



ONTARIO COLLEGE OF TRADES

ORDRE DES MÉTIERS DE L'ONTARIO

Apprenticeship
Curriculum Standard

Automotive Electronic
Accessory Technician

Trade Code: 310K

Date: 2001

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>

Table of Contents

Program Summary Reportable Subjects	1
1. Work Practices	2
1.1 Applied Learning and Communication Techniques	3
1.2 Safe Working Practices and Techniques	6
2. Basic Electrical / Electronics	9
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	22
2.7 Battery Fundamentals	24
2.8 Cranking Systems and Control	26
2.9 Electronic Fundamentals	28
3. Prep and Trim	30
3.1 Trim	31
3.2 Charging Systems and Control Circuits	34
3.3 Applied Computer Skills	36
3.4 Supplemental Restraint Systems	38
3.5 Vehicle Preparation	41
4. Alarm Systems	44
4.1 Immobilizer / Theft Deterrent Systems	45
4.2 Immobilizer / Theft Deterrent Systems Component Installation	47
4.3 Performing Electrical Installation	49
4.4 Immobilizer / Theft Deterrent Systems	52
5. Remote Start Systems	54
5.1 Remote Starter Systems Fundamentals	55
5.2 Fundamentals of Remote Starter Installation	58
6. Advanced Electrical / Electronics	61
6.1 Electronics Fundamentals	62
6.2 Electrical Circuit Calculations	64
6.3 Diagnostic Test Equipment	66
6.4 Computer Fundamentals	68

7.	Advanced Diagnostics for Alarm Systems.....	70
	7.1 Advanced Diagnostics for Immobilizer / Anti-theft Systems	71
	7.2 Applied Advanced Diagnostics for Immobilizer / Anti-theft Systems	73
8.	Advanced Diagnostics for Remote Start Systems.....	75
	8.1 Advanced Diagnostics For Remote Start Systems.....	76
	8.2 Applied Advanced Diagnostics For Remote Start Systems.....	78

Program Summary of Reportable Subjects

The following is a guideline for delivery agencies to adhere to in the scheduling and reporting of the program whether it be a block or day release, night school, distance education, or alternate delivery method.

Number	Reportable Subjects	Total	Theory	Practical
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
Total		240	144	96

Number: 1
Title: Work Practices
Duration: 12 Total Hours
Theory: 10 hours Practical: 2 hours
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

1.1 – Applied Learning and Communication Techniques

Cross-Reference to Learning Outcomes:

1.8-10, 3.14, 4.16, 5.6, 6.6

Duration: 6 Total Hours Theory: 4 hours Practical: 2 hours

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

1.2– Safe Working Practices and Techniques

Cross-Reference to Learning Outcomes:

1.1-4, 1.7, 1.11-12

Duration: 6 Total Hours Theory: 6 hours Practical: 0 hours

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.

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

Number: 2
Title: Basic Electrical / Electronics
Duration: 48 Total Hours
Theory: 35 hours Practical: 13 hours
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

2.1 – Electrical Fundamentals

Cross-Reference to Learning Outcomes:

2.2, 3.2, 3.7

Duration: 6 Total Hours Theory: 6 hours Practical: 0 hours

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

2.2– Electrical Circuit Calculation

Cross-Reference to Learning Outcomes:

3.7, 3.9

Duration: 9 Total Hours Theory: 4 hours Practical: 5 hours

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

2.3 – Electrical / Electronics Diagnostic Test Equipment

Cross-Reference to Learning Outcomes:

2.1, 3.3, 4.3, 4.15

Duration: 9 Total Hours Theory: 7 hours Practical: 2 hours

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

2.4 – Applied Electrical Schematics

Cross-Reference to Learning Outcomes:

3.2, 3.9, 4.3

Duration: 3 Total Hours Theory: 2 hours Practical: 1 hours

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

2.5 – Circuit Repair And Protection Devices

Cross-Reference to Learning Outcomes:

3.7, 4.2, 5.4, 6.2, 6.3

Duration: 9 Total Hours Theory: 5 hours Practical: 4 hours

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

2.6 – Electromagnetic Device Fundamentals

Cross-Reference to Learning Outcomes:

5.4, 6.3

Duration: 3 Total Hours Theory: 3 hours Practical: 0 hours

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

2.7 – Battery Fundamentals

Cross-Reference to Learning Outcomes:

2.4, 5.4, 6.4

Duration: 3 Total Hours Theory: 2 hours Practical: 1 hours

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

2.8 – Cranking Systems and Control

Cross-Reference to Learning Outcomes:

6.4

Duration: 3 Total Hours Theory: 3 hours Practical: 0 hours

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

2.9 – Electronic Fundamentals

Cross-Reference to Learning Outcomes:

5.4, 6.3

Duration: 3 Total Hours Theory: 3 hours Practical: 0 hours

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.

Theory Testing	50%
Practical Application Exercises	30%
Research Project	10%
Notebook and Organizational Skills	10%

Number: 3
Title: Prep and Trim
Duration: 24 Total Hours
Theory: 18 hours Practical: 6 hours
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

3.1 - Trim

Cross-Reference to Learning Outcomes:

3.11, 4.14

Duration: 6 Total Hours Theory: 3 hours Practical: 3 hours

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

3.2 - Charging Systems and Control Circuits

Cross-Reference to Learning Outcomes:

6.4

Duration: 6 Total Hours Theory: 4 hours Practical: 2 hours

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

3.3 - Applied Computer Skills

Cross-Reference to Learning Outcomes:

1.8

Duration: 3 Total Hours Theory: 2 hours Practical: 1Hours

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

3.4– Supplemental Restraint Systems

Cross-Reference to Learning Outcomes:

2.3, 2.4

Duration: 6 Total Hours Theory: 6 hours Practical: 0 hours

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

3.5– Vehicle Preparation

Cross-Reference to Learning Outcomes:

2.2, 3.1-2

Duration: 3 Total Hours Theory: 3 hours Practical: 0 hours

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.

Theory Testing	40%
Practical Application Exercises	40%
Research Assignment	10%
Notebook and Organizational Skills	10%

Number: 4
Title: Alarm Systems
Duration: 30 Total Hours
Theory: 16 hours Practical: 14 hours
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

4.1 – Immobilizer / Theft Deterrent Systems

Cross-Reference to Learning Outcomes:

3.1-3

Duration: 3 Total Hours Theory: 3 hours Practical: 0 hours

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

4.2 – Immobilizer / Theft Deterrent Systems Component Installation

Cross-Reference to Learning Outcomes:

3.4-6

Duration: 9 Total Hours Theory: 3 hours Practical: 6 hours

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

4.3 - Performing Electrical Installation

Cross-Reference to Learning Outcomes:

3.7-8

Duration: 9 Total Hours Theory: 6 hours Practical: 3 hours

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

4.4– Immobilizer / Theft Deterrent Systems

Cross-Reference to Learning Outcomes:

3.9-10, 3.12-13

Duration: 9 Total Hours Theory: 4 hours Practical: 5 hours

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.

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

Number: 5
Title: Remote Start Systems
Duration: 30 Total Hours
Theory: 16 hours Practical: 14 hours
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

5.1 - Remote Starter Systems Fundamentals

Cross-Reference to Learning Outcomes:

4.1-4

Duration: 12 Total Hours Theory: 10 hours Practical: 2 hours

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

5.2– Fundamentals Of Remote Starter Installation

Cross-Reference to Learning Outcomes:

4.6-12

Duration: 18 Total Hours Theory: 6 hours Practical: 12 hours

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.

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

Number: 6
Title: Advanced Electrical/ Electronics
Duration: 36 Total Hours
Theory: 26 hours Practical: 10 hours
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

6.1 - Electronics Fundamentals

Cross-Reference to Learning Outcomes:

3.9, 4.11

Duration: 12 Total Hours Theory: 8 hours Practical: 4 hours

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

6.2 - Electrical Circuit Calculations

Cross-Reference to Learning Outcomes:

3.7, 3.9

Duration: 6 Total Hours Theory: 4 hours Practical: 2 hours

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

6.3 - Diagnostic Test Equipment

Cross-Reference to Learning Outcomes:

4.3, 5.3, 6.3

Duration: 12 Total Hours Theory: 8 hours Practical: 4 hours

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

6.4 - Computer Fundamentals

Cross-Reference to Learning Outcomes:

5.4, 6.4

Duration: 6 Total Hours Theory: 6 hours Practical: 0 hours

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.

Theory Testing	50%
Practical Application Exercises	30%
Research Assignment	10%
Notebook and Organizational Skills	10%

Number: 7
Title: Advanced Diagnostics For Alarm Systems
Duration: 30 Total Hours
Theory: 12 hours Practical: 18 hours
Prerequisites: Section 1, 2, 6
Co-requisites:

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

7.1 - Advanced Diagnostics for Immobilizer / Anti-Theft Systems

Cross-Reference to Learning Outcomes:

5.1-3, 5.5

Duration: 12 Total Hours Theory: 12 hours Practical: 0 hours

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

7.2 - Applied Advanced Diagnostics for Immobilizer / Anti-Theft Systems

Cross-Reference to Learning Outcomes:

5.1-3, 5.5

Duration: 18 Total Hours Theory: 0 hours Practical: 18 hours

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.

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

Number: 8
Title: Advanced Diagnostics For Remote Start Systems
Duration: 30 Total Hours
Theory: 12 hours Practical: 18 hours
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

8.1 - Advanced Diagnostics for Remote Start Systems

Cross-Reference to Learning Outcomes:

6.1-3, 6.5

Duration: 12 Total Hours Theory: 12 hours Practical: 0 hours

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

8.2 - Applied Advanced Diagnostics for Remote Start Systems

Cross-Reference to Learning Outcomes:

6.1-3, 6.5

Duration: 18 Total Hours Theory: 0 hours Practical: 18 hours

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.

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