recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5169.01 Perform visual inspection, identifying system types and applications; by: checking for: oil level/condition, leaking, worn, loose, defective, or missing components, including: pumps and drive mechanisms, cylinders, reservoirs, valves, controls, fittings, lines, hoses, seals, gaskets, steering boxes/racks/motors, linkages, tie rod ends, seals, bearings, bushings, guides, variable assist systems, column assemblies, ball joints, king pins, transfer boxes, switches, relays, sensors, modules, wiring harnesses, diagnostic codes, information/warning displays, data links, and fastening and mounting devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature  
_____________________________  _____________________  ______________________

5169.02 Diagnose and troubleshoot steering systems and components, including: pumps, drive mechanisms, cylinders, reservoirs, valves, controls, lines, fittings, hoses, steering boxes/racks/motors, linkages, tie rod ends, seals, gaskets, bearings, bushings, guides, variable assist systems, column assemblies, ball joints, king pins, transfer boxes, switches, relays, sensors, modules, wiring harnesses, information/warning displays, data links, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function, checking for: odour, temperature, colour, alignment, vibration/noise, corrosion, fluid type, contamination, pressure, leaks, flow, and diagnostic codes; using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature  
_____________________________  _____________________  ______________________
U5169.0 STEERING SYSTEMS - Contd.

5169.03 Repair steering systems and components, including: pumps, drive mechanisms, cylinders, reservoirs, valves, controls, lines, fittings, hoses, steering boxes/racks/motors, linkages, tie rod ends, seals, gaskets, bearings, bushings, guides, variable assist systems, column assemblies, ball joints, king pins, transfer boxes, switches, relays, sensors, modules, wiring harnesses, information/warning displays, data links, and fastening and mounting devices, by: exchanging, reconditioning, aligning, or servicing; using: hand, power, specialized, and electronic service tools, alignment equipment, lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature

5169.04 Verify repair of steering systems and components, including: pumps, drive mechanisms, cylinders, reservoirs, valves, controls, lines, fittings, hoses, steering boxes/racks/motors, linkages, tie rod ends, seals, gaskets, bearings, bushings, guides, variable assist systems, column assemblies, ball joints, king pins, transfer boxes, switches, relays, sensors, modules, wiring harnesses, information/warning displays, data links, and fastening and mounting devices, by: visually inspecting, testing, and analysing performance and function; using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature

5169.05 Align steering, axles, and suspensions, by: adjusting alignment geometry, and verifying, using alignment equipment, hand, power, specialized, and electronic service tools; according to manufacturer’s recommendation, specification and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature

Employer/Sponsor Name  Employer/Sponsor Signature
U5170.0 BRAKING SYSTEMS

GENERAL PERFORMANCE OBJECTIVE

Diagnose and repair braking systems by: performing a visual inspection; diagnosing and troubleshooting hydraulic braking systems and components; repairing hydraulic braking systems and components; verifying repair of hydraulic braking systems and components, diagnosing and troubleshooting anti-lock braking systems and components; repairing anti-lock braking systems and components, and verifying repair of anti-lock braking system and components; diagnosing and troubleshooting anti-skid/traction control systems and components; repairing anti-skid/traction control systems and components, and verifying repair of anti-skid/traction control systems and components; measuring and resurfacing brake drums, linings, and rotors, according to manufacturer’s recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5170.01 **Perform visual inspection**, identifying system types and applications, by: checking for: hydraulic fluid level/condition, worn, loose, missing, or damaged components, including: drums, calipers, rotors, backing plates, dust shields, friction material, hoses, lines, routing, mounting hardware, bushings, slack adjusters, valves, brake chambers, wheel and master cylinders, boosters, switches, relays, sensors, modules, wiring harnesses, safety devices, anti-lock brake systems (ABS), anti-skid/traction control systems, information/warning displays, and data links; according to manufacturer’s recommendations, specifications, and safety requirements.

Date Completed        Trainer Signature        Apprentice Signature
_________________________  ______________________  ______________________
U5170.0  BRAKING SYSTEMS - Contd.

5170.02 **Diagnose and troubleshoot hydraulic braking systems and components**, including: drums, calipers, rotors, friction materials, backing plates, routing of hoses and lines, valves, master and wheel cylinders, fluids, boosters, actuators, switches, relays, sensors, wiring harnesses, valves, safety devices, information warning displays, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function; checking for: wear, vibration/noise, pressure, corrosion, colour, fluid level/condition, leaks, contamination, and temperature; using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>______________</td>
<td>_________________</td>
<td>________________</td>
</tr>
</tbody>
</table>

5170.03 **Repair hydraulic braking systems and components**, including: drums, calipers, rotors, friction materials, backing plates, routing of hoses and lines, valves, master and wheel cylinders, fluids, boosters, actuators, switches, relays, sensors, wiring harnesses, valves, safety devices, information warning displays, and fastening and mounting devices; by: exchanging, reconditioning, or servicing; using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>______________</td>
<td>_________________</td>
<td>________________</td>
</tr>
</tbody>
</table>

5170.04 **Verify repair of hydraulic braking systems and components**, including: drums, calipers, rotors, friction materials, backing plates, routing of hoses and lines, valves, master and wheel cylinders, fluids, boosters, actuators, switches, relays, sensors, wiring harnesses, valves, safety devices, information warning displays, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function, using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>______________</td>
<td>_________________</td>
<td>________________</td>
</tr>
</tbody>
</table>
U5170.0  BRAKING SYSTEMS - Contd.

5170.05  Diagnose and troubleshoot anti-lock braking systems (ABS) and components, including: drums, calipers, rotors, friction materials, backing plates, routing of hoses and lines, valves, master and wheel cylinders, fluids, boosters, accumulators, actuators, switches, solenoids, relays, sensors, rotor sensors, motors, pumps, actuators, reservoirs, relactors, modules, boosters, wiring harnesses, valves, safety devices, information warning displays, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function; checking for: opens/shorts/grounds, vibration/noise, pressure, corrosion, colour, fluid level/condition, leaks, contamination, and temperature; using hand, power, and specialized tools, and lifting, rigging, and blocking devices; according to manufacturer’s recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature
_______________   _____________________  ______________________

5170.06  Repair anti-lock braking systems (ABS) and components, including: drums, calipers, rotors, friction materials, backing plates, routing of hoses and lines, valves, master and wheel cylinders, fluids, boosters, accumulators, actuators, switches, solenoids, relays, sensors, rotor sensors, motors, pumps, actuators, reservoirs, relactors, modules, boosters, wiring harnesses, valves, safety devices, information warning displays, and fastening and mounting devices; by: exchanging, reconditioning, or servicing, using: hand, power, and specialized tools, and lifting, rigging, and blocking devices; according to manufacturer’s recommendations, specifications, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature
_______________   _____________________  ______________________

5170.07  Verify repair of anti-lock braking systems (ABS) and components, including: drums, calipers, rotors, friction materials, backing plates, routing of hoses and lines, valves, master and wheel cylinders, fluids, boosters, accumulators, actuators, switches, solenoids, relays, sensors, rotor sensors, motors, pumps, actuators, reservoirs, relactors, modules, boosters, wiring harnesses, valves, safety devices, information warning displays, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function, using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature
_______________   _____________________  ______________________
U5170.0  BRAKING SYSTEMS - Contd.

5170.08  Diagnose and troubleshoot anti-skid/traction control systems and components, including: drums, calipers, rotors, backing plates, friction materials, hoses, lines, valves, master and wheel cylinders, switches, solenoids, relays, boosters, sensors, modules, accumulators, motors, pumps, actuators, reservoirs, relactors, wiring harnesses, information/warning displays, safety devices, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function; checking for: opens/shorts/grounds, vibration/noise, pressure, corrosion, colour, leaks, contamination, fluid level/condition and temperature, routing of hoses and lines, using hand, power, specialized and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer’s recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature

5170.09  Repair anti-skid/traction control systems and components, including: drums, calipers, rotors, backing plates, friction materials, hoses, lines, routing, valves, master and wheel cylinders, boosters, switches, relays, solenoids, sensors, modules, accumulators, motors, pumps, actuators, reservoirs, relactors, wiring harnesses, information/warning displays, safety devices, and fastening and mounting devices; by: exchanging, reconditioning and servicing; using: hand, power, and specialized electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer’s recommendations, specifications, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature

5170.10  Verify repair of anti-skid/traction control systems and components, including: drums, calipers, rotors, backing plates, friction materials, hoses, lines, routing, valves, master and wheel cylinders, boosters, switches, relays, solenoids, sensors, modules, accumulators, motors, pumps, actuators, reservoirs, relactors, wiring harnesses, information/warning displays, safety devices, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function; using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature
U5170.0  BRAKING SYSTEMS - Contd.

5170.11  Measure and resurface brake drums, linings, and rotors, by: using hand, power, electronic service and specialized tools and resurfacing equipment; according to manufacturer’s recommendations, specifications, and safety requirements.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Employer/Sponsor Name  Employer/Sponsor Signature

<table>
<thead>
<tr>
<th>Employer/Sponsor Name</th>
<th>Employer/Sponsor Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
U5171.0 TIRES, WHEELS, RIMS, AND HUBS

GENERAL PERFORMANCE OBJECTIVE

Diagnose and repair tires, wheels, rims, and hubs, by: performing a visual inspection; diagnosing and troubleshooting tires and components; repairing tires and components, and verifying repairs to tires and components, according to manufacturer’s recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5171.01 Perform visual inspection, identifying system types and applications, by: checking for: worn, loose, damaged, overheated, leaking, missing, or defective components, tire ratings and sizes, including: tires, tubes, valves, caps, mounting arrangements, rims, hubs, bearings, seals, spacers, and fastening and mounting devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed: ____________________  Trainer Signature: ____________________  Apprentice Signature: ____________________

5171.02 Diagnose and troubleshoot tires and components, including: tires, tubes, valves, stems, caps, wear indicators, mounting arrangements, rims, hubs, bearings, seals, spacers, flanges, and fastening and mounting devices, by: visually inspecting, testing, and analysing performance and function, checking for: corrosion, contamination, pressure, temperature, vibration/noise, lubrication, leaks, fractures, run-out, tire-matching and condition; using: hand, power, and specialized tools, balancing equipment, torque wrenches, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed: ____________________  Trainer Signature: ____________________  Apprentice Signature: ____________________
### U5171.0 TIRES, WHEELS, RIMS, AND HUBS - Contd.

<table>
<thead>
<tr>
<th>Task Code</th>
<th>Task Description</th>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>5171.03</td>
<td><strong>Repair tires and components</strong>, including: tires, tubes, valves, stems, caps, wear indicators, mounting arrangements, rims, hubs, bearings, seals, spacers, flanges, fastening and mounting devices; by: exchanging, reconditioning, or servicing; using: hand, power, specialized and service tools, balancing equipment, safety cages, torque wrenches, heating, welding and cutting equipment, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5171.04</td>
<td><strong>Verify repair of tires and components</strong>, including: tires, tubes, valves, stems, caps, wear indicators, mounting arrangements, rims, hubs, bearings, seals, spacers, flanges, fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function; using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5171.05</td>
<td><strong>Balance tires and components</strong>, using static and dynamic wheel balancers, weights, jacks, and safety stands; according to manufacturer's recommendations, specifications, and safety requirements.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
U5172.0 HEATING, VENTILATION, AND AIR-CONDITIONING SYSTEMS

GENERAL PERFORMANCE OBJECTIVE

Diagnose and repair heating, ventilation, and air-conditioning systems, by:
performing a visual inspection; diagnosing and troubleshooting air-conditioning
systems and components; repairing air-conditioning systems and components;
verifying repair of air-conditioning systems and components; diagnosing and
troubleshooting heating and ventilation systems and components, repairing
heating and ventilation systems and components, and verifying repair of heating
systems and components, according to manufacturer’s recommendations,
specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5172.01 Perform visual inspection, identifying system types and applications, by
checking for: worn, loose, damaged, leaking, missing, or defective components,
including: controls, actuators, cables, valves, switches, relays, sensors, modules,
wiring harnesses, warning devices, compressors, drive mechanisms, motors,
pumps, filters, lines, hoses, fittings, heat exchangers, auxiliary heaters/coolers,
receiver/driers, accumulators, ducting, and fastening and mounting devices;
according to manufacturer's recommendations, specifications, and safety
requirements.
U5172.0 HEATING, VENTILATION, AND AIR-CONDITIONING SYSTEMS - Contd.

5172.02 Diagnose and troubleshoot air-conditioning systems and components, including: hoses, lines, fittings, controls, actuators, cables, valves, switches, relays, sensors, modules, wiring harnesses, modules, compressors, drive mechanisms, motors, pumps, filters, refrigerant, heat exchangers, receiver/dryers, accumulators, ducting, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function, checking for: opens/shorts/grounds, odour, colour, corrosion, temperature, contamination, vibration/noise, diagnostic codes, pressure, leaks, refrigerant type, quality and condition, using: hand, power specialized, electronic service tools, manifold gauge sets, and leak-detection devices; according to manufacturer's recommendations, specifications, schematic diagrams, safety requirements, and government regulations.

Date Completed         Trainer Signature         Apprentice Signature
____________________  ______________________  ______________________

5172.03 Repair air-conditioning systems and components, including: hoses, lines, fittings, controls, actuators, cables, valves, switches, relays, sensors, modules, wiring harnesses, compressors, drive mechanisms, motors, pumps, filters, refrigerant, heat exchangers, receiver/dryers, accumulators, ducting, and fastening and mounting devices; by: exchanging, reconditioning, or servicing; using: hand, power specialized, electronic service tools, manifold gauge sets, leak-detection devices, and refrigerant recovery and charge equipment, according to manufacturer's recommendations, specifications, safety requirements, and government regulations.

Date Completed         Trainer Signature         Apprentice Signature
____________________  ______________________  ______________________

5172.04 Verify repair of air-conditioning systems and components, including: hoses, lines, fittings, controls, actuators, cables, valves, switches, relays, sensors, modules, wiring harnesses, modules, compressors and drive mechanisms, motors, pumps, filters, refrigerant, heat exchangers, receiver/dryers, accumulators, ducting, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function; using: hand, power specialized, electronic service tools, manifold gauge sets, and leak-detection devices; according to manufacturer's recommendations, specifications, safety requirements, and government regulations.

Date Completed         Trainer Signature         Apprentice Signature
____________________  ______________________  ______________________
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Date Completed</th>
<th>Trainer Signature</th>
<th>Apprentice Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>U5172.0</td>
<td><strong>HEATING, VENTILATION, AND AIR-CONDITIONING SYSTEMS - Contd.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5172.05</td>
<td><strong>Diagnose and troubleshoot heating and ventilation systems and components</strong>, including: hoses, lines, fittings, controls, actuators, cables, valves, switches, relays, resistors, sensors, modules, circuit protection devices, wiring harnesses, warning devices, drive mechanisms, motors, pumps, filters, heat exchangers, ducting, and fasteners and mounting hardware; by: visually inspecting, testing, and analyzing performance and function, checking for: opens/shorts/grounds, odour, colour, corrosion, temperature, contamination, vibration/noise, pressure and leaks, fluid levels, types, and condition; using: hand, power, specialized, and electronic service tools, leak-detection devices, lifting, rigging and blocking devices; according to manufacturer's recommendations, specifications, schematic diagrams, safety requirements, and government regulations.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5172.06</td>
<td><strong>Repair heating and ventilation systems and components</strong>, including: hoses, lines, fittings, controls, actuators, cables, valves, switches, relays, resistors, sensors, modules, circuit protection devices, wiring harnesses, warning devices, drive mechanisms, motors, pumps, filters, heat exchangers, ducting, fasteners and mounting devices; by: exchanging, replacing, or servicing; using: hand, power, specialized, and electronic service tools, leak-detection devices, lifting, rigging and blocking devices; according to manufacturer's recommendations, specifications, safety requirements, and government regulations.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5172.07</td>
<td><strong>Verify repair of heating and ventilation systems and components</strong>, including: hoses, lines, fittings, controls, actuators, cables, valves, switches, relays, resistors, sensors, modules, circuit protection devices, wiring harnesses, warning devices, drive mechanisms, motors, pumps, filters, heat exchangers, ducting, and fasteners and mounting hardware; by: visually inspecting, testing, and analyzing performance and function; using: hand, power, specialized, and electronic service tools, leak-detection devices, lifting, rigging and blocking devices; according to manufacturer's recommendations, specifications, safety requirements, and government regulations.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
U5173.0  BODY AND TRIM

GENERAL PERFORMANCE OBJECTIVE

Diagnose and repair body and trim, by: performing a visual inspection; diagnosing and troubleshooting body and trim, repairing body and trim, and verifying repair of body and trim, according to manufacturer’s recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5173.01  **Perform visual inspection**, identifying system types and applications, by: checking for: worn, loose, damaged, leaking or missing components, including: exterior body panels and trim, weather stripping, locks, hinges, latches, window regulator channels, trunk and hood supports, bumpers, hitches, anchoring devices, glass, lenses and housings, mirrors, antennae, sun roofs, convertible and t-roofs, adhesives, interior trim, carpets, panels, upholstery, roof lining, seats, hoods, fenders, trunks, doors, lighting assemblies, reinforcement bars, bumper shocks, electronic mirror controls, switches, solenoids, relays, sensors, modules, and occupant restraints systems; according to manufacturer’s recommendations, specifications, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature

5173.02  **Diagnose and troubleshoot body and trim**, including: exterior body panels and trim, weather stripping, locks, hinges, latches, window regulator channels, trunk and hood supports, bumpers, hitches and anchoring devices, glass, lenses and housings, mirrors, antennae, sun roofs, convertible and t-roofs, adhesives, interior trim, carpets, panels, upholstery, roof lining, seats, hoods, fenders, trunks, doors, lighting assemblies, reinforced bars, bumper shocks, electronic mirror controls, switches, solenoids, relays, sensors, modules, occupant restraints systems, latching mechanisms, and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function, checking for: opens/shorts/grounds, vibration, corrosion, pressure, noise, and leaks; using: hand, power, specialized, electronic service tools; according to manufacturer’s recommendations, specifications, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature
5173.03 **Repair body and trim**, including: exterior body panels and trim, weather stripping, locks, hinges, latches, window regulator channels, trunk and hood supports, bumpers, hitches and anchoring devices, glass, lenses and housings, mirrors, antennae, sun roofs, convertible and t-roofs, adhesives, interior trim, carpets, panels, upholstery, roof linings, carpeting, seats, hoods, fenders, trunks, doors, lighting assemblies, reinforced bars and bumper shocks, electronic mirror controls, switches, solenoids, relays, sensors, modules, occupant restraint systems, latching mechanisms, and fastening and mounting devices; by: exchanging, replacing, or servicing; using: hand, power, specialized, and electronic service tools; according to manufacturer’s recommendations, specifications, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature
__________________________   ___________________  ______________________

5173.04 **Verify repair of body and trim**, including: exterior body panels and trim, weather stripping, locks, hinges, latches, window regulator channels, trunk and hood supports, bumpers, hitches and anchoring devices, glass, lenses and housings, mirrors, antennae, sun roofs, convertible and t-roofs, adhesives, interior trim, carpets, panels, upholstery, roof linings, carpeting, seats, hoods, fenders, trunks, doors, lighting assemblies, reinforced bars, bumper shocks, electronic mirror controls, switches, solenoids, relays, sensors, modules, occupant restraint systems, latching mechanisms, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function; using: hand, power, specialized, and electronic service tools; according to manufacturer’s recommendations, specifications, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature
__________________________   ___________________  ______________________

Employer/Sponsor Name            Employer/Sponsor Signature
_________________  ___________________
U5174.0  EXHAUST, INTAKE, AND EMISSION CONTROL SYSTEMS

GENERAL PERFORMANCE OBJECTIVES

Diagnose and repair exhaust, intake, and emission systems and components, by: performing a visual inspection; diagnosing and troubleshooting exhaust and intake components; repairing exhaust and intake components; verifying the repair of exhaust and intake components; diagnosing and troubleshooting turbocharger/supercharger systems and components, repairing turbocharger/supercharger systems and components, and verifying repair of turbocharger/supercharger systems and components; diagnosing and troubleshooting Level I emission control systems and components; repairing Level I emission control systems and components; verifying repair of Level I emission control systems; diagnosing and troubleshooting Level II emission control systems and components; repairing Level II emission control systems and components; and verifying repair of Level II emission control systems and components; according to manufacturer’s recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5174.01  Perform visual inspection, identifying system types and applications, by: checking for: worn, loose, damaged, leaking, missing, or defective components, including: manifolds, piping, gaskets, mufflers, catalytic converters, turbochargers/superchargers, heat shields, charge air coolers, particulate traps, filters, indicators, emission control devices, actuators, sensors, modules, and wiring harnesses, according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed                Trainer Signature   Apprentice Signature
_________________________   _____________________  ______________________

Ontario College of Trades ©
U5174.0  EXHAUST, INTAKE, AND EMISSION CONTROL SYSTEMS - Contd.

5174.02  Diagnose and troubleshoot exhaust and intake systems and components, including: manifolds, piping, gaskets, seals, mufflers, heat shields, catalytic converters, resonators, filters, indicators, ducting, air pumps, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function, checking for: odour, pressure, vibration/noise, and leaks; using: hand, power, specialized tools, gauges, manometers, vacuum gauges, stethoscopes, infrared thermometers, exhaust gas analyzing equipment, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature

5174.03  Repair exhaust and intake systems and components, including: manifolds, piping, gaskets, seals, mufflers, heat shields, catalytic converters, resonators, filters, indicators, ducting, air pumps, and fastening and mounting devices; by exchanging, reconditioning, or servicing; using: hand, power, specialized tools, gauges, lifting, heating, welding, and cutting equipment, rigging, blocking, and welding equipment; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature

5174.04  Verify repair of exhaust and intake systems and components, including: manifolds, piping, gaskets, seals, mufflers, heat shields, catalytic converters, resonators, filters indicators, ducting, air pumps, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function; using: hand, power, specialized tools, gauges, manometers, vacuum gauges, stethoscopes, infrared thermometers, and lifting, rigging, and blocking equipment; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature
5174.05 **Diagnose and troubleshoot turbocharger/supercharger systems and components**, including: housings, shafts, bearings, seals, turbines, waste gates, variable volume controls, manifold boost control devices, boost pressure sensors, piping, actuators, sensors, modules, wiring harnesses, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function, checking for: opens/shorts/grounds, pressure, temperature, corrosion, lubrication, wear, leaks, and noise/vibration, using: hand, power, specialized, and electronic service tools, gauges, stethoscopes, precision measuring instruments, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed  
Trainer Signature  
Apprentice Signature

5174.06 **Repair turbocharger/supercharger systems and components**, including: housings, shafts, bearings, seals, turbines, waste gates, variable volume controls, manifold boost control devices, boost pressure sensors, piping, actuators, sensors, modules, wiring harnesses, and fastening and mounting devices; by: exchanging, reconditioning, or servicing; using: hand, power, specialized, and electronic service tools, gauges, stethoscopes, and precision measuring instruments, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed  
Trainer Signature  
Apprentice Signature

5174.07 **Verify repair of turbocharger/supercharger systems and components**, including: housings, shafts, bearings, seals, turbines, waste gates, variable volume controls, manifold boost control devices, boost pressure sensors, piping, actuators, sensors, modules, wiring harnesses, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function; using: hand, power, specialized, and electronic service tools, gauges, stethoscopes, and precision measuring instruments, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed  
Trainer Signature  
Apprentice Signature
U5174.0  EXHAUST, INTAKE, AND EMISSION CONTROL SYSTEMS - Contd.

5174.08  Diagnose and troubleshoot Level I emission control systems and components (Positive Crankcase Ventilation (PCV), Exhaust Gas Recirculation (EGR), Thermostatic Air Intake and Evaporative Fuel Systems), including: PCV and EGR valves, tubing, hoses, evaporative fuel canisters, switches, solenoids, wiring harnesses, thermostatic air cleaners, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function, checking for: opens/shorts/grounds, colour, pressure, temperature, corrosion, wear, leaks, and noise/vibration, using: hand, power, specialized, and electronic service tools, gauges, stethoscopes, precision measuring instruments, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature

5174.09  Repair Level I emission control systems and components (Positive Crankcase Ventilation (PCV), Exhaust Gas Recirculation (EGR), Thermostatic Air Intake and Evaporative Fuel Systems), including: PCV and EGR valves, tubing, hoses, evaporative fuel canisters, switches, solenoids, wiring harnesses, thermostatic air cleaners, and fastening and mounting devices; by: exchanging, reconditioning, or servicing; using: hand, power, specialized, and electronic service tools, gauges, stethoscopes, precision measuring instruments, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature

5174.10  Verify repair of Level I emission control systems and components (Positive Crankcase Ventilation (PCV), Exhaust Gas Recirculation (EGR), Thermostatic Air Intake and Evaporative Fuel Systems), including: PCV and EGR valves, tubing, hoses, evaporative fuel canisters, switches, solenoids, wiring harnesses, thermostatic air cleaners, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function, using: hand, power, specialized, and electronic service tools, gauges, stethoscopes, precision measuring instruments, and lifting, rigging, and blocking devices, according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed  Trainer Signature  Apprentice Signature
5174.11 Diagnose and troubleshoot Level II emission control systems and components, (Electronically-Controlled EGR, Evaporative Recovery Systems, Spark Timing and Idle Control Systems), including: EGR valves, switches, solenoids, sensors, modules, wiring harnesses, thermostatic air cleaners and valves, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function, pressure, checking for: opens/shorts/grounds, temperature, corrosion, wear, leaks, noise, and vibration, using: hand, power, specialized, and electronic service tools, exhaust gas analyzing equipment, gauges, stethoscopes, precision measuring instruments, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed
____________________
Trainer Signature
____________________
Apprentice Signature
____________________

5174.12 Repair Level II emission control systems and components, (Electronically-Controlled EGR, Evaporative Recovery Systems, Spark Timing and Idle Control Systems), including: EGR valves, switches, solenoids, sensors, modules, wiring harnesses, thermostatic air cleaners and valves, and fastening and mounting devices; by: exchanging, reconditioning, or servicing; using: hand, power, specialized, and electronic service tools, gauges, stethoscopes, precision measuring instruments, exhaust gas analyzing equipment, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed
____________________
Trainer Signature
____________________
Apprentice Signature
____________________

5174.13 Verify repair of Level II emission control systems and components, (Electronically-Controlled EGR, Evaporative Recovery Systems, Spark Timing and Idle Control Systems), including: EGR valves, switches, solenoids, sensors, modules, wiring harnesses, thermostatic air cleaners and valves, and fastening and mounting devices; by: visually inspecting, testing, and analyzing performance and function; using: hand, power, specialized, and electronic service tools, gauges, stethoscopes, precision measuring instruments, exhaust gas analyzing equipment, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed
____________________
Trainer Signature
____________________
Apprentice Signature
____________________

Employer/Sponsor Name
____________________
Employer/Sponsor Signature
____________________

Ontario College of Trades ©