



**Skilled  
Trades**  
Ontario

**Métiers  
spécialisés**  
Ontario

Apprenticeship  
Curriculum Standard

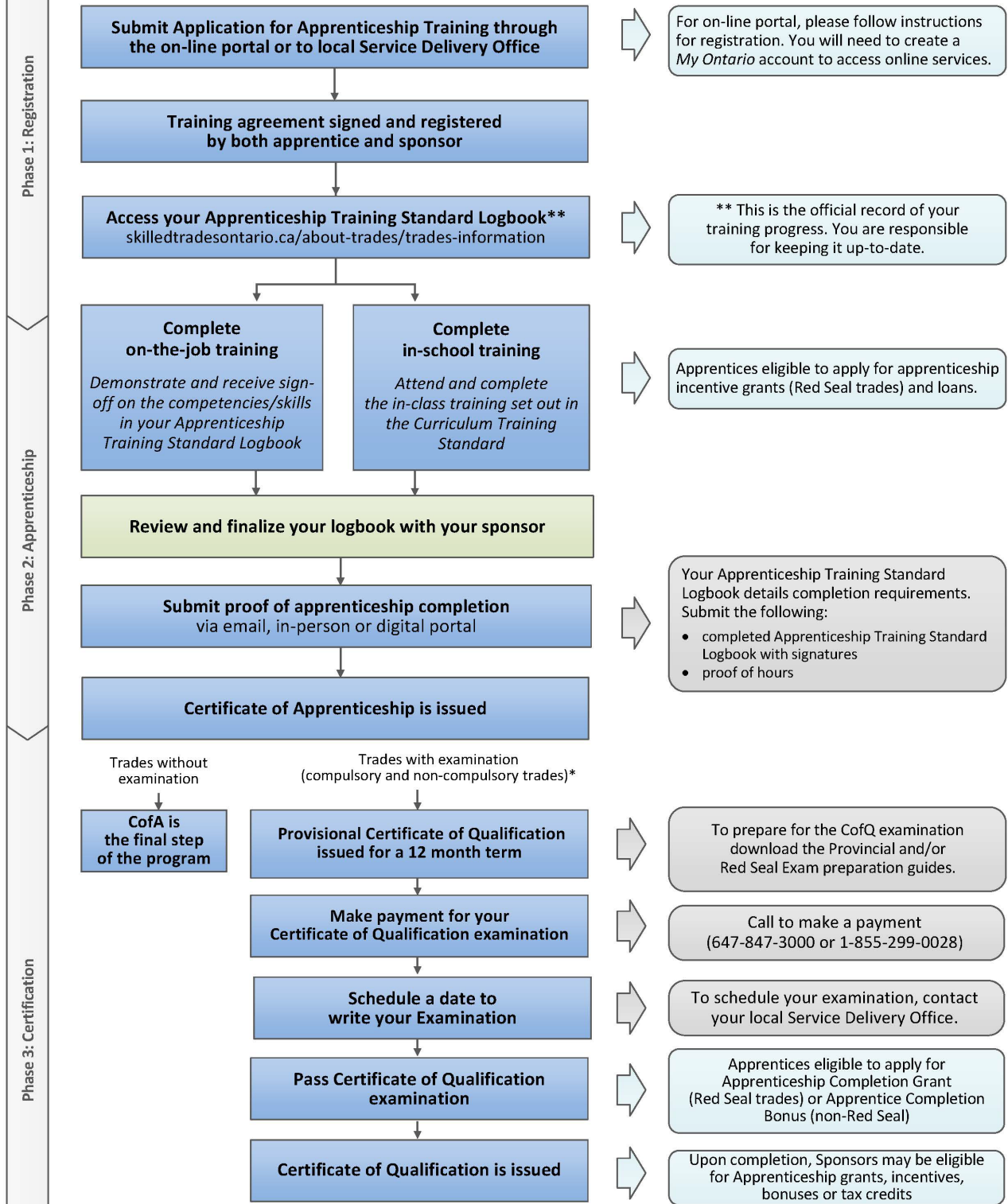
Automotive Electronic  
Accessory Technician

310K

2001



# Apprenticeship Pathway to a Certificate of Qualification



\* For a list of trades subject to a certification examination, visit: [skilledtradesontario.ca](http://skilledtradesontario.ca)

<b>Table of Contents</b>
--------------------------

Preface.....	1
Automotive Electronic Accessory Technician.....	2
Reportable Subject Summary .....	3
1 Work Practices .....	4
1.1 Applied Learning and Communication Techniques .....	5
1.2 Safe Working Practices and Techniques.....	8
2 Basic Electrical / Electronics.....	10
2.1 Electrical Fundamentals .....	11
2.2 Electrical Circuit Calculation .....	13
2.3 Electrical / Electronics Diagnostic Test Equipment.....	15
2.4 Applied Electrical Schematics .....	17
2.5 Circuit Repair And Protection Devices.....	19
2.6 Electromagnetic Device Fundamentals .....	21
2.7 Battery Fundamentals .....	23
2.8 Cranking Systems and Control.....	25
2.9 Electronic Fundamentals .....	27
3 Prep and Trim.....	29
3.1 Trim .....	30
3.2 Charging Systems and Control Circuits.....	32
3.3 Applied Computer Skills .....	34
3.4 Supplemental Restraint Systems .....	36
3.5 Vehicle Preparation .....	38
4 Alarm Systems .....	40
4.1 Immobilizer / Theft Deterrent Systems .....	41
4.2 Immobilizer / Theft Deterrent Systems Component Installation.....	43
4.3 Performing Electrical Installation .....	45
4.4 Immobilizer / Theft Deterrent Systems .....	48
5 Remote Start Systems.....	50
5.1 Remote Starter Systems Fundamentals.....	51
5.2 Fundamentals Of Remote Starter Installation.....	54

6	Advanced Electrical/ Electronics.....	57
6.1	Electronics Fundamentals .....	58
6.2	Electrical Circuit Calculations .....	60
6.3	Diagnostic Test Equipment.....	62
6.4	Computer Fundamentals .....	64
7	Advanced Diagnostics for Alarm Systems.....	66
7.1	Advanced Diagnostics for Immobilizer / Anti-Theft Systems .....	67
7.2	Applied Advanced Diagnostics for Immobilizer / Anti-Theft Systems.....	68
8	Advanced Diagnostics for Remote Start Systems .....	70
8.1	Advanced Diagnostics for Remote Start Systems .....	71
8.2	Applied Advanced Diagnostics for Remote Start Systems .....	72

**Please Note:** This Standard has been revised to reflect the visual identity of Skilled Trades Ontario (STO) which replaced the Ontario College of Trades on January 1, 2022. The content of this Standard may refer to the former organization; however, all trade specific information or content remains relevant and accurate based on the original date of publishing.

Please refer to STO's website: [skilledtradesontario.ca](https://skilledtradesontario.ca) for the most accurate and up to date information. For information about BOSTA and its regulations, please visit [Building Opportunities in the Skilled Trades Act, 2021 \(BOSTA\)](#).

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*Maintained with transfer to Skilled Trades Ontario 2001 (V100)*

### **Preface**

This curriculum standard for the Automotive Electronic Accessory Technician trade program is based upon the on-the-job performance objectives, located in the industry-approved training standard.

The curriculum is organized into 8 reportable subjects. The Reportable Subjects Summary chart (located on page 3) summarizes the training hours for each reportable subject.

The curriculum identifies the learning that takes place in-school. The in-school program focuses primarily on the theoretical knowledge and the essential skills required to support the performance objectives of the Apprenticeship Training Standards.

Employers/Sponsors are expected to extend the apprentice's knowledge and skills through practical training on a work site. Regular evaluations of the apprentice's knowledge and skills are conducted throughout training to verify that all apprentices have achieved the learning outcomes identified in the curriculum standard.

It is not the intent of the in-school curriculum to perfect on-the-job skills. The practical portion of the in-school program is used to reinforce theoretical knowledge. Skill training is provided on the job.

Please refer to Skilled Trades Ontario website ([www.skilledtradesontario.ca](http://www.skilledtradesontario.ca)) for the most accurate and up-to-date information about Skilled Trades Ontario. For information on *Building Opportunities in the Skilled Trades Act, 2021 (BOSTA)* and its regulations, please visit [Building Opportunities in the Skilled Trades Act, 2021, S.O. 2021, c. 28 - Bill 288 \(ontario.ca\)](http://www.skilledtradesontario.ca/building-opportunities-in-the-skilled-trades-act-2021-s.o.-2021-c.-28-bill-288)

### **Hours Disclaimer** (if applicable)

It is agreed that Training Delivery Agents (TDAs) may need to make slight adjustments (with cause) according to particular apprentice needs and may deviate from the unit sequencing and the prescribed practical and theoretical hours shown within the standard. However, all TDAs will comply with the hours at the reportable subject level.

### **Suggested Equipment for Training Delivery Agencies**

Personal and Safety Equipment: Personal protective equipment is at the discretion of the TDA who must conform to Ontario Provincial Health and Safety Regulations.

# **Automotive Electronic Accessory Technician**

**Reportable Subject Summary**

<b>Number</b>	<b>Reportable Subjects</b>	<b>Hours Total</b>	<b>Hours Theory</b>	<b>Hours Practical</b>
0.1	Work Practices	12	10	2
0.2	Basic Electrical / Electronics	48	35	13
0.3	Prep and Trim	24	17	7
0.4	Alarm Systems	30	16	14
0.5	Remote Start Systems	30	16	14
0.6	Advanced Electrical / Electronics	36	26	10
0.7	Advanced Diagnostics For Alarm Systems	30	12	18
0.8	Advanced Diagnostics For Remote Start Systems	30	12	18
	<b>Total</b>	<b>240</b>	<b>144</b>	<b>96</b>



Number:	1		
<b>Title:</b>	<b>Work Practices</b>		
Duration:	Total Hours: 12	Theory: 10	Practical: 2
Prerequisites:	None		
Co-requisites:	Section 2, 3, 4, 5, 6, 7, 8		

1.1 Applied Learning and Communication Techniques

6 Total Hours      Theory: 4 hours      Practical: 2 hours

1.2 Safe Work Practices and Techniques

6 Total Hours      Theory: 6 hours      Practical: 0 hours

Number:	1.1		
Title:	<b>Applied Learning and Communication Techniques</b>		
Duration:	Total Hours: 6	Theory: 4	Practical: 2
Cross-Reference to Learning Outcomes:	1.8-10, 3.14, 4.16, 5.6, 6.6		

### General Learning Outcome

Demonstrate a working knowledge of business, communication and learning techniques.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 1.1.1 Define the purpose and fundamentals of business and communication techniques.
- 1.1.2 Identify learning techniques
- 1.1.3 Identify communication techniques
- 1.1.4 Access information from manufacturers' service manuals and other related service materials.

### Learning Content

- 1.1.1 Define the purpose and fundamentals of business and communication techniques.  
[2/0]
  - define the following terms:
    - communications
    - learning to learn and methods of inquiry
    - shop systems and lines of communications
  - employability skills
    - attitude
    - behaviour
    - reliability
    - organizational skills
    - teamwork
  - information accessing
    - service manuals
    - computer programs
    - texts
    - periodicals
    - internet
    - customer service

### 1.1.2 Identify learning techniques [1/0]

- reading techniques
  - newspaper, periodicals, magazines
  - service literature
  - texts
- writing techniques
  - technical terms
  - principle of operations
  - work orders and invoice clarity
  - hard copy language
- listening techniques
  - concentration
- importance of:
- verbal skills / clarity
- tone
- pronunciation

### 1.1.3 Identify communication techniques [1/0]

- writing techniques
  - use of trade terminology
  - choice of words
- non-verbal communication
  - body language and actions
- verbal communication
  - tone of voice
  - selection of key words
  - focus on information
  - phone techniques
  - trade language terminology uses
- listening techniques

### 1.1.4 Access information from manufacturers' service manuals and other related service materials. [0/2]

- locate parts and service information by use of:
  - service manuals
  - parts manuals
  - bulletins
  - computer software
  - internet
  - CD-ROM (compact disc-read only memory)

- use proper manuals to identify:
  - parts numbers
  - prices
  - service procedures
  - specifications
  - service bulletins
- locate
  - shop supplies
  - special tools
  - electrical test equipment
  - special equipment
  - technical data
  - update
  - parts manuals
  - service manuals
  - computers
  - service bulletins

Number:	1.2		
Title:	<b>Safe Working Practices and Techniques</b>		
Duration:	Total Hours: 6	Theory: 6	Practical: 0
Cross-Reference to Learning Outcomes:	1.1-4, 1.7, 1.11-12		

### General Learning Outcome

Describe the pertinent information relating to Workplace Hazardous Materials Information Safety (WHMIS), Occupational Health and Safety Act (OHSA), Repair and Storage Liens Act (RSLA) and Workplace Safety Insurance Board (WSIB).

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 1.2.1 Describe Workplace Hazardous Materials Information Safety (WHMIS).
- 1.2.2 Describe Occupational Health and Safety Act (OHSA).
- 1.2.3 Describe the Repair and Storage Liens Act (RSLA).
- 1.2.4 Describe the Workplace Safety Insurance Board (WSIB).

### Learning Content

- 1.2.1 Describe Workplace Hazardous Materials Information Safety (WHMIS).  
[2/0]
  - right to know
  - legislation
  - safe handling of products
  - hazardous materials
  - Material Safety Data Sheets (MSDS)
- 1.2.2 Describe Occupational Health and Safety Act (OHSA).  
[1/0]
  - legislation
  - obligation of employer and worker

- 1.2.3 Describe the Repair and Storage Liens Act (RSLA).  
[2/0]
- payment for repairs or storage
  - lien
  - search for
    - Personal Property Security Registration (PPSR)
    - registration by vehicle identification number (VIN)
    - registration by individuals name
    - registration by business name
  - dispute over lien
- 1.2.4 Describe the Workplace Safety Insurance Board (WSIB).  
[1/0]
- reporting accidents to company
  - reporting accidents to WSIB
  - required records
  - training requirements
  - accident prevention
  - safety precautions
  - personal protection equipment
  - house keeping
  - service bulletins

**Evaluation:**

The following evaluation structure is only a suggested format. Specific evaluation of theory and practical components of training varies due to the resource material and training aides utilized.

Evaluation Structure		
Theory Testing	Practical Application Exercises	Notebook and Organizational Skills
50%	40%	10%

Number:	2		
<b>Title:</b>	<b>Basic Electrical / Electronics</b>		
Duration:	Total Hours: 48	Theory: 35	Practical: 13
Prerequisites:	None		
Co-requisites:	Section 1, 3, 4, 5, 6, 7, 8		

2.1 Electrical Fundamentals

6 Total Hours      Theory: 6 hours      Practical: 0 hours

2.2 Electrical Circuit Calculations

9 Total Hours      Theory: 4 hours      Practical: 5 hours

2.3 Electrical / Electronics Diagnostic Test Equipment

9 Total Hours      Theory: 7 hours      Practical: 2 hours

2.4 Applied Electrical Schematics

3 Total Hours      Theory: 2 hours      Practical: 1 hours

2.5 Circuit Repair and Protection Devices

9 Total Hours      Theory: 5 hours      Practical: 4 hours

2.6 Electromagnetic Device Fundamentals

3 Total Hours      Theory: 3 hours      Practical: 0 hours

2.7 Battery Fundamentals

3 Total Hours      Theory: 2 hours      Practical: 1 hours

2.8 Cranking Systems and Control

3 Total Hours      Theory: 3 hours      Practical: 0 hours

2.9 Electronics Fundamentals

3 Total Hours      Theory: 3 hours      Practical: 0 hours

Number:	2.1		
<b>Title:</b>	<b>Electrical Fundamentals</b>		
Duration:	Total Hours: 6	Theory: 6	Practical: 0
Cross-Reference to Learning Outcomes: 2.2, 3.2, 3.7			

### **General Learning Outcome**

Demonstrate a working knowledge of the fundamentals and principles of operation for electricity.

### **Learning Outcomes**

Upon successful completion, the apprentice is able to:

- 2.1.1 Define the purpose, fundamentals and principles of electricity.
- 2.1.2 Describe the application of electrical concepts

### **Learning Content**

- 2.1.1 Define the purpose, fundamentals and principles of electricity.  
[3/0]
  - atomic structure
  - conductors and insulators
  - magnetism
  - electromagnetism
  - electron and conventional theories
  - sources of electricity
    - heat
    - pressure
    - friction
    - chemical
    - light
    - magnetism
  - Ohm's Law, Kirchoff's Law, Watts Law
  - current flow, heat and resistance
  - electromagnetic induction
  - Standard International (S.I.) System, e.g. mega, kilo, milli, micro



2.1.2 Describe the application of electrical concepts  
[3/0]

- voltage
- amperage
- resistance
- wattage
- electrical circuit schematics
- electrical circuit component

Number:	2.2		
<b>Title:</b>	<b>Electrical Circuit Calculation</b>		
Duration:	Total Hours: 9	Theory: 4	Practical: 5
Cross-Reference to Learning Outcomes: 3.7, 3.9			

### General Learning Outcome

Demonstrate a working knowledge of performing circuit calculations to verify Ohm's, Watts and Kirchoff's Laws.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 2.2.1 Define the purpose and fundamentals of electrical circuits.
- 2.2.2 Describe the function, construction, composition, types and application of electrical circuits.
- 2.2.3 Perform circuit calculations to verify Ohm's, Watts and Kirchoff's Laws.
- 2.2.4 Demonstration and application for selecting meters for voltage, amperage and resistance tests.

### Learning Content

- 2.2.1 Define the purpose and fundamentals of electrical circuits.  
[2/0]
  - series
  - parallel
  - series-parallel
- 2.2.2 Describe the function, construction, composition, types and application of electrical circuits.  
[2/0]
  - electrical schematics and symbols
  - electrical circuit formulae
  - series, parallel, series-parallel circuit configurations
  - circuit characteristics

2.2.3 Perform circuit calculations to verify Ohm's, Watts and Kirchoff's Laws.  
[0/3]

- Ohm's Law and Watts Law applied to:
- circuit calculations
  - series
  - parallel
  - series-parallel

2.2.4 Demonstration and application for selecting meters for voltage, amperage and resistance tests.  
[0/2]

- circuit board exercises
- simulated electrical circuits
- vehicle electrical circuits
- comparisons between measured and calculated circuit performance

Number:	2.3		
Title:	<b>Electrical / Electronics Diagnostic Test Equipment</b>		
Duration:	Total Hours: 9	Theory: 7	Practical: 2
Cross-Reference to Learning Outcomes:	2.1, 3.3, 4.3, 4.15		

### General Learning Outcome

Demonstrate a working knowledge of the purpose, construction, principles of operation for diagnostic test equipment.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 2.3.1 Define the purpose and fundamentals of diagnostic test equipment.
- 2.3.2 Describe the construction, composition, types and application of diagnostic test equipment.
- 2.3.3 Explain the principles of operation of diagnostic test equipment.
- 2.3.4 Perform inspection and testing procedures with diagnostic test equipment following manufacturers' recommendations.

### Learning Content

- 2.3.1 Define the purpose and fundamentals of diagnostic test equipment.  
[2/0]
  - digital multi-meters (DMM)
  - current clamp
  - encoders and programmers
  - computer safe test lights / logic probe
  - high and low impedance multimeters
- 2.3.2 Describe the construction, composition, types and application of diagnostic test equipment.  
[2/0]
  - digital multi-meters (DMM)
  - current clamp
  - encoders and programmers
  - computer safe test lights / logic probe

2.3.3 Explain the principles of operation of diagnostic test equipment.  
[2/0]

- digital multi-meters (DMM)
- current clamp
- encoders and programmers
- computer safe test lights / logic probe

2.3.4 Perform inspection and testing procedures with diagnostic test equipment following manufacturers' recommendations.  
[1/2]

- digital multi-meters (DMM)
- current clamp
- encoders and programmers
- computer safe test lights / logic probe

Number:	2.4		
Title:	<b>Applied Electrical Schematics</b>		
Duration:	Total Hours: 3	Theory: 2	Practical: 1
Cross-Reference to Learning Outcomes:	3.2, 3.9, 4.3		

### General Learning Outcome

Demonstrate a working knowledge of application of wiring schematics, locating electrical components and tracing electrical circuits.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 2.4.1 Define the purpose and fundamentals of electrical wiring schematics.
- 2.4.2 Describe the composition, types, styles and application of manufacturers' wiring diagrams.
- 2.4.3 Locate electrical components and trace electrical circuits of vehicle systems with the prescribed manufacturers' wiring diagrams.

### Learning Content

- 2.4.1 Define the purpose and fundamentals of electrical wiring schematics.  
[1/0]
  - electrical symbols
  - circuit identification methods
  - colour codes
  - circuit number codes
- 2.4.2 Describe the composition, types, styles and application of manufacturers' wiring diagrams.  
[1/0]
  - layout
  - interpretation
  - colour codes
  - circuit number codes

2.4.3 Locate electrical components and trace electrical circuits of vehicle systems with the prescribed manufacturers' wiring diagrams.  
[0/1]

- demonstrate and perform on-vehicle verification of wiring diagram circuits
  - colour codes
  - circuit number codes
  - connectors
  - gauge and metric wire sizes
  - circuit number codes
  - circuit protection devices

Number:	2.5		
Title:	<b>Circuit Repair And Protection Devices</b>		
Duration:	Total Hours: 9	Theory: 5	Practical: 4
Cross-Reference to Learning Outcomes:	3.7, 4.2, 5.4, 6.2, 6.3		

### **General Learning Outcome**

Demonstrate a working knowledge of the purpose, construction, principles of operation, of circuit protection devices and their inspection and testing.

### **Learning Outcomes**

Upon successful completion, the apprentice is able to:

- 2.5.1 Define the purpose and fundamentals of circuit repair and protection devices.
- 2.5.2 Describe the construction and application of circuit repair and protection devices.
- 2.5.3 Explain the principles of operation of circuit protection devices.
- 2.5.4 Perform inspection and testing procedures on circuit repair and protection devices with the prescribed service tools and equipment following manufacturers' recommendation.

### **Learning Content**

- 2.5.1 Define the purpose and fundamentals of circuit repair and protection devices.  
[1/0]
  - opens
  - shorts
  - ground
  - high resistance connections



2.5.2 Describe the construction and application of circuit repair and protection devices.

[2/0]

- wiring and terminals
- wire size and identification, composition, terminal connectors
- circuit protection devices
  - fuses
  - circuit breakers
  - fusible links
- weather proofing

2.5.3 Explain the principles of operation of circuit protection devices.

[1/0]

- circuit protection devices
  - fuses
  - circuit breakers
  - fusible links

2.5.4 Perform inspection and testing procedures on circuit repair and protection devices with the prescribed service tools and equipment following manufacturers' recommendations.

[1/4]

- wiring and terminals
- wire size
- temperature effects / weather proofing
- circuit protection
  - fuses
  - circuit breakers / fusible links
- wiring repair
  - cleaning
  - splicing
  - crimping
  - soldering
  - corrosion protection
- circuit analysis to identify
  - shorts
  - opens
  - grounds
  - high resistance

Number:	2.6		
Title:	<b>Electromagnetic Device Fundamentals</b>		
Duration:	Total Hours: 3	Theory: 3	Practical: 0
Cross-Reference to Learning Outcomes: 5.4, 6.3			

### General Learning Outcome

Demonstrate a working knowledge of the purpose, construction and principles of operation of electromagnetic devices.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 2.6.1 Define the purpose and fundamentals of electromagnetic devices.
- 2.6.2 Describe the construction, composition, types, styles and application of electromagnetic devices.
- 2.6.3 Explain the principles of operation of electromagnetic devices.

### Learning Content

- 2.6.1 Define the purpose and fundamentals of electromagnetic devices.  
[1/0]
  - electro static discharge (ESD)
  - magnetism
  - electromagnetism
  - current flow and magnetic fields
    - relays
    - solenoids
    - motors
  - right and left hand rules
  - counter-electromotive force effect
  - induction

2.6.2 Describe the construction, composition, types, styles and application of electromagnetic devices.

[1/0]

- electric motors
- solenoids
- relays
- permanent magnet (pulse generator)
- coils

2.6.3 Explain the principles of operation of electromagnetic devices.

[1/0]

- electric motors
- solenoids
- relays
- permanent magnet (pulse generator)
- coils

Number:	2.7		
Title:	<b>Battery Fundamentals</b>		
Duration:	Total Hours: 3	Theory: 2	Practical: 1
Cross-Reference to Learning Outcomes:	2.4, 5.4, 6.4		

### General Learning Outcome

Demonstrate a working knowledge of the purpose, construction, principles of operation, inspection and testing for batteries.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 2.7.1 Define the purpose and fundamentals of batteries.
- 2.7.2 Describe the construction, composition, types, styles and application of batteries.
- 2.7.3 Explain the principles of operation of batteries.
- 2.7.4 Perform inspection and testing procedures on batteries with the prescribed service tools and equipment according to manufacturers' recommendations.
- 2.7.5 Perform assigned operations on batteries following manufacturers' recommendations.

### Learning Content

- 2.7.1 Define the purpose and fundamentals of batteries.  
[.50/0]
  - amp-hour rating (AH)
  - cranking amps (CA)
  - reserve capacity (RC)
  - cold cranking amps (CCA)
  - temperature effects
  - internal resistance factors
  - specific gravity and temperature compensation for electrolyte

- 2.7.2 Describe the construction, composition, types, styles and application of batteries.  
[.50/0]
- lead acid
  - low maintenance
  - maintenance-free batteries
- 2.7.3 Explain the principles of operation of batteries.  
[1/0]
- battery chemical action during charging and discharging
- 2.7.4 Perform inspection and testing procedures on batteries with the prescribed service tools and equipment according to manufacturers' recommendations.  
[0/.5]
- visual inspection
  - state of charge
  - surface discharge
  - load test
  - temperature adjustments
  - conductance testing
- 2.7.5 Perform assigned operations on batteries following manufacturers' recommendations.  
[0/.5]
- maintenance
  - state of charge
  - storage
  - charging procedures
  - adding electrolyte / water

Number:	2.8		
Title:	<b>Cranking Systems and Control</b>		
Duration:	Total Hours: 3	Theory: 3	Practical: 0
Cross-Reference to Learning Outcomes:	6.4		

### General Learning Outcome

Demonstrate a working knowledge of the fundamentals, construction and principles of operation of cranking systems and controls.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 2.8.1 Define the purpose and fundamentals of cranking systems.
- 2.8.2 Describe the construction, composition, types, styles and application of cranking motor circuits and drives.
- 2.8.3 Explain the principles of operation of cranking motor circuits and drives.
- 2.8.4 Define the introductory information and fundamentals of factors affecting cranking system operation.

### Learning Content

- 2.8.1 Define the purpose and fundamentals of cranking systems.  
[.5/0]
  - cranking motors
  - control circuits
  - cranking speed effects on current draw
- 2.8.2 Describe the construction, composition, types, styles and application of cranking motor circuits and drives.  
[1/0]
  - relay controlled cranking circuits
  - solenoid controlled cranking circuits
  - combination relay and solenoid controlled cranking circuits

2.8.3 Explain the principles of operation of cranking motor circuits and drives.  
[1/0]

- relay controlled cranking circuits
- solenoid controlled cranking circuits
- combination relay and solenoid controlled cranking circuits

2.8.4 Define the introductory information and fundamentals of factors affecting cranking system operation.  
[.5/0]

- factors affecting cranking system operation
  - temperature
  - battery conditions and ratings
  - excessive cranking time and overheating

Number:	2.9		
<b>Title:</b>	<b>Electronic Fundamentals</b>		
Duration:	Total Hours: 3	Theory: 3	Practical: 0
Cross-Reference to Learning Outcomes: 5.4, 6.3			

### General Learning Outcome

Demonstrate a working knowledge of the construction, principles of operation, inspection and testing of electronic devices.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 2.9.1 Define the purpose and fundamentals of electronics.
- 2.9.2 Describe the function, construction, composition, types, styles and application of electronic devices.

### Learning Content

- 2.9.1 Define the purpose and fundamentals of electronics.  
[1/0]
  - semi-conductor materials
  - analog - digital signals
  - static electricity
  - electrostatic discharge
  - shielding
  - grounding
- 2.9.2 Describe the function, construction, composition, types, styles and application of electronic devices.  
[2/0]
  - diodes
    - rectifying
    - zener
    - light emitting
    - photo
  - voltage spike control



**Evaluation:**

The following evaluation structure is only a suggested format. Specific evaluation of theory and practical components of training varies due to the resource material and training aides utilized.

<b>Evaluation Structure</b>			
Theory Testing	Practical Application Exercises	Research Project	Notebook and Organizational Skills
50%	30%	10%	10%

Number:	3		
<b>Title:</b>	<b>Prep and Trim</b>		
Duration:	Total Hours: 24	Theory: 18	Practical: 6
Prerequisites:	Section 1, 2, 6		
Co-requisites:	Section 1, 2, 4, 5, 6, 7, 8		

3.1 Trim

6 Total Hours      Theory: 3 hours      Practical: 3 hours

3.2 Charging Systems and Control Circuits

6 Total Hours      Theory: 4 hours      Practical: 2 hours

3.3 Applied Computer Skills

3 Total Hours      Theory: 2 hours      Practical: 1 hours

3.4 Supplemental Restraint Systems

6 Total Hours      Theory: 6 hours      Practical: 0 hours

3.5 Vehicle Preparation

3 Total Hours      Theory: 3 hours      Practical: 0 hours

Number:	3.1		
<b>Title:</b>	<b>Trim</b>		
Duration:	Total Hours: 6	Theory: 3	Practical: 3
Cross-Reference to Learning Outcomes: 3.11, 4.14			

### General Learning Outcome

Demonstrate a working knowledge of the construction, principles of operation, inspection and testing of electronic devices.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 3.1.1 Define the introductory information and fundamentals of trim hardware.
- 3.1.2 Explain the removal and replacement procedures for trim hardware according to manufacturers' recommendations.
- 3.1.3 Perform the removal and replacement of trim hardware using the prescribed service tools and equipment according to manufacturers' recommendations.

### Learning Content

- 3.1.1 Define the introductory information and fundamentals of trim hardware.  
[1/0]
  - adhesives
    - spray
    - tube
    - anaerobic
    - activated
  - fasteners and retainers
    - types and use
    - nuts and bolts
    - machine screws
    - sheet metal screws
    - lock washers
  - classification
    - grade
    - torque specification
    - drill size
  - clips and fastening methods
    - ties
    - anchors

3.1.2 Explain the removal and replacement procedures for trim hardware according to manufacturers' recommendations.  
[2/0]

- interior door, trunk locks and latches
- lock linkage
- interior handles
- grills
- dash boards
- door panels
- head liners
- remote start antennae

3.1.3 Perform the removal and replacement of trim hardware using the prescribed service tools and equipment according to manufacturers' recommendations.  
[0/3]

- interior door, trunk, locks and latches
- lock linkage
- latches
- grills
- head liners
- door panels
- remote start antennae
- dash boards

Number:	3.2		
Title:	<b>Charging Systems and Control Circuits</b>		
Duration:	Total Hours: 6	Theory: 4	Practical: 2
Cross-Reference to Learning Outcomes:	6.4		

### General Learning Outcome

Demonstrate a working knowledge of the purpose, construction, principles of operation, inspecting and testing for charging systems and control units.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 3.2.1 Define the purpose and fundamentals of charging systems and control circuits.
- 3.2.2 Explain the principles of operation of alternators and voltage regulators as applied to motor vehicle charging systems.
- 3.2.3 Perform inspection and testing procedures on charging systems including alternators and voltage regulators following manufacturers' recommendations.

### Learning Content

- 3.2.1 Define the purpose and fundamentals of charging systems and control circuits.  
[2/0]
  - A/C generators
  - electromagnetic induction principles
  - amperage / voltage output vs vehicle load
- 3.2.2 Explain the principles of operation of alternators and voltage regulators as applied to motor vehicle charging systems.  
[2/0]
  - A/C generators
  - voltage regulation

3.2.3 Perform inspection and testing procedures on charging systems including alternators and voltage regulators following manufacturers' recommendations.

[0/2]

- perform charging system visual inspection
  - battery condition
  - belt tension, alignment and condition
  - connections and wiring
  - amperage / voltage output vs vehicle load

Number:	3.3		
<b>Title:</b>	<b>Applied Computer Skills</b>		
Duration:	Total Hours: 3	Theory: 2	Practical: 1
Cross-Reference to Learning Outcomes: 1.8			

### **General Learning Outcome**

Demonstrate a working knowledge of the use of a personal computer (PC).

### **Learning Outcomes**

Upon successful completion, the apprentice is able to:

- 3.3.1 Define the purpose, functions and application of the computers.
- 3.3.2 Perform the following computer functions.

### **Learning Content**

- 3.3.1 Define the purpose, functions and application of the computers.  
[2/0]
  - introduction to the computer
  - components
  - device names and designations
  - hard / floppy disk data retention
  - CD-ROM
  - software management
  
- 3.3.2 Perform the following computer functions.  
[0/1]
  - menu structure
  - create word-processed document
  - file saving
    - floppy
    - hard drive
  - naming
  - copy / move
  - access trade related information
    - service manuals
    - computer programs

- email
  - accessing
  - sending
  - attachments
- access internet
  - browsing
  - file download



Number:	3.4		
Title:	<b>Supplemental Restraint Systems</b>		
Duration:	Total Hours: 6	Theory: 6	Practical: 0
Cross-Reference to Learning Outcomes: 2.3, 2.4			

### General Learning Outcome

Demonstrate a working knowledge of the fundamentals, construction, principles of operation, inspection, and testing procedures supplemental restraint systems.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 3.4.1 Define the history, purpose and fundamentals of supplemental restraint and automatic seat belt systems.
- 3.4.2 Describe the function, construction, composition, types, styles and application of restraint and automatic seat belt systems and components.
- 3.4.3 Explain the principles of operation of restraint and automatic seat belt systems components.
- 3.4.4 Explain procedures for de-activating and re-activating supplemental restraint systems according to manufactures recommendations.

### Learning Content

- 3.4.1 Define the history, purpose and fundamentals of supplemental restraint and automatic seat belt systems.  
[1/0]
  - electronics fundamentals review
  - inertia
  - deceleration forces
  - gas properties
  - automatic seat belts
  - inflatable restraint systems
  - control of electro static discharge (ESD)

3.4.2 Describe the function, construction, composition, types, styles and application of restraint and automatic seat belt systems and components.  
[2/0]

- inflatable and non-inflatable restraint systems
- crash sensors
- diagnostic and control modules
  - air bags
  - air bags inflators
  - clock spring
- automatic seat belts
  - track / drive
- pyrobelts

3.4.3 Explain the principles of operation of restraint and automatic seat belt systems components.  
[2/0]

- inflatable and non-inflatable restraint systems
- crash sensors
- diagnostic and control modules
  - air bags
  - air bag inflators
  - clock spring
- automatic seat belts
- track / drive
- pyrobelts

3.4.4 Explain procedures for de-activating and re-activating supplemental restraint systems according to manufacturers' recommendations.  
[1/0]

- power source
- backup power source
- time requirement
- proper sequence
- verification of operation
- safety precautions
- safe handling

Number:	3.5		
Title:	<b>Vehicle Preparation</b>		
Duration:	Total Hours: 3	Theory: 3	Practical: 0
Cross-Reference to Learning Outcomes: 2.2, 3.1-2			

### General Learning Outcome

Demonstrate a working knowledge for preparing a vehicle for the installation of an electronic accessory.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 3.5.1 Define the essential knowledge required for the preparation of a vehicle prior to accessory installations.

### Learning Content

- 3.5.1 Define the essential knowledge required for the preparation of a vehicle prior to accessory installations.  
[3/0]

- verify vehicle integrity of systems by activating and confirming performance and function of:
  - lights and indicators
  - warning light indicators
  - audible chimes
  - gauge operation
  - starting system / battery performance
  - power accessories
  - climate control
- examine overall vehicle
  - exterior condition
  - interior condition
  - interior contents
- determine installation needs
  - main module
  - required relays
  - polarity converters
  - sensors
  - switches
  - by pass modules
  - actuators
  - resistors and diodes

- organize required equipment for the installation
  - basic hand tools
  - test equipment
  - fender, floor and seat covers
  - instruction sheets and required manuals
- record all presets and notify customers of possible memory function loss
- open windows and disconnect battery
- confirm Supplemental Restraint Systems (S.R.S.) disabling procedures

### **Evaluation:**

The following evaluation structure is only a suggested format. Specific evaluation of theory and practical components of training varies due to the resource material and training aides utilized.

<b>Evaluation Structure</b>			
Theory Testing	Practical Application Exercises	Research Assignment	Notebook and Organizational Skills
40%	40%	10%	10%

Number:	4		
<b>Title:</b>	<b>Alarm Systems</b>		
Duration:	Total Hours: 30	Theory: 16	Practical: 14
Prerequisites:	Section 1, 2, 6		
Co-requisites:	Section 1, 2, 3, 5, 6, 7, 8		

4.1 Immobilizer / Theft Deterrent Systems

3 Total Hours      Theory: 3 hours      Practical: 0 hours

4.2 Immobilizer / Theft Deterrent Systems Component Installation

9 Total Hours      Theory: 3 hours      Practical: 6 hours

4.3 Performing Electrical Installation

9 Total Hours      Theory: 6 hours      Practical: 3 hours

4.4 Immobilizer / Theft Deterrent Systems

9 Total Hours      Theory: 4 hours      Practical: 5 hours

Number:	4.1		
Title:	<b>Immobilizer / Theft Deterrent Systems</b>		
Duration:	Total Hours: 3	Theory: 3	Practical: 0
Cross-Reference to Learning Outcomes: 3.1-3			

### General Learning Outcome

Demonstrate a working knowledge of the fundamentals, construction and principles of operation of immobilizer / theft deterrent systems.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 4.1.1 Define the purpose and fundamentals of immobilizer / theft deterrent systems.
- 4.1.2 Describe the construction of immobilizer /theft deterrent systems.
- 4.1.3 Explain the principles of operation of immobilizer / theft deterrent system.

### Learning Content

- 4.1.1 Define the purpose and fundamentals of immobilizer / theft deterrent systems.  
[1/0]

- philosophy of security systems
  - minimal vehicle intrusion
  - non lethal response
  - security overview, reasons for
  - monitoring methods
  - reaction and output
  - process handling
  - interface devices
  - Original Equipment Manufacturers' (OEM) override devices
  - transmitters
- ULC ORD 275 standard (required for insurance credit)

- 4.1.2 Describe the construction of immobilizer / theft deterrent systems.  
[1/0]
- monitoring devices
  - reaction and output devices
  - process handling
  - interface devices
  - Original Equipment Manufacturers' (OEM) override devices
  - transmitters
  - inputs
- 4.1.3 Explain the principles of operation of immobilizer / theft deterrent system.  
[1/0]
- monitoring devices
  - main module
  - inputs (pin switch, field disturbance, pressure, acoustic and voltage sensing)
  - reaction and output (lights, horn, siren, transmitters and miscellaneous devices)
  - process handling
  - interface devices
  - Original Equipment Manufacture's (OEM) override devices
  - transmitters

Number:	4.2		
Title:	<b>Immobilizer / Theft Deterrent Systems Component Installation</b>		
Duration:	Total Hours: 9	Theory: 3	Practical: 6
Cross-Reference to Learning Outcomes:	3.4-6		

### General Learning Outcome

Demonstrate a working knowledge of selecting appropriate mounting and connecting locations for immobilizer / theft deterrent systems.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 4.2.1 Select the appropriate mounting and connection locations for immobilizer / theft deterrent systems components.
- 4.2.2 Describe the mounting procedures for immobilizer / theft deterrent systems components.
- 4.2.3 Perform immobilizer / theft deterrent systems components mounting following component and vehicle manufacturers' recommended procedures.

### Learning Content

- 4.2.1 Select the appropriate mounting and connection locations for immobilizer / theft deterrent systems components.  
[.5/0]
  - safety considerations
  - electrical interference
  - mechanical interference
  - physical interference
  - secure mounting
  - environmental considerations
  - maintaining vehicle integrity
  - expansion modules



4.2.2 Describe the mounting procedures for immobilizer / theft deterrent systems components.

[1.5/0]

- mounting hardware selection and usage
- sensor and input devices
- actuators and indicators
- relays and solenoids
- main control unit
- expansion modules

4.2.3 Perform immobilizer / theft deterrent systems components mounting following component and vehicle manufacturers' recommended procedures.

[1/6]

- sensor and input devices
- actuators and indicators
- relays and solenoids
- main control unit
- expansion modules

Number:	4.3		
Title:	<b>Performing Electrical Installation</b>		
Duration:	Total Hours: 9	Theory: 6	Practical: 3
Cross-Reference to Learning Outcomes:	3.7-8		

### General Learning Outcome

Demonstrate a working knowledge of the fundamentals, construction and principles of performing electrical installations.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 4.3.1 Define the purpose and fundamentals of making secure electrical connections and properly interfacing to the electrical system of the vehicle.
- 4.3.2 Describe the methods and techniques for making secure electrical connections and properly interfacing following manufacturers' recommendations.
- 4.3.3 Explain the principles of performing electrical installation:
- 4.3.4 Perform electrical installation of vehicle immobilizer/ theft deterrent system using component and vehicle manufacturers' recommended procedures.

### Learning Content

- 4.3.1 Define the purpose and fundamentals of making secure electrical connections and properly interfacing to the electrical system of the vehicle.  
[1/0]
  - identifying vehicle circuits
    - main power circuits, accessory and ignition circuits
    - Supplemental Restraint Systems (SRS) circuits
    - input sensor circuits
    - ground return circuits
    - output control circuits
    - starter / ignition / fuel interrupt
  - secure automotive electrical connection methods
  - manufacturers' recommended installation procedures
  - wire routing, protecting, concealing and harnessing
  - wire ties and fasteners

4.3.2 Describe the methods and techniques for making secure electrical connections and properly interfacing following manufacturers' recommendations.

[2/0]

- identifying vehicle circuits
  - main power circuits, accessory and ignition circuits
  - Supplemental Restraint Systems (S.R.S.)
  - input sensor circuits (door pin switches, hood / trunk switches, motion / shock / glass, field disturbance)
  - ground return circuits
  - output control circuits (park lights, door locks, annunciators, trunk release, power windows)
  - starter / ignition / fuel interrupt
- secure automotive electrical connection methods (tape / solder / heat shrink, crimp terminals, designed connection kit)
- manufacturers' recommended installation procedures
- wire routing, protecting, concealing and harnessing
- wire ties and fasteners

4.3.3 Explain the principles of performing electrical installation:

[3/0]

- battery / power circuits, ignition switched circuits, accessory switched circuits
- input sensor circuits (door pin switches, hood / trunk switches, motion / shock / glass, field disturbance)
- ground return circuits
- output control circuits (park lights, door locks, annunciators, trunk release, power windows)
- starter / ignition / fuel interrupt

4.3.4 Perform electrical installation of vehicle immobilizer/ theft deterrent system using component and vehicle manufacturer's recommended procedures.  
[0/3]

- identifying and connect main power circuits, accessory and ignition circuits
- identify Supplemental Restraint Systems (SRS) circuits
- identify and connect input sensor circuits
- identify and connect ground return circuits
- identify and connect output control circuits
- identify and connect starter/ignition/fuel interrupts
- secure automotive electrical connection methods
- manufacturer's recommended installation procedures
  - wire routing
  - protecting
  - concealing
  - harnessing
  - wire ties and fasteners

Number:	4.4		
Title:	<b>Immobilizer / Theft Deterrent Systems</b>		
Duration:	Total Hours: 9	Theory: 4	Practical: 5
Cross-Reference to Learning Outcomes:	3.9-10, 3.12-13		

### General Learning Outcome

Demonstrate a working knowledge of programming, testing and verification of the operation of immobilizer / theft deterrent systems.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 4.4.1 Define the purpose and fundamentals of programming, testing and verification of operation of immobilizer / theft deterrent systems.
- 4.4.2 Describe the programming, testing and verification procedures for immobilizer / theft deterrent systems components according to manufacturers' recommendations.
- 4.4.3 Perform / demonstrate programming, testing and verification procedures for immobilizer / theft deterrent systems components according to manufacturers' recommendations.

### Learning Content

- 4.4.1 Define the purpose and fundamentals of programming, testing and verification of operation of immobilizer / theft deterrent systems.  
[2/0]
  - programming charts
  - manufacturers support
  - encoding devices
  - programming operation parameters
  - calibrating sensors
  - adjusting switches

4.4.2 Describe the programming, testing and verification procedures for immobilizer / theft deterrent systems components according to manufacturers' recommendations.

[2/0]

- programming charts
- manufacturers support
- encoding devices
- programming operation parameters
- calibrating sensors
- adjusting switches

4.4.3 Perform / demonstrate programming, testing and verification procedures for immobilizer / theft deterrent systems components according to manufacturers' recommendations.

[0/5]

- encode main controllers
- program main control unit parameters
- calibrate sensors
- adjust switches

**Evaluation:**

The following evaluation structure is only a suggested format. Specific evaluation of theory and practical components of training varies due to the resource material and training aides utilized.

<b>Evaluation Structure</b>		
Theory Testing	Practical Application Exercises	Notebook and Organizational Skills
40%	40%	10%

Number:	5		
<b>Title:</b>	<b>Remote Start Systems</b>		
Duration:	Total Hours: 30	Theory: 16	Practical: 14
Prerequisites:	Section 1, 2, 6		
Co-requisites:	Section 1, 2, 3, 4, 6, 7, 8		

5.1 Remote Starter Systems Fundamentals

12 Total Hours      Theory: 10 hours      Practical: 2 hours

5.2 Fundamentals of Remote Starter Installation

18 Total Hours      Theory: 6 hours      Practical: 12 hours

Number:	5.1		
<b>Title:</b>	<b>Remote Starter Systems Fundamentals</b>		
Duration:	Total Hours: 12	Theory: 10	Practical: 2
Cross-Reference to Learning Outcomes: 4.1-4			

### **General Learning Outcome**

Demonstrate a working knowledge of the fundamentals, construction and principles of operation of a remote start system.

### **Learning Outcomes**

Upon successful completion, the apprentice is able to:

- 5.1.1 Define the purpose and fundamentals of remote start systems.
- 5.1.2 Describe the construction, application of a remote starter system.
- 5.1.3 Explain the principles of operation of the following inputs and outputs.

### **Learning Content**

- 5.1.1 Define the purpose and fundamentals of remote start systems.  
[3/0]
  - control module
  - transmitter
  - anti theft by-pass systems
  - interface to vehicle



5.1.2 Describe the construction and applications of a remote starter system.  
[3/0]

- hood switch
- safety switches
- programming input
- brake switch
- shut down control
- valet switch
- antenna positioning
- tach. input sources
- ignition signal
- vacuum switches
- fuel injector
- tach generator / multipliers
- powers & grounds
- parking light
  - system status / diagnostics
- security by-pass
  - alarm system
  - vehicle anti theft immobilizer system
- starter system
- neutral safety switch
- clutch safety switch
- door switch
- parking brake switch
- solenoids and relays
- crank duration calibration
- auxiliary outputs
- ignition input and output
- accessory output
- starter circuits
- rear defogger

5.1.3 Explain the principles of operation of the following inputs and outputs.  
[4/2]

- hood switch
- safety switches
- programming input
- brake switch
- shut down control
- valet switch
- antenna positioning
- tach. input sources
- ignition signal
- vacuum switches
- fuel injector
- tach generator / multipliers
- powers & grounds
- parking light
  - system status / diagnostics
- security by-pass
  - alarm system
  - vehicle anti theft immobilizer system
- starter system
- neutral safety switch
- clutch safety switch
- door switch
- parking brake switch
- solenoids and relays
- crank duration calibration
- auxiliary outputs
- ignition input and output
- accessory output
- starter circuits
- rear defogger

Number:	5.2		
Title:	<b>Fundamentals Of Remote Starter Installation</b>		
Duration:	Total Hours: 18	Theory: 6	Practical: 12
Cross-Reference to Learning Outcomes: 4.6-12			

### **General Learning Outcome**

Demonstrate a working knowledge of vehicle preparation for remote start installation and verify operation.

### **Learning Outcomes**

Upon successful completion, the apprentice is able to:

- 5.2.1 Demonstrate the fundamentals of vehicle preparation for remote start installation.
- 5.2.2 Locate wiring connections in vehicle and verify their operation for remote start installation
- 5.2.3 Perform the electrical installation of the remote start components using vehicle manufacturers' recommendations
- 5.2.4 Perform the mounting of Main Module and By Pass Module
- 5.2.5 Programming and calibration for remote start installation following manufacturers' recommendations.
- 5.2.6 Verification of proper performance and functions for remote starter installation following manufacturers' recommendations.

### **Learning Content**

- 5.2.1 Demonstrate the fundamentals of vehicle preparation for remote start installation.  
[0/3]
  - verify proper vehicle operation
  - vehicle identification yr. / make / model
  - identification of Supplemental Restraint Systems (SRS) system
  - identification of security system options
  - obtaining vehicle wiring information
  - select mounting and connection location for module and switches

- 5.2.2 Locate wiring connections in vehicle and verify their operation for remote start installation  
[4/2]
- hood switch
  - brake switch
  - valet switch
  - antenna
  - tach signal
  - power supplies and grounds
  - parking light connections
  - security circuit by-pass / module
  - starter relay / solenoid
  - accessory outputs
  - ignition inputs and outputs
  - auxiliary control outputs
- 5.2.3 Perform the electrical installation of the remote start components using vehicle manufacturers' recommendations  
[1/2]
- solder & shrink tubing
  - crimp terminals
  - designed connection kit
  - tape
  - shrink tubing
- 5.2.4 Perform the mounting of Main Module and By Pass Module  
[1/2]
- using specific hardware
  - using supplied kit
  - awareness of environmental concerns and corrosion
  - avoiding any physical, mechanical or electrical interference with normal vehicle operation
- 5.2.5 Programming and calibration for remote start installation following manufacturers' recommendations.  
[0/2]
- transmitter
  - tach
  - anti theft by-pass values

5.2.6 Verification of proper performance and functions for remote starter installation following manufacturers' recommendations.  
[0/1]

- installed unit
- anti theft by-pass
- vehicle performance

**Evaluation:**

The following evaluation structure is only a suggested format. Specific evaluation of theory and practical components of training varies due to the resource material and training aides utilized.

Evaluation Structure		
Theory Testing	Practical Application Exercises	Notebook and Organizational Skills
40%	40%	10%

Number:	6		
Title:	<b>Advanced Electrical/ Electronics</b>		
Duration:	Total Hours: 36	Theory: 26	Practical: 10
Prerequisites:	Section 2		
Co-requisites:	Section 1, 2, 3, 4, 5, 7, 8		

6.1 Electronics Fundamentals

12 Total Hours      Theory: 8 hours      Practical: 4 hours

6.2 Electrical Circuit Calculations

6 Total Hours      Theory: 4 hours      Practical: 2 hours

6.3 Diagnostic Test Equipment

12 Total Hours      Theory: 8 hours      Practical: 4 hours

6.4 Computer Fundamentals

6 Total Hours      Theory: 6 hours      Practical: 0 hours

Number:	6.1		
Title:	<b>Electronics Fundamentals</b>		
Duration:	Total Hours: 12	Theory: 8	Practical: 4
Cross-Reference to Learning Outcomes: 3.9, 4.11			

### General Learning Outcome

Demonstrate a working knowledge of the construction, applications and principles of operation for electronic devices.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 6.1.1 Describe the construction, composition, types, style and applications of electronic devices.
- 6.1.2 Explain the principles of operations of electronic devices.
- 6.1.3 Perform inspection and testing procedures for electronic devices following manufacturers' recommendations.

### Learning Content

- 6.1.1 Describe the construction, composition, types, style and applications of electronic devices.  
[4/0]
  - diodes
  - transistors
    - PNP
    - NPN
  - sensors
  - thermistors
  - resistors
  - variable resistors
    - rheostat
    - potentiometer
  - Hall effect devices

6.1.2 Explain the principles of operations of electronic devices.  
[4/0]

- diodes
- transistors
  - PNP
  - NPN
- sensors
- thermistors
- resistors
- variable resistors
  - rheostat
  - potentiometer
- Hall effect devices

6.1.3 Perform inspection and testing procedures for electronic devices following manufacturers' recommendations.  
[0/4]

- diodes
- transistors
  - PNP
  - NPN
- sensors / thermistors
- resistors
- variable resistors
  - rheostat
  - potentiometer
- Hall effect devices



Number:	6.2		
Title:	<b>Electrical Circuit Calculations</b>		
Duration:	Total Hours: 6	Theory: 4	Practical: 2
Cross-Reference to Learning Outcomes: 3.7, 3.9			

### General Learning Outcome

Demonstrate a working knowledge of performing circuit calculations to verify Ohm's, Watts and Kirchoff's Laws.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 6.2.1 Define the essential introductory information and fundamentals of electrical circuits as they apply to:
- 6.2.2 Perform circuit calculations to verify Ohm's and Kirchoff's Laws.
- 6.2.3 Demonstration and application of the selection of meters for voltage, amperage and resistance tests.

### Learning Content

- 6.2.1 Define the essential introductory information and fundamentals of electrical circuits as they apply to:  
[2/0]
  - series circuits
  - parallel circuits
  - series – parallel circuits
- 6.2.2 Perform circuit calculations to verify Ohm's and Kirchoff's Laws.  
[2/0]
  - series circuits
  - parallel circuits
  - series – parallel circuits

6.2.3 Demonstration and application of the selection of meters for voltage, amperage and resistance tests.  
[0/2]

- circuit board exercises
- simulated electrical circuits
- vehicle electrical circuits
- comparison between measured and calculated circuit performance

Number:	6.3		
<b>Title:</b>	<b>Diagnostic Test Equipment</b>		
Duration:	Total Hours: 12	Theory: 8	Practical: 4
Cross-Reference to Learning Outcomes: 4.3, 5.3, 6.3			

### General Learning Outcome

Demonstrate a working knowledge of the purpose, construction, principles of operation for diagnostic test equipment.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 6.3.1 Define the purpose and fundamentals of diagnostic test equipment.
- 6.3.2 Describe the types, styles and application of diagnostic test equipment.
- 6.3.3 Explain the operating principles of diagnostic test electronic equipment.
- 6.3.4 Connect and operate diagnostic test equipment according to manufacturer's operating procedures.

### Learning Content

- 6.3.1 Define the purpose and fundamentals of diagnostic test equipment.  
[2/0]
  - digital multi-meter (DMM)
  - inductive current pickup
  - encoders and programmers
  - scan tools
- 6.3.2 Describe the types, styles and application of diagnostic test equipment.  
[3/0]
  - digital multi-meter (DMM)
  - inductive current pickup
  - encoders and programmers
  - scan tools

6.3.3 Explain the operating principles of diagnostic test electronic equipment.  
[3/0]

- digital multi-meter (DMM)
- inductive current pickup
- encoders and programmers
- scan tools

6.3.4 Connect and operate diagnostic test equipment according to manufacturer's operating procedures.  
[0/4]

- digital multi-meter (DMM)
- inductive current pickup
- encoders and programmers
- scan tools

Number:	6.4		
Title:	<b>Computer Fundamentals</b>		
Duration:	Total Hours: 6	Theory: 6	Practical: 0
Cross-Reference to Learning Outcomes:	5.4, 6.4		

### General Learning Outcome

Demonstrate a working knowledge of the fundamentals, construction and principles of operation of on board computer fundamentals.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 6.4.1 Define the purpose and fundamentals of onboard computers, input devices and output actuators.
- 6.4.2 Describe the construction, composition, types, styles and application of on board computers.
- 6.4.3 Explain the principles of operation of on board computers.

### Learning Content

- 6.4.1 Define the purpose and fundamentals of onboard computers, input devices and output actuators.  
[2/0]
  - analog / digital computers
  - binary systems
  - multiplexing
  - fibre optics
- 6.4.2 Describe the construction, composition, types, styles and application of on board computers.  
[2/0]
  - analog / digital computers
  - binary systems
  - multiplexing
  - fibre optics

6.4.3 Explain the principles of operation of on board computers.  
[2/0]

- analog / digital computers
- binary systems
- multiplexing
- fibre optics

**Evaluation:**

The following evaluation structure is only a suggested format. Specific evaluation of theory and practical components of training varies due to the resource material and training aides utilized.

<b>Evaluation Structure</b>			
Theory Testing	Practical Application Exercises	Research Assignment	Notebook and Organizational Skills
50%	30%	10%	10%

Number:	7		
<b>Title:</b>	<b>Advanced Diagnostics for Alarm Systems</b>		
Duration:	Total Hours: 30	Theory: 12	Practical: 18
Prerequisites:	Section 1, 2, 6		
Co-requisites:	None		

7.1 Advanced Diagnostics for Immobilizer / Anti-Theft Systems

12 Total Hours      Theory: 12 hours      Practical: 0 hours

7.2 Applied Advanced Diagnostics for Immobilizer / Anti-Theft Systems

18 Total Hours      Theory: 0 hours      Practical: 18 hours

Number:	7.1		
Title:	<b>Advanced Diagnostics for Immobilizer / Anti-Theft Systems</b>		
Duration:	Total Hours: 12	Theory: 12	Practical: 0
Cross-Reference to Learning Outcomes:	5.1-3, 5.5		

### General Learning Outcome

Demonstrate a working knowledge of inspecting, testing, diagnostic procedures for immobilizer and theft deterrent systems.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 7.1.1 Describe each step in detail of the strategy based diagnostic procedure as they apply for immobilizer and theft deterrent systems.
- 7.1.2 Describe the inspection, testing and diagnostic procedures on immobilizer and theft deterrent systems following manufacturers' recommendations.

### Learning Content

- 7.1.1 Describe each step in detail of the strategy based diagnostic procedure as they apply for immobilizer and theft deterrent systems.  
[3/0]
  - verify customer complaint
  - visual and preliminary checks
  - product service bulletins
  - using manufacturer's diagnostic starting point (vehicle and accessory)
  - computer aided diagnostics codes
  - symptom based diagnostics
  - verification of repair performed
- 7.1.2 Describe the inspection, testing and diagnostic procedures on immobilizer and theft deterrent systems following manufacturers' recommendations.  
[9/0]
  - sensor failures
  - annunciator / output failures
  - false triggers
  - vehicle fault codes created by immobilizer and theft deterrent systems
  - immobilizer and theft deterrent systems diagnostic codes



Number:	7.2		
Title:	<b>Applied Advanced Diagnostics for Immobilizer / Anti-Theft Systems</b>		
Duration:	Total Hours: 18	Theory: 0	Practical: 18
Cross-Reference to Learning Outcomes: 5.1-3, 5.5			

### General Learning Outcome

Demonstrate a working knowledge of performing inspecting, testing, diagnostic procedures for immobilizer and theft deterrent systems.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 7.2.1 Perform inspection, testing and diagnostic procedures on immobilizer and theft deterrent systems following manufacturers' recommendations.

### Learning Content

- 7.2.1 Perform inspection, testing and diagnostic procedures on immobilizer and theft deterrent systems following manufacturers' recommendations.  
[0/18]

- using specialized diagnostic service tools
  - digital multi-meters
  - logic probes
  - computer safe test lights
  - encoders and programmers
  - using vehicles manufacturer's diagnostic procedures
  - immobilizer and theft deterrent systems manufacturer's diagnostic
  - perform final check, insuring that vehicle and immobilizer and theft deterrent operate as designed

**Evaluation:**

The following evaluation structure is only a suggested format. Specific evaluation of theory and practical components of training varies due to the resource material and training aides utilized.

<b>Evaluation Structure</b>		
Theory Testing	Practical Application Exercises	Notebook and Organizational Skills
40%	40%	10%

Number:	8		
<b>Title:</b>	<b>Advanced Diagnostics for Remote Start Systems</b>		
Duration:	Total Hours: 30	Theory: 12	Practical: 18
Prerequisites:	Section 1, 2, 6		
Co-requisites:	Section 1, 2, 3, 4, 5, 6, 7		

8.1 Advanced Diagnostics for Remote Start Systems

12 Total Hours      Theory: 12 hours      Practical: 0 hours

8.2 Applied Advanced Diagnostics for Remote Start Systems

18 Total Hours      Theory: 0 hours      Practical: 18 hours

Number:	8.1		
Title:	<b>Advanced Diagnostics for Remote Start Systems</b>		
Duration:	Total Hours: 12	Theory: 12	Practical: 0
Cross-Reference to Learning Outcomes: 6.1-3, 6.5			

### General Learning Outcome

Demonstrate a working knowledge of inspecting, testing and diagnostic procedures for remote starting systems.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 8.1.1 Describe each step in detail of the strategy based diagnostic procedure as they apply for remote starting systems.
- 8.1.2 Describe the inspection, testing and diagnostic procedures on remote starting systems following manufacturers' recommendations.

### Learning Content

- 8.1.1 Describe each step in detail of the strategy based diagnostic procedure as they apply for remote starting systems.  
[3/0]
  - verify customer complaint
  - visual and preliminary checks
  - product service bulletins
  - using manufacturer's diagnostic starting point (vehicle and accessory)
  - computer aided diagnostics (codes)
  - symptom based diagnostics
  - verification of repair performed
- 8.1.2 Describe the inspection, testing and diagnostic procedures on remote starting systems for the following manufacturers' recommendations.  
[9/0]
  - no cranking conditions
  - cranks but will not start
  - starts then stalls
  - no accessory power feed
  - over and under duration cranking
  - vehicle fault codes created by remote start system
  - remote start diagnostic codes

Number:	8.2		
Title:	<b>Applied Advanced Diagnostics for Remote Start Systems</b>		
Duration:	Total Hours: 18	Theory: 0	Practical: 18
Cross-Reference to Learning Outcomes: 6.1-3, 6.5			

### General Learning Outcome

Demonstrate a working knowledge of performing inspecting, testing and diagnostic procedures for remote starting systems.

### Learning Outcomes

Upon successful completion, the apprentice is able to:

- 8.2.1 Perform inspection, testing and diagnostic procedures on remote starting systems following manufacturers' recommendations.

### Learning Content

- 8.2.1 Perform inspection, testing and diagnostic procedures on remote starting systems following manufacturers' recommendations.  
[0/18]

- using specialized diagnostic service tools
  - load testers
  - digital multi-meters
  - logic probes
  - test lights (computer safe)
  - scan tools
  - oscilloscope
  - inductive current pickup
- using vehicle manufacturer's diagnostic procedures
- using remote starter's manufacturer's diagnostic procedures
- perform final check, insuring that vehicle and remote starter systems operate as designed

**Evaluation:**

The following evaluation structure is only a suggested format. Specific evaluation of theory and practical components of training varies due to the resource material and training aides utilized.

<b>Evaluation Structure</b>		
Theory Testing	Practical Application Exercises	Notebook and Organizational Skills
40%	40%	10%



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