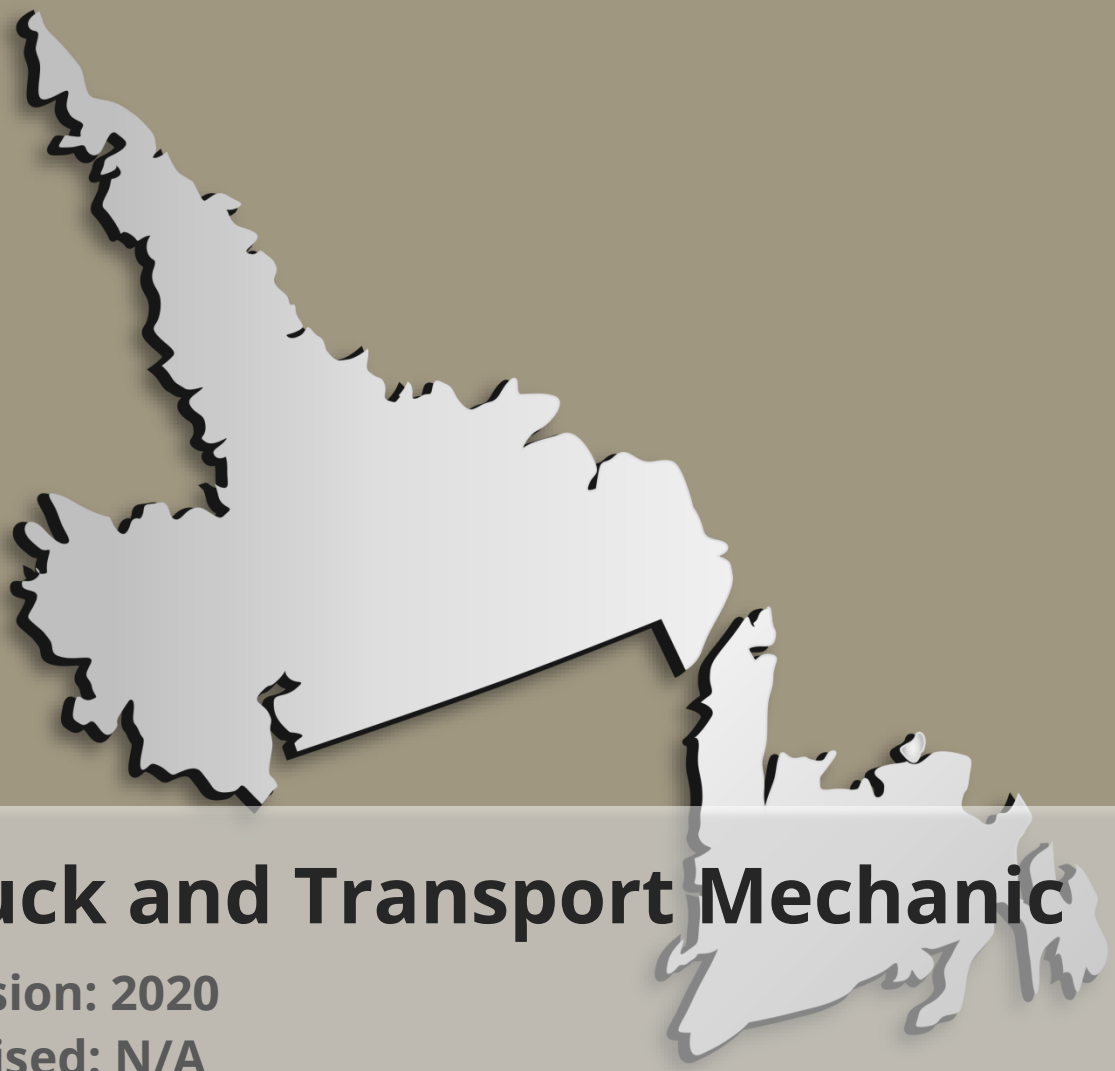
Curriculum Standard

Atlantic Apprenticeship

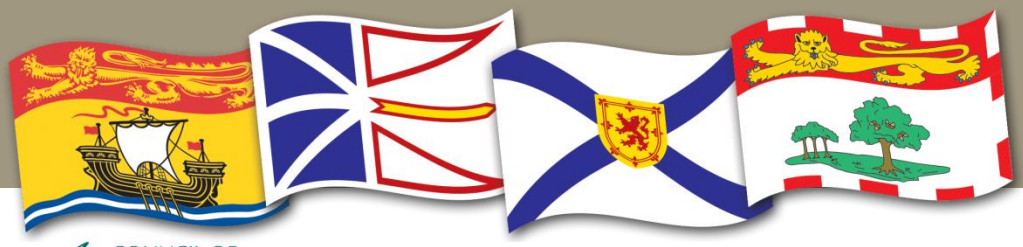
Atlantic Workforce Partnership



Truck and Transport Mechanic

Version: 2020

Revised: N/A



COUNCIL OF ATLANTIC PREMIERS
CONSEIL DES PREMIERS MINISTRES DE L'ATLANTIQUE

Employment and Social Development Canada
Emploi et Développement social Canada

Atlantic Apprenticeship Curriculum Standard

Truck and Transport Mechanic

Preface

This Atlantic Apprenticeship Curriculum Standard is intended to assist instructional staff in the design and delivery of technical, in-class training in support of the Truck and Transport Mechanic program.

This document contains all the technical training elements required to complete the Truck and Transport Mechanic apprenticeship program and has been developed based on the 2015 National Occupation Analysis. The NOA can be found on the Red Seal website (www.red-seal.ca).

Implementation of this AACS for Apprenticeship training is outlined in the following table.

Level	Implementation Effective
Level 1	2020-2021
Level 2	2021-2022
Level 3	2022-2023
Level 4	2023-2024

*** The above implementation schedule was current at time of printing. Please **confirm** with Apprenticeship Staff prior to commencing training.*

Granting of credit or permission to challenge Level examinations for pre-employment or pre-apprenticeship training for the Truck and Transport Mechanic trade will be based on the content outlined in this standard. Training providers must contact their provincial apprenticeship authority for more information on the process and requirements for determining eligibility for credit towards an apprenticeship program. Programs which have been deemed acceptable by the provincial apprenticeship authority will be identified in transfer credit matrix developed through the Atlantic Apprenticeship Harmonization Project.

Acknowledgements

The Atlantic Apprenticeship Curriculum Standard (AACS) is an initiative under the Atlantic Apprenticeship Harmonization Project (AAHP) through the Atlantic Workforce Partnership and Employment and Social Development Canada.

The Atlantic apprenticeship authorities wish to acknowledge the contributions of the following industry and instructional representatives on the Atlantic Trade Advisory Committee (ATAC) who participated in the development of this document in October 2018.

Iannick Robichaud	New Brunswick
Simon Robichaud	New Brunswick
Denis Manuel	New Brunswick
Ryan Greeley	Newfoundland and Labrador
Shamus Harris	Newfoundland and Labrador
Ken Hulan	Newfoundland and Labrador
Daniel Currie	Nova Scotia
David Rossiter	Nova Scotia
Donald Preeper	Nova Scotia
Bruce MacMillian	Prince Edward Island
Shawn Gallant	Prince Edward Island

Advisory committees, industry representatives, instructors and apprenticeship staff provided valuable input to the development of this document. Without their dedication to quality apprenticeship training, this document could not have been produced.

Table of Contents

User Guide

Atlantic Apprenticeship Curriculum Standards (AACS) are developed based on National Occupational Analyses (NOA), Interprovincial Program Guides (IPG) (if available) and extensive industry consultation. This document represents the minimum content to be delivered as part of the harmonized Atlantic program for the Truck and Transport Mechanic trade.

The AACS is deliberately constructed for ease of use and flexibility of structure in order to adapt to all delivery requirements. It details units of training, unit outcomes and objectives. It does not impose a delivery model or teaching format.

Jurisdictions and/or training providers will select and develop delivery materials and techniques that accommodate a variety of learning styles and delivery patterns. The AACS does not dictate study materials, textbooks or learning activities to be used in delivery.

The document includes a Level Structure to facilitate mobility for apprentices moving from one jurisdiction to another.

Structure

The content of the AACS is divided into units. Unit codes are used as a means of identification and are not intended to convey the order of delivery. It is at the discretion of the training provider to deliver the content in the required logical sequence of delivery within the level. Jurisdictions are free to deliver units one at a time or concurrently within a level, provided all outcomes are met.

The Learning Outcomes describe what the apprentice should know or be able to do at the end of training. Wording of the Learning Outcomes, "Demonstrate knowledge of…" acknowledges the broad spectrum of ways in which knowledge can be assessed (i.e. practical projects, multiple choice testing, presentations, etc.) by instructional staff within the training.

Summative evaluation will be through a multiple-choice Level Examination administered through the jurisdictional Apprenticeship Authority.

The 2015 National Occupational Analysis References (NOA) to AACS Comparison chart outlines the relation between each NOA sub-task and the AACS units. NOA References have also been detailed in each unit to highlight the direct link between the unit and relevant sub-tasks in the NOA.

In the Level Structure section, the document identifies suggested hours in order to provide an indication of the time it should take to cover the material in the unit and is provided as a guide only. Adjustments to the suggested hours for each unit may be required to account for rate of apprentice learning, statutory holidays, storm days, registration and examinations. These suggested hours detailed for each unit will represent both theory and practical training (if relevant) and for consistency will be based on a standard of 30 hours per week of training. The true length of time required to deliver an outcome successfully will depend upon the learning activities and teaching methods used.

There are two types of objectives found in the AACS document: theoretical and practical.

The theoretical objectives represent the material that is to be covered during the technical training in order to convey the required knowledge to the apprentice.

The practical objectives represent the tasks or skills that have been deemed by the Atlantic Trade Advisory Committee as critical for the apprentices to receive exposure to while attending technical training. For example, exposure could be done through instructor demonstration or individual or group performance of the skill or task. Training providers are encouraged to use practical demonstration and opportunities for hands-on learning whenever possible. Practical objectives are not intended to replace the on-the-job training component of the apprentice's program or to mirror or replace the logbook skills that are to be taught and evaluated in the workplace.

Detailed content for each objective has not been developed. Where detail is required for clarity, content has been provided.

Glossary of Terms

These definitions are intended as a guide to how language is used in the document.

ADJUST	To put in good working order; regulate; bring to a proper state or position.
APPLICATION	The use to which something is put and/or the circumstance in which an individual would use it.
CHARACTERISTIC	A feature that helps to identify, tell apart or describe recognizably; a distinguishing mark or trait.
COMPONENT	A part that can be separated from or attached to a system; a segment or unit.
DEFINE	To state the meaning of (a word, phrase, etc.).
DESCRIBE	To give a verbal account of; tell about in detail.
EXPLAIN	To make plain or clear; illustrate; rationalize.
IDENTIFY	To point out or name objectives or types.
INTERPRET	To translate information from observation, charts, tables, graphs and written material.
MAINTAIN	To keep in a condition of good repair or efficiency.
METHOD	A means or manner of doing something that has procedures attached to it.
OPERATE	How an object works; to control or direct the functioning of.
PROCEDURE	A prescribed series of steps taken to accomplish an end.
PURPOSE	The reason for which something exists or is done, made or used.

SERVICE	Routine inspection and replacement of worn or deteriorating parts. An act or business function provided to a customer in the course of an individual's profession (e.g., haircut).
TECHNIQUE	Within a procedure, the manner in which technical skills are applied.
TEST	v. To subject to a procedure that ascertains effectiveness, value, proper function or other quality. n. A way of examining something to determine its characteristics or properties, or to determine whether or not it is working correctly.

Essential Skills Profiles

Through extensive research, the Government of Canada and other national and international agencies have identified and validated key essential skills for the workplace. These skills are used in nearly every job and at different levels of complexity. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Essential Skills Profiles describe how workers in various occupations use each of the key essential skills. They include:

- a brief description of the occupation;
- examples of tasks that illustrate how each essential skill is applied; and,
- complexity ratings that indicate the level of difficulty of the example tasks.

Essential Skills profiles can be found on the Employment and Social Development Canada (ESDC) website at www.esdc.gc.ca/eng/jobs/les/profiles/index.shtml

The development and improvement of these Essential Skills is inherent throughout the apprenticeship training program as apprentices work towards achieving journeyperson status.

Profile Chart

COMMON OCCUPATIONAL SKILLS			
CHT-100 Safety	CHT-105 Tools and Equipment	CHT-110 Hoisting and Lifting	CHT-115 Trade Documentation
CHT-120 Preventive Maintenance	CHT-125 Start, Move and Park Vehicle	CHT-130 Fasteners, Tubing, Hoses and Fittings	CHT-135 Lubrication and Fluid Servicing
CHT-140 Gaskets, Seals, and Sealing Compounds	CHT-145 Bearings	CHT-150 Metallurgy	CHT-155 Cutting and Heating
CHT-160 MIG Welding	CHT-625 Shielded Metal Arc Welding		
ENGINES AND ENGINE SUPPORT SYSTEMS			
CHT-170 Engine Principles	CHT-300 Cooling Systems	CHT-305 Engine Lubrication Systems	CHT-325 Diesel Fuel Supply Systems
CHT- 345 Electronic Ignition Systems	CHT-350 Non-Diesel Fuel Systems	CHT-400 Base Engine Diagnostics	CHT-405 Diesel Fuel Injection Systems
CHT-410 Electronically Controlled Diesel Fuel Injection Systems	CHT-415 Intake and Exhaust Systems	CHT-420 Emission Control Systems	CHT-425 Engine Brakes and Retarders
CHT-430 Diesel Engine Overhaul	CHT-440 Vehicle Mangement Systems		
AIR SYSTEMS AND BRAKES			
CHT-610 Hydraulic Brake Systems I	CHT-615 Introduction to Air Brake Systems	TTM-225 Dual Air Brake Systems	TTM-230 Anti-Lock Braking and Traction Control Systems
ELECTRICAL AND ELECTRONIC SYSTEMS			
CHT-175 Electrical and Electronic Principles	CHT-180 Batteries	CHT-185 Lighting Circuits	CHT-190 Wiring Harnesses and Accessories
CHT-330 Starting Systems	CHT-340 Charging Systems	CHT-345 Electronic Ignition Systems	CHT-410 Electronically Controlled Diesel Fuel Injection Systems
CHT-435 Gauges and Instrumentation	CHT-440 Vehicle Management Systems		

Profile Chart *(continued)*

DRIVETRAIN SYSTEMS			
CHT-310 Drivelines	CHT-315 Drive Axle Assemblies	CHT-320 Engine Clutches	CHT-355 Manual Transmissions
CHT-360 Pump Drives/Power Take Offs	CHT-365 Transfer Cases	CHT-370 Automatic/Powershift, CVT Transmissions	CHT-375 Torque Converters
CHT-425 Engine Brakes and Retarders			
STEERING, CHASSIS/FRAMES, SUSPENSION, WHEELS, HUBS, TIRES			
CHT-165 Tires, Rims, Wheels and Hubs	CHT-630 Introduction to Steering System Components	TTM-200 Front Axles and Suspension Systems	TTM-205 Rear Axles and Suspension Systems
TTM- 210 Wheel and Axle Alignment	TTM-215 Frames and Chassis	TTM-220 Power-Assisted Steering Systems	TTM-245 Truck Bodies and Trailers
CAB			
TTM-235 Cab Components	CHT-435 Gauges and Instrumentation		
TRAILERS			
TTM-215 Frames and Chassis	TTM-225 Dual Air Brake Systems	TTM-240 Trailer Coupling Devices	TTM-245 Truck Bodies and Trailers
CLIMATE CONTROL SYSTEMS			
CHT-620 Ozone Depleting Substances	CHT-445 Air Conditioning Systems	CHT-450 Heating and Ventilation Systems	
HYDRAULIC SYSTEMS			
CHT-195 Introduction to Hydraulics	CHT-600 Hydraulic Fittings, Piping, Tubing and Hoses	CHT-605 Hydraulic Reservoirs, Coolers and Filters	TTM – 255 Hydraulic Pumps
TTM – 260 Hydraulic Cylinders	TTM – 265 Control Valves	TTM – 270 Accumulators	

Recommended Atlantic Level Structure

Level 1 - 9 Weeks

Unit Code	Unit Title	Sugg Hrs*	Pg #	Practical Objectives*
MENT-700	Mentoring I	6	22	N/A
CHT-100	Safety	9	24	N/A
CHT-105	Tools and Equipment	9	26	N/A
CHT-110	Hoisting and Lifting	6	28	N/A
CHT-115	Trade Documentation	3	30	N/A
CHT-120	Preventive Maintenance	3	32	N/A
CHT-125	Start, Move and Park Vehicle	3	33	N/A
CHT-130	Fasteners, Tubings, Hoses and Fittings	9	34	N/A
CHT-135	Lubrication and Fluids Servicing	15	35	N/A
CHT-140	Gaskets, Seals and Sealing Compounds	3	37	N/A
CHT-145	Bearings	3	39	N/A
CHT-150	Metallurgy	3	40	N/A
CHT-155	Cutting and Heating	9	42	Set up, operate & shut down oxy-fuel equipment.
CHT-160	Metal Inert Gas (MIG) Welding	9	44	N/A
CHT-165	Tires, Rims,Wheels and Hubs	12	46	N/A
CHT-170	Engine Principles	21	48	N/A
CHT-175	Electrical and Electronic Principles	30	49	N/A
CHT-180	Batteries	6	51	N/A
CHT-185	Lighting Circuits	6	53	N/A
CHT-190	Wiring Harnesses and Accessories	18	55	Repair an electrical connection.
CHT-195	Introduction to Hydraulics	18	57	N/A
CHT-600	Hydraulic Fittings, Piping, Tubing & Hoses	6	59	N/A
CHT-605	Hydraulic Reservoirs, Coolers and Filters	6	61	N/A
CHT-610	Hydraulic Brake Systems I	15	63	N/A
CHT-615	Introduction to Air Brake Systems	15	65	N/A
CHT-620	Ozone Depleting Substances	6	67	N/A
CHT-625	Shielded Metal Arc Welding (SMAW)	9	68	N/A
CHT-630	Introduction to Steering Sys Components	12	70	N/A

Level 2 - 6 Weeks

Unit Code	Unit Title	Sugg Hrs*	Pg #	Practical Objectives*
TTM-200	Front Axles and Suspension Systems	9	74	N/A
TTM-205	Rear Axles and Suspension Systems	15	76	N/A
TTM-210	Wheel and Axle Alignment	12	78	Check wheel alignment.
TTM-215	Frames and Chassis	6	80	N/A
TTM-220	Power-Assisted Steering Systems	12	82	Check flow and pressure on power-assisted steering system.
TTM-225	Dual Air Brake Systems	30	84	N/A
TTM-230	Anti-lock Braking and Traction Control Systems	18	86	N/A

Unit Code	Unit Title	Sugg Hrs*	Pg #	Practical Objectives*
TTM-235	Cab Components	6	89	N/A
TTM-240	Trailer Coupling Devices	12	91	Disassemble, inspect, reassemble, adjust fifth wheel.
TTM-245	Truck Bodies and Trailers	12	93	1. Inspect coupling devices. 2. Inspect and repair landing gear.
TTM-250	Introduction to Vehicle Safety Inspections	6	96	N/A
TTM-255	Hydraulic Pumps	12	98	Demonstrate cut aways.
TTM-260	Hydraulic Cylinders	6	101	Demonstrate procedure to test a hydraulic cylinder.
TTM-265	Control Valves	18	103	1. Adjust and verify the operation of a system and circuit relief valve. 2. Follow a schematic and identify components.
TTM-270	Accumulators	6	105	Demonstrate procedures of releasing hydraulic pressure of an accumulator.

Level 3 - 7 Weeks

Unit Code	Unit Title	Sugg Hrs*	Pg #	Practical Objectives*
CHT-300	Cooling Systems	6	108	N/A
CHT-305	Engine Lubrication Systems	9	110	N/A
CHT-310	Drivelines	6	112	1. Calculate drive line angles and phasing. 2. Adjust ride height.
CHT-315	Drive Axle Assemblies	18	114	Disassemble & assemble a drive axle assembly/power divider.
CHT-320	Engine Clutches	18	116	Remove, replace and adjust a clutch.
CHT-325	Diesel Fuel Supply Systems	6	118	Perform a vacuum, pressure and flow test.
CHT-330	Starting Systems	15	120	1. Perform a voltage drop test. 2. Disassemble and assemble starter and test components.
CHT-335	Starting Aids	6	122	1. Measure current draw of intake heater. 2. Test a glow-plug circuit. 3. Test immersion heaters
CHT-340	Charging Systems	15	124	1. Disassemble and assemble an alternator. 2. Verify remote sense wire. 3. Diagnose and repair charging system components.
CHT-345	Electronic Ignition Systems	6	126	N/A
CHT-350	Non-Diesel Fuel Systems	30	128	N/A
CHT-355	Manual Transmissions	18	130	Identify internal components and find path and power.
CHT-360	Pump Drives/Power Take-Offs	6	132	N/A
CHT-365	Transfer Cases	6	134	N/A
CHT-370	Automatic/Power Shift and CVT Transmissions	36	136	Perform stall and pressure test.
CHT-375	Torque Converters	9	138	N/A

Level 4 - 8 Weeks

Unit Code	Unit Title	Sugg Hrs*	Pg #	Practical Objectives*
CHT-400	Base Engine Diagnostics	12	142	1. Perform a base pressure test. 2. Perform cylinder balance test. 3. Perform oil pressure test.
CHT-405	Diesel Fuel Injection Systems	24	144	1. Perform a bench test on an injector. 2. Pin time a fuel injection pump.
CHT-410	Electronically-Controlled Diesel Fuel Injection Systems	27	146	1. Program an injector. 2. Perform cylinder cut out test. 3. Perform cylinder balance test. 4. Perform solenoid cut out test. 5. Perform an injector leak test. 6. Perform fault code trouble shooting.
CHT-415	Intake and Exhaust Systems	12	148	1. Perform air flow restriction. 2. Perform boost pressure test. 3. Perform air to air leak test (charge air cooler CAC). 4. Perform exhaust back pressure test. 5. Disassemble turbo charger. 6. Verify waste gate operation.
CHT-420	Emission Control Systems	27	150	1. Diagnose emission control systems. 2. Remove and install emission control system components. 3. Repair emission control system components. 4. Inspect, clean and maintain emission control sys components. 5. Test vehicle emission controls. 6. Perform a forced regeneration.
CHT-425	Engine Brakes and Retarders	12	152	1. Diagnose engine brakes and retarders. 2. Disassemble and assemble engine brakes and retarders. 3. Adjust engine brakes.
CHT-430	Diesel Engine Overhaul	30	154	1. Perform precision measurements of diesel engine components. 2. Perform a top end adjustment.
CHT-435	Gauges and Instrumentation	6	156	1. Demonstrate knowledge of smart switches & programming. 2. Demonstrate knowledge of gauge and instrument symbols.
CHT-440	Vehicle Management Systems	30	158	1. Troubleshoot datalink communication. 2. Read and interpret schematics and flowcharts. 3. Demonstrate use of a multimeter. 4. Check, troubleshoot and clear fault codes. 5. Perform ECM downloads.
CHT-445	Air Conditioning Systems	18	160	1. Conduct a standing leak test. 2. Evacuate and recharge an air conditionioning system. 3. Conduct performance testing.
CHT-450	Heating & Ventilation Systems	6	162	N/A
MENT-701	Mentoring II	6	164	N/A
TTM-465	Motor Vehicle Inspection (NS Specific)	6	165	N/A
CHT-460	Program Review	30	167	N/A

***Suggested Hours:** The time it should take to cover the unit (a guide only).

***Practical Objectives:** The tasks/skills apprentices must be exposed to during technical training. An individual or group performance of the task/skill is recommended; if not possible, an instructor demonstration is acceptable. Training Providers should use practical, hands-on learning whenever possible, whether identified in the curriculum as a practical objective or not.

2015 NOA Sub-Task to Curriculum Guide Unit Comparison

2015 NOA Task		Curriculum Guide Unit	
Task 1 - Performs saftey related functions			
1.01	Maintains safe work environment	CHT 100	Safety
		CHT 125	Start, Move and Park Vehicle
1.02	Uses PPE and safety equipment	CHT 100	Safety
		CHT 620	Ozone Depleting Substances
Task 2 - Uses and maintains tools and equipment			
2.01	Maintains hand, power, measuring, testing, and diagnostic tools	CHT 105	Tools and Equipment
2.02	Maintains shop equipment	CHT 105	Tools and Equipment
2.03	Uses hoisting and lifting equipment	CHT 110	Hoisting and Lifting
2.04	Uses Welding and Cutting Equipment	CHT 105	Tools and Equipment
		CHT 150	Metallurgy
		CHT 155	Cutting and Heating
		CHT 160	MIG Welding
		CHT 625	SMAW Welding
Task 3 - Performs routine trade activities			
3.01	Uses documentation and reference materials	CHT 115	Trade Documentation
		CHT 120	Preventive Maintenance
3.02	Maintains fluids, lubricants, and coolants	CHT 120	Preventive Maintenance
		CHT 135	Lubrication and Fluids Servicing
3.03	Services hoses, tubing, and fittings	CHT 130	Fasteners, Tubing, Hoses and Fittings
3.04	Services filters	CHT 120	Preventive Maintenance
		CHT 135	Lubrication and Fluids Servicing
3.05	Services bearings, bushings, and seals	CHT 140	Gaskets, Seals and Sealing Compounds
		CHT 145	Bearings
3.06	Uses fasteners, sealing devices, adhesives, and gaskets	CHT 130	Fasteners, Tubing, Hoses and Fittings
		CHT 140	Gaskets, Seals and Sealing Compounds
Task 4 - Services, diagnoses, and repairs base engine			
4.01	Services base engine	CHT 170	Engine Principles
		CHT 400	Base Engine Diagnostics
		CHT 430	Diesel Engine Overhaul
4.02	Diagnoses base engine	CHT 170	Engine Principles
		CHT 400	Base Engine Diagnostics
		CHT 430	Diesel Engine Overhaul
4.03	Repairs base engine	CHT 170	Engine Principles
		CHT 400	Base Engine Diagnostics
		CHT 430	Diesel Engine Overhaul
Task 5 - Services lubrication systems			

2015 NOA Task		Curriculum Guide Unit	
5.01	Services lubrication systems	CHT 135	Lubrication and Fluids Servicing
		CHT 305	Engine Lubrication Systems
5.02	Diagnoses lubrication systems	CHT 305	Engine Lubrication Systems
5.03	Repairs lubrication systems	CHT 305	Engine Lubrication Systems
Task 6- Services, diagnoses and repairs intake and exhaust systems			
6.01	Services intake and exhaust systems	CHT 415	Intake and Exhaust Systems
6.02	Diagnoses intake and exhaust systems	CHT 415	Intake and Exhaust Systems
6.03	Repairs intake and exhaust systems	CHT 415	Intake and Exhaust Systems
Task 7 - Services, diagnoses, and repairs engine management systems			
7.01	Services engine management systems	CHT 440	Vehicle Management Systems
7.02	Diagnoses engine management systems	CHT 440	Vehicle Management Systems
7.03	Repairs engine management systems	CHT 440	Vehicle Management Systems
Task 8 - Services, diagnoses, and repairs fuel delivery systems			
8.01	Services fuel delivery systems	CHT 350	Non-Diesel Fuel Systems
		CHT 325	Diesel Fuel Supply Systems
		CHT 405	Diesel Fuel Injection Systems
		CHT 410	Electronically-Controlled Diesel Fuel Injection Systems
8.02	Diagnoses fuel delivery systems	CHT 350	Non-Diesel Fuel Systems
		CHT 325	Diesel Fuel Supply Systems
		CHT 405	Diesel Fuel Injection Systems
		CHT 410	Electronically-Controlled Diesel Fuel Injection Systems
8.03	Repairs fuel delivery systems	CHT 350	Non-Diesel Fuel Systems
		CHT 325	Diesel Fuel Supply Systems
		CHT 405	Diesel Fuel Injection Systems
		CHT 410	Electronically-Controlled Diesel Fuel Injection Systems
Task 9 - Services, diagnoses, and repairs emission systems for diesel engines			
9.01	Services emission systems for diesel engines	CHT 420	Emission Control Systems
9.02	Diagnoses emission systems for diesel engines	CHT 420	Emission Control Systems
9.03	Repairs emission systems for diesel engines	CHT 420	Emission Control Systems
Task 10 - Services, diagnoses, and repairs engine retarder systems			
10.01	Services and repairs engine retarder systems	CHT 425	Engine Brakes and Retarders
10.02	Diagnoses engine retarder systems	CHT 425	Engine Brakes and Retarders
Task 11 - Services, diagnoses, and repairs cooling system			
11.01	Services cooling systems	CHT 135	Lubrication and Fluids Servicing
		CHT 300	Cooling Systems
11.02	Diagnoses cooling systems	CHT 300	Cooling Systems
11.03	Repairs cooling systems	CHT 300	Cooling Systems
Task 12 - Services, diagnoses, and repairs air systems			
12.01	Services air systems	CHT 615	Introduction to Air Brake Systems

2015 NOA Task		Curriculum Guide Unit	
		TTM 225	Dual Air Brake Systems
12.02	Diagnoses air systems	CHT 615	Introduction to Air Brake Systems
		TTM 225	Dual Air Brake Systems
12.03	Repairs air systems	CHT 615	Introduction to Air Brake Systems
		TTM 225	Dual Air Brake Systems
Task 13 - Services, diagnoses, and repairs brake systems			
13.01	Services brake systems	CHT 610	Hydraulic Brake Systems I
		CHT 615	Introduction to Air Brake Systems
		TTM 225	Dual Air Brake Systems
		TTM 230	Anti-lock Braking and Traction Control Systems
13.02	Diagnoses brake systems	CHT 610	Hydraulic Brake Systems I
		CHT 615	Introduction to Air Brake Systems
		TTM 225	Dual Air Brake Systems
		TTM 230	Anti-lock Braking and Traction Control Systems
13.03	Repairs brake systems	CHT 610	Hydraulic Brake Systems I
		CHT 615	Introduction to Air Brake Systems
		TTM 225	Dual Air Brake Systems
		TTM 230	Anti-lock Braking and Traction Control Systems
Task 14 - Services, diagnoses, and repairs batteries			
14.01	Performs servicing and repair of batteries	CHT 175	Electrical and Electronic Principles
		CHT 180	Batteries
14.02	Diagnoses batteries	CHT 175	Electrical and Electronic Principles
		CHT 180	Batteries
Task 15 - Services, diagnoses, and repairs charging systems			
15.01	Services charging sytem	CHT 175	Electrical and Electronic Principles
		CHT 180	Batteries
		CHT 340	Charging Systems
15.02	Diagnoses charging systems	CHT 175	Electrical and Electronic Principles
		CHT 180	Batteries
		CHT 340	Charging Systems
15.03	Repairs charging systems	CHT 175	Electrical and Electronic Principles
		CHT 180	Batteries
		CHT 340	Charging Systems
Task 16 - Services, diagnoses, and repairs spark ignition systems			
16.01	Performs servicing and repair of spark ignition systems	CHT 345	Electronic Ignition Systems
16.02	Diagnose spark ignition systems	CHT 345	Electronic Ignition Systems
Task 17 - Service, diagnoses, and repairs starting systems			
17.01	Performs servicing and repairs of starting systems	CHT 175	Electrical and Electronic Principles
		CHT 330	Starting Systems
		CHT 335	Starting Aids
17.02	Diagnoses starting systems	CHT 175	Electrical and Electronic Principles
		CHT 330	Starting Systems

2015 NOA Task		Curriculum Guide Unit	
		CHT 335	Starting Aids
Task 18 - Services, diagnoses, and repairs electrical components and accessories			
18.01	Performs servicing and repair of electrical and electronic components and accessories	CHT 175	Electrical and Electronic Principles
		CHT 185	Lighting Circuits
		CHT 190	Wiring Harnesses and Accessories
18.02	Diagnoses electrical and electronic components and accessories	CHT 175	Electrical and Electronic Principles
		CHT 185	Lighting Circuits
		CHT 190	Wiring Harnesses and Accessories
Task 19 - Services, diagnoses and repairs vehicle management systems and electronic components			
19.01	Services vehicle management systems and electronic components	CHT 175	Electrical and Electronic Principles
		CHT 190	Wiring Harnesses and Accessories
		CHT 345	Electronic Ignition Systems
		CHT 410	Electronically-Controlled Diesel Fuel Injection Systems
		CHT 440	Vehicle Management Systems
19.02	Diagnoses vehicle management systems and electronic components	CHT 175	Electrical and Electronic Principles
		CHT 190	Wiring Harnesses and Accessories
		CHT 345	Electronic Ignition Systems
		CHT 410	Electronically-Controlled Diesel Fuel Injection Systems
		CHT 440	Vehicle Management Systems
19.03	Repairs vehicle management systems and electronic components	CHT 175	Electrical and Electronic Principles
		CHT 190	Wiring Harnesses and Accessories
		CHT 345	Electronic Ignition Systems
		CHT 410	Electronically-Controlled Diesel Fuel Injection Systems
		CHT 440	Vehicle Management Systems
Task 20 - Services, diagnoses, and repairs clutches			
20.01	Services clutches	CHT 320	Engine Clutches
20.02	Diagnoses clutches	CHT 320	Engine Clutches
20.03	Repairs clutches	CHT 320	Engine Clutches
Task 21 - Services, diagnoses, and repairs manual transmission and transfer cases			
21.01	Services manual transmission and tranfer cases	CHT 355	Manual Transmissions
		CHT 360	Pump Drives/Power Take Offs
		CHT 365	Transfer Cases
21.02	Diagnoses manual transmission and tranfer cases	CHT 355	Manual Transmissions
		CHT 360	Pump Drives/Power Take Offs
		CHT 365	Transfer Cases
21.03	Repairs manual transmission and tranfer cases	CHT 355	Manual Transmissions
		CHT 360	Pump Drives/Power Take Offs
		CHT 365	Transfer Cases
Task 22 - Services, diagnoses, and repairs automatic transmissions			
22.01	Services automatic transmissions	CHT 370	Automatic/Powershift and CVT Transmissions
		CHT 375	Torque Converters

2015 NOA Task		Curriculum Guide Unit	
22.02	Diagnoses automatic transmissions	CHT 370	Automatic/Powershift and CVT Transmissions
		CHT 375	Torque Converters
22.01	Repairs automatic transmissions	CHT 370	Automatic/Powershift and CVT Transmissions
		CHT 375	Torque Converters
Task 23 - Services, diagnoses, and repairs automated transmissions			
23.01	Services automated transmissions	CHT 370	Automatic/Powershift and CVT Transmissions
		CHT 320	Engine Clutches
23.02	Diagnoses automated transmissions	CHT 370	Automatic/Powershift and CVT Transmissions
		CHT 320	Engine Clutches
23.03	Repairs automated transmissions	CHT 370	Automatic/Powershift and CVT Transmissions
		CHT 320	Engine Clutches
Task 24 - Services, diagnoses, and repairs driveline systems			
24.01	Services driveline systems	CHT 310	Drivelines
24.02	Diagnoses driveline systems	CHT 310	Drivelines
24.03	Repairs driveline systems	CHT 310	Drivelines
Task 25 - Services, diagnoses, and repairs differentials			
25.01	Service differentials	CHT 315	Drive Axle Assemblies
25.02	Diagnoses differentials	CHT 315	Drive Axle Assemblies
25.03	Repairs differentials	CHT 315	Drive Axle Assemblies
Task 26 - Services, diagnoses, and repairs drivetrain retarders			
26.01	Services drivetrain retarders	CHT 425	Engine Brakes and Retarders
26.02	Diagnoses drivetrain retarders	CHT 425	Engine Brakes and Retarders
26.03	Repairs drivetrain retarders	CHT 425	Engine Brakes and Retarders
Task 27 - Services, diagnoses, and repairs steering systems			
27.01	Services steering systems	CHT 630	Introduction to Steering System Components
		TTM 210	Wheel and Axle Alignment
		TTM 220	Power-Assisted Steering Systems
27.02	Diagnoses steering systems	CHT 630	Introduction to Steering System Components
		TTM 210	Wheel and Axle Alignment
		TTM 220	Power-Assisted Steering Systems
27.03	Repairs steering systems	CHT 630	Introduction to Steering System Components
		TTM 210	Wheel and Axle Alignment
		TTM 220	Power-Assisted Steering Systems
Task 28 - Services, diagnoses, and repairs chassis/frames			
28.01	Services chassis/frames	TTM 215	Frames and Chassis
		TTM 245	Truck Bodies and Trailers
28.02	Diagnoses chassis/frames	TTM 215	Frames and Chassis
		TTM 245	Truck Bodies and Trailers

2015 NOA Task		Curriculum Guide Unit	
28.03	Repairs chassis/frames	TTM 215	Frames and Chassis
		TTM 245	Truck Bodies and Trailers
Task 29 - Services, diagnoses, and repairs suspension			
29.01	Services suspension	TTM 200	Front Axles and Suspension
		TTM 205	Rear Axles and Suspension
29.02	Diagnoses suspension	TTM 200	Front Axles and Suspension
		TTM 205	Rear Axles and Suspension
29.03	Repairs suspension	TTM 200	Front Axles and Suspension
		TTM 205	Rear Axles and Suspension
Task 30 - Services, diagnoses, repairs hitches and couplers			
30.01	Services hitches and couplers	TTM 240	Trailer Coupling Devices
		TTM 245	Truck Bodies and Trailers
30.02	Diagnoses hitches and couplers	TTM 240	Trailer Coupling Devices
		TTM 245	Truck Bodies and Trailers
30.03	Repairs hitches and couplers	TTM 240	Trailer Coupling Devices
		TTM 245	Truck Bodies and Trailers
Task 31 - Services, diagnoses, repairs tires, wheels, and hubs			
31.01	Services tires, wheels, and hubs	CHT 165	Tires, Rims, Wheels and Hubs
		TTM 210	Wheel and Axle Alignment
31.02	Diagnoses tires, wheels, and hubs	CHT 165	Tires, Rims, Wheels and Hubs
		TTM 210	Wheel and Axle Alignment
31.03	Repairs tires, wheels, and hubs	CHT 165	Tires, Rims, Wheels and Hubs
		TTM 210	Wheel and Axle Alignment
Task 32 - Services, diagnoses, and repairs interior cab components			
32.01	Services interior cab components	TTM 235	Cab Components
		CHT 435	Gauges and Instrumentation
32.02	Diagnoses interior cab components	TTM 235	Cab Components
		CHT 435	Gauges and Instrumentation
32.03	Repairs interior cab components	TTM 235	Cab Components
		CHT 435	Gauges and Instrumentation
Task 33 - Services, diagnoses, and repairs exterior cab components			
33.01	Services exterior cab components	TTM 235	Cab Components
33.02	Diagnoses exterior cab components	TTM 235	Cab Components
33.03	Repairs exterior cab components	TTM 235	Cab Components
Task 34 - Services, diagnoses, and repairs trailer components and accessories			
34.01	Services trailer components and accessories	TTM 245	Truck Bodies and Trailers
34.02	Diagnoses trailer components and accessories	TTM 245	Truck Bodies and Trailers
34.03	Repairs trailer components and accessories	TTM 245	Truck Bodies and Trailers
Task 35 - Services, diagnoses, repairs heating and refrigeration systems (trailers).			
35.01	Services heating and refrigeration systems	TTM 245	Truck Bodies and Trailers
35.01	Diagnoses heating and refrigeration systems	TTM 245	Truck Bodies and Trailers
35.01	Repairs heating and refrigeration systems	TTM 245	Truck Bodies and Trailers
Task 36 - Services, diagnoses, and repairs heating and ventilation systems			

2015 NOA Task		Curriculum Guide Unit	
36.01	Services heating and ventilation systems	CHT 450	Heating and Ventilation Systems
36.02	Diagnoses heating and ventilation systems	CHT 450	Heating and Ventilation Systems
36.03	Repairs heating and ventilation systems	CHT 450	Heating and Ventilation Systems
Task 37 - Services, diagnoses, and repairs air conditioning systems			
37.01	Services air conditioning systems	CHT 620	Ozone Depleting Substances
		CHT 445	Air Conditioning Systems
37.02	Diagnoses air conditioning systems	CHT 620	Ozone Depleting Substances
		CHT 445	Air Conditioning Systems
37.03	Repairs air conditioning systems	CHT 620	Ozone Depleting Substances
		CHT 445	Air Conditioning Systems
Task 38 - Services, diagnoses, and repairs hydraulic components			
38.01	Services hydraulic components	CHT 195	Introduction to Hydraulics
		CHT 600	Hydraulic Fittings, Piping, Tubing and Hoses
		CHT 605	Hydraulic Reservoirs, Coolers and Filters
		TTM 255	Hydraulic Pumps
		TTM 260	Hydraulic Cylinders
		TTM 265	Control Valves
		TTM 270	Accumulators
38.02	Diagnoses hydraulic components	CHT 195	Introduction to Hydraulics
		CHT 600	Hydraulic Fittings, Piping, Tubing and Hoses
		CHT 605	Hydraulic Reservoirs, Coolers and Filters
		TTM 255	Hydraulic Pumps
		TTM 260	Hydraulic Cylinders
		TTM 265	Control Valves
		TTM 270	Accumulators
38.03	Repairs hydraulic components	CHT 195	Introduction to Hydraulics
		CHT 600	Hydraulic Fittings, Piping, Tubing and Hoses
		CHT 605	Hydraulic Reservoirs, Coolers and Filters
		TTM 255	Hydraulic Pumps
		TTM 260	Hydraulic Cylinders
		TTM 265	Control Valves
		TTM 270	Accumulators

LEVEL 1

MENT-700 Mentoring I

Learning Outcomes:

- Demonstrate knowledge of effective communication practices as a learner.
- Demonstrate knowledge of strategies for learning skills in the workplace.

Red Seal Occupational Standard Reference:

4.01 Uses communication techniques
4.02 Uses mentoring techniques

Suggested Hours:

6 hours

Theoretical Objectives:

1. Describe the importance of one's own individual experiences.
2. Identify behaviours that demonstrate positive learning experiences.
3. Identify the benefits of workplace mentoring for the apprentice, mentor, and employer.
4. Identify the partners involved in apprenticeship training.
5. Describe the shared responsibilities for workplace learning in apprenticeship.
6. Identify different learning needs and strategies to address challenges or barriers in the workplace.
   i) learning disabilities
   ii) language
   iii) underrepresentation
7. Identify the components that create a positive and inclusive workplace culture.
   i) workplace characteristics
   ii) individual behaviours

8. Identify various learning styles and determine one's own learning preferences.

9. Explain how learning preferences impact learning new skills.

10. Identify different learning strategies to meet individual learning needs.

11. Describe the importance of adapting to a variety of teaching and learning methods in the workplace.

12. Identify techniques for effective communication as a learner.
    i) verbal and non-verbal
    ii) active listening

13. Identify and describe personal responsibilities and attitudes that contribute to on-the-job success.
    i) self advocating
    ii) asking questions
    iii) accepting constructive feedback
    iv) working safely
    v) employing time management techniques and being punctual

Practical Objectives:
N/A

CHT-100 Safety

Learning Outcomes:

- Demonstrate knowledge of safe work practices.
- Demonstrate knowledge of regulatory requirements pertaining to safety.
- Demonstrate knowledge of safety equipment, their applications and procedures for use.

2015 National Occupational Analysis Reference:

1.01 Maintains safe work environment.
1.02 Uses PPE and safety equipment.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Identify types of personal protective clothing and equipment and describe their applications.

2. Describe the care and maintenance of personal protective equipment (PPE).

3. Identify workplace hazards and describe safe work practices.
   - i) personal
   - ii) shop/facility
     - fire
     - explosion
     - gases
     - electrical
     - housekeeping
     - awareness of surroundings
   - iii) environmental awareness
   - iv) vehicle/equipment
     - restraint systems
     - lock out/tag out

- high voltage systems
- high pressure systems
    - hydraulic
    - fuel
    - air
- fire suppression systems

4. Identify and explain workplace safety and health regulations.
    i) federal
        - material safety data sheets (MSDS)
        - workplace hazardous material information system (WHMIS)
    ii) provincial/territorial
        - occupational health and safety (OHS)

Practical Objectives

N/A

CHT-105 Tools and Equipment

Learning Outcomes:

- Demonstrate knowledge of hand and power tools, their applications, maintenance and procedures for use.
- Demonstrate knowledge of measuring tools, their applications, maintenance and procedures for use.
- Demonstrate knowledge of diagnostic tools, their applications and maintenance.
- Demonstrate knowledge of shop equipment, their applications, maintenance and procedures for use.

2015 National Occupational Analysis Reference:

2.01 Maintains hand, power, measuring, testing, and diagnostic tools.
2.02 Maintains shop equipment.
2.04 Uses welding and cutting equipment.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Identify types of hand tools and describe their applications and procedures for use.

2. Describe the procedures used to store and maintain hand tools.

3. Identify types of power tools and describe their applications and procedures for use.
   i) electric/cordless
   ii) pneumatic
   iii) hydraulic

4. Describe the procedures used to store and maintain power tools.

5. Identify types of measuring tools and describe their applications and procedures for use.
   i) imperial
   ii) metric

6. Identify types of diagnostic tools and describe their applications.

7. Describe the procedures used to store and maintain measuring and diagnostic tools.

8. Identify types of shop equipment and describe their applications and procedures for use.

9. Describe the procedures used to store and maintain shop equipment.

Practical Objectives

N/A

CHT-110 Hoisting and Lifting

Learning Outcomes:

- Demonstrate knowledge of hoisting and lifting equipment, their applications and procedures for use.

2015 National Occupational Analysis Reference:

2.03 Uses hoisting and lifting equipment.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with hoisting and lifting.

2. Identify hazards and describe safe work practices pertaining to hoisting and lifting.

3. Identify and interpret codes and regulations pertaining to hoisting and lifting.

4. Identify types of hoisting and lifting equipment and describe their applications, limitations and procedures for use.
   i) vehicle
   ii) component/equipment
   iii) jack stands and cribbing

5. Identify types of hoisting and lifting equipment accessories and describe their applications and procedures for use.
   i) chain
   ii) chain hoist
   iii) slings
   iv) shackles

6. Describe the procedures used to inspect, store and maintain hoisting and lifting equipment and accessories.

7. Describe the procedures used to determine lift points and perform lifts.

8. Identify hand signals used to perform hoisting and lifting operations.

Practical Objectives

N/A

CHT-115 Trade Documentation

Learning Outcomes:

- Demonstrate knowledge of trade related documentation.
- Demonstrate knowledge of vehicle identification codes.

2015 National Occupational Analysis Reference:

3.01 Uses documentation and reference materials.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Locate and interpret identification codes found on the vehicle and vehicle components.

2. Identify and interpret types of service related documents.
   - i) work orders
     - service report writing
     - identify complaint, cause and correction
   - ii) schematics and service information
   - iii) technical service bulletins (TSB)/recalls
   - iv) preventive maintenance schedules
   - v) parts lists
   - vi) time estimates

Practical Objectives

N/A

CHT-120 Preventive Maintenance

Learning Outcomes:

- Demonstrate knowledge of preventive maintenance and its purpose.
- Demonstrate knowledge of the procedures used to perform preventive maintenance.

2015 National Occupational Analysis Reference:

3.01 Uses documentation and reference materials.
3.02 Maintains fluids, lubricants, and coolants.
3.04 Services filters.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with preventive maintenance.

2. Describe preventive maintenance programs.
   i) scheduled lubrication
   ii) scheduled servicing
   iii) scheduled cleaning
   iv) inspections
   v) completing documentation
   vi) legal responsibilities

3. Describe the procedures used to perform preventive maintenance.

Practical Objectives

N/A

CHT-125 Start, Move and Park Vehicle

Learning Outcomes:

- Demonstrate knowledge of the procedures used to start-up, operate and shut-down equipment/vehicle.
- Demonstrate knowledge of the procedures used to prepare equipment/vehicle to be towed or pushed.
- Demonstrate knowledge of equipment/vehicle lock-out procedures.

2015 National Occupational Analysis Reference:

1.01 Maintains safe work environment.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Identify hazards and describe safe work practices pertaining to entering, starting, moving and parking vehicles.

2. Describe the procedures used to start-up and shut down equipment/vehicles.

3. Describe the procedures used to operate equipment/vehicles.

4. Describe the procedures used to prepare equipment/vehicles to be towed or pushed.

5. Describe the procedures used to lock-out equipment/vehicles prior to servicing.

Practical Objectives

N/A

CHT-130 Fasteners, Tubings, Hoses and Fittings

Learning Outcomes:

- Demonstrate knowledge of fasteners, tubings, hoses and fittings, their applications and procedures for use.

2015 National Occupational Analysis Reference:

3.03 Services hoses, tubing and fittings.
3.06 Uses fasteners, sealing devices, adhesives and gaskets.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Identify hazards and describe safe work practices pertaining to fasteners, tubings, hoses and fittings.

2. Identify specialty tools and equipment used to remove and install fasteners, tubings, hoses and fittings and describe their applications and procedures for use.

3. Identify types of fasteners and describe their applications and procedures for use.

4. Identify types of tubings and hoses and describe their applications and procedures for use.

5. Identify types of fittings and describe their applications and procedures for use.

Practical Objectives

N/A

CHT-135 Lubrication and Fluids Servicing

Learning Outcomes:

- Demonstrate knowledge of lubricants and fluids, their characteristics and applications.
- Demonstrate knowledge of the procedures to lubricate vehicle/equipment components.
- Demonstrate knowledge of the procedures for lubrication and fluid servicing.

2015 National Occupational Analysis Reference:

3.02 Maintains fluids, lubricants and coolants.
3.04 Services filters.
5.01 Services lubrication systems.
11.01 Services cooling systems.

Suggested Hours:

15 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with lubrication/coolants and fluids servicing.

2. Identify hazards and describe safe work practices pertaining to lubrication and fluid servicing.
   i) personal
   ii) equipment
   iii) environmental

3. Identify specialty tools and equipment used for lubrication and fluid servicing and describe their applications and procedures for use.

4. Identify types of lubricants and fluids and describe their applications.

5. Identify the properties and characteristics of lubricants and fluids.

6. Identify types of filters and describe their characteristics and applications.

7. Describe the procedures used to check lubricant and fluid levels and condition.

8 Describe the procedures used to sample fluids.

9. Describe the procedures used to change fluids and filters.

10. Describe the procedures used to lubricate vehicle/equipment components.

11. Identify types of automatic lubrication systems and describe their purpose and operation.

12. Describe the procedures used to service and maintain automatic lubrication systems.

13. Describe the procedures used to handle, store and dispose of lubricants and fluids.

Practical Objectives

N/A

CHT-140 Gaskets, Seals and Sealing Compounds

Learning Outcomes:

- Demonstrate knowledge of gaskets, seals and sealing compounds, their applications and procedures for use.

2015 National Occupational Analysis Reference:

3.05 Services bearings, bushings and seals.
3.06 Uses fasteners, sealing devices, adhesives and gaskets.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with gaskets, seals and sealing compounds.

2. Identify hazards and describe safe work practices pertaining to gaskets, seals and sealing compounds.

3. Identify specialty tools and equipment used to remove and install gaskets, seals and sealing compounds and describe their applications and procedures for use.

4. Identify types of gaskets and seals and describe their applications.

5. Identify types of sealing compounds and describe their applications.
   i) room temperature vulcanizing
   ii) anaerobic

6. Describe the procedures used to remove, fabricate and install gaskets.

7. Describe the procedures used to remove and install seals.

8. Describe the procedures used to apply sealing compounds.

Practical Objectives

N/A

CHT-145 Bearings

Learning Outcomes:

- Demonstrate knowledge of bearings and their applications.
- Demonstrate knowledge of the procedures to remove and install bearings.

2015 National Occupational Analysis Reference:

3.05 Services bearings, bushings and seals.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with bearings.

2. Identify hazards and describe safe work practices pertaining to bearings.

3. Identify specialty tools and equipment used to remove and install bearings and describe their applications and procedures for use.

4. Identify types of bearings and describe their applications.
   i) friction
   ii) anti-friction

5. Describe bearing failure and its causes.

6. Describe the procedures used to remove and install bearings.

7. Describe the procedures used to lubricate and maintain bearings.

Practical Objectives

N/A

CHT-150 Metallurgy

Learning Outcomes:

- Demonstrate knowledge of metals and their characteristics.
- Demonstrate knowledge of material testing procedures.

2015 National Occupational Analysis Reference:

2.04 Uses welding and cutting equipment.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with metallurgy.

2. Identify types of metals.
   - i) ferrous
   - ii) plain carbon steels
   - iii) cast irons
   - iv) low alloy steels
   - v) heat treated steels
   - vi) stainless steels
   - vii) non ferrous

3. Describe mechanical and physical properties of metals.
   - i) common mechanical properties
     - tensile strength
     - ductility
     - hardness
     - brittleness
   - ii) common physical properties
     - melting point
     - electrical and thermal conductivity
     - corrosion resistance

4. Identify common metal tests and describe their associated procedures.
    i) hardness tests (Rockwell and Brinell)
    ii) spark testing
    iii) file test
    v) magnetic test

Practical Objectives

N/A

CHT-155 Cutting and Heating

Learning Outcomes:

- Demonstrate knowledge of cutting and heating equipment and accessories.
- Demonstrate knowledge of the procedures used to cut and heat using oxy-fuel equipment.

2015 National Occupational Analysis Reference:

2.04 Uses welding and cutting equipment.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with cutting and heating.
   - i) oxy-fuel
   - ii) induction

2. Identify hazards and describe safe work practices pertaining to cutting and heating.
   - i) personal
   - ii) shop/facility
     - awareness of surroundings
   - iii) equipment/vehicle
   - iv) ventilation
   - v) cutting and heating equipment

3. Identify and interpret codes and regulations pertaining to oxy-fuel cutting and heating.

4. Identify cutting and heating equipment and accessories and describe their applications.
   - i) oxy-fuel
   - ii) plasma-arc

iii) induction

5. Describe the procedures used to set-up, adjust and shut-down oxy-fuel equipment.

6. Describe the procedures used to inspect and maintain oxy-fuel equipment.

7. Describe the procedures used to transport and store oxy-fuel equipment.

8. Describe the procedures used to cut and heat material using oxy-fuel equipment.

9. Describe the procedures used to solder, braze and fuse using oxy-fuel equipment.

Practical Objectives

1. Set up, operate and shut down oxy-fuel equipment.

CHT-160 Metal Inert Gas (MIG) Welding

Learning Outcomes:

- Demonstrate knowledge of MIG welding equipment and accessories.
- Demonstrate knowledge of the procedures used to weld using MIG welding equipment.

2015 National Occupational Analysis Reference:

2.04 Uses welding and cutting equipment.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with MIG welding.

2. Identify hazards and describe safe work practices pertaining to MIG welding.
   - i) personal
   - ii) shop/facility
     - awareness of surroundings
   - iii) equipment/vehicle
   - iv) ventilation
   - v) MIG equipment

3. Describe MIG welding processes and their applications.
   - i) Gas Metal Arc Welding (GMAW)
   - ii) Flux-Cored Arc Welding (FCAW)

4. Identify MIG welding equipment, consumables and accessories and describe their applications.

5. Describe the procedures used to set-up, adjust and shut-down MIG welding equipment.

6. Describe the procedures used to inspect and maintain MIG welding equipment.

7. Identify the types of welds performed using MIG welding equipment.
   i) joints
   ii) positions

8. Describe the procedures used to weld using MIG welding equipment.

9. Describe weld defects, their causes and prevention.

Practical Objectives

N/A

CHT-165 Tires, Rims, Wheels and Hubs

Learning Outcomes:

- Demonstrate knowledge of tires, rims and wheels, their characteristics and applications.
- Demonstrate knowledge of the procedures used to service and repair tires, rims and wheels.

2015 National Occupational Analysis Reference:

31.01 Services tires, wheels and hubs.
31.02 Diagnoses tires, wheels, and hubs.
31.03 Repairs tires, wheels, and hubs.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with tires, rims, wheels, and hubs.

2. Identify hazards and describe safe work practices pertaining to tires,rims, wheels, and hubs.

3. Identify codes and regulations pertaining to tires, rims, wheels and hubs.
   i) jurisdictional requirements

4. Identify specialty tools and equipment used to service and repair tires, wheels, and hubs and describe their applications and procedures for use.

5. Identify types of tires and describe their characteristics and applications.
   i) on-road
      - radial
      - bias-ply
      - tube
      - tubeless

ii) off-road
- loaded
- non-loaded

6. Identify types of rims and wheel assemblies and describe their characteristics and applications.

7. Identify tire and wheel assembly components and accessories and describe their purpose.

8. Describe the procedures used to inspect and maintain tires,rims wheels, and hubs.

9. Describe the procedures used to remove and install tires,rims wheels, and hubs.

10. Describe the procedures used to repair tires,wheel assemblies, and hubs.

11. Describe the procedures used to balance wheels.

Practical Objectives

N/A

CHT-170 Engine Principles

Learning Outcomes:

- Demonstrate knowledge of engine operating principles.
- Demonstrate knowledge of major engine components, their purpose and operation.

2015 National Occupational Analysis Reference:

4.01 Services base engine.
4.02 Diagnoses base engine.
4.03 Repairs base engine.

Suggested Hours:

21 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with engine principles.

2. Explain the principles and theories of engine operation.

3. Identify types and classifications of engines and describe their applications.

4. Identify major engine components and describe their purpose and operation.

Practical Objectives

N/A

CHT-175 Electrical and Electronic Principles

Learning Outcomes:

- Demonstrate knowledge of electrical and electronic principles.
- Demonstrate knowledge of the principles of magnetism.
- Demonstrate knowledge of electrical and electronic testing devices and their procedures for use.

2015 National Occupational Analysis Reference:

14.01 Performs servicing and repair of batteries.
14.02 Diagnoses batteries.
15.01 Services charging systems.
15.02 Diagnoses charging systems.
15.03 Repairs charging systems.
17.01 Performs servicing and repair of starting systems.
17.02 Diagnoses starting systems.
18.01 Performs servicing and repair of electrical components and accessories.
18.02 Diagnoses electrical components and accessories.
19.01 Services vehicle management systems and electronic components.
19.02 Diagnoses vehicle management systems and electronic components.
19.03 Repairs vehicle management systems and electronic components.

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with electricity, electronics and magnetism.

2. Identify hazards and describe safe work practices pertaining to electricity, electronics and magnetism.

3. Explain the principles of electricity and electronics.

4. Explain the principles of magnetism.

5. Describe Ohm's law and its applications.

6. Describe the procedures used to perform electrical-related calculations using Ohm's law.

7. Identify types of circuits and describe their characteristics and applications.
   i) electrical
   ii) electronic

8. Identify electrical components and describe their purpose and operation.

9. Identify electronic components and describe their purpose and operation.
   i) diodes
   ii) transistors
   iii) capacitors
   iv) resistors

10. Identify testing devices used to test circuits and describe their applications and procedures for use.

11. Identify and interpret information found on schematics.

12. Describe electrical malfunctions and their causes.

13. Describe the procedures used to test circuits.

Practical Objectives

N/A

CHT-180 Batteries

Learning Outcomes:

- Demonstrate knowledge of batteries and their operating principles.
- Demonstrate knowledge of the procedures used to service and test batteries.

2015 National Occupational Analysis Reference:

14.01 Performs servicing and repair of batteries.
14.02 Diagnoses batteries.
15.01 Services charging systems.
15.02 Diagnoses charging systems.
15.03 Repairs charging systems.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with batteries.

2. Identify hazards and describe safe work practices pertaining to batteries.
   i) personal
   ii) shop/facility
   iii) vehicle

3. Identify equipment used to test and recharge batteries and describe their applications and procedures for use.

4. Identify types of batteries and describe their applications, construction and operating principles.

5. Describe the procedures used to remove and install batteries.

6. Describe the procedures used to activate, maintain and store batteries.
   i) maintenance free

ii) dry charge
iii) gel

7. Describe the procedures used to boost start engines
   i) battery booster
   ii) cables

8. Identify battery problems and describe the procedures used to diagnose and correct them.

Practical Objectives

N/A

CHT-185 Lighting Circuits

Learning Outcomes:

- Demonstrate knowledge of conventional lighting circuits, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair conventional lighting circuits.

2015 National Occupational Analysis Reference:

18.01 Performs servicing and repair of electrical components and accessories.
18.02 Diagnoses electrical components and accessories.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with lighting circuits.

2. Identify hazards and describe safe work practices pertaining to lighting circuits.

3. Identify specialty tools and equipment used to service and repair lighting circuits and describe their applications and procedures for use.

4. Identify types of lighting circuits and describe their components, purpose and operation.
   i) high voltage
   ii) low voltage

5. Interpret electrical symbols and wiring diagrams relating to lighting circuits.

6. Describe the procedures used to inspect and maintain lighting circuits and their components.

7. Identify lighting circuit problems and their causes.

8. Describe the procedures used to diagnose lighting circuits.

9. Describe the procedures used to remove and install cl lighting circuit components.

10. Describe the procedures to repair lighting circuits and components.

Practical Objectives

N/A

CHT-190 Wiring Harnesses and Accessories

Learning Outcomes:

- Demonstrate knowledge of wiring harnesses and accessories, their purpose and operation.
- Demonstrate knowledge of the procedures used to service and repair wiring harnesses and accessories.

2015 National Occupational Analysis Reference:

18.01 Performs servicing and repair of electrical components and accessories.
18.02 Diagnoses electrical components and accessories.
19.01 Services vehicle management systems and electronic components.
19.02 Diagnoses vehicle management systems and electronic components.
19.03 Repairs vehicle management systems and electronic components.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with wiring harnesses and accessories.

2. Identify hazards and describe safe work practices pertaining to wiring harnesses and accessories.

3. Identify specialty tools and equipment used to service and repair wiring harnesses and accessories and describe their applications and procedures for use.

4. Identify types of wiring harnesses and their components and describe their purpose and operation.

5. Identify types of wiring accessories and their components and describe their purpose and operation.
   i) switches
   ii) relays

iii) plugs
iv) sealed connectors
v) resistors
vi) solenoids

6. Interpret electrical symbols and wiring diagrams relating to wiring harnesses and accessories.

7. Describe the procedures used to inspect and maintain wiring harnesses and accessories and their components.

8. Identify wiring harness and accessory component problems and their causes.

9. Describe the procedures used to diagnose wiring harnesses and accessories.

10. Describe the procedures used to remove and install wiring harnesses and accessories and their components.

11. Describe the procedures used to repair wiring harnesses, plugs, connectors and their components.

Practical Objectives

1. Repair an electrical connection.

CHT-195 Introduction to Hydraulics

Learning Outcomes:

- Demonstrate knowledge of the principles of hydraulics.
- Demonstrate knowledge of hydraulic components, their purpose and operation.
- Demonstrate knowledge of the procedures used to remove, install, service and maintain hydraulic components.

2015 National Occupational Analysis Reference:

38.01 Services hydraulic components.
38.02 Diagnoses hydraulic components.
38.03 Repairs hydraulic components.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with hydraulics.

2. Identify hazards and describe safe work practices pertaining to hydraulics.

3. Explain the principles and theories of hydraulics.
   i) Pascal's law
   ii) Bernoulli's principle

4. Describe units of measure as they relate to hydraulics.

5. Identify hydraulic-related formulae and describe their applications.

6. Identify and interpret hydraulic-related symbols and abbreviations found on schematics.

7. Describe the properties of hydraulic fluids.

8. Identify tools and equipment used to remove, install, service and maintain hydraulic components and describe their applications and procedures for use.

9. Identify hydraulic components and describe their purpose, applications and operation.
   i) pumps
      - positive displacement
      - non-positive displacement
      - fixed displacement
      - variable displacement
   ii) actuators
      - linear
      - rotary
   iii) pressure control valves
   iv) directional control valves
   v) flow control valves
   vi) accumulators

10. Describe the procedures used to remove and install hydraulic components.

11. Describe the procedures used to service and maintain hydraulic components.

Practical Objectives

N/A

CHT-600 Hydraulic Fittings, Piping, Tubing and Hoses

Learning Outcomes:

- Demonstrate knowledge of hydraulic fittings, piping, tubing and hoses, their characteristics and applications.
- Demonstrate knowledge of the procedures used to maintain hydraulic fittings, piping, tubing and hoses.
- Demonstrate knowledge of the procedures used to remove and install hydraulic fittings, piping, tubing and hoses.

2015 National Occupational Analysis Reference:

38.01 Services hydraulic components.
38.02 Diagnoses hydraulic components.
38.03 Repairs hydraulic components.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with hydraulic fittings, piping, tubing and hoses.

2. Identify hazards and describe safe work practices pertaining to hydraulic fittings, piping, tubing and hoses.

3. Identify specialty tools and equipment used to remove and install hydraulic fittings, piping, tubing and hoses and describe their applications and procedures for use.

4. Identify types of hydraulic fittings and describe their characteristics and applications.

5. Identify types of hydraulic piping and tubing and describe their characteristics and applications.

6. Identify types of hydraulic hoses and describe their characteristics and applications.

7. Describe the procedures used to inspect and maintain hydraulic fittings, piping, tubing and hoses.

8. Describe the procedures used to remove and install hydraulic fittings, piping, tubing and hoses.

Practical Objectives

N/A

CHT-605 Hydraulic Reservoirs, Coolers and Filters

Learning Outcomes:

- Demonstrate knowledge of hydraulic reservoirs, coolers and filters, their applications and operation.
- Demonstrate knowledge of the procedures used to service and repair hydraulic reservoirs, coolers and filters.

2015 National Occupational Analysis Reference:

38.01 Services hydraulic components.
38.02 Diagnoses hydraulic components.
38.03 Repairs hydraulic components.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with hydraulic reservoirs, coolers and filters.

2. Identify hazards and describe safe work practices pertaining to hydraulic reservoirs, coolers and filters.

3. Identify specialty tools and equipment used to service and repair hydraulic reservoirs, coolers and filters and describe their applications and procedures for use.

4. Identify types of hydraulic reservoirs and describe their characteristics and applications.
   i) vented
   ii) pressurized

5. Identify hydraulic reservoir components and describe their purpose and operation.

6. Identify types of coolers and filters and describe their characteristics and applications.

7. Identify cooler and filter components and describe their purpose and operation.

8. Describe the procedures used to inspect and maintain hydraulic reservoirs, coolers and filters and their components.

9. Identify hydraulic reservoir, cooler and filter problems and describe their causes.

10. Describe the procedures used to diagnose hydraulic reservoirs, coolers and filters and their components.

11. Describe the procedures used to remove and install hydraulic reservoirs, coolers and filters and their components.

12. Describe the procedures used to repair hydraulic reservoirs and coolers and their components.

Practical Objectives

N/A

CHT-610 Hydraulic Brake Systems I

Learning Outcomes:

- Demonstrate knowledge of hydraulic brake systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair hydraulic brake systems.

2015 National Occupational Analysis Reference:

13.01 Services brake systems.
13.02 Diagnoses brake systems.
13.03 Repairs brake systems.

Suggested Hours:

15 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with hydraulic brake systems.
   i) drum
   ii) single disc

2. Identify hazards and describe safe work practices pertaining to hydraulic brake systems.

3. Identify specialty tools and equipment used to service and repair hydraulic brake systems and describe their applications and procedures for use.

4. Identify types of hydraulic brake systems and describe their applications and operation.
   i) drum
   ii) single disc

5. Identify hydraulic brake system components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain hydraulic brake systems and their components.

7. Identify hydraulic brake system problems and their causes.

8. Describe the procedures used to diagnose hydraulic brake systems.

9. Describe the procedures used to remove and install hydraulic brake system components.

10. Describe the procedures used to repair and adjust hydraulic brake systems and their components.

Practical Objectives

N/A

CHT-615 Introduction to Air Brake Systems

Learning Outcomes:

- Demonstrate knowledge of air brake systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and replace air brake systems components.

2015 National Occupational Analysis Reference:

12.01 Services air systems.
12.02 Diagnoses air systems.
12.03 Repairs brake systems.
13.01 Services brake systems.
13.02 Diagnoses brake systems.
13.03 Repairs brake systems.

Suggested Hours:

15 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with air brake systems.

2. Identify hazards and describe safe work practices pertaining to air brake systems.

3. Identify specialty tools and equipment used to service and repair air brake systems and describe their applications and procedures for use.

4. Identify types of air brake systems and describe their applications and operation.
   i) air
   ii) air over hydraulic

5. Identify air brake system components and describe their purpose and operation.
   i) compressors
   ii) reservoirs

iii) governors
iv) hoses, lines and fittings
v) air dryers
vi) foundation brakes
- drum
- disc brakes
vii) brake chambers
viii) valves
ix) indicators and warning devices

6. Describe the procedures used to inspect and maintain air brake systems and components.

7. Identify air brake system problems and their causes.

8. Describe the procedures used to remove and install basic air brake system components.

9. Describe the procedures used to adjust air brake system components.

Practical Objectives

N/A

CHT-620 Ozone Depleting Substances

Learning Outcomes:

- Demonstrate knowledge of handling ozone-depleting substances (refrigerants) used in motor vehicle.

2015 National Occupational Analysis Reference:

1.02 Uses PPE and safety equipment.
37.01 Services air conditioning systems.
37.02 Diagnoses air conditioning systems.
37.03 Repairs air conditioning systems.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with ozone depleting substances.

2. Identify hazards and describe safe work practices pertaining to ozone depleting substances

3. Identify and interpret codes, federal/provincial regulations and certifications pertaining to ozone depleting substances.

Practical Objectives

N/A

CHT-625 Shielded Metal Arc Welding (SMAW)

Learning Outcomes:

- Demonstrate knowledge of SMAW equipment and accessories.
- Demonstrate knowledge of the procedures used to weld using SMAW equipment.

2015 National Occupational Analysis Reference:

2.04 Uses welding and cutting equipment.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with SMAW.

2. Identify hazards and describe safe work practices pertaining to SMAW.
   - i) personal
   - ii) shop/facility
     - awareness of surroundings
   - iii) equipment/vehicle
   - iv) ventilation
   - v) SMAW equipment

3. Identify and interpret codes and regulations pertaining to SMAW.

4. Describe the SMAW process and its application.

5. Identify SMAW equipment, consumables and accessories and describe their applications and storage requirements.

6. Describe the procedures used to set-up, adjust and shut-down SMAW equipment.

7. Describe the procedures used to inspect and maintain SMAW equipment.

8. Identify the types of welds performed using SMAW equipment.
   i) joints
   ii) positions

9. Describe the procedures used to weld using SMAW equipment.

10. Describe weld defects, their causes and prevention.

Practical Objectives

N/A

CHT-630 Introduction to Steering Systems Components

Learning Outcomes:

- Demonstrate basic knowledge of steering systems, their components and operation.
- Demonstrate basic knowledge of the procedures used to service and replace steering systems components.

2015 National Occupational Analysis Reference:

27.01 Services steering systems.
27.02 Diagnoses steering systems.
27.03 Repairs steering systems.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with steering systems.

2. Identify hazards and describe safe work practices pertaining to steering systems.

3. Identify specialty tools and equipment used to service and replace steering system components and describe their applications and procedures for use.

4. Identify types of steering systems and describe their applications and operation.

5. Identify steering components and describe their purpose and operation.
   - i) steering columns
   - ii) steering linkage
   - iii) gear boxes
   - iv) hydraulic components
     - orbital motor
     - steering cylinders
     - power assist

- priority valve

6. Describe the procedures used to inspect and maintain steering systems and their components.

7. Describe the procedures used to remove and install steering system components.

8. Describe the procedures used to replace steering system components.

Practical Objectives

N/A

Level 2

TTM-200 Front Axles and Suspension Systems

Learning Outcomes:

- Demonstrate knowledge of front axles and suspension systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair front axles and suspension systems.

2015 National Occupational Analysis Reference:

29.01 Services suspension.
29.02 Diagnoses suspension.
29.03 Repairs suspension.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with front axles and suspension systems.

2. Identify hazards and describe safe work practices pertaining to front axles and suspension systems.
   i) jacking and supporting procedures
   ii) blocking

3. Identify specialty tools and equipment used to service and repair front axles and suspension systems and describe their applications and procedures for use.

4. Identify types of axles and describe their components, purpose and operation.
   i) independent
   ii) solid axle ("I" beam)
   iii) single axle
   iv) double axle

5. Identify types of front suspensions and describe their components, purpose and operation.

6. Describe the procedures used to inspect and maintain front axles and suspension systems and their components.

7. Identify front axle and suspension system problems and their causes.

8. Describe the procedures used to diagnose front axles and suspension systems and their components.

9. Describe the procedures used to remove and install front axles and suspension systems and their components.

10. Describe the procedures used to repair and adjust front axles and suspension systems and their components.

Practical Objectives

N/A

TTM-205 Rear Axles and Suspension Systems

Learning Outcomes:

- Demonstrate knowledge of rear axles and suspension systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair rear axles and suspension systems.

2015 National Occupational Analysis Reference:

29.01 Services suspension.
29.02 Diagnoses suspension.
29.03 Repairs suspension.

Suggested Hours:

15 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with rear axles and suspension systems.

2. Identify hazards and describe safe work practices pertaining to rear axles and suspensions.
   i) jacking and supporting procedures
   ii) blocking

3. Identify specialty tools and equipment used to service and repair rear axles and suspension systems and describe their applications and procedures for use.

4. Identify types of rear axles and describe their components, purpose and operation.
   i) single axle
   ii) multi-axle
   iii) driven/non-driven

5. Identify types of rear suspensions and describe their components, purpose and operation.

6. Describe the procedures used to inspect and maintain rear axles and suspension systems and their components.

7. Identify rear axles and suspension system problems and their causes.

8. Describe the procedures used to diagnose rear axles and suspension systems and their components.

9. Describe the procedures used to remove and install rear axles and suspension systems and their components.

10. Describe the procedure used to repair and adjust rear axles and suspension systems and their components.

Practical Objectives

N/A

TTM-210 Wheel and Axle Alignment

Learning Outcomes:

- Demonstrate knowledge of the procedures used to perform wheel and axle alignment.

2015 National Occupational Analysis Reference:

27.01 Services steering systems.
27.02 Diagnoses steering systems.
27.03 Repairs steering systems.
31.01 Services tires, wheels and hubs.
31.02 Diagnoses tires, wheels, and hubs.
31.03 Repairs tires, wheels, and hubs.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with wheel and axle alignment.

2. Identify hazards and describe safe work practices pertaining to wheel and axle alignment.

3. Identify specialty tools and equipment used to perform wheel and axle alignment.

4. Identify axle alignment problems and their causes.

5. Describe the procedures used to measure and adjust axle misalignment.

6. Identify trailer alignment problems and their causes.

7. Describe the procedures used to measure and adjust trailer misalignment.

8. Identify wheel alignment problems and their causes.

Practical Objectives

1. Check wheel alignment.

TTM-215 Frames and Chassis

Learning Outcomes:

- Demonstrate knowledge of frames and chassis, their components and characteristics.
- Demonstrate knowledge of the procedures used to service and repair frames and chassis.

2015 National Occupational Analysis Reference:

28.01 Services chassis/frames.
28.02 Diagnoses chassis/frames.
28.03 Repairs chassis/frames.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with frames and chassis.

2. Identify hazards and describe safe work practices pertaining to frames and chassis.

3. Identify and interpret codes and regulations pertaining to frames and chassis.
   i) CMVSS regulations

4. Identify specialty tools and equipment used to service and repair frames and chassis and describe their applications and procedures for use.

5. Identify types of truck frames and their components and describe their purpose and characteristics.

6. Describe the procedures used to perform frame alignment.

7. Describe the procedures used to inspect frames and their components for damage.

8. Describe the procedures used to remove and install frame components.

9. Describe the procedures used to reinforce frames.

10. Describe the procedures to modify wheel base.

Practical Objectives

N/A

TTM-220 Power-Assisted Steering Systems

Learning Outcomes:

- Demonstrate knowledge of power-assisted steering systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair power-assisted steering systems.

2015 National Occupational Analysis Reference:

27.01 Services steering systems.
27.02 Diagnoses steering systems.
27.03 Repairs steering systems.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with power-assisted steering systems.

2. Identify hazards and describe safe work practices pertaining to power-assisted steering systems.

3. Identify specialty tools and equipment used to service power-assisted steering system components and describe their applications and procedures for use.

4. Identify power-assisted steering system components and describe their applications and operation.

5. Describe the procedures used to inspect and maintain power-assisted steering systems and their components.

6. Describe the procedures to diagnose power-assisted steering systems and their components.

7. Describe the procedures used to remove and install power-assisted steering system components.

8. Describe the procedures used to disassemble and assemble power-assisted steering system components.

9. Describe the procedures used to adjust and repair power-assisted steering system components.

Practical Objectives

1. Check flow and pressure on power-assisted steering system.

TTM-225 Dual Air Brake Systems

Learning Outcomes:

- Demonstrate knowledge of dual air brake systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair dual air brake systems.

2015 National Occupational Analysis Reference:

12.01 Services air systems.
12.02 Diagnoses air systems.
12.03 Repairs brake systems.
13.01 Services brake systems.
13.02 Diagnoses brake systems.
13.03 Repairs brake systems.

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with dual air brake systems.

2. Identify hazards and describe safe work practices pertaining to dual air brake systems.

3. Describe the federal regulations FMVSS-121 and CMVSS-121.

4. Identify specialty tools and equipment used to service and repair dual air brake systems and describe their applications and procedures for use.

5. Identify types of dual air brake systems and describe their applications and operation.

6. Identify dual air brake system components and describe their purpose and operation.
   i) valves
   ii) trailer systems

7. Describe the procedures used to inspect and maintain dual air brake systems and components.

8. Identify dual air brake system problems and their causes.

9. Describe the procedures used to diagnose dual air brake systems.
   i) schematics
   ii) pressure testing
   iii) brake timing theory

10. Describe the procedures used to remove and install dual air brake system components.

11. Describe the procedures used to repair and adjust dual air brake system components.

Practical Objectives

N/A

TTM-230 Anti-Lock Braking and Traction Control Systems

Learning Outcomes:

- Demonstrate knowledge of anti-lock braking systems (ABS), their components and operation.
- Demonstrate knowledge of control systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair anti-lock braking systems.
- Demonstrate knowledge of the procedures used to service and repair control systems.

2015 National Occupational Analysis Reference:

18.02 Diagnoses braking and control systems.
19.02 Repairs braking and control systems.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with anti-lock braking and control systems.

2. Identify hazards and describe safe work practices pertaining to anti-lock braking and control systems.

3. Explain the operating principles of anti-lock braking systems.

4. Identify anti-lock braking system components and describe their purpose and operation.
   - i) tooth wheel (reluctor)
   - ii) wheel speed sensor
   - iii) sensor holder and spring clip
   - iv) electronic control unit
   - v) ABS warning lamp
   - vi) blink code switch
   - vii) valves and modulators

viii) wiring harnesses

5. Explain the operating principles of control systems.
   i) traction control
   ii) roll stability
   iii) collision avoidance

6. Identify traction control system components and describe their purpose and operation.
   i) automatic traction control
   ii) valves and modulators
   iii) indicator lamp
   iv) deep snow/mud switch

7. Identify roll stability control system components and describe their purpose and operation.
   i) steering angle sensor
   ii) related ABS components

8. Identify collision avoidance system components and describe their purpose and operation.
   i) forward radar sensor
   ii) related ABS components

9. Identify specialty tools and equipment used to service and repair anti-lock braking and control systems and describe their applications and procedures for use.

10. Describe the procedures used to inspect and maintain anti-lock braking and control systems.

11. Identify anti-lock braking and control systems problems and their causes.

12. Describe the procedures used to diagnose anti-lock braking and control systems.

13. Describe the procedures used to remove and install anti-lock braking and control systems.

14. Describe the procedures used to repair anti-lock braking and control systems.

Practical Objectives

N/A

TTM-235 Cab Components

Learning Outcomes:

- Demonstrate knowledge of cab components, their purpose and operation.
- Demonstrate knowledge of the procedures used to service and repair cab components.

2015 National Occupational Analysis Reference:

32.01 Services interior cab components.
32.02 Diagnoses exterior components.
32.03 Repairs interior cab components.
33.01 Services exterior cab components.
33.02 Diagnoses exterior cab components.
33.03 Repairs exterior cab components.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with cab components.

2. Identify hazards and describe safe work practices pertaining to cab components.

3. Identify cab components and describe their purpose and operation.
   - i) interior
     - pedals
     - seats
     - restraints
     - side windows
   - ii) exterior
     - wipers
     - windshields
     - mirrors
     - door handles

- steps
- latches and cables
- cab air suspension

4. Describe the procedures used to inspect and maintain cab components.

5. Describe the procedures used to remove and install cab components.

6. Describe the procedures used to repair and adjust cab components.

Practical Objectives

N/A

TTM-240 Trailer Coupling Devices

Learning Outcomes:

- Demonstrate knowledge of trailer coupling devices, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair trailer coupling devices.

2015 National Occupational Analysis Reference:

30.01 Services hitches and couplers.
30.02 Diagnoses hitches and couplers.
30.03 Repairs hitches and couplers.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with trailer coupling devices.

2. Identify hazards and describe safe work practices pertaining to trailer coupling devices.

3. Identify specialty tools and equipment used to service and repair trailer coupling devices and describe their applications and procedures for use.

4. Identify types of trailer coupling devices and describe their purpose and operation.
   i) fifth wheels
   ii) pintle hook couplers
   iii) draw bars

5. Describe the procedures used to inspect and maintain trailer coupling devices.

6. Identify trailer coupling device problems and their causes.

7. Describe the procedures used to diagnose trailer coupling devices.

8. Describe the procedures used to remove and install trailer coupling devices.

9. Describe the procedures used to repair and adjust trailer coupling devices.

Practical Objectives

1. Disassemble, inspect, reassemble, adjust fifth wheel.

TTM-245 Truck Bodies and Trailers

Learning Outcomes:

- Demonstrate knowledge of trailers, their components and accessories.
- Demonstrate knowledge of the procedures used to service and repair trailers.

2015 National Occupational Analysis Reference:

28.01 Services chassis/frames.
28.02 Diagnoses chassis/frames.
28.03 Repairs chassis/frames.
30.01 Services hitches and couplers.
30.02 Diagnoses hitches and couplers.
30.03 Repairs hitches and couplers.
34.01 Services trailer components and accessories.
34.02 Diagnoses trailer components and accessories.
34.03 Repairs trailer components and accessories.
35.01 Services heating and refrigeration systems.
35.02 Diagnoses heating and refrigeration systems.
35.03 Repairs heating and refrigeration systems.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with truck bodies and trailers.

2. Identify hazards and describe safe work practices pertaining to truck bodies and trailers.

3. Identify specialty tools and equipment used to service and repair truck bodies and trailers and describe their applications and procedures for use.

4. Identify types of trailers and describe their construction.
   i) dry van and reefer

ii) flat deck and step deck
iii) dump
iv) live bottom
v) drop deck and removable gooseneck
vi) forestry
- chip van
- log trailer

vii) tankers
- dry
- liquid

viii) car haulers
ix) livestock
x) special commodity

5. Identify types of truck bodies and describe their construction.
i) dump bodies
ii) van bodies
iii) flat deck
iv) tilt deck
v) towing/wrecker body
vi) roll off/multi-purpose
vii) tanker
viii) highway tractor

6. Identify types of trailer configurations.
i) A, B, C-trains
ii) LCV (long combined vehicle)
iii) converter dollies
iv) jeeps and boosters

7. Identify trailer coupling components and landing gear, and describe their purpose and operation.
i) king pin and bolster plate.
ii) pintle hitches
iii) two speed landing gear

8. Inspect and maintain trailer coupling components and landing gear.
i) king pin and bolster plate.
ii) pintle hitches
iii) two speed landing gear

9. Identify trailer suspension and steering components.
    i) lift axle trailers

10. Inspect and maintain trailer suspension and steering components.
    i) lift axle trailers

11. Identify trailer problems and their causes.
    i) retrieve and identify fault codes on refrigeration units.
    ii) lighting
    iii) brakes
    iv) suspension
    v) body and hydraulics
    vi) structural; frame and body

12. Describe the procedures used to diagnose trailers and truck bodies.

Practical Objectives

1. Inspect coupling devices.

2. Inspect and repair landing gear.

TTM-250 Introduction to Vehicle Safety Inspections

Learning Outcomes:

- Demonstrate knowledge of the requirements associated with vehicle safety inspections.
- Demonstrate knowledge of the procedures used to perform vehicle safety inspections.

PLEASE NOTE: In addition to this course, individuals may be required to complete further jurisdiction specific certification in order to perform motor vehicle inspections.

2015 National Occupational Analysis Reference:

N/A

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Identify the individuals and authorities involved with vehicle safety inspections and explain their roles and responsibilities.
   i) liability for unsafe vehicles

2. Explain the purpose of a vehicle safety inspection.

3. Identify vehicle safety inspection procedures and requirements.
   i) inspection instructions
   ii) specifications and tolerances
   iii) documentation of inspections
   iv) awareness of reconfigured or modified vehicles and brake systems

4. Describe vehicle safety inspection procedures.
   i) vehicles
   ii) trailers

Practical Objectives

N/A

TTM-255 Hydraulic Pumps

Learning Outcomes:

- Demonstrate knowledge of hydraulic pumps and motors, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair hydraulic pumps and motors.

2015 National Occupational Analysis Reference:

38.01 Services hydraulic components.
38.02 Diagnoses hydraulic components.
38.03 Repairs hydraulic components.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with hydraulic pumps and motors.

2. Identify hazards and describe safe work practices pertaining to hydraulic pumps and motors.

3. Identify specialty tools and equipment used to diagnose and repair pumps and motors and describe their applications and procedures for use.

4. Identify classifications of hydraulic pumps and describe their characteristics, applications and operation.
   - i) non-positive displacement
   - ii) positive displacement
   - iii) fixed displacement
   - iv) variable displacement
     - load sensing
     - pressure compensating
     - negative flow

5. Identify types of hydraulic pumps and describe their characteristics, applications and operation.
   i) gear
   ii) vane
   iii) piston

6. Identify hydraulic pump components and describe their purpose and operation.

7. Describe the procedures used to inspect hydraulic pumps and their components.

8. Identify hydraulic pump problems and their causes.

9. Describe the procedures used to diagnose hydraulic pumps.

10. Describe the procedures used to repair hydraulic pumps and their components.
    i) start-up process and procedures

11. Identify classifications of hydraulic motors and describe their characteristics, applications and operation.
    i) fixed displacement
    ii) variable displacement

12. Identify types of hydraulic motors and describe their characteristics, applications and operation.
    i) gear
    ii) vane
    iii) piston

13. Identify hydraulic motor components and describe their purpose and operation.

14. Describe the procedures used to inspect hydraulic motors and their components.

15. Identify hydraulic motor problems and their causes.

16. Describe the procedures used to diagnose hydraulic motors.

17. Describe the procedures used to repair and adjust hydraulic motors and their components.
    i) start-up process and procedures

Practical Objectives

1. Demonstrate cut aways.

TTM-260 Hydraulic Cylinders

Learning Outcomes:

- Demonstrate knowledge of hydraulic cylinders, their components and operation.
- Demonstrate knowledge of the procedures used to diagnose and repair hydraulic cylinders.

2015 National Occupational Analysis Reference:

38.01 Services hydraulic components.
38.02 Diagnoses hydraulic components.
38.03 Repairs hydraulic components.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with hydraulic cylinders.

2. Identify hazards and describe safe work practices pertaining to hydraulic cylinders.

3. Identify specialty tools and equipment used to diagnose and repair hydraulic cylinders and describe their applications and procedures for use.

4. Identify types of hydraulic cylinders and describe their characteristics and applications.

5. Identify hydraulic cylinder components and describe their purpose and operation.
   i) snubbers
   ii) anti-cavitation valves
   iii) load-check valves
   iv) drop valves

6. Describe the procedures used to inspect hydraulic cylinders and their components.

7. Identify hydraulic cylinder problems and their causes.

8. Describe the procedures used to diagnose hydraulic cylinders.

9. Describe the procedures used to disassemble and assemble hydraulic cylinders and their components.

10. Describe the procedures used to adjust and repair hydraulic cylinders and their components.

Practical Objectives

1. Demonstrate procedure to test a hydraulic cylinder.

TTM-265 Control Valves

Learning Outcomes:

- Demonstrate knowledge of control valves, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair control valves.

2015 National Occupational Analysis Reference:

38.01 Services hydraulic components.
38.02 Diagnoses hydraulic components.
38.03 Repairs hydraulic components.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with control valves.

2. Identify hazards and describe safe work practices pertaining to control valves.

3. Identify specialty tools and equipment used to service and repair control valves and describe their applications and procedures for use.

4. Identify types of control valves and describe their characteristics and applications.
   i) pressure control
   ii) directional control
   iii) volume control
   iv) hydraulic swivel

5. Identify control valve components and describe their purpose and operation.

6. Identify the methods of valve actuation and describe their characteristics and applications.

i) manual
ii) pneumatic
iii) hydraulic
iv) electric

7. Describe the procedures used to inspect and maintain control valves and components.

8. Identify control valve problems and their causes.

9. Describe the procedures used to diagnose control valves and components.

10. Describe the procedures used to remove and install control valves and components.

11. Describe the procedures used to disassemble and assemble control valves and components.

12. Describe the procedures used to adjust and repair control valves and their components.

Practical Objectives

1. Adjust and verify the operation of a system and circuit relief valve.

2. Follow a schematic and identify components .

TTM-270 Accumulators

Learning Outcomes:

- Demonstrate knowledge of accumulators, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair accumulators.

2015 National Occupational Analysis Reference:

38.01 Services hydraulic components.
38.02 Diagnoses hydraulic components.
38.03 Repairs hydraulic components.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with accumulators.

2. Identify hazards and describe safe work practices pertaining to accumulators.

3. Identify specialty tools and equipment used to service and repair accumulators and describe their applications and procedures for use.

4. Identify the types and design of accumulators and describe their applications and operation.
   i) gas charged
   ii) spring-loaded

5. Identify accumulator components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain accumulators.

7. Identify accumulator problems and their causes.

8. Describe the procedures used to diagnose accumulators.

9. Describe the procedures used to remove and install accumulators and their components.

10. Describe the procedures used to disassemble, assemble and recharge accumulators.

11. Describe the procedures used to adjust and repair accumulators.

Practical Objectives

1. Demonstrate procedures of releasing hydraulic pressure of an accumulator.

LEVEL 3

CHT-300 Cooling Systems

Learning Outcomes:

- Demonstrate knowledge of engine cooling systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair cooling systems.

2015 National Occupational Analysis Reference:

11.01 Services cooling system.
11.02 Diagnoses cooling system.
11.03 Repairs cooling system.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with cooling systems.

2. Identify hazards and describe safe work practices pertaining to cooling systems and their components.

3. Identify specialty tools and equipment used to service and repair cooling systems and describe their applications and procedures for use.

4. Identify types of cooling systems and describe their applications and operation.
   i) liquid-cooled
   ii) air-cooled

5. Identify cooling system components and describe their purpose and operation.

6. Identify types of cooling system fluids and describe their characteristics and applications.

7. Describe the procedures used to handle and dispose of cooling system fluids.

8. Identify cooling system fluid tests and describe their associated procedures.

9. Describe the procedures used to service cooling systems.

10. Describe the procedures used to inspect and maintain cooling systems and components.

11. Identify cooling system problems and their causes.

12. Describe the procedures used to diagnose cooling systems and components.

13. Describe the procedures used to remove and install cooling system components.

14. Describe the procedures used to repair cooling systems and components.

Practical Objectives

N/A

CHT-305 Engine Lubrication Systems

Learning Outcomes:

- Demonstrate knowledge of engine lubrication systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair engine lubrication systems.

2015 National Occupational Analysis Reference:

5.01 Services lubrication system.
5.02 Diagnoses lubrication systems.
5.03 Repairs lubrication systems.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with engine lubrication systems.

2. Identify hazards and describe safe work practices pertaining to engine lubrication systems.

3. Identify types of engine lubrication systems and describe their applications and operation.

4. Identify engine lubrication system components and describe their purpose and operation.

5. Describe the procedures used to inspect and maintain engine lubrication systems and components.

6. Identify engine lubrication system failures and their causes.

7. Describe the procedures used to diagnose engine lubrication systems and components.

8. Describe the procedures used to remove and install engine lubrication system components.

9. Describe the procedures used to disassemble and assemble engine lubrication system components.

10. Describe the procedures used to repair engine lubrication systems and components.

Practical Objectives

N/A

CHT-310 Drivelines

Learning Outcomes:

- Demonstrate knowledge of drivelines, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair drivelines.

2015 National Occupational Analysis Reference:

24.01 Services driveline systems.
24.02 Diagnoses driveline systems.
24.03 Repairs driveline systems.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with drivelines.

2. Identify hazards and describe safe work practices pertaining to drivelines.

3. Identify specialty tools and equipment used to service and repair drivelines and describe their applications and procedures for use.

4. Identify driveline configurations and describe their characteristics and operation.

5. Identify driveline components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain driveline components.

7. Identify driveline problems and their causes.

8. Describe the procedures used to diagnose drivelines.

9. Describe the procedures used to remove and install driveline components.

10. Describe the procedures used to repair and adjust driveline components.

Practical Objectives

1. Calculate driveline angles and phasing.

2. Adjust ride height.

CHT-315 Drive Axle Assemblies

Learning Outcomes:

- Demonstrate knowledge of drive axle assemblies, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair drive axle assemblies.

2015 National Occupational Analysis Reference:

25.01 Services differentials.
25.02 Diagnoses differentials.
25.03 Repairs differentials.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with drive axle assemblies.

2. Identify hazards and describe safe work practices pertaining to drive axle assemblies.

3. Identify specialty tools and equipment used to service and repair drive axle assemblies and describe their applications and procedures for use.

4. Identify types of drive axle assemblies and describe their applications and operation.
   i) locking
   ii) non-locking
   iii) single reduction
   iv) double reduction
   v) planetary two-speed
   vi) planetary double reduction
   vii) double reduction two-speed

viii) power divider

5. Identify drive axle assembly components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain drive axle assemblies and their components.

7. Identify drive axle assembly problems and their causes.

8. Describe the procedures used to diagnose drive axle assemblies.

9. Describe the procedures used to remove and install drive axle assemblies and their components.

10. Describe the procedures used to repair and adjust drive axle assemblies.

Practical Objectives

1. Disassemble and assemble a drive axle assembly/power divider.

CHT-320 Engine Clutches

Learning Outcomes:

- Demonstrate knowledge of engine clutches, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair engine clutches.

2015 National Occupational Analysis Reference:

20.01 Services clutches.
20.02 Diagnoses clutches.
20.03 Repairs clutches.
23.01 Services automated transmissions.
23.02 Diagnoses automated transmissions.
23.03 Repairs automated transmission.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with engine clutches.

2. Identify hazards and describe safe work practices pertaining to engine clutches.

3. Identify specialty tools and equipment used to service and repair engine clutches and describe their applications and procedures for use.

4. Identify types of engine clutches and describe their characteristics and operation.
   i) single plate
   ii) double plate
   iii) over-center
   iv) wet/dry

5. Identify types of engine clutch actuating mechanisms and describe their principles of operation.

i) mechanical
ii) hydraulic
iii) pneumatic
iv) electronically controlled

6. Identify engine clutch components and describe their purpose and operation.
   i) pressure plate assemblies
   ii) release bearings
   iii) pilot bearings
   iv) brakes
   v) flywheels
   vi) housings

7. Describe the procedures used to inspect and maintain engine clutch components.

8. Identify engine clutch related problems and their causes.

9. Describe the procedures used to diagnose engine clutches.

10. Describe the procedures used to remove and install engine clutches and their components.

11. Describe the procedures to repair and adjust engine clutches and their components.

Practical Objectives

1. Remove, replace and adjust a clutch.

CHT-325 Diesel Fuel Supply Systems

Learning Outcomes:

- Demonstrate knowledge of diesel fuel supply systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair diesel fuel supply systems.

2015 National Occupational Analysis Reference:

8.01 Services fuel delivery system.
8.02 Diagnoses fuel delivery system.
8.03 Repairs fuel deliverysystem.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with diesel fuel supply systems.

2. Identify hazards and describe safe work practices pertaining to diesel fuel supply systems.

3. Identify the properties and characteristics of diesel fuels.

4. Identify and interpret codes and regulations pertaining to the handling and storage procedures of diesel fuels.

5. Identify specialty tools and equipment used to service and repair diesel fuel supply systems and describe their applications and procedures for use.

6. Identify diesel fuel supply system components and describe their purpose and operation.

7. Describe the procedures used to inspect and maintain diesel fuel supply systems and components.

8. Identify diesel fuel supply system problems and their causes.

9. Describe the procedures used to diagnose diesel fuel supply system and components.

10. Describe the procedures used to remove and install diesel fuel supply system components.

11. Describe the procedures used to disassemble and assemble diesel fuel supply system components.

12. Describe the procedures used to repair and adjust diesel fuel supply systems and components.

Practical Objectives

1. Perform a vaccum, pressure and flow test.

CHT-330 Starting Systems

Learning Outcomes:

- Demonstrate knowledge of starting systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair starting systems.

2015 National Occupational Analysis Reference:

17.01 Performs servicing and repairs of starting systems.
17.02 Diagnoses starting systems.

Suggested Hours:

15 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with starting systems.

2. Identify hazards and describe safe work practices pertaining to starting systems.

3. Identify specialty tools and equipment used to service and repair starting systems and describe their applications and procedures for use.

4. Identify types of starting systems and describe their applications and operation.
   i) electrical
   ii) hydraulic
   iii) pneumatic

5. Identify starting system components and describe their applications and operation.
   i) 12/24
   ii) magnetic switches
   iii) solenoids
   iv) thermal protection switches
   v) relays

vi) clutch switch
vii) neutral start
viii) ignition switch
ix) starter drives

6. Describe the procedures used to inspect and maintain starting system components.
   i) electrical
   ii) hydraulic
   iii) pneumatic

7. Identify starting system problems and their causes.
   i) electrical
   ii) hydraulic
   iii) pneumatic

8. Describe the procedures used to diagnose starting system components.
   i) electrical
   ii) hydraulic
   iii) pneumatic

9. Describe the procedures used to remove and install starting system components.
   i) electrical
   ii) hydraulic
   iii) pneumatic

10. Describe the procedures used to repair starting system components.
    i) electrical
    ii) hydraulic
    iii) pneumatic

Practical Objectives

1. Perform a voltage drop test.

2. Dissassemble and assemble starter and test components.

CHT-335 Starting Aids

Learning Outcomes:

- Demonstrate knowledge of starting aids, their purpose and operation.
- Demonstrate knowledge of the procedures used to service and repair starting aids.

2015 National Occupational Analysis Reference:

17.01 Performs servicing and repairs of starting systems.
17.02 Diagnoses starting systems.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with starting aids.

2. Identify hazards and describe safe work practices pertaining to starting aids.

3. Identify the types of starting aids and describe their purpose and operation.
   i) ether starting systems
   ii) oil heaters
   iii) coolant heaters
   iv) battery warmers
   v) glow plugs
   vi) intake manifold heaters
   vii) decompression mechanisms

4. Describe the procedures used to inspect and maintain starting aids and their components.

5. Identify starting aid problems and their causes.

6. Describe the procedures used to diagnose starting aids and their components.

7. Describe the procedures used to remove and install starting aids and their components.

8. Describe the procedures used to repair starting aids and their components.

Practical Objectives

1. Measure current draw of intake heater.

2. Test a glow-plug circuit.

3. Test immersion heaters.

CHT-340 Charging Systems

Learning Outcomes:

- Demonstrate knowledge of charging systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair charging systems.

2015 National Occupational Analysis Reference:

15.01 Services charging systems.
15.02 Diagnoses charging systems.
15.03 Repairs charging systems.

Suggested Hours:

15 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with charging systems.

2. Identify hazards and describe safe work practices pertaining to charging systems.

3. Identify specialty tools and equipment used to service and repair charging systems and describe their applications and procedures for use.

4. Identify charging system components and describe their purpose and operation.

5. Describe the procedures used to inspect and maintain charging system components.

6. Identify charging system problems and their causes.

7. Describe the procedures used to diagnose charging system components.

8. Describe the procedures used to remove and install charging system components.

9. Describe the procedures used to disassemble and assemble charging system components.

10. Describe the procedures used to repair charging system components.

Practical Objectives

1. Disassemble and assemble an alternator.

2. Verify remote sense wire.

3. Diagnose and repair charging system components.

CHT-345 Electronic Ignition Systems

Learning Outcomes:

- Demonstrate knowledge of electronic ignition systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair electronic ignition systems.

2015 National Occupational Analysis Reference:

16.01 Performs servicing and repair of spark ignition systems.
16.02 Diagnose spark ignition systems.
19.01 Services vehicle management and electronic components.
19.02 Diagnoses vehicle management and electronic components.
19.03 Repairs vehicle management and electronic components.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with electronic ignition systems.

2. Identify hazards and describe safe work practices pertaining to electronic ignition systems.

3. Identify specialty tools and equipment used to service and repair electronic ignition systems and describe their applications and procedures for use.

4. Identify types of electronic ignition systems and describe their operating principles.

5. Identify electronic ignition system components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain electronic ignition systems and components.

7. Identify electronic ignition system problems and their causes.

8. Describe the procedures used to diagnose electronic ignition systems and components.

9. Describe the procedures used to remove and install electronic ignition system components.

10. Describe the procedures used to repair and adjust electronic ignition systems and components.

Practical Objectives

N/A

CHT-350 Non-Diesel Fuel Systems

Learning Outcomes:

- Demonstrate knowledge of non-diesel fuel systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair non-diesel fuel systems.

2015 National Occupational Analysis Reference:

8.01 Services fuel delivery system.
8.02 Diagnoses fuel delivery system.
8.03 Repairs fuel delivery system.

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with non-diesel fuel systems.

2. Identify hazards and describe safe work practices pertaining to non-diesel fuel systems.

3. Identify the properties and characteristics of non-diesel fuels and describe the handling and storage procedures.
   i) gasoline
   ii) liquefied petroleum gas (LPG)
   iii) compressed natural gas (CNG)
   iv) hybrid

4. Identify specialty tools and equipment used to service and repair non-diesel fuel systems and describe their applications and procedures for use.

5. Identify non-diesel fuel system components and describe their purpose and operation.

i) tanks
ii) filters
iii) converters
iv) carburetors
v) valves
vi) gauges
vii) fuel lines and fittings
viii) pumps
ix) batteries
x) motors
xi) cables
xii) capacitors

6. Describe the procedures used to inspect and maintain non-diesel fuel systems and components.

7. Identify non-diesel fuel system problems and their causes.

8. Describe the procedures used to diagnose non-diesel fuel systems and components.

9. Describe the procedures used to remove and install non-diesel fuel system components.

10. Describe the procedures used to disassemble and assemble non-diesel fuel system components.

11. Describe the procedures used to repair and adjust non-diesel fuel systems and components.

Practical Objectives

N/A

CHT-355 Manual Transmissions

Learning Outcomes:

- Demonstrate knowledge of manual transmissions, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair manual transmissions.

2015 National Occupational Analysis Reference:

21.01 Services manual transmissions and transfer cases.
21.02 Diagnoses manual transmissions and transfer cases.
21.03 Repairs manual transmissions and transfer cases.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Identify hazards and describe safe work practices pertaining to servicing and repairing manual transmissions.

2. Identify specialty tools and equipment used to service and repair manual transmissions and describe their applications and procedures for use.

3. Identify types of manual transmissions and describe their applications and operation.
   i) conventional manual shift
   ii) electronic
   iii) automated manual

4. Identify manual transmission components and describe their purpose and operation.

5. Describe the procedures used to disassemble and assemble manual transmissions and their components.

6. Describe the procedures used to inspect and maintain manual transmissions and their components.

7. Identify manual transmission problems and their causes.

8. Describe the procedures used to diagnose manual transmissions.

9. Describe the procedures used to remove and install manual transmissions and their components.

10. Describe the procedures used to repair manual transmissions and their components.

Practical Objectives

1. Identify internal components and find path and power.

CHT-360 Pump Drives/Power Take-Offs

Learning Outcomes:

- Demonstrate knowledge of pump drives/power take-offs, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair pump drives/ power take-offs.

2015 National Occupational Analysis Reference:

21.01 Services manual transmissions and transfer cases.
21.02 Diagnoses manual transmissions and transfer cases.
21.03 Repairs manual transmission and transfer cases.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with pump drives/power take-offs.

2. Identify hazards and describe safe work practices pertaining to servicing and repairing pump drives/power take-offs.

3. Identify specialty tools and equipment used to service and repair pump drives /power take-offs and describe their applications and procedures for use.

4. Identify types of pump drives/power take-offs and their components and describe their purpose and operation.
   - i) engine driven
     - front crankshaft
     - gear train
   - ii) transmission driven
   - iii) driveline driven
   - iv) independent (540rpm/1000 rpm)

5. Describe the procedures used to disassemble and assemble pump drives/power take-offs and their components.

6. Describe the procedures used to inspect and maintain pump drives/power take-offs and their components.

7. Identify pump drives/power take-off problems and their causes.

8. Describe the procedures used to diagnose pump drives/power take-offs and their components.

9. Describe the procedures used to remove and install pump drives/power take-offs and their components.

10. Describe the procedures used to adjust and repair pump drives/power take-offs and their components.

Practical Objectives

N/A

CHT-365 Transfer Cases

Learning Outcomes:

- Demonstrate knowledge of transfer cases, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair transfer cases.

2015 National Occupational Analysis Reference:

21.01 Services manual transmissions and transfer cases.
21.02 Diagnoses manual transmissions and transfer cases.
21.03 Repairs manual transmissions and transfer cases.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with transfer cases.

2. Identify hazards and describe safe work practices pertaining to transfer cases.

3. Identify specialty tools and equipment used to service and repair transfer cases and describe their applications and procedures for use.

4. Identify types of transfer cases and describe their applications and operation.

5. Identify transfer case components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain transfer cases and their components.

7. Identify transfer case problems and their causes.

8. Describe the procedures used to diagnose transfer cases.

9. Describe the procedures used to remove and install transfer cases and their components.

10. Describe the procedures used to overhaul and repair transfer cases and their components.

Practical Objectives

N/A

CHT-370 Automatic/Power Shift and CVT Transmissions

Learning Outcomes:

- Demonstrate knowledge of automatic/power shift transmissions, CVT transmissions, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair automatic/power shift transmissions and CVT transmissions.

2015 National Occupational Analysis Reference:

22.01 Services automatic transmissions.
22.02 Diagnoses automatic transmissions.
22.03 Repairs automatic transmissions.
23.01 Services automated transmissions.
23.02 Diagnoses automated transmissions.
23.03 Repairs automated transmissions.

Suggested Hours:

36 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with automatic/power shift, and CVT transmissions.

2. Identify hazards and describe safe work practices pertaining to automatic/power shift transmissions.

3. Identify specialty tools and equipment used to service and repair automatic/power shift, and CVT transmissions and describe their applications and procedures for use.

4. Identify types of automatic/power shift, and CVT transmissions and describe their applications and operation.
   i) hydromechanical
   ii) electrohydraulic (electronically controlled)

5. Identify automatic/power shift, and CVT transmission components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain automatic/power shift, and CVT transmissions and their components.

7. Identify automatic/power shift, and CVT transmission problems and their causes.

8. Describe the procedures used to diagnose automatic/power shift, and CVT transmissions.

9. Describe the procedures used to remove and install automatic/power shift, and CVT transmissions and their components.

10. Describe the procedures used to repair and adjust automatic/power shift, and CVT transmissions and their components.
    i) shift point learning
    ii) shift point programming
    iii) valve body adjustments

Practical Objectives

1. Perform stall and pressure test.

CHT-375 Torque Converters

Learning Outcomes:

- Demonstrate knowledge of torque converters, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair torque converters.

2015 National Occupational Analysis Reference:

22.01 Services automatic transmissions.
22.02 Diagnoses automatic transmissions.
22.03 Repairs automatic transmissions.
23.01 Services automated transmissions.
23.02 Diagnoses automated transmissions.
23.03 Repairs automated transmissions.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with torque converters.

2. Identify hazards and describe safe work practices pertaining to torque converters.

3. Identify specialty tools and equipment used to service and repair torque converters and describe their applications and procedures for use.

4. Identify types of torque converters and describe their applications and operation.
   i) torque divider
   ii) torque converter
   iii) fluid coupling

5. Identify torque converter components and describe their purpose and operation.
   i) impeller(s)

ii) turbine(s)
iii) stator(s)
iv) split guide rings
v) flex plate
vi) lock-up clutches
vii) charge pump
viii) oil circuits
ix) valves
x) oil coolers

6. Describe the procedures used to inspect and maintain torque converters and their components.

7. Identify torque converter problems and their causes.

8. Describe the procedures used to diagnose torque converters.

9. Describe the procedures used to remove and install torque converters and their components.

10. Describe the procedures used to repair and adjust torque converters and their components.

Practical Objectives

N/A

Level 4

CHT-400 Base Engine Diagnostics

Learning Outcomes:

- Demonstrate knowledge of the procedures used to diagnose base engines and their components.

2015 National Occupational Analysis Reference:

4.01 Services base engine.
4.02 Diagnoses base engine.
4.03 Repairs base engine.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with base engine diagnostics.

2. Identify hazards and describe safe work practices pertaining to base engine diagnostics.

3. Identify specialty tools and equipment used to diagnose base engines and describe their applications and procedures for use.

4. Identify base engine problems and their causes.

5. Identify the procedures used for base engine diagnostics and describe their applications and associated procedures.
   i) compression test
   ii) cylinder balance
   iii) cylinder leak down

6. Interpret diagnostic test results to determine base engine problems.

Practical Objectives

1. Perform a base pressure test.

2. Perform cylinder balance test.

3. Perform oil pressure test.

CHT-405 Diesel Fuel Injection Systems

Learning Outcomes:

- Demonstrate knowledge of diesel fuel injection systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair diesel fuel injection systems.

2015 National Occupational Analysis Reference:

8.01 Services fuel delivery system.
8.02 Diagnoses fuel delivery system.
8.03 Repairs fuel delivery system.

Suggested Hours:

24 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with diesel fuel injection systems.

2. Identify hazards and describe safe work practices pertaining to diesel fuel injection systems.
   i) high pressure injection injuries

3. Identify specialty tools and equipment used to service and repair diesel fuel injection systems and describe their applications and procedures for use.

4. Identify types of diesel fuel injection systems and describe their applications and operation.
   i) in-line pump
   ii) distributor pump
   iii) unit injector
   iv) high pressure common rail
   v) hydraulic electric unit injector (HEUI)

5. Identify diesel fuel injection system components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain diesel fuel injection system components.

7. Identify diesel fuel injection system problems and their causes.

8. Describe the procedures used to diagnose diesel fuel injection systems and components.

9. Describe the procedures used to remove and install diesel fuel injection system components.

10. Describe the procedures used to disassemble and assemble diesel fuel injection system components.

11. Describe the procedures used to repair and adjust diesel fuel injection system components.

Practical Objectives

1. Perform a bench test on an injector.

2. Pin time a fuel injection pump.

CHT-410 Electronically-Controlled Diesel Fuel Injection Systems

Learning Outcomes:

- Demonstrate knowledge of electronically-controlled diesel fuel injection systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair electronically-controlled diesel fuel injection systems.

2015 National Occupational Analysis Reference:

8.01 Services fuel delivery system.
8.02 Diagnoses fuel delivery system.
8.03 Repairs fuel delivery system.
19.01 Services vehicle management systems and electronic components.
19.02 Diagnoses vehicle management systems and electronic components.
19.03 Repairs vehicle management systems and electronic components.

Suggested Hours:

27 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with electronically-controlled diesel fuel injection systems.

2. Identify hazards and describe safe work practices pertaining to electronically-controlled diesel fuel injection systems.
   i) high voltage
   ii) high pressure

3. Identify specialty tools and equipment used to service and repair electronically-controlled diesel fuel injection systems and describe their applications and procedures for use.

4. Identify types of electronically-controlled diesel fuel injection systems and describe their applications and operation.

5. Identify electronically-controlled diesel fuel injection system components and describe their purpose and operation.
   i) inputs (sensors)
   ii) outputs
   iii) processors

6. Describe the procedures used to inspect and maintain electronically-controlled diesel fuel injection system components.

7. Identify electronically-controlled diesel fuel injection system problems and their causes.

8. Describe the procedures used to diagnose electronically-controlled diesel fuel injection systems and components.

9. Describe the procedures used to remove and install electronically-controlled diesel fuel injection system components.

10. Describe the procedures used to disassemble and assemble electronically-controlled diesel fuel injection system components.

11. Describe the procedures used to repair and adjust electronically-controlled diesel fuel injection system components.

Practical Objectives

1. Program an injector.

2. Perform cylinder cut out test.

3. Perform cylinder balance test.

4. Perform solenoid cut out test.

5. Perform an injector leak test.

6. Perform fault code trouble shooting.

CHT-415 Intake and Exhaust Systems

Learning Outcomes:

- Demonstrate knowledge of intake and exhaust systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair intake and exhaust systems.

2015 National Occupational Analysis Reference:

6.01 Services intake and exhaust systems.
6.02 Diagnoses intake and exhaust systems.
6.03 Repairs intake and exhaust systems.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with intake and exhaust systems.

2. Identify hazards and describe safe work practices pertaining to intake and exhaust systems.

3. Identify specialty tools and equipment used to service and repair intake and exhaust systems and describe their applications and procedures for use.

4. Identify types of air filtration systems and describe their applications and operation.

5. Identify types of turbo systems and describe their applications and operation.
   i) constant geometry
   ii) constant volute
   iii) variable geometry
   iv) twin

6. Identify intake system components and describe their purpose and operation.

7. Identify exhaust system components and describe their purpose and operation.

8. Describe the procedures used to inspect and maintain intake and exhaust systems and components.

9. Identify intake and exhaust system problems and their causes.

10. Describe the procedures used to diagnose intake and exhaust systems and components.

11. Describe the procedures used to remove and install intake and exhaust system components.

12. Describe the procedures used to repair intake and exhaust systems and components.

Practical Objectives

1. Perform air flow restriction.

2. Perform boost pressure test.

3. Perform air to air leak test (charge air cooler CAC).

4. Perform exhaust back pressure test.

5. Dissassemble turbo charger.

6. Verify waste gate operation.

CHT-420 Emission Control Systems

Learning Outcomes:

- Demonstrate knowledge of emission control systems, their components, and operation.
- Demonstrate knowledge of the procedures used to service and repair emission control systems.

2015 National Occupational Analysis Reference:

9.01 Services emission systems for diesel engines.
9.02 Diagnoses emissions systems for diesel engines.
9.03 Repairs emission systems for diesel engines.

Suggested Hours:

27 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with emission control systems.

2. Identify hazards and describe safe work practices pertaining to emission control systems.
   i) Diesel Exhaust Fluid (DEF)
   ii) Diesel Particulate Filter (DPF)
   iii) high temperature

3. Identify and interpret codes and regulations pertaining to emission control.
   i) federal/provincial

4. Identify specialty tools and equipment used to service and repair emission control systems and describe their applications and procedures for use.

5. Identify types of emission control systems and describe their characteristics and applications.
   i) reducing particulate matter

ii) reducing NOx
iii) reducing CO and CO^2
iv) reducing hydrocarbons

6. Identify emission control system components and describe their purpose and operation.

7. Describe the procedures used to inspect and maintain emission control system components.
   i) start up and shut down

8. Identify emission control system problems and their causes.

9. Describe the procedures used to diagnose emission control systems and components.

10. Describe the procedures used to remove and install emission control system components.

11. Describe the procedures used to adjust and repair emission control systems and components.

12. Describe the procedures used to test vehicle emission controls.

Practical Objectives

1. Diagnose emission control systems.

2. Remove and install emission control system components.

3. Repair emission control system components.

4. Inspect, clean and maintain emission control system components.

5. Test vehicle emission controls.

6. Perform a forced regeneration.

CHT-425 Engine Brakes and Retarders

Learning Outcomes:

- Demonstrate knowledge of engine brakes and retarders, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair engine brakes and retarders.

2015 National Occupational Analysis Reference:

10.01 Services and repairs engine retarder systems.
10.02 Diagnoses engine retarder systems.
26.01 Services drive train retarders.
26.02 Diagnoses drive train retarders.
26.03 Repairs drive train retarders.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with engine brakes and retarders.

2. Identify hazards and describe safe work practices pertaining to engine brakes and retarders.

3. Identify specialty tools and equipment used to service and repair engine brakes and retarders and describe their applications and procedures for use.

4. Identify types of engine brakes and retarders and describe their applications and operation.
   i) engine brakes
   ii) exhaust brakes
   iii) hydraulic retarders
   iv) electric retarders

5. Identify engine brake and retarder components and describe their purpose and operation.

6. Identify engine brake and retarder problems and their causes.

7. Describe the procedures used to diagnose engine brakes and retarders and their components.

8. Describe the procedures used to remove and install engine brakes and retarders and their components.

9. Describe the procedures used to disassemble and assemble engine brakes and retarders.

10. Describe the procedures used to inspect, adjust and repair engine brakes and retarders and their components.

Practical Objectives

1. Diagnose engine brakes and retarders.

2. Diassemble and assemble engine brakes and retarders.

3. Adjust engine brakes.

CHT-430 Diesel Engine Overhaul

Learning Outcomes:

- Demonstrate knowledge of the procedures used to overhaul diesel engines.

2015 National Occupational Analysis Reference:

4.01 Services base engines.
4.02 Diagnoses base engines.
4.03 Repairs base engines.

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with diesel engine overhauling.

2. Identify hazards and describe safe work practices pertaining to diesel engine overhauling.

3. Identify specialty tools and equipment used for diesel engine overhauling and describe their applications and procedures for use.

4. Describe the procedures used to remove and install diesel engines.

5. Describe the procedures used to inspect engine mounting components for wear.

6. Describe the procedures used to disassemble and assemble diesel engines and components.

7. Describe the procedures used to clean and inspect diesel engines and their components.

8. Describe the procedures used to measure diesel engine components for wear.

9. Diagnose root cause of failure of diesel engine components.
    i) failure analysis

10. Describe the procedures used to repair diesel engine components.

11. Describe the procedures used to commission diesel engines.

Practical Objectives

1. Perform precision measurements of diesel engine components.

2. Perform a top end adjustment.

CHT-435 Gauges and Instrumentation

Learning Outcomes:

- Demonstrate knowledge of gauges and instrumentation, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair gauges and instrumentation.

2015 National Occupational Analysis Reference:

32.01 Services interior cab components.
32.02 Diagnoses interior cab components.
32.03 Repairs interior cab components.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with gauges and instrumentation.

2. Identify hazards and describe safe work practices pertaining to gauges and instrumentation.

3. Identify specialty tools and equipment used to service and repair gauges and instrumentation and describe their applications and procedures for use.

4. Identify types of gauges and instrumentation and their components and describe their purpose and operation.

5. Interpret electrical symbols and wiring diagrams relating to gauges and instrumentation.

6. Describe the procedures used to inspect and maintain gauges and instrumentation and their components.

7. Identify gauge and instrumentation problems and their causes.

8. Describe the procedures used to diagnose gauge and instrumentation circuits and their components.

9. Describe the procedures used to remove and install gauges and instrumentation and their components.

10. Describe the procedures to repair and calibrate gauge and instrumentation components.

Practical Objectives

1. Demonstrate knowledge smart switches and programming.

2. Demonstrate knowledge of gauge and instrument symbols.

CHT-440 Vehicle Management Systems

Learning Outcomes:

- Demonstrate knowledge of vehicle management systems, their components and operation.
- Demonstrate knowledge of reprogramming software.
- Demonstrate knowledge of the procedures used to diagnose and repair vehicle management system components.

2015 National Occupational Analysis Reference:

7.01 Services engine management systems.
7.02 Diagnoses engine management systems.
7.03 Repairs engine management systems.
19.01 Services vehicle management systems and electronic components.
19.02 Diagnoses vehicle management systems and electronic components.
19.03 Repairs vehicle management systems and electronic components.

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Explain basic computer operation and its relationship to vehicle management systems.

2. Identify computer diagnostic systems and describe their components and operation.

3. Describe the networking of modules, multi-plexing and power line carriers (PLCs).
   i) datalink protocol
      - J 1708/1587
      - J 1939
      - Control Area Network (CAN)

4. Identify and interpret diagnostic trouble codes (DTC).

5. Identify the parameters of inputs and outputs and describe their relationships.

6. Identify types of specialized tools and equipment used to diagnose network and electronic circuitry and describe their applications and procedures for use.
   i) digital volt ohmmeter (DVOM)
   ii) scopes
   iii) probes
   iv) break out boxes
   v) scan tools
   vi) laptops

7. Identify the methods to diagnose vehicle management systems and describe their associated procedures.
   i) PLCs
   ii) on-board diagnostic (OBD)
   iii) laptop/scan tools

8. Identify methods used to access/transfer and reprogram software and describe their associated procedures.
   i) CD/DVD
   ii) Internet
   iii) scan tool
   iv) electronically erasable programmable read only memory (EEPROM)

9. Describe the procedures used to repair and replace vehicle management system components.

Practical Objectives

1. Troubleshoot datalink communication.

2. Read and interpret schematics and flowcharts.

3. Demonstrate use of a multimeter.

4. Check, troubleshoot and clear fault codes.

5. Perform ECM downloads.

CHT-445 Air Conditioning Systems

Learning Outcomes:

- Demonstrate knowledge of air conditioning systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair air conditioning systems.

2015 National Occupational Analysis Reference:

37.01 Services air conditioning systems.
37.02 Diagnoses air conditioning systems.
37.03 Repairs air conditioning systems.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with air conditioning systems.

2. Identify hazards and describe safe work practices pertaining to air conditioning systems.

3. Identify codes and regulations pertaining to refrigerants and air conditioning systems.
   i) federal/provincial
   ii) certification requirements

4. Identify specialty tools and equipment used to service and repair air conditioning systems and describe their applications and procedures for use.

5. Describe the principles of refrigeration.

6. Identify refrigerant types and describe their characteristics and applications.

7. Identify and interpret information found on pressure/temperature charts.

8. Identify air conditioning system components and describe their purpose and operation.

9. Describe the procedures used to inspect and maintain air conditioning system and components.

10. Identify air conditioning system problems and their causes.

11. Describe the procedures used to diagnose air conditioning systems.

12. Describe the procedures used to remove and install air conditioning system components.

13. Describe the procedures used to repair and adjust air conditioning systems and components.

Practical Objectives

1. Conduct a standing leak test.

2. Evacuate and recharge an air conditioning system.

3. Performance testing.

CHT-450 Heating and Ventilation Systems

Learning Outcomes:

- Demonstrate knowledge of heating and ventilation systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair heating and ventilation systems.

2015 National Occupational Analysis Reference:

36.01 Services heating and ventilation systems.
36.02 Diagnoses heating and ventilation systems.
36.03 Repairs heating and ventilation systems.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with heating and ventilation systems.

2. Identify hazards and describe safe work practices pertaining to heating and ventilation systems.

3. Identify types of heating and ventilation systems and describe their applications and operation.
   i) cab
   ii) auxiliary

4. Identify heating and ventilation system components and describe their purpose and operation.

5. Describe the procedures used to inspect and maintain heating and ventilation systems and components.

6. Identify heating and ventilation system problems and their causes.

7. Describe the procedures used to diagnose heating and ventilation systems.

8. Describe the procedures used to remove and install heating and ventilation system components.

9. Describe the procedures used to repair and adjust heating and ventilation systems and components.

Practical Objectives

N/A

MENT-701 Mentoring II

Learning Outcomes:

- Demonstrate knowledge of effective communication practices as a mentor.
- Demonstrate knowledge of strategies for teaching workplace skills.

Red Seal Occupational Standard Reference:

4.01 Uses communication techniques
4.02 Uses mentoring techniques

Suggested Hours:

6 hours

Theoretical Objectives:

1. Identify the different roles played by a workplace mentor.

2. Identify strategies to create a supportive learning environment.

3. Identify techniques for effective communication as a mentor.
   i) constructive feedback
   ii) active listening
   iii) leading meetings and one-on-one sessions

4. Describe the steps in teaching a skill.
   i) identifying the point of lesson
   ii) linking the lesson
   iii) demonstrating the skill
   iv) providing practice
   v) giving feedback
   vi) assessing skill and progress

5. Identify strategies to assist in teaching a skill while meeting individual learning needs.
   i) principles of instruction
   ii) coaching skills

6. Explain how to adjust a lesson for various situations.

TTM-465 Motor Vehicle Inspection

(Nova Scotia Unit of Instruction)

Learning Outcomes:

- Demonstrate knowledge of jurisdictional motor vehicle inspections and their purpose.
- Demonstrate knowledge of the procedures used to perform provincial motor vehicle inspections.

2015 National Occupational Analysis Reference:

N/A

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Explain the purpose of a provincial motor vehicle inspection.

2. Identify individuals and authorities involved with provincial motor vehicle inspections, and explain their role, responsibilities and liabilities.
   - i) vehicle owner
   - ii) journeyperson
   - iii) shop owner
   - iv) government

3. Identify jurisdictional requirements pertaining to motor vehicle inspections.
   - i) inspection instructions
   - ii) specifications and tolerances
   - iii) documentation
     - inspection forms
     - rejection stickers
     - inspection stickers

4. Describe the procedures used to perform a provincial motor vehicle inspection.
    i) vehicles
    ii) trailers

Practical Objectives

N/A

CHT-460 Program Review

Learning Outcomes:

- Demonstrate knowledge of the National Occupational Analysis and its relationship to the Interprovincial Exam.
- Demonstrate knowledge of overall comprehension of the trade in preparation for the Interprovincial Exam.

National Occupational Analysis Reference:

Entire National Occupational Analysis

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with an NOA.
   i) blocks
   ii) tasks
   iii) sub-tasks

2. Explaini how an NOA is developed and the link it has with the Interprovincial Exam.
   i) development
   ii) validation
   iii) block and task weighting
   iv) examination break-down (pie chart)

3. Identify Red Seal products and describe their use for preparing for the Interprovincial Red Seal Exam.
   i) Red Seal website
   ii) examination preparation guide
   iii) sample questions
   iv) examination counselling sheets

4. Explain the relationship between the NOA and the AACS and the IPG.

5. Review Common Occupational Skills for the HDET trade as identified in the NOA.
   i) Uses and maintains tools and equipment.
   ii) Performs general maintenance and inspections.
   iii) Organizes work.
   iv) Performs routine trade activities.

6. Review Engines and Support Systems for the HDET trade as identified in the NOA.
   i) Diagnoses engines and engine support systems.
   ii) Repairs engines and engine support systems.

7. Review Hydraulic, Hydrostatic, and Pneumatic Systems for the HDET trade as idenfied in the NOA.
   i) Diagnose hydraulic, hyrdrostatic, and pneumatic systems.
   ii) Repairs hydraulic, hyrdrostatic, and pneumatic systems.

8. Review Drivetrain Systems for the HDET trade as idenfied in the NOA.
   i) Diagnose drivetrain systems.
   ii) Repair drivetrain systems.

9. Review Steering, Suspension, Brake Systems, Wheel Assemblies, and Undercarriage for the HDET trade as idenfied in the NOA.
   i) Diagnose steering, suspension, brake systems, wheel assemblies, and undercarriage.
   ii) Repair steering, suspension, brake systems, wheel assemblies, and undercarriage.

10. Review Electrical and Vehicle Management for the HDET trade as idenfied in the NOA.
   i) Diagnoses electrical systems.
   ii) Repairs electrical systems.
   iii) Diagnoses electronic vehicle management systems.
   iv) Repair electronic vehicle management systems

11. Review Environmental Control Systems for the HDET trade as idenfied in the NOA.
   i) Diagnose environmental control systems.
   ii) Repair environmental control systems.

12. Review Structural Components, Accessories, and Attachments for the HDET trade as idenfied in the NOA.
    i) Diagnose structural components, accessories, and attachments.
    ii) Repair structural components, accessories, and attachments.

Practical Objectives

N/A

Feedback and Revisions

This AACS will be amended periodically; comments or suggestions for improvements should be directed to:

New Brunswick:
Apprenticeship and Occupational Certification
Post-Secondary Education, Training and Labour
470 York St., Rm. 110, PO Box 6000
Fredericton, NB E3B 5H1
Tel: 506-453-2260
Toll Free in NB: 1-855-453-2260
www.gnb.ca

Prince Edward Island:
Apprenticeship, Training and Certification
Atlantic Technology Centre
212-176 Great George St.,
PO Box 2000
Charlottetown, PE C1A 7N8
Tel: 902-368-4460
www.apprenticeship.pe.ca

Newfoundland and Labrador:
Apprenticeship and Trades Certification Immigration, Population Growth & Skills
Confederation Bldg., West Block
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St. John's, NL A1B 4J6
Toll Free: 877-771-3737
www.gov.nl.ca/atcd

Nova Scotia:
Nova Scotia Apprenticeship Agency
1256 Barrington St.
Halifax, NS B3J 1Y6
Tel: 902-424-5651
Toll Free in NS: 1-800-494-5651
www.nsapprenticeship.ca

Any comments or suggestions received will be reviewed and considered to determine the course of action required. If the changes are deemed to be minor, they will be held for implementation during the next review cycle. If immediate change is deemed appropriate and approved by the Atlantic Trade Advisory Committee, it will result in a revision to this version of the AACS and will be detailed in the following section.

Version Changes

Revision Date	Affected Section	Description of Change
May 2024	Levels 1 and 4	Integration of MENT-700 Mentoring I and MENT-701 Mentoring II