A PLAN OF TRAINING

FOR

TRUCK & TRANSPORT MECHANIC

OCCUPATION

Approved by
Provincial Apprenticeship Board

June, 2000

Foreword

Apprenticeship training in the Province of Newfoundland and Labrador is undergoing considerable change. This change is prompted by the need to keep pace with technological changes in industry, the need to be competitive, and the desire to be efficient and effective in meeting the needs of the apprentice. We feel that this training plan will lay the groundwork to meet both the demands of industry and the needs of the apprentice.

The plan that follows is a comprehensive one. It recognizes that apprenticeship training begins when a student first registers at a training institution, or signs a Contract of Apprenticeship with an employer, and continues until such time as the apprentice has completed all of the required technical training and has received the required industry experiences necessary to write an interprovincial examination. Passing this examination will result in the apprentice receiving Red Seal Certification which gives the tradesperson national mobility of trade qualifications. This plan also recognizes the need to provide flexible access to training based on the needs of the employer and the apprentice while at the same time recognizing the end goal is to complete the requirements for Red Seal Certification.

It is realized that change in all facets of education and industry is continuous and sometimes rapid. This change will necessitate the review of this document on a continuous basis to ensure that current needs of industry and apprentices are being satisfied. Through a process of accreditation, regular input from industry advisory committees, as well as input from those involved in the administration and delivery of the training, we are confident that residents of our province who elect to pursue an apprenticeable trade as a career choice will receive high quality training and thus will be prepared to compete for jobs worldwide.

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Chair, Provincial Apprenticeship Board Minister of Education

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PREFACE

This document is intended to describe the curriculum content of the Truck and Transport Mechanic theory training program in the Atlantic provinces

It describes the suggested content of each of the 65 courses required for completion of apprenticeship.

Through performance objectives, it identifies knowledge and practical skills that are required to master competencies under the scope of the occupation.

This Curriculum Standard will be amended periodically and suggestions for improvement should be directed to the Apprenticeship and Occupational Certification Branch.

ACKNOWLEDGMENTS

Valuable input into the development of this Curriculum Standard has been made by Advisory Committees, instructional and support staff. Without their dedication to quality training, this document would not have been produced. A sincere thank you!

This document has been validated by the Provincial Advisory Committee at their ***APRIL, 1999*** meeting.

INTRODUCTION

OVERVIEW

This training service is designed to provide trainees with skills and knowledge required for employment in the field of Heavy Equipment Repair. Truck and Transport Mechanics diagnose problems, locate the cause of the malfunction, dismantle and overhaul components. They repair defects, reassemble existing parts or fit new parts, and make final adjustments.

Technicians use many specialized tools, including hand tools, gauges, jacks and hoists, welding equipment, hydraulic equipment, and complex electronic diagnostic testing devices.

GENERAL OBJECTIVES

Following successful completion of this program, the apprentice will be able to:

- demonstrate good safety habits and the proper use and maintenance of various tools and equipment used in motor vehicle repair shop;

- display skills in recognizing, servicing, removing, overhauling, and installing different types of truck engines and the various related parts and systems, such as the fuel and electrical systems, clutches, and drive lines;

- demonstrate various skills relating to steering, suspension, and braking systems of truck and transport vehicles.

PROGRAM INFORMATION

DURATION

Apprenticeship requires a combined total of 7200 hours of classroom and practical work experience.

PROGRAM INFORMATION

DELIVERY

This training program will be delivered by an instructor holding a Certificate of Qualification recognized by Apprenticeship and Occupational Certification.

At this moment, three methods of delivery could be used:

One is an individualized system that is learner centered and self paced, where trainees are involved in a “modular” learning process. Trainees, through consultation with instructors, establish schedules, take tests, and exit each module when they have achieved the objectives of that module.

The second method of delivery is a conventional system that is instructor centered and group paced. This method involves lectures, demonstrations, practical and self study.

The third method of delivery is through distance education, that is, apprentices are provided learning material prior to the lesson with the instructor where he/she will teach on line the material that has been scheduled for that lesson. The apprentices are able to interchange with the instructor and with other students by way of the audio graphic technology. The practical is done on-the-job at the employer’s place of business. Courses are scheduled at the beginning of the academic year, apprentices register and take their training at specified times.

PROGRAM INFORMATION

Evaluation

Theory

The evaluation of the theory component is based on a final theory test, a pass mark of 70% is required on the final theory test for each course.

Practical

A pass mark of 70% is required on the final practical test for each course.

The evaluation of an apprentice's practical competencies is done by the journeyperson supervising the apprentice and by the employer and is recorded in the Progress Record Book.

GLOSSARY OF TERMS

The following is a brief explanation of the components of the courses found in this Curriculum Standard.

Outcome is a statement that summarizes the performance objectives of the unit of instruction.

Duration is the approximate length of time required for the apprentice to complete the course. The duration may vary for each apprentice as their background and experience will impact on the time required to meet the objectives.

Prerequisites are the courses that must be completed before the apprentice attempts the course at hand.

Objectives are statements that identify what the apprentices will learn and what they will be able to do, how well, and to what standards.

Content is a listing of the theoretical topics included in the courses material and required by the apprentice for the performance of the tasks/objectives.

Suggested Learning Activities are activities assigned in relationship to the objectives of the course. The suggested projects may be substituted by the instructor for other projects that will also enable the apprentice to meet the objectives of the course. There are activities that take place during a course that apprentices must participate in for them to be able to meet the objectives of that course. The suggested activities may be substituted by the instructor(s) by other activities as long as it does not interfere with the progress of the apprentice.

Suggested Resources includes any material required by the apprentice to complete that course. Written reference material may include text books, Manufacturer's Service Manuals, Learning Activity Package, or other appropriate publications or literature.

CONDITIONS GOVERNING APPRENTICESHIP TRAINING

1.0 GENERAL

The following general conditions will apply to all apprenticeship training programs approved by the Provincial Apprenticeship Board in accordance with the Apprenticeship Act. Where an occupation requires additional conditions, these will be noted in the specific plan of training for that occupation. In no case should there be a conflict between these conditions and the additional requirements specified in certain plans of training.

2.0 ENTRANCE REQUIREMENTS

2.1 Entry into the occupation as an apprentice requires:

The completion of designated first year courses specific to the occupation

OR

Indenturing into the occupation by an employer who agrees to provide the appropriate training and work experiences as outlined in this plan of training.

OR

Enrolment in a program of studies that includes all entry and advanced level skills and required work experiences as approved by the Provincial Apprenticeship Board.

2.2 Notwithstanding the above, each candidate must have successfully completed a high school program or equivalent and in addition may be required to have completed certain academic subjects as specified in particular plans of training. Mature students, at the discretion of the Director of Institutional and Industrial Education, may be registered. A mature student is defined as one who has reached the age of 19 and who can demonstrate the ability and the interest to complete the requirements for certification.

2.3 At the discretion of the Director of Institutional and Industrial Education, credit towards the apprenticeship program may be awarded to an apprentice for previous work experience and/or training as validated through prior learning assessment.

2.4 A Registration for Apprenticeship form must be duly completed.

3.0 PROBATIONARY PERIOD

The probationary period for each memorandum of understanding will be six months. Within that period the memorandum may be terminated by either party upon giving the other party and the Provincial Apprenticeship Board one week notice in writing.

4.0 TERMINATION OF A MEMORANDUM OF UNDERSTANDING

After the probationary period referred to in Section 3.0 herein, the memorandum of understanding may be terminated by the Board by mutual consent of the parties thereto or cancelled by the Board for proper and sufficient cause in the opinion of the Board.

5.0 APPRENTICESHIP PROGRESSION SCHEDULE AND WAGE RATES

5.1 Progression Schedule

7200 Hour Programs	**Requirements for Progression**	**Progress To**
First Year Apprentice	25% of Course Credit Hours, **Plus** relevant work experience totaling 1800 hours	Second Year
Second Year Apprentice	50% of Course Credit Hours, **Plus** relevant work experience totaling 3600 hours	Third Year
Third Year Apprentice	75% of Course Credit Hours, **Plus** relevant work experience totaling 5400 hours	Fourth Year
Fourth Year Apprentice	100% of Course Credit Hours, **Plus** completion and sign-off of workplace skills required for certification totaling 7200 hours	Write Certification Examination
5400/4800 Hour Programs		
First Year Apprentice	33% of Course Credit Hours, **Plus** relevant work experience totaling 1800/1600 hours	Second Year
Second Year Apprentice	66% of Course Credit Hours, **Plus** relevant work experience totaling 3600/3200 hours	Third Year
Third Year Apprentice	100% of Course Credit Hours, **Plus** completion and sign-off of workplace skills required for certification totaling 5400/4800 hours	Write Certification Examination

5.2 For the duration of each Apprenticeship Training Period, the apprentice, who is not covered by a collective agreement, shall be paid a progressively increased schedule of wages which shall not be less than:

Program Duration	Wage Rates		Comments
7200 Hours	1st Year	55%	These wage rates are percentages of the prevailing journeyperson's wage rate in the place of employment of the apprentice. No apprentice shall be paid less than the wage rate established by the Labour Standards Act (1988), as now in force or as hereafter amended, or by other Order, as amended from time to time replacing the first mentioned Order.
	2nd Year	65%	
	3rd Year	75%	
	4th Year	90%	
5400 Hours and 4800 Hours	1st Year	55%	
	2nd Year	70%	
	3rd Year	85%	
4000 (Hairstylist) - The apprentice shall be paid no less than the minimum wage for hours worked and a commission agreed upon between the apprentice and the employer.			

6.0 TOOLS

Apprentices shall be required to obtain hand tools as and when specified by the Board.

7.0 PERIODIC EXAMINATIONS

7.1 Every apprentice shall submit to such occupational tests and examinations as the Board shall direct. If after such occupational tests and examinations the apprentice is found to be making unsatisfactory progress, his/her rate of wage shall not be advanced as provided in Section 5 until his/her progress is satisfactory to the Director of Institutional and Industrial Education and his/her date of completion shall be deferred accordingly. Persistent failure to pass required tests shall be a cause for revocation of his/her Memorandum of Understanding.

7.2 Upon receipt of reports of accelerated progress of the apprentice, the Board may shorten the term of apprenticeship and advance the date of completion accordingly.

8.0 GRANTING OF CERTIFICATES OF APPRENTICESHIP

Upon the successful completion of apprenticeship, the Board shall issue a Certificate of Apprenticeship

9.0 HOURS OF WORK

Any hours employed in the performance of duties related to the designated occupation will be credited towards the completion of the term of apprenticeship. Appropriate documentation of these hours must be provided.

10.0 COPIES OF THE REGISTRATION FOR APPRENTICESHIP

The Director of Institutional and Industrial Education shall provide copies of the Registration for Apprenticeship form to all signatories to the document.

11.0 RATIO OF APPRENTICES TO JOURNEYPERSONS

The ratio of Apprentices to Journeypersons normally shall not exceed one apprentice to every one journeyperson employed. Exceptions for specific occupations may occur with the approval of the Provincial Apprenticeship Board.

12.0 RELATIONSHIP OF THE PLAN OF TRAINING TO A COLLECTIVE BARGAINING AGREEMENT

Collective agreements take precedence over the conditions outlined in the plan of training.

13.0 AMENDMENTS TO A PLAN OF APPRENTICESHIP TRAINING

A plan of training may be amended at any time by the Provincial Apprenticeship Board.

14.0 EMPLOYMENT, RE-EMPLOYMENT AND TRAINING REQUIREMENTS

14.1 The plan of training requires Apprentices to attend regularly their place of employment.

14.2 The plan of training requires Apprentices to regularly attend training programs for that occupation as prescribed by The Provincial Apprenticeship Board.

14.3 Failure to comply with Sections 14.1 and 14.2 will result in cancellation of the Memorandum of Understanding. Apprentices may have their M.O.U.'s reinstated by the Provincial Apprenticeship Board but would be subject to a commitment to complete the entire program as outlined in the General Conditions of Apprenticeship. Permanent cancellation in the said occupation is the result of non-compliance.

14.4 Cancellation of the Memorandum of Understanding to challenge journeyperson examinations, if unsuccessful, would require an apprentice to serve a time penalty of two (2) years before reinstatement as an apprentice or registering as a Trade Qualifier.

14.5 Under the plan of training the employer is required; to keep each apprentice employed as long as work is available, and if the apprentice is laid off due to lack of work, to give opportunity to be re-employed before another is hired.

14.6 The employer will permit each apprentice to attend regularly training programs as prescribed by the Provincial Apprenticeship Board.

14.7 Apprentices who cannot acquire all the workplace skills at their place of employment will have to be evaluated in a simulated work environment at a training institution and have sign-off done by instructors to meet the requirements for certification.

15.0 APPEALS TO DECISIONS BASED ON CONDITIONS GOVERNING APPRENTICESHIP TRAINING

Persons wishing to appeal any decisions based on the above conditions must do so in writing to the Minister of Education within 30 days of the decision.

REQUIREMENTS FOR RED SEAL CERTIFICATION
IN THE TRUCK & TRANSPORT MECHANIC OCCUPATION

1. Evidence that the required work experiences outlined in this plan of training have been obtained. This evidence must be in a format that clearly outlines the experiences and must be signed by an appropriate person or persons attesting that these experiences have been obtained to the level required.

2. Normally, a combination of training from an accredited training program and suitable work experience totalling 7200 hours

   Or

   A total of 9000 hours of suitable work experience.

3. Completion of a National Red Seal examination, to be set at a place and time determined by the Industrial Training Division of the Department of Education.

4. Payment of the appropriate examination fee.

ROLES AND RESPONSIBILITIES OF STAKEHOLDERS
IN THE APPRENTICESHIP PROCESS

The Apprenticeship process involves a number of stakeholders playing significant roles in the training of apprentices. This section captures, in a broad sense, these roles and the responsibilities that result from them.

The Apprentice

- to complete all required technical training courses as approved by the Provincial Apprenticeship Board.
- to find appropriate employment.
- to complete all required work experiences in combination with the required hours.
- to ensure that the work experiences are well documented.
- to approach apprenticeship training with an attitude and commitment that fosters the qualities necessary for a successful career as a qualified journeyperson.
- to obtain the required hand tools as specified by the Board for each period of training of the apprenticeship program.

The Employer

- to provide high quality work experiences in an environment that is conducive to learning.
- to remunerate apprentices as set out in this Plan of Training or Collective Agreements.
- to provide feedback to Training Institutions, Industrial Training Division and Apprentices in an effort to establish a process of continuous quality improvement.
- where appropriate, to release apprentices for the purpose of returning to a training institution to complete the necessary technical courses.
- to ensure that work experiences of the apprentices are documented.

The Training Institution

- to provide a high quality learning environment.
- to provide the necessary student support services that will enhance an apprentice's ability

to be successful.

- to participate with other stakeholders in the continual updating of programs.

The Industrial Training Division

- to establish and maintain program advisory committees under the direction of the Provincial Apprenticeship Board.

- to promote apprenticeship training as a viable career option to prospective apprentices and other appropriate persons involved, such as career guidance counsellors, teachers, parents, etc.

- to establish and maintain a protocol with training institutions, employers and other appropriate stakeholders to ensure the quality of apprenticeship training programs.

- to ensure that all apprentices are appropriately registered and records are maintained as required.

- to schedule all necessary technical training periods for apprentices to complete requirements for certification.

- to administer provincial/interprovincial examinations.

The Provincial Apprenticeship Board

- to set policies to ensure that the provisions of the Apprenticeship Training Act are implemented.

- to ensure that advisory and examination committees are established and maintained.

- to accredit institutions to deliver apprenticeship training programs.

PROGRAM STRUCTURE

PROGRAM STRUCTURE

Code	*Course Name*	*Hours*	*Prerequisite(s)*	*Page #*
SV1100	Safety in the Shop	15	N/A	25
TS1510	Occupational Health and Safety	4	N/A	27
TS1520	WHMIS	6	N/A	31
SV1110	Ozone Depleting Substances	16	N/A	34
TS1530	First Aid	7	N/A	35
SV1120	Gasket, Seals and Sealers	8	SV1100 - SV1110 TS1510 - TS1520 TS1530	37
WD2330	MIG Welding	30	SV1100 - SV1110 TS1510 - TS1520 TS1530	39
WD1300	Oxy-Fuel Welding	30	SV1100 - SV1110 TS1510 - TS1520 TS1530	41
SV1130	Electrical and Electronic Basic Principles	90	SV1100 - SV1110 TS1510 - TS1520	43
SV2680	Basic Motive Power Computers	60	SV1130	46
SV1140	Hydraulic Basic Principles	30	N/A	50
SV1150	Service Information Systems	30	N/A	52
SV1160	Hand Tools	30	SV1100 - SV1110 TS1510 - TS1520 TS1530 SV1150	54
SV1170	Shop Tools and Equipment	30	SV1160	59
SV1180	Fasteners, Tubing and Fittings	30	SV1160	61

Code	*Course Name*	*Hours*	*Prerequisite(s)*	*Page #*
SV1190	Lubrication and Fluid Services	30	TS1510 - TS1520 SV1100 - SV1110 SV1120 SV1150 - SV1180	64
WD2320	Arc Welding	30	TS1510 - TS1520 SV1100 - SV1110 WD1300 SV1150 - SV1170	68
SV1420	Wheels & Tires	30	TS1510 - TS1520 SV1100 - SV1110 SV1150 - WD2320	137
SV1430	Wheel Balancing	15	SV1420	139
SV1440	Front Axles and Suspension	45	WD1300 SV1430	141
SV1450	Steering Components	45	SV1430 SV1140	144
SV2810	Wheel Alignment	45	SV1420 - SV1450	147
SV1460	Rear Suspension Systems	75	SV1430	149
SV2690	Frames & Chassis	30	SV2810 SV1460	151
SV1260	Hydraulic Brakes	60	SV1140 SV1190	71
SV1270	Air Brakes	60	SV1260	75
SV2570	Engine Brakes and Retarders	15	SV1270	79
SV1470	Basic Anti-Lock Brakes	30	SV1420 SV1270 - SV1370 SV1130	153
SV1480	Dual Air Brake Systems	45	SV1420 - SV1270	155
SV2700	Electronic Components of Anti-Lock Brakes	30	SV1470	157
SV1280	Drive Lines	30	SV1190	81

Code	*Course Name*	*Hours*	*Prerequisite(s)*	*Page #*
SV2710	Engine Clutches	30	SV1100 - WD1300 SV1150 - SV1180 WD2320 - SV1280	159
SV2720	Manual Transmission	60	SV2710	162
SV2730	Automatic Transmission	90	SV1100 - WD1300 SV1150 - SV1180 WD2320 - SV1280	166
SV2740	Transfer Cases	30	SV1100 - WD1300 SV1150 - SV1180 WD2320 - SV1280	169
SV2750	Drive Axle Assemblies	45	SV1100 - WD1300 SV1150 - SV1180 WD2320 - SV1280	171
SV1300	Engine Principles	75	SV1190	83
SV2580	Engine Removal and Installation	30	SV1190 - SV1300 SV1110	86
SV1310	Cooling Systems	30	SV1300 SV2580	88
SV1320	Lubrication Systems	15	SV1190 SV1300	92
SV1330	Air Filtration and Exhaust Systems	30	WD2320 - SV1300	94
SV2590	Turbochargers, Blowers and Intercoolers	30	SV1190 - SV1320	97
SV2600	Diesel Engines Overhauling	90	SV1300 - SV2590	99
SV2610	Diesel Engine Problems Diagnosis	30	SV2600	102
SV1340	Gasoline Fuel Systems	15	SV1330 SV1130	104
SV1350	Alternative Fuel Systems	15	SV1340	107
SV1360	Diesel Fuel Supply Systems	15	SV1340	109

Code	*Course Name*	*Hours*	*Prerequisite(s)*	*Page #*
SV2620	Injectors	30	SV1360	112
SV2630	Injection Pumps	30	SV1360	114
SV2640	Tune Ups and Diagnosis of Diesel Fuel Systems	30	SV2630 SV2570	117
SV2650	Electronic Fuel Control Systems	60	SV1130 SV2680 SV2620 - SV2630 SV2640	120
SV2760	Gasoline Fuel Injection Systems	60	TS1510 - TS1520 SV1100 - SV1110 SV1130 SV1150 - WD2320 SV1300 - SV1340 SV1370 - SV2660	174
SV2770	Emission Controls	30	SV2760	178
SV1370	Batteries	15	TS1510 - TS1520 SV1100 - SV1110 WD1300 - SV1130 SV1150 - SV1180	122
SV1380	Starting Systems	30	SV1370	125
SV1390	Charging System Components	30	SV1370	129
SV2660	Ignition Systems and Tune-Ups	15	SV1370 - SV1300 SV1340 - SV1350	131
SV1490	Lighting Systems	30	SV1100 - SV1130 SV1150 - SV1170 SV1370	180
SV1500	Wiring Harness & Accessories	30	SV1370	182
SV2670	Air Conditioning Systems	30	SV1190 - SV1310 SV1130 TS1530	134
SV2780	Fifth Wheels	15	TS1510 - TS1520 SV1100 - SV1110 SV1150 - WD2320	184

Code	*Course Name*	*Hours*	*Prerequisite(s)*	*Page #*
SV2790	Government Safety Inspection	7	Entire Program	186
SV2800	Preventative Maintenance Inspections	30	Entire Program	187

Required Related Courses

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SUGGESTED COURSE LAYOUT FOR THE TRUCK AND TRANSPORT MECHANIC

SUGGESTED ENTRY LEVEL COURSES

SV1100 - Safety in the Shop	15 hrs.
TS1510 - Occupational Health and Safety	4 hrs.
TS1520 - WHMIS	6 hrs.
SV1110 - Ozone Depleting Substances	7 hrs.
TS1530 - First Aid	16 hrs.
SV1120 - Gasket, Seals and Sealers	8 hrs.
WD1300 - Oxy-Fuel Welding	30 hrs.
SV1130 - Electrical and Electronic Basic Principles	90 hrs.
SV1140 - Hydraulic Basic Principles	30 hrs.
SV1150 - Service Information Systems	30 hrs.
SV1160 - Hand Tools	30 hrs.
SV1170 - Shop Tools and Equipment	30 hrs.
SV1180 - Fasteners, Tubing and Fittings	30 hrs.
SV1190 - Lubrication and Fluid Services	30 hrs.
SV1420 - Wheels & Tires	30 hrs.
SV1430 - Wheel Balancing	15 hrs.
SV1440 - Front Axles and Suspension	45 hrs.
SV1450 - Steering Components	45 hrs.
SV1460 - Rear Suspension Systems	75 hrs.
SV1260 - Hydraulic Brakes	60 hrs.
SV1270 - Air Brakes	60 hrs.
SV1470 - Basic Anti-Lock Brakes	30 hrs.
SV1480 - Dual Air Brake Systems	45 hrs.
SV1280 - Drive Lines	30 hrs.
SV1300 - Engine Principles	75 hrs.
SV1310 - Cooling Systems	30 hrs.
SV1330 - Air Filtration and Exhaust Systems	30 hrs.
SV1340 - Gasoline Fuel Systems	15 hrs.
SV1360 - Diesel Fuel Supply Systems	15 hrs.
SV1370 - Batteries	15 hrs.
SV1490 - Lighting Systems	30 hrs.
SV1500 - Wiring Harness & Accessories	30 hrs.
OT1160 - Workplace Exposure	60 hrs
*CM2150 - Workplace Correspondence	45 hrs.
*MR1210 - Customer Service	30 hrs.
*SP2330 - QA/QC	30 hrs.
*MC1050 - Introduction to Computers	30 hrs.
*SD1700 - Workplace Skills	30 hrs.
*SD1710 - Job Search	15 hrs.
*SD1720 - Entrepreneurial Awareness	15 hrs.

*Related courses are to be interspersed throughout the program.

SUGGESTED COURSE LAYOUT FOR THE TRUCK AND TRANSPORT MECHANIC

Program and Apprenticeship Registration

ADVANCED LEVEL COURSES

WD2330 - MIG Welding	30 hrs.
SV2680 - Basic Motive Power Computers	60 hrs.
WD2320 - Arc Welding	30 hrs.
SV2810 - Wheel Alignment	45 hrs.
SV2690 - Frames and Chassis	30 hrs.
SV2570 - Engine Brakes and Retarders	15 hrs.
SV2700 - Electronic Components of Anti-Lock Brakes	30 hrs.
SV2710 - Engine Clutches	30 hrs.
SV2720 - Manual Transmission	60 hrs.
SV2730 - Automatic Transmission	90 hrs.
SV2740 - Transfer Cases	30 hrs.
SV2750 - Drive Axle Assemblies	45 hrs.
SV2580 - Engine Removal and Installation	30 hrs.
SV1320 - Lubrication Systems	15 hrs.
SV2590 - Turbochargers, Blowers and Intercoolers	30 hrs.
SV2600 - Diesel Engines Overhauling	90 hrs.
SV2610 - Diesel Engine Problems Diagnosis	30 hrs.
SV1350 - Alternative Fuel Systems	15 hrs.
SV2620 - Injectors	30 hrs.
SV2630 - Injection Pumps	30 hrs.
SV2640 - Tune-ups and Diagnosis of Diesel Fuel Systems	30 hrs.
SV2650 - Electronic Fuel Control Systems	60 hrs.
SV2760 - Gasoline Fuel Injection Systems	60 hrs.
SV2770 - Emission Controls	30 hrs.
SV1380 - Starting Systems	30 hrs.
SV1390 - Charging System Components	30 hrs.
SV2660 - Ingnition Systems and Tune-ups	15 hrs.
SV2670 - Air Conditioning Systems	30 hrs.
SV2780 - Fifth Wheels	15 hrs.
SV2790 - Government Safety Inspection	7 hrs.
SV2800 - Preventative Maintenance Inspections	30 hrs.

PROGRAM CONTENT

NAME AND NUMBER: SV1100 - Safety in the Shop

SUGGESTED DURATION: 15 hours

PREREQUISITES: None

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able identify procedures for the maintenance of a safe and clean work environment and proper procedures to extinguish fires.

OVERVIEW OF OBJECTIVES:

1. Identify fire hazards.
2. Identify safe working habits.
3. Identify explosion hazards.

CONTENT:

1. Identify fire hazards
- Fire hazards: classification of fires, types, purpose and use of fire extinguishers.
- Explosion hazards: spontaneous combustion, storage and handling of fuels
- Ventilation and hazardous gases: carbon monoxide, storage batteries

2. Identify safe working habits
- Personal hazards
- Good housekeeping practices
- Reporting injuries

3. Identify explosion hazards
- Recognize and prevent explosion hazards

SUGGESTED LEARNING ACTIVITIES:

1. Operate fire extinguishers.
2. Locate exits, fire alarms.
3. Locate shop ventilation systems.

4. Prepare a floor plan showing fire exit routes.

SUGGESTED RESOURCES:

EVALUATIONS:

Test on recognition of types of extinguishers, explosion hazards and other areas covered in objectives.

NAME AND NUMBER: TS1510 - Occupational Health and Safety

SUGGESTED DURATION: 4 hours

PREREQUISITES: None

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to prevent accidents and illnesses and to improve health and safety conditions in the workplace.

OVERVIEW OF OBJECTIVES:

1. Interpret the Occupational Health and Safety Act laws and regulations.
2. Designate responsibilities within the laws and regulations.
3. Establish joint health and safety committees/representatives within the laws and regulations.
4. Examine right to refuse dangerous work.
5. Describe discriminatory action.
6. Explain duties of commission officers.
7. Interpret appeals of others.
8. Emphasize reporting of accidents.

CONTENT:

1. Interpret the Occupational Health and Safety Act laws and regulations

a. Expound scope of the act
- Application of the act
- Federal/Provincial jurisdictions
- Canada Labour Code
- Rules and regulations
- Private home application
- Conformity of the Crown by the Act

b. Define definitions
- Application of definitions
- Defining terminology

2. Designate responsibilities within the laws and regulations

- Duties of employer, owner, contractors, sub-contractors, employees, and suppliers

3. Establish joint health and safety committees/representatives within the laws and regulations
- Establish committee
- Functions of committee
- Legislated rights
- Deviation from policy standards
- Performance of other duties
- Establish health and safety representation
- Reasonable grounds for refusal
- Reporting endangerment to health
- Appropriate remedial action
- Committee recommendation
- Investigation of endangerment
- Employer to take appropriate remedial action

4. Examine right to refuse dangerous work
- Reasonable grounds for refusal
- Reporting endangerment to health
- Appropriate remedial action
- Committee recommendation
- Investigation of endangerment
- Employer to take appropriate remedial action
- Action taken when employee does not have reasonable grounds for refusing dangerous work
- Employee's rights
- Assigning another employee to perform duties
- Temporary reassignment of employee to perform other duties
- Collective agreement influences
- Wages and benefits

5. Describe discriminatory action
- Definition
- Filing a complaint procedure
- Allocated period of time a complaint can be filed with the Commission
- Duties of an arbitrator under the Industrial Relations Act
- Order in writing inclusion
- Report to commission
- Allocated period of time to request Arbitrator to deal with the matter of the request
- Notice of application
- Failure to comply with the terms of an order
- Order filed in the court

6. Explain duties of commission officers

- Powers and duties of officers
- Carry out examinations and inspections
- Officer's procedure for carrying out any inspection
- Orders given by officers orally or in writing
- Specifications of an order given by an officer to owner of the place of employment, employer, contractor, sub-contractor, employee, or supplier
- Service of an order
- Prohibition of persons towards an officer in the exercise of his/her power or duties
- Rescinding of an order
- Posting a copy of the order
- Illegal removal of an order

7. Interpret appeals of others
- Allocated period of time for appeal of an order
- Person who may appeal order
- Action taken by Commission when person involved does not comply with the order
- Enforcement of the order
- Notice of application
- Rules of court

8. Emphasize reporting of accidents
- Application of act
- Report procedure
- Reporting notification of injury
- Reporting accidental explosion or exposure
- Posting of act and regulations

SUGGESTED LEARNING ACTIVITIES:

1. Describe repairs or work situations around vehicles that one might want to refuse.
2. Interview someone in the motor vehicle repair trade - report results.

SUGGESTED RESOURCES:

1. Occupational, Health & Safety Act.

EVALUATIONS:
Theory test.
Value for Learning Activities 1 & 2.

NAME AND NUMBER: TS1520 - WHMIS

SUGGESTED DURATION: 6 hours

PREREQUISITES: None

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to interpret and apply the Workplace Hazardous Materials Information System (WHMIS) Regulation.

OVERVIEW OF OBJECTIVES:

1. Define WHMIS.
2. Examine hazard identification and ingredient disclosure.
3. Explain labeling and other forms of warning.
4. Introduce material safety data sheets (MSDS).

CONTENT:

1. Define WHMIS safety
- Rational and key elements
- History and development of WHMIS
- WHMIS legislation
- WHMIS implementation program
- Definitions of legal and technical terms

2. Examine hazard identification and ingredient disclosure
- Prohibited, restricted and controlled products
- Classification and the application of WHMIS information requirements
- Responsibilities for classification
- the supplier
- the employer
- the worker - Classification: rules and criteria
- information on classification
- classes, divisions and subdivision in WHMIS
- general rules for classification
- class A - compressed gases
    - class B - flammable and combustible materials

    - class C - oxidizing material
    - class D - poisonous and infectious material
    - class E - corrosive material
    - class F - dangerously reactive material
- Products excluded form the application of WHMIS legislation
    - consumer products
    - explosives
    - cosmetics, drugs, foods and devices
    - pest control products
    - radioactive prescribed substances
    - wood or products made of wood
    - manufactured articles
    - tobacco or products of tobacco
    - hazardous wastes
    - products handled or transported pursuant to the Transportation of Dangerous Goods (TDG) Act
- Comparison of classification systems - WHMIS and TDG
    - General comparison of classification categories
    - Detailed comparison of classified criteria

3. Explain labeling and other forms of warning

- Definition of a WHMIS label
    - supplier label
    - workplace label
    - other means of identification
- Responsibility for labels
    - supplier responsibility
    - employer responsibility
    - worker responsibility
- Introduce label content, design and location
    - supplier labels
    - workplace labels
    - other means of identification

4. Introduce material safety data sheets (MSDS)

- Definition of a material safety data sheet
- Purpose of the data sheet
- Responsibility for the production and availability of data sheets
    - supplier responsibility
    - employer responsibility
    - workers responsibility

SUGGESTED LEARNING ACTIVITIES:

1. Lectures
2. Class Participation

3. Locate WHMIS labels - describe different sections

SUGGESTED RESOURCES:

1. WHMIS Regulation
2. Sample MSDS sheets

EVALUATIONS:

Theory test
Value for practical project

NAME AND NUMBER: SV1110 - Ozone Depleting Substances

SUGGESTED DURATION: 7 hours

PREREQUISITES: None

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to legally handle ozone depleting substances (refrigerants) used in motor vehicles.

OVERVIEW OF OBJECTIVES:

1. Handle ozone depleting substances (refrigerants) used in motor vehicles as per regulations.

CONTENT:

1. Handle ozone depleting substances (refrigerants) used in motor vehicles as per regulations.

- Curriculum and certification supplied by HRAI to be delivered by instructors certified to teach ODS courses for Motive Power Occupations

SUGGESTED LEARNING ACTIVITIES:

SUGGESTED RESOURCES:

EVALUATIONS:

Test supplied by HRAI.

NAME AND NUMBER: TS1530 - First Aid

SUGGESTED DURATION: 16 hours

PREREQUISITES: None

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to recognize situations requiring emergency action and to make appropriate decisions concerning first aid.

OVERVIEW OF OBJECTIVES:

First Aid Safety Oriented course offered by the St John Ambulance or equivalent.

1. Identify the objectives of first aid and the general principles of safety.
2. Describe what is involved in the application of the Priority Action Approach.
3. Recognize the interdependence of all the systems of the body.
4. Assess emergency situations by doing a primary examination to detect life-threatening conditions.
5. Do a secondary examination when the victim's life is no longer in danger.
6. Describe how sorting is done when the victim has multiple injuries or when there are several casualties.
7. Recognize the signs and symptoms of different emergencies and describe how to treat them.
8. Demonstrate the appropriate general and specific care to be provided in different emergency situations where one or more body systems are failing because of an accident or secondary illness.
9. Select the rescue and transportation method that offers maximum protection for the victim and subjects the rescuer to a minimum of risks.
10. Know when to call on more qualified persons or ask for medical assistance.
11. Prevent accidents by adopting a safety-oriented lifestyle.

CONTENT:

1. As per St John Ambulance or equivalent curriculum.

SUGGESTED LEARNING ACTIVITIES:

1. As per St John Ambulance or equivalent curriculum

SUGGESTED RESOURCES:

EVALUATIONS:

NAME AND NUMBER: SV1120 - Gaskets, Seals and Sealers

SUGGESTED DURATION: 8 hours

PREREQUISITES: SV1100 - SV1110
TS1510 - TS1520
TS1530

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the student will be able to use gaskets, seals and sealing compounds.

OVERVIEW OF OBJECTIVES:

1. Identify types of gaskets, o-rings, seals and sealing compounds and their purposes.

CONTENT:

1. Identify types of gaskets, o-rings, seals and sealing compounds and their purposes

a. Gaskets
- Type and construction
- Purpose
- Installation

b. O-rings
- Types
- Limitations
- Installations

c. Seals
- Types
- Installation

d. Sealing compound
- Room temperature vulcanizing (RTV)

- Anaerobic

SUGGESTED LEARNING ACTIVITIES:

SUGGESTED RESOURCES:

EVALUATIONS:

NAME AND NUMBER: WD2330 - Mig Welding

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1100 - SV1110
TS1510 - TS1520
TS1530

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to describe the basic MIG (GMAW) welding process and provide the trainee with the skills and knowledge needed to use MIG Welding equipment.

OVERVIEW OF OBJECTIVES:

1. Operate MIG welding equipment to industrial safety standards as needed for various motorized equipment.

CONTENT:

1. Operate MIG welding equipment to industrial safety standards as needed for various motorized equipment

a. Equipment used in MIG welding

b. Shielding gases used in MIG welding

c. Filler wire used in MIG welding

d. The basic MIG welding process

e. Advantages of MIG welding

f. Types of MIG welding

g. Proper penetration

h. Electrical system cautions when MIG welding

- Location of ground cables
- Possible bearing damage from welding
- Possible computer and electrical accessory damage from welding
- Procedures to prevent electrical and bearing damage

i. Set up and shut down procedures

SUGGESTED LEARNING ACTIVITIES:

1. Identify the equipment used in MIG welding.
2. Describe the shielding gases used in MIG welding.
3. Describe the filler wire used in MIG welding.
4. Describe the basic MIG welding process.
5. List the advantages of MIG welding.
6. List the types of MIG welding.
7. Weld using MIG equipment.
8. Perform set up and shut down procedures.

SUGGESTED RESOURCES:

EVALUATIONS:

NAME AND NUMBER: WD1300 - Oxy-Fuel Welding

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1100 - SV1110
TS1510 - TS1520
TS1530

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to identify procedures for the safe and effective set up and operation of oxy-fuel equipment for heating, cutting and braze welding.

OVERVIEW OF OBJECTIVES:

1. Operate oxy-fuel heating and cutting equipment to industrial safety standards for the removal and/or installation of parts.
2. Perform braze welding using oxy-fuel equipment.
3. Perform flame cutting with oxy-fuel equipment.

CONTENT:

1. Operate oxy-fuel heating and cutting equipment to industrial safety standards for the removal and/or installation of parts.

a. Safety precautions
- Safety apparel
- Storage and handling of welding gases
- Pre-operational inspection

b. Setting up equipment
- Cylinders
- Gauges
- Regulators
- Valves-flame arrestor
- Torches and tips
- Hoses
- Testing for leaks

c. Operating the torch
- Lighting procedures
- Types of flame (adjustment)
- Shutting down procedures

2. Perform braze welding using oxy-acetylene equipment
- Braze welding

3. Perform flame cutting with oxy-acetylene equipment
- Flame cutting
  - Cutting torch and tips
  - Use of cutting torch

SUGGESTED LEARNING ACTIVITIES:

1. Assemble, test, light and adjust oxy-fuel welding and cutting equipment.
2. Perform braze welding on sheet metal using oxy-fuel equipment.
3. Perform flame cutting with oxy-fuel equipment.
4. Perform proper shut down procedures.

SUGGESTED RESOURCES:

EVALUATIONS:

Theory tests as used in welding department.

NAME AND NUMBER: SV1130 - Electrical & Electronic Basic Principles

SUGGESTED DURATION: 90 hours

PREREQUISITES: SV1100 - SV1110
TS1510 - TS1520

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to apply basic electrical and electronic principles.

OVERVIEW OF OBJECTIVES:

1. Demonstrate knowledge of electrical basic principles.
2. Apply electrical principles using ohms law to calculate volts, ohms and amperes.
3. Use instruments to test components of series, parallel and series parallel circuits to determine cause of malfunctions in an electrical circuit.
4. Identify electronic components.

CONTENT:

1. Demonstrate knowledge of electrical basic principles

a. Safety practices and procedures working with electrical equipment

b. Terminology - abbreviations and glossary of electrical terms

c. Sources of Electricity
- generation of electricity
- use of chemical, magnetism, heat, light and DC power supply
- theory and laws of electricity
- theory and laws of magnetism and inductance

d. Ohms Law - volts, ohms and amperes

e. Symbols and schematics - common automotive symbols
- read schematics/wiring diagrams

2. Apply electrical principles using ohms law to calculate volts, ohms and amperes
- Application of Ohms Law to Electrical Circuits

- Series circuit
- Parallel circuit
- Series and parallel circuit

3. Use instruments to test components of series, parallel and series parallel circuits to determine cause of malfunctions in an electrical circuit

a. Circuit testing devices
- Applications of volt, ohm and ammeters
- Meter ranges
- Correct hookup of meters
- Test lights, circuit breakers

b. Circuit problems and testing problems
- Short, open and grounds
- Diagnostic trouble shooting procedures
- Testing procedures and equipment

4. Identify electronic components

a. Wires and terminals
- Types and sizes
- Terminals and connectors
- Conductors, semi conductors and insulators

b. Fibre Optics
- Basics

c. Capacitors
- Construction
- Purpose
- Uses

d. Resistors
- Identification
- Purpose
- Uses

e. Transistors
- Identification
- Purpose
- Uses

f. Diodes
- Identification
- Purpose
- Uses

SUGGESTED LEARNING ACTIVITIES:

1. Classroom Theory
2. Read schematics and wiring diagrams
3. Familiarize learner with circuit testing devices
4. Use circuit testing devices.
   - ampmeter
   - ohmmeter
   - voltmeter
   - test lights
5. Apply Ohms Law to Electrical Circuit
6. Identify wires and terminals
   - demonstrate back probing
7. Test electronic circuits

SUGGESTED RESOURCES:

EVALUATIONS:

1. Theory mark
2. Practical evaluation

NAME AND NUMBER: SV2680 - Basic Motive Power Computers

SUGGESTED DURATION: 60 hours

PREREQUISITES: SV1130

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to diagnose and/or repair/reprogram motive power computers.

OVERVIEW OF OBJECTIVES:

1. Explain the basic operation of computers.
2. Explain how and why computers are used to control vehicle systems.
3. Demonstrate ability to follow safety precautions associated with computers and electronics components.
4. Demonstrate understanding of scan tools and their operation.

CONTENT:

1. Explain the basic operation of computers

a. Rationale - reasons for using electronic controls
- more accurate control
- less change in emissions and performance with accumulated mileage

b. Basic computer systems
- computers - compared to brain
- inputs - information to brain
- outputs - commands from brain

c. Computer operation
- basic CPU
- types of memory - RAM, ROM, PROM, EEPROM
- input and output interfaces
- clock speed
- feeds (power) and grounds for computers

d. Input circuits

- discreet inputs
- analogue inputs
- 2-wire sensor systems
- 3-wire sensor systems

e. Output circuits
- high side and low side control of circuits
- pulse width modulation (PWM)
- current limiting protection in newer computers versus burn-out of older units with no self-protection

f. Sensing devices
- switches
- thermistors
- potentiometers
- pressure sensors
- permanent magnet (PM) generators
- hall effect switches
- LED operated
- knock sensors

g. Feedback systems
- open loop versus closed loop operation
- oxygen sensors

h. Adaptive learning
- purpose for adaptive strategies of computer systems
- short term versus long term memories
- ways of describing variation - counts or percentages
- conditions versus commands - what does 115 integrator counts or long-term fuel trim of 110% means

i. Output systems
- solenoids - on-off and PWM
- relays
- stepper motors
- lights
- trouble codes and diagnostic information

2. Explain how and why computers are used to control vehicle systems
- Electrical and electronic fundamentals

3. Demonstrate ability to follow safety precautions associated with computers and electronics components
- Construction and programmability of computers

- Use of original PROMS and knock sensor calibrators
- Programming of reprogrammable type before use

4. Demonstrate understanding of scan tools and their operation

a. Scan tools
- Test circuitry for operation and defects
- Clear codes
- Road test with scanners and data recorders

b. Understand J 1930 technology

c. Test computer output sensors
- Solenoids/on off and PWM
- Relays
- Stepper motors
- Lights
- Trouble codes and diagnostic information

d. Sensing Devices

e. Wiring Diagrams
- Power and ground wiring and connectors
- Proper procedure for testing

f. Use of Logical Approach to Diagnosis
- Verify complaint
- Preliminary checks (visual, operational, and other systems)
- Diagnostic systems check (check operational of MIL)
- Check for service bulletins
- Check for diagnostic trouble codes (DTC's)
- Use symptoms diagnostic charts
- Repair and verify operation

g. Diagnostic Tools
- Shop manuals and other printed or electronic service information
- Digital VOM
- Various test lights - 12 volt - noid
- Pressure gauges
- Injector testers
- Test connector sets (for testing weatherproof terminal circuits)

h. Specific Tests
- Precautions with static electricity
- Diagnostic system check
- Computer feeds and grounds - voltage drops
- Use of scan tools to check inputs

- Use of VOM and oscilloscopes to check inputs
- Snap-shot functions in scan tools
- Fuel injector balance tests and current tests
- Fuel pump output tests

SUGGESTED LEARNING ACTIVITIES:

1. Demonstrate ability to use diagnostic tools.
2. Access trouble codes and analyze information received.
3. Interpret service manuals for wiring diagrams, flow charts and trouble shooting guides.

SUGGESTED RESOURCES:

- Scanners
- Break out boxes
- Manufacturers specific scan tools
- Engine analyzers
- Lab-type oscilloscopes
- Portable scanners

EVALUATIONS:

NAME AND NUMBER: SV1140 - Hydraulic Basic Principles

SUGGESTED DURATION: 30 hours

PREREQUISITES: None

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon completion of this course, the apprentice will be able to apply basic hydraulic principles by using Pascal's Law to calculate force and fluid pressure as applied to Motive Powered Equipment.

OVERVIEW OF OBJECTIVES:

1. Apply basic hydraulic principles.
2. Identify basic hydraulic components and systems and their applications.
3. Interpret and use hydraulic symbols and diagrams.
4. Identify safety practices.

CONTENT:

1. Apply basic hydraulic principles
- Definition of Pascal's Law
- Multiplication of force
- Using the formulas, calculate area, pressure, force
- Bernoulli's principle
- Advantages of hydraulic systems
- Hydrodynamics
- Hydrostatic
- Types of properties of hydraulic fluid
    - viscosity
    - friction
    - flow
    - volume
    - velocity
    - laminar
- Pressure
    - imperial
    - metric

- Force
- Energy
- Work
- Power
- Torque
- Pressure gauge
- Absolute pressure

2. Identify basic hydraulic components and systems and their applications
- Basic hydraulic components
    - pump
    - hydraulic actuator
        - linear
        - rotary
    - pressure control valve
    - directional control valve
    - volume control valve
    - reservoir
    - hoses
- Types of hydraulic systems
    - open-center
    - close-center
    - advantages and disadvantages of different systems

3. Interpret and use hydraulic symbols and diagrams
- Recognize symbols commonly used in hydraulic diagrams
- Interpretation of schematics and diagrams
    - pictorial drawing
    - cutaway drawing
    - symbol drawing
    - exploded views

4. Identify safety practices
- Blocking prior to removal (procedures)
- Releasing system pressure

SUGGESTED LEARNING ACTIVITIES:

SUGGESTED RESOURCES:

EVALUATIONS:

NAME AND NUMBER: SV1150 - Service Information Systems

SUGGESTED DURATION: 30 hours

PREREQUISITES: None

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to select and use different types of service manuals found in heavy equipment and truck and transport.

OVERVIEW OF OBJECTIVES:

1. Use operator's manual.
2. Use maintenance and lubrication manual.
3. Use service manual.
4. Use parts manual.
5. Use special bulletins.
6. Computerized information systems.

CONTENT:

1. Use operator's manual
- Methods of using
- Interpretation of sections

2. Use maintenance and lubrication manual
- Methods of using
- Interpretation of sections

3. Use service manual
- Methods of using
- Interpretation of sections

4. Use parts manual
- Methods of using
- Interpretation of sections

5. Use special bulletins

- Methods of using
- Purpose
- Interpretation
- Introduction to computers
    - computerized parts information
    - computerized service and repair information

6. Computerized information systems
- Work order
- Warranty claims
- Time ticket
- Tracking procedures
- Computerized Info System
- Electronic service

SUGGESTED LEARNING ACTIVITIES:

1. Find serial number of a vehicle on the following items:
- chassis
- motor
- transmission

2. With the appropriate manual, find the type and amount of hydraulic oil recommended on a vehicle.

3. With the appropriate manual find the step by step removal procedure of the engine and transmission of a vehicle.

4. With the appropriate manual, make a parts list of a cylinder head.

SUGGESTED RESOURCES:

1. Manufacturer's manual.
2. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV1160 - Hand Tools

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1100 - SV1110
TS1510 - TS1520
TS1530
SV1150

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to use and maintain hand tools.

OVERVIEW OF OBJECTIVES:

1. Use and maintain hand tools.
2. Use and maintain cutting tools.
3. Use and maintain measuring tools.
4. Use and maintain miscellaneous tools.

CONTENT:

1. Use and maintain hand tools

- Screwdrivers
  - standard
  - Phillips
  - Robertson
  - Torex
- Reconditioning procedures
- Correct use and care
  - reed and prince
  - offset
  - stubby
  - screw starters
- Pliers
  - combination

- gripping
- cutting
- vise-grips
- snap ring
- needle nose
- hose clamp
    - proper use and care

- Wrenches
    - open-end
    - box ends
    - ratcheting box ends
    - flex-head box ends
    - obstruction wrenches
    - striking wrenches
    - special-purpose box wrenches
    - adjustable wrenches
    - pipe wrenches
    - spanner wrenches
    - allen & multispline wrenches
        - recognition of sizes (imperial and metric)
        - proper use and care
- Sockets and drives
    - drive sizes
    - sockets points
    - deep sockets
    - flexible sockets
    - impact socket
    - drive handle
    - ratchet
    - universal joint
    - adapters
    - extensions
    - speed handles
    - recognition of sizes (imperial and metric)
    - proper use and care
- Hammers
    - ball peen hammer
    - cross peen hammer
    - plastic tip hammer
    - brass-headed hammer
    - rubber mallet hammer
    - dead blow hammer
    - sledgehammer
- Hammer handles
    - installation procedures
    - proper use and care

- Punches
  - starting punch
  - pin punch
  - center punch
  - aligning punch
  - reconditioning procedures
  - proper use and care
- Torque wrenches
  - types
  - sizes
  - purpose
  - proper use and care
- Torque multiplier
- Torque rods (stick)

2. Use and maintain cutting tools

- Chisels
  - flat chisel
  - cape chisel
  - round nose cape chisel
  - diamond point chisel
  - rivet buster chisel
- Chisel holder
- Reconditioning procedures
- Proper use and care
- Hacksaws
  - types and designs
  - blades classification and selection
  - proper use and care
- Files
  - types and designs
  - file handle
  - file card
  - proper use and care
- Twist drills
  - types and designs
  - sharpen procedures
  - recognition of sizes (imperial and metric)
  - proper use and care

- Taps
  - taper taps
  - plug taps
  - bottoming taps
  - recognition of sizes (imperial and metric)
  - tap handle

    - proper use and care
- Dies
    - types
    - recognition of sizes (imperial and metric)
    - dies stock
    - proper use and care
- Thread restorers
    - types and designs
    - proper use and care

3. Use and maintain measuring tools
- Steel rules and squares
- Calipers
- Micrometers
- Dial indicators
- Small hole gage
- Telescoping gage
- Vernier caliper
- Protractors
- Dividers
- Wire gage
- Drill gage
- Screw pitch gage
- Feeler gage
- Proper use and care

4. Use and maintain miscellaneous tools
- Stud extractors
- Bushing and seal drivers
- Magnetic pickup tools
- Mechanical pickup tools
- Inspection Mirrors
- Stamping sets
- Stethoscope

SUGGESTED LEARNING ACTIVITIES:

1. Bench work projects to include the use of common hand tools, metal cutting, filing, measuring, drilling, tapping, threading and broken stud removal.

2. Sharpen a twist drill.

SUGGESTED RESOURCES:

EVALUATIONS:

NAME AND NUMBER: SV1170 - Shop Tools and Equipment

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1160

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the trainee will be able to use and maintain shop tools and equipment.

OVERVIEW OF OBJECTIVES:

1. Use and maintain shop tools.
2. Use and maintain shop equipment.

CONTENT:

1. Use and maintain shop tools

- Power tools
    - impact wrenches
    - hand impact wrench
    - air ratchet
    - air chisels
    - air hammers
    - electric impact wrench
- Electric drills
- Air drills
- Air lines
- Air nozzles
- Air regulators
- Face shield
- Safety goggles
- Drill press
- Hydraulic press
- Floor jacks
- Hand jack
- Transmission jack
- Portable crane

- Overhead crane
- Hoist crane safety standards
- Chain hoist
- Hoists
- Safety stands
- Lifting cables, slings and chains
- Cleaning equipment
    - solvent washers
    - pressure washers

2. Use and maintain shop equipment

- Bench grinders
- Portable grinders
- Grinding wheels
- Grinder accessories
    - wire wheels
    - wheel dressers
    - eye shields
    - pedestal
- Pullers
    - gear and bearing pullers
    - slide hammer pullers
    - steering pullers
    - blind hole pullers
    - puller attachments
    - bench vises
    - vise jaw covers
    - extension lights
    - creepers

SUGGESTED LEARNING ACTIVITIES:

1. Raise a vehicle, blocking it using safety stand and cross blocking.
2. Wash a vehicle or a component with pressure washer equipment.

SUGGESTED RESOURCES:

1. Automotive Service and Repair Tools (Hill).
2. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV1180 - Fasteners, Tubings and Fittings

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1160

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to select and use common fasteners, tubing and fittings found in heavy equipment and truck and transport.

OVERVIEW OF OBJECTIVES:

1. Select and use fasteners.
2. Select and use different types of tubing and hoses.
3. Select and use different types of fittings.
4. Select and use flaring tools.

CONTENT:

1. Select and use fasteners.

- Bolts
- Capscrews
- Nuts
- Studs
- Threads classification
    - imperial and metric
- Grade markings
- Theory of torquing
- Torquing pattern
- Torque chart
- Washers
    - flat washer
    - lock washer
    - external spring washer
    - internal spring washer
- Machines screws
- Sheet metal screws

- Self tapping screws
- Keys and pins
  - woodruff keys
  - square keys
  - cotter pins
  - spring pins
  - tapered pins
  - clevis pins
- Locking devices
  - functions
  - types
- Liquid compounds
  - lock-type compounds
  - antiseizure compounds

2. Select and use different types of tubing and hoses
- Steel tubing
- Copper tubing
- Plastic tubing
- Rubber tubing
- Recognition of sizes

3. Select and use different types of fittings
- Types of low pressure fittings
- Types of flares
- Types of threads
- Torque limitation of fitting
- Thread sealers

4. Select and use flaring tools
- Flaring tool kit
- ISO flaring
- Tubing cutter
- Deburring tool
- Tubing bender
- Tubing wrenches
- Cutting, bending and flaring procedures

SUGGESTED LEARNING ACTIVITIES:

1. Cut, flare, bend and connect copper and steel tubing.

SUGGESTED RESOURCES:

1. Automotive Service and Repair Tools (Hill).
2. Diesel Mechanics.
3. FOS Fasteners (Deere).
4. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV1190 - Lubrication and Fluid Services

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1100 - SV1110
SV1120
TS1510 - TS1520
SV1150 - SV1180

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to perform engine oil and filter changes, chassis lubrication and service automatic lubrication systems.

OVERVIEW OF OBJECTIVES:

1. Select and use different types of oil.
2. Change engine oil.
3. Change engine oil filter.
4. Start and run engine.
5. Select and use different types of grease.
6. Lubricate vehicles chassis.
7. Repair and service automatic lubrication systems.
8. Disposal of used lubricants.
9. Oil analysis.

CONTENT:

1. Select and use different types of oil
- Oil classification
  - API
  - SAE
- Oil viscosity
- Oil additive
- Function of the oil
- Oil selection
- Recognition of contaminated fluid
- Hydraulic oil
  - function

  - classification
  - selection
- Gear oil
  - function
  - classification
  - selection

2. Change engine oil
- Procedures for draining the oil
- Precautions with hot oil
- Cleaning drain plug
- Filling procedures
- Importance of cleanliness
- Checking oil level
- Proper torque of drain plug
- Storage of used oil

3. Change engine oil filter
- Construction of filter
- Types of filter
- Selection of filter
- Oil filter removal
- Oil filter seals
- Importance of cleanliness

4. Start and run engine
- Check for oil leaks
- Check engine oil pressure
- Check oil level

5. Select and use different types of grease
- Properties of grease
  - function
  - classification
  - selection
- Type of grease
  - wheel bearing grease
  - universal joint grease
  - chassis grease
  - high temperature grease
  - multipurpose grease

6. Lubricate vehicles chassis
- Grease gun (hand and air)
- Lubrication lines
- Grease fitting

- Refilling the grease gun
- Grease gun adapters
- Oilers
- Storage and handling grease
- Lubricating charts

7. Repair and service automatic lubrication systems
- Types of systems
- Purpose
- Systems operations
    - reservoir
    - lubrication points
    - lubrication lines
    - regulator function
- Warning malfunction
- Reservoir refilling
- Procedures to repair hoses and fittings

8. Disposal of used lubricants
- Environmental issues
- Health issues
- Filter crushers

9. Oil analysis.
- Contamination of sample
- Interpretation of analysis
- Identification of contaminants
- Collection of specimen

SUGGESTED LEARNING ACTIVITIES:

1. Change engine oil and filter on a vehicle.
2. Perform a complete lubrication service on a vehicle.
3. Check fluid level on vehicles components.

SUGGESTED RESOURCES:

1. FOS - Fuels, Lubricants and Coolants (Deere).
2. Diesel Mechanics.
3. FOS - Hydraulics (Deere)
4. Vehicle's service manual
5. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: WD2320 - Arc Welding

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1100 - SV1110
WD1300
TS1510 - TS1520
SV1150
SV1170

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to set up and perform basic arc welding.

OVERVIEW OF OBJECTIVES:

1. Apply safety rules with arc welding.
2. Use electric arc welding equipment.
3. Use different types of electrodes.
4. Use personal protective equipment to arc weld.
5. Set up welding equipment.
6. Strike an arc and run stringer beads.

CONTENT:

1. Apply safety rules with arc welding
- Proper ventilation
- Rays
    - ultraviolet
    - infrared
- Danger of high voltage
- Danger of damp areas

2. Use electric arc welding equipment.
- Types of welding machines
    - generators
    - transformer
    - rectifiers
- Electrodes holder

- Ground clamp
- Protective shield
- Welder's clothing
- Cables
- Chipping hammer

3. Use different types of electrodes
- AWS
- ASTM
- Classification
  - E-6011
  - E-7018
- Selecting the electrode
  - quality of weld requirement
  - weld position
  - joint design
  - welding speed
  - composition of base metal
  - storing the electrodes

4. Use personal protective equipment to arc weld
- Protective equipment
  - wear goggles
  - head shield or helmet
  - gloves
  - aprons
  - shoes

5. Set up welding equipment
- Safety precautions
  - safety equipment
  - electrical connection
  - properly grounded machine
- Procedures to set the current

6. Strike an arc and run stringer beads
- Starting the arc
- Length of arc
- Travel speed
- Forming the crater
- Types of joints
- Cleaning metals to be welded
- Angle of electrode

SUGGESTED LEARNING ACTIVITIES:

1. Strike and maintain an arc.
2. Fillet weld flat position.

SUGGESTED RESOURCES:

1. Learning activity package for unit IMP 1105.
2. FOS - Welding (Deere)
3. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV1260 - Hydraulic Brakes

SUGGESTED DURATION: 60 hours

PREREQUISITES: SV1140
SV1190

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to remove, disassemble, repair, assemble and install hydraulic brake systems and components used in heavy equipment and truck and transport.

OVERVIEW OF OBJECTIVES:

1. Remove, repair and replace a master cylinder.
2. Remove, repair and replace drum type brakes.
3. Remove, repair and replace wheel cylinders.
4. Remove, repair and replace disc type brakes.
5. Remove, repair and replace parking brakes.
6. Remove, repair and replace brake lines.
7. Bleed brake systems.
8. Diagnose hydraulic brake problems.

CONTENT:

1. Remove, repair and replace a master cylinder

- Fundamentals of brake systems
  - kinetic energy
  - heat
  - friction
  - coefficient of friction
  - heat dissipation
  - hydraulic principles
  - action of primary and secondary shoe
  - servo brakes
- Types of master cylinders
- Removal and installation procedures
- Identifications of parts

- Cleaning procedures
- Repair procedures
- Bleeding of the master cylinder
- Adjust brake pedal free play
- Types and function of hydraulic valves
    - proportional valve
    - metering valve
    - brake warning switch
    - combination valve

2. Remove, repair and replace drum type brakes
- Removal and installation of brake drum
- Removal of brake shoes
- Lining condition and wear
- Brake shoe arc
- Method of attaching lining to shoe
- Lubrication
- Adjustments
    - minor and major
- Measure drum for wear
- Machine drum
- Self-adjusting brakes
- Automatic star wheels
- Return springs
- Identification of primary and secondary shoe
- Backing plate

3. Remove, repair and replace wheel cylinders
- Types of wheel cylinders
- Removal and installation procedures
- Identification of parts
- Cleaning procedures
- Repair procedures
- Bleeding the system

4. Remove, repair and replace disc type brakes
- Operating principle
- Types
- Component identification
- Removal and installation of brake disc
- Removal and installation of caliper
- Recondition caliper
- Check brake pad wear and contamination
- Measure disc wear
- Machine brake disc

5. Remove, repair and replace parking brakes
- Lever and fulcrum theory
- Mechanical advantage
- Application
- Types and designs
    - external band
    - internal shoe
    - drive shaft type
    - wheel type
- Parking brake lock mechanism
- Adjustment

6. Remove, repair and replace brake lines
- Brake lines
- Fittings
- Repair and replacement procedures
- Safety rules to follow

7. Bleed brake systems
- Types of fluids
- Properties of fluids
- Replacement of fluids
- Bleeding methods
    - pressure
    - gravity
    - procedures for bleeding
- Power boosters
    - hydraulic boost
    - vacuum

8. Diagnose hydraulic brake problems
- Procedures to diagnose hydraulic brakes problems
    - brake pedal goes to floorboard
    - one brake drag
    - all brake drag
    - vehicle pulls to one side
    - soft or spongy pedal
    - poor braking action
    - brakes too sensitive
    - noisy brakes
    - air in system
    - loss of brake fluid
    - brakes do not self-adjust
    - warning light comes on

SUGGESTED LEARNING ACTIVITIES:

1. Disassemble, repair and assemble a master cylinder.
2. Disassemble, repair and assemble drum brakes.
3. Disassemble, repair and assemble disc brakes.
4. Machine drum and rotor.

SUGGESTED RESOURCES:

1. Diesel Equipment I (Schulz).
2. Auto Technology (Nash).
3. Auto Service and Repair (Stockel).
4. Heavy Equipment Repair (Nichols).
5. Service manual.
6. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV1270 - Air Brakes

SUGGESTED DURATION: 60 hours

PREREQUISITES: SV1260

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to remove, disassemble, repair, assemble and install air brake systems and components used in heavy equipment and truck and transport.

OVERVIEW OF OBJECTIVES:

1. Remove, repair and replace air compressors.
2. Remove, service and install reservoir.
3. Disassemble, repair and assemble air valves.
4. Inspect, repair or replace air chambers.
5. Remove, repair and install drum type brake.
6. Remove, service and install slack adjuster.
7. Service air dryer.
8. Remove, repair and install air over hydraulic chamber.
9. Diagnose air brake problems.

CONTENT:

1. Remove, repair and replace air compressors

- Fundamentals of air brake systems
- Air as a force multiplier
- Major components of air brakes systems and functions
    - compressor
    - reservoir
    - valves
    - brake chamber
    - brake shoes and drums
    - indicator and warning devices
- Compressors
    - types
    - classifications

    - operating principles
- Removal and replacement procedures
- Repair procedures
- Maintenance
- Troubleshooting

2. Remove, service and install reservoir
- Types
    - dry
    - wet
- Purpose
- Classification
- Safety valves
- Repair procedures and caution

3. Disassemble, repair and assemble air valves
- Operating principles of the following valves
    - foot valve
    - quick release valve
    - relay valve
    - hand valve
    - limiting valve
    - tractor protection valve
    - automatic reservoir drain valve
    - check valve (single and double)
- Repair procedures

4. Inspect, repair or replace air chambers
- Brake chamber
    - types and designs
    - functions
    - inter-relationship of mechanical components
    - principle of operations
    - adjustment methods and limitations
    - reconditioning procedures and precautions

5. Remove, repair and install drum type brake
- Types
    - cam
    - wedge
- Removal and installation procedures of brake drum
- Removal of brake shoes
- Check lining condition and wear
- Sequence of bolting the brake lining to shoe
- Installation procedures of brake shoe to backing plate
- Lubrication

6. Remove, service and install slack adjuster
- Types
  - manual
  - automatic
- Operation
- Servicing
- Adjustment procedures

7. Service air dryer
- Types
  - air dryer
  - alcohol evaporators
- Purpose
- Service procedures

8. Remove, repair and install air over hydraulic chamber
- Air over hydraulic brakes
  - types and designs
  - principles of operation
  - recognition and function of major components
  - service procedures
  - cylinder reconditioning precautions
  - relationship to other hydraulic systems
  - repair procedures and caution
  - adjustments
- Brake accumulator
  - purpose
  - types
  - precautions

9. Diagnose air brake problems
- Procedures to diagnose air brakes problems
- Reservoir leaking or water accumulation
- Low or high air pressure
- Frozen air lines
- Camshaft and bushing wear
- Poor braking performance, etc

SUGGESTED LEARNING ACTIVITIES:

1. Disassemble, repair and assemble air compressors.
2. Disassemble, repair and assemble air valves.
3. Disassemble, repair and assemble drum and disc brakes.

4. Disassemble, repair and assemble air-packed (air over hydraulic unit).

SUGGESTED RESOURCES:

1. Diesel Equipment I (Schulz).
2. Air Brake Manual (Province of NB).
3. Heavy Equipment Repair (Nichols).
4. Service Manual.
5. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV2570 - Engine Brakes and Retarders

SUGGESTED DURATION: 15 hours

PREREQUISITES: SV1270

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to service, repair and adjust engine brakes and retarders.

OVERVIEW OF OBJECTIVES:

1. Inspect, repair and adjust engine brakes.
2. Inspect, repair and adjust retarders.
3. Diagnose engine brakes and retarders problems.

CONTENT:

1. Inspect, repair and adjust engine brakes

- Purpose of engine brakes
  - types
  - operation
  - components
  - electric circuit
- Exhaust system compression brakes
  - types
  - operation
  - components
- Maintenance recommendations
  - testing procedures
  - adjustment procedures
  - troubleshooting

2. Inspect, repair and adjust retarders

- Types
- Operation
- Components
- Hydraulic and electric circuits

3. Diagnose engine brakes and retarders problems
- Maintenance recommendations
- Testing procedures
- Troubleshooting

SUGGESTED LEARNING ACTIVITIES:

1. Service and adjust engine brakes.

SUGGESTED RESOURCES:

1. Diesel Equipment I (Schulz).
2. Service Manual.
3. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV1280 - Drive Lines

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1190

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to remove, repair and install drive lines used on heavy equipment and truck and transport.

OVERVIEW OF OBJECTIVES:

1. Remove, repair and install drive lines.
2. Remove and install universal joints.
3. Remove and install center support bearing.
4. Diagnose drive shaft problems.

CONTENT:

1. Remove, repair and install drive lines
- Purpose of drive lines
- Types of drive lines
    - hotchkiss
    - rubber element
    - two-piece
- Construction details
    - provision for balance
    - provision for variation in length
- Removal and installation procedures

2. Remove and install universal joints
- Purpose of universal joints
- Types
    - cross and roller
    - constant-velocity
- Limitations of U-joints
- Removal and installation procedures
- Provision for lubrication

- Journal cross phasing
- Shaft alignment
- Shaft balancing

3. Remove and install center support bearing
- Purpose
- Types

4. Diagnose drive shaft problems
- Procedures to diagnose faulty drive lines
    - vibrations
    - out of phasing
    - out of balance
    - angles limitations
    - common failures
    - manufacturer's specifications

SUGGESTED LEARNING ACTIVITIES:

1. Remove and replace drive shaft, check phasing, alignment and shaft angle.
2. Remove, service and install universal joint.

SUGGESTED RESOURCES:

1. Diesel Equipment II (Schulz).
2. Automotive Service and Repair (Stockel).
3. FOS Power Trains (Deere).
4. Service Manual.
5. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV1300 - Engine Principles

SUGGESTED DURATION: 75 hours

PREREQUISITES: SV1190

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to be familiar with internal combustion engines and components.

OVERVIEW OF OBJECTIVES:

1. Identify and describe the components of engines.
2. Describe the operation of all major parts and their purpose within the engines.

CONTENT:

1. Identify and describe the components of engines

- Engine operating theory
    - matter
    - mass
    - energy
    - inertia
    - force
    - momentum
    - torque
    - work
    - mechanical power
    - friction
    - combustion
    - atmospheric pressure
    - vacuum
    - laws of gases
        - Boyle's law
        - Charlie's law

2. Describe the operation of all major parts and their purpose within the engines

- Principle of engine operation
  - Stroke
  - Bore
  - Throw
  - Top dead center
  - Bottom dead center
  - Valve timing (diagram)
  - Firing order
  - Compression ratio
  - Volumetric efficiency
  - Mechanical efficiency
  - Reciprocating and rotating movement
  - Piston displacement
  - Clearance volume
  - Total volume
  - Scavenging
  - Engine clutches
  - 2 strokes
  - 4 strokes
- Horsepower
  - indicated HP
  - friction HP
  - flywheel or brake HP
  - drawbar HP
  - power take-off HP
  - rated HP
- Engine support system
  - cooling
  - lubrication
  - fuel
  - air intake
  - exhaust
- Cylinder head
- Valves
- Valve train
- Camshaft
- Cylinder block
- Sleeves
  - dry and wet
- Pistons
- Rings
- Connecting rod
- Crankshaft
- Bearings
- Lubrication pump
- Oil cooler

- Water pump
- Flywheel
- Intake manifold
- Exhaust manifold
- Valve arrangements
    - I head
    - H head
    - F head
    - L head
    - T head
- In line engine
- V-engine
- Overhead camshaft
- Cooling system
    - air
    - liquid
- Gasoline engine
- Diesel engine
- Combustion chambers design
    - open combustion
    - pre-combustion
    - turbulence combustion
    - energy cells
- Disassembly procedures of engine
- Procedures to measure engine dimensions
- Procedures to assemble engine
- Importance of following manufacturer's recommendations and specifications

SUGGESTED LEARNING ACTIVITIES:

SUGGESTED RESOURCES:

1. FOS - Engines (Deere).
2. Automotive Technology (Nash).
3. Diesel Mechanics (Schulz).
4. Auto Service and Repair (Stockel).
5. Service Manual.
6. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV2580 - Engine Removal and Installation

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1110
SV1190
SV1300

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to remove and reinstall engines according to manufacturer's recommended procedures.

OVERVIEW OF OBJECTIVES:

1. Remove an engine.
2. Inspect parts for wear.
3. Install engine.
4. Test engine operation.

CONTENT:

1. Remove an engine

- Systems drainage
  - oil
  - coolant
  - hydraulic fluid (if applicable)
- Disconnect and identify
  - electrical wires
  - hydraulic lines
- Disconnecting engine from transmission
- Supporting the transmission
- Suitable engine hoist
- Removing engine from chassis
- Precautions
- Following service manual recommendations

2. Inspect parts for wear

- Inspect engine mounts
- Check for loose or worn parts
- Check linkages operation

3. Install engine
- Installation procedures
- Importance of proper alignments of parts
- Torque attaching bolts
- Reconnect all attaching components
- Refill systems

4. Test engine operation
- Start engine
- Check oil pressure
- Check for leaks
- Check for abnormal noise
- Check linkage operation
- Follow manufacturer's recommendations

SUGGESTED LEARNING ACTIVITIES:

1. Remove and reinstall an engine.

SUGGESTED RESOURCES:

1. Diesel Mechanics (Schulz).
2. Auto Service and Repair (Stoccel).
3. Service Manual.
4. Use appropriate audio-visual material where available.
5. Reverse fan (Heavy Equipment only).

EVALUATIONS:

NAME AND NUMBER: SV1310 - Cooling Systems

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1300 - SV2580

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to service and repair engine cooling systems and components.

OVERVIEW OF OBJECTIVES:

1. Remove, repair and replace cooling systems.
2. Remove, service and replace radiators.
3. Remove, repair and replace water pump.
4. Remove, service and install thermostat.
5. Remove, service and install fans.
6. Drain, flush and refill the cooling systems.
7. Remove, repair and replace air cooling systems.
8. Service and repair cab heating systems.
9. Engine heater.
10. Diagnose cooling system problems.

CONTENT:

1. Remove, repair and replace cooling systems

- Types of cooling systems
  - liquid cooled
  - air cooled
- Purposes of cooling systems
- Heat dissipation
  - convection
  - radiation
  - conduction
- Cooling system components and functions
  - water pump
  - radiator
  - pressure caps

- auxiliary tank
- thermostat
- fan
- fan drive
- water jackets
- shutterstat and control
- connecting pipes and hoses
- liquid or coolant
- filters and conditioners

2. Remove, service and replace radiators
- Types of radiators
- Construction
- Removal procedures
- Cleaning procedures
- Installation procedures
- Pressurizing the system using pressure tester
- Construction of radiator caps

3. Remove, repair and replace water pump
- Types of pumps
- Construction
- Removal procedures
- Repair procedures
- Installation procedures
- Adjustment of belts

4. Remove, service and install thermostat
- Types of thermostats
- Construction
- Opening temperature interpretation
- Removal procedures
- Testing procedures
- Installation procedures

5. Remove, service and install fans
- Types of fans
  - pusher
  - suction
  - application
  - viscous fan drive
  - thermatic fan drive
- Removal procedures
- Inspection
- Installation procedures

6. Drain, flush and refill the cooling systems
- Drainage procedures
- Flushing procedures
- Refilling procedures
- Antifreeze ratio mixtures
- Recycling, storage, etc antifreeze
- Methods of testing
    - ph
    - density
- Conditioners

7. Remove, repair and replace air cooling systems
- Shrouds
- Fan
- Thermostat application
- Fan drive
- Removal and installation procedures

8. Service and repair cab heating systems
- Cab heating systems
    - types
    - principles of operation
    - recognition of components
    - heater controls
    - installation procedures
    - bleeding procedures

9. Engine heater
- Types
    - block heaters
    - in line heaters
    - external sources
    - oil based heaters
- Function
- Installation procedures

10. Diagnose cooling system problems
- Cooling system troubleshooting
    - overheating
    - under heating
    - external leakage
    - internal leakage
    - exhaust gas leakage
    - restricted air flow
    - defective thermostat
    - rust and scale accumulation

- air in coolant
- worn or loose fan belt
- defective pressure cap

SUGGESTED LEARNING ACTIVITIES:

1. Drain, flush and pressure test a cooling system.
2. Remove, service and install a thermostat.
3. Remove, repair and install a water pump.
4. Check antifreeze strength in cooling systems.

SUGGESTED RESOURCES:

1. FOS - Engines (Deere).
2. Diesel Mechanics (Schulz).
3. Auto Service and Repair (Stockel).
4. Service Manual.
5. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV1320 - Lubrication Systems

SUGGESTED DURATION: 15 hours

PREREQUISITES: SV1190 - SV1300

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to service and repair engine lubrication system and components.

OVERVIEW OF OBJECTIVES:

1. Service and repair engine lubrication systems.
2. Service and repair engine oil pump.
3. Service and repair engine oil cooler.
4. Check engine oil pressure.
5. Diagnose lubrication system problems.

CONTENT:

1. Service and repair engine lubrication systems
- Purpose of lubrication systems
- Types of lubrication systems
    - splash
    - pressurized
    - by-pass
    - full flow
    - combination
- Components of lubricating systems
    - oil pump
    - oil filter
    - oil cooler
    - oil pans
    - pressure regulating valve
    - oil filter by pass valve
    - oil cooler by pass valve
    - relief valve

2. Service and repair engine oil pump

- Types of oil pumps
  - gears
  - rotor
- Scavenging
- Disassembly procedures
- Inspecting and measuring pump wear
- Following manufacturer's specifications
- Reassembly procedures

3. Service and repair engine oil cooler
- Disassembly procedures
- Inspecting and testing oil cooler
- Reassembly procedures

4. Check engine oil pressure
- Installation of pressure gauge
- Importance of engine operating temperature
- Checking pressure at low and high speed
- Following manufacturer's recommendations

5. Diagnose lubrication system problems
- Lubrication system troubleshooting
  - low oil pressure
  - high oil pressure
  - interpretation of oil contaminants
  - excessive oil consumption
  - oil leakage

SUGGESTED LEARNING ACTIVITIES:

1. Repair and install an engine oil pump.
2. Check engine oil pressure on an engine.

SUGGESTED RESOURCES:

1. FOS - Engines (Deere).
2. Diesel Mechanics (Schulz).
3. Auto Service and Repair (Stockel).
4. Service Manual.

EVALUATIONS:

NAME AND NUMBER: SV1330 - Air Filtration and Exhaust Systems

SUGGESTED DURATION: 30 hours

PREREQUISITES: WD2320 - SV1300

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to remove, service and install engine air cleaners and exhaust system used on heavy equipment and truck and transport.

OVERVIEW OF OBJECTIVES:

1. Remove, service and replace air filtration systems.
2. Remove, service and install air cleaners.
3. Service and repair exhaust systems.
4. Test for and diagnose problems in air filtration and exhaust systems.

CONTENT:

1. Remove, service and replace air filtration systems
- Construction of air cleaning systems
- Purpose of air cleaning systems
- Types and designs
    - dry types
    - wet types
- Air cleaner system components
    - air filter
    - safety filter
    - spiral rotor air cleaner (Donaclone)
    - air silencers
    - pre-cleaner
    - restriction indicator
    - crankcase ventilation system

2. Remove, service and install air cleaners
- Dry type
    - element removal procedures

    - applicable cleaning procedures
    - inspection
    - importance of following manufacturer's specifications
    - importance of cleanliness
    - installation procedures
- Wet type
    - removal procedures
    - cleaning procedures
    - importance of using proper grade of oil
    - installation procedures

3. Service and repair exhaust systems
- Exhaust system components
    - muffler
    - rain trap
    - spark arrestors
    - manifold
    - pipes
    - clamps and hangers
    - heat control valves
    - catalytic converters
- Removal procedures of components
    - muffler
    - rain trap
    - exhaust manifold
- Proper alignment of mating parts
- Check operation of heat control valve (if applicable)
- Installation procedures

4. Test for and diagnose problems in air filtration and exhaust systems
- Air flow restricted
- Air intake leaks
- Too much crankcase pressure
- Exhaust system leaks and restriction
- Abnormal exhaust noise
- Check intake restriction
- Pressure measurement methods

SUGGESTED LEARNING ACTIVITIES:

1. Service dry and wet type air cleaner.
2. Inspect, repair or replace exhaust system and related components.
3. Check intake restrictions using manometers.

SUGGESTED RESOURCES:

1. FOS - Engines (Deere).
2. Diesel Mechanics (Schulz).
3. Auto Service and Repair (Stockel).
4. Service Manual.
5. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV2590 - Turbochargers, Blowers and Intercoolers

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1190 - SV1320

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to remove, service or repair and install engine turbochargers, blowers and intercoolers used on Diesel engines.

OVERVIEW OF OBJECTIVES:

1. Remove, service and install turbochargers.
2. Remove, service and install blowers.
3. Remove, service and install intercoolers.

CONTENT:

1. Remove, service and install turbochargers.

- Construction of turbochargers
- Purpose of turbocharger
- Types and designs
  - single stage
  - two stage
  - altitude compensators
- Action in turbochargers
- Components of turbochargers
  - turbine
  - compressor
  - shaft
  - bearings
  - seals
  - housing
- Removal procedures
- Inspection and tolerance checks
- Installation procedures
- Diagnosing turbochargers problems

2. Remove, service and install blowers.
- Construction of blowers
- Purpose of the blower
- Types and designs
    - centrifugal type
    - roots type
- Action in blower
- Removal procedures
- Inspection and tolerance checks
- Installation procedures
- Diagnosing blower problems

3. Remove, service and install intercoolers
- Construction of intercoolers
- Purpose of the intercoolers
- Types and designs
    - air to coolant
    - air to air
- Removal procedures
- Service checks
- Installation procedures
- Diagnosing intercoolers problems

SUGGESTED LEARNING ACTIVITIES:

1. Remove, inspect and install a turbocharger.
2. Disassemble, repair and assemble a blower.

SUGGESTED RESOURCES:

1. Diesel Mechanics (Schulz).
2. FOS - Engines (Deere).
3. Service Manual.
4. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV2600 - Diesel Engines Overhauling

SUGGESTED DURATION: 90 hours

PREREQUISITES: SV1300 - SV2590

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to disassemble, inspect, repair and assemble Diesel engines.

OVERVIEW OF OBJECTIVES:

1. Disassemble, inspect, repair and assemble Diesel engine.
2. Start and run engine.

CONTENT:

1. Disassemble, inspect, repair and assemble Diesel engine
- Engine disassembly procedures
- Disassembly, checking and repair of the following components
- Cylinder head service
    - valves
    - valves protrusion
    - injector tube service
- Pre-combustion chamber service
- Fuel galleries
    - seats
    - guides
    - springs
    - rotators
    - pressure testing cylinder head
    - warpage
    - crack detection
- Valve train service
    - rocker arm
    - rocker arm shaft
    - valve bridge
    - push rods

  - cam follower
  - gear train
- Cylinder block service
  - cleaning and inspection
  - removal procedures of dry and wet sleeves
  - check sleeve wear
  - ridge removal
  - de-glazing cylinder walls
  - honing cylinder walls
  - checking sleeve protrusion
  - checking main bearing caps and bores
  - checking camshaft bores
- Crankshaft and bearing service
  - inspecting and measuring for wear
  - remove and install crankshaft, bearing and bushing
- Camshaft and bearing service
  - inspecting and measuring for wear
- Piston and connecting rod service
  - piston wear or damage
  - rings wear
  - piston pin wear
  - connecting rod bend or damage
  - rebuilt connecting rods
- Engine assembly procedures
  - torque
  - valve timing
- Oil pump service
  - measuring all parts for wear and repairing to manufacturer's specifications

2. Start and run engine

- Reconnecting all components
- Refilling systems with oil and coolant
- Pre-start check points
  - fluid level
  - fluid leaks
  - belt tension
  - emergency shut-off
  - safety
- Starting engine and checking
  - oil pressure
  - water temperature
  - fluid leaks
  - abnormal noise
- Disassembly procedures of engine
- Procedures to measure engine dimensions
- Procedures to assemble engine

- Importance of following manufacturer's recommendations and specifications
- Fitting Bearings
    - main
    - thrust
    - connecting rods
- Replace camshaft bushings
- Cylinder block boring
- Re-condition cylinder head
    - check for straightness
    - check for cracks
    - replace injector tubes
    - reface valves
- Check crankshaft
- Recondition connecting rods

SUGGESTED LEARNING ACTIVITIES:

1. Overhaul Diesel engine.

SUGGESTED RESOURCES:

1. Diesel Mechanics (Schulz).
2. FOS - Engines (Deere).
3. Auto Service and Repair (Stockel).
4. Service Manual.
5. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV2610 - Diesel Engine Problems Diagnosis

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV2600

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to evaluate and diagnose Diesel engine problems and conditions.

OVERVIEW OF OBJECTIVES:

1. Diagnose Diesel engine problems and conditions.

CONTENT:

1. Diagnose Diesel engine problems and conditions
- Basic steps in diagnosing engine problems
    - know the system
    - ask the operator
    - inspect the engine
    - operate the engine
    - list the possible causes
    - reach a conclusion
    - test your conclusion
- Leak down test
    - compression test
    - cranking speed test
- Engine noise and knock interpretations
    - rod bearings
    - main bearings
    - piston noises
    - valves
    - timing gears
    - wrist pin
- Lack of power
- Excessive vibration
- Engine starting problems

- Oil pressure too low
- Oil pressure too high
- High oil consumption
- Crankcase oil dilution
- Engine overheating
- Exhaust smoke interpretations
    - black smoke
    - blue smoke
    - white smoke

SUGGESTED LEARNING ACTIVITIES:

1. With appropriate test equipment, check the following items on diesel engine
- Cylinder compression
- Exhaust back pressure
- Crankcase pressure
- Air intake pressure

SUGGESTED RESOURCES:

1. Diesel Mechanics (Schulz).
2. FOS - Engines (Deere).
3. Service Manual.
4. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV1340 - Gasoline Fuel Systems

SUGGESTED DURATION: 15 hours

PREREQUISITES: SV1130
SV1330

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to diagnose, service and repair gasoline fuel supply system and carburetors used on gasoline engines.

OVERVIEW OF OBJECTIVES:

1. Service and repair reservoir and fuel lines.
2. Service and repair fuel transfer pump.
3. Test fuel pump performance.
4. Remove, repair and replace carburetors.
5. Diagnose problem in gasoline fuel systems.
6. Describe the operation of governors and service them.

CONTENT:

1. Service and repair reservoir and fuel lines
- Properties of gasoline
  - volatility
  - antiknock value
  - combustion process
  - octane rating
  - chemical control of detonation
  - fuel additives
- Safety precautions when handling gasoline
  - danger of explosion
  - storage
- Reservoir
  - location and arrangement
  - removal and replacement
  - repair procedures and precautions

    - inspect tank for leaks
- Fuel lines
    - types
    - fittings
    - removal and installation procedures
    - repair procedures

2. Service and repair fuel transfer pump
- Types of transfer pumps
    - mechanical
    - electric
- Removal procedures from engine
- Disassembly of pump (if applicable)
- Identification of parts
- Reassembly procedures

3. Test fuel pump performance
- Pressure
- Vacuum
- Volume
- Removal procedures
- Importance of cleanliness
- Installation procedures

4. Remove, repair and replace carburetors
- Principles of carburation
    - effect of venturi
    - atomization
    - evaporation
    - vaporization
- Types of carburetors
    - single barrel
    - two barrel
    - four barrel
    - down draft carburetor
    - updraft carburetor
    - side draft carburetor
- Carburetor circuits
    - float circuit
    - idle circuit
    - low-speed circuit
    - high-speed circuit or main metering circuit
    - acceleration circuit
    - choke circuit

5. Diagnose problem in gasoline fuel systems
- Low fuel pump pressure

- Low fuel pump volume
- Flooding
- Choke malfunctioning
- Hard starting
- Loss of power
- Poor economy
- Poor idling
- Poor acceleration
- Fuel lines restriction or leaking
- Clogged fuel filters
- Defective speed control linkage

6. Describe the operation of governors and service them
- Purpose
- Type
    - mechanical
    - electronic
    - pneumatic
- Adjustment

SUGGESTED LEARNING ACTIVITIES:

1. Check transfer pump performance
    - pressure
    - vacuum
    - delivery

2. Disassemble, repair and assemble carburetors

SUGGESTED RESOURCES:

1. Auto Technology (Nash).
2. Auto Service and Repair (Stockel).
3. FOS - Engines - (Deere)
4. Service Manual.
5. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV1350 - Alternative Fuel Systems

SUGGESTED DURATION: 15 hours

PREREQUISITES: SV1340

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to service, inspect and perform minor repairs on LPG systems.

OVERVIEW OF OBJECTIVES:

1. Service and repair LPG systems.
2. Diagnose LPG system problems.
3. Identify regulations related to fuel systems.

CONTENT:

1. Service and repair LPG systems
- Special type of fuel
  - Combustion temperature
- Principles of operation of LPG systems
- Advantages and disadvantages of LPG
- Relationship to engine timing
- Safety rules in handling LPG
- Liquid withdrawal system
- Vapor withdrawal system
- LPG components
  - tank
  - filter
  - converter
  - carburetor
  - safety valve
  - filler valve
  - liquid level gauge
  - fuel lines and fittings
- Repair or service
  - converter

    - carburetor
    - safety valves
- Check system for leaks
- Adjust engine timing
- Importance of following manufacturer's recommendations

2. Diagnose LPG system problems
- LPG troubleshooting
    - hard starting
    - loss of power
    - poor economy
    - freeze-up of converter
    - frost on fuel strainer
    - rough idling
    - overheating

3. Identify regulations related to fuel systems
- Location of tanks
- Manufacturing hoses
- Provincial
- Federal

SUGGESTED LEARNING ACTIVITIES:

1. Check and service the convertor and carburetor of a LPG engine.
2. Adjust timing of a LPG engine.
3. Check system for leak.

SUGGESTED RESOURCES:

1. FOS - Engines (Deere).
2. Service Manual.
3. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV1360 - Diesel Fuel Supply Systems

SUGGESTED DURATION: 15 hours

PREREQUISITES: SV1340

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to service, inspect and repair Diesel fuel supply systems.

OVERVIEW OF OBJECTIVES:

1. Service and repair fuel tank and fuel lines.
2. Use proper fuel storage and handling techniques.
3. Remove, service and install fuel filter.
4. Service and repair fuel transfer pump.
5. Test fuel pump performance.

CONTENT:

1. Service and repair fuel tank and fuel lines
- Properties of diesel fuel
- Fuel classification
    - certain number
    - specific gravity testing
    - viscosity
    - flash point
    - pour point
    - sulfur
    - volatility
    - carbon residue
    - fuel additives
    - interpretation of fuel specifications
    - summer and winter fuel
- Tank
    - location and arrangement
    - removal and replacement procedures
    - repair procedures and precautions

    - inspecting tank for leaks
    - design and material
- Fuel lines
    - types
    - fittings
    - removal and installation procedures
    - repair procedures

2. Use proper fuel storage and handling techniques
- Storage practices to prevent fuel contamination
- Precautions
- Safety measures

3. Remove, service and install fuel filter
- Filters
    - types
    - functions
    - restriction indicator
    - water indicator
    - water separators
    - limitations of filters
    - location
    - service procedures
    - filling and bleeding procedures
- Fuel heater and filter
    - removal procedures
    - design
    - testing
- Importance of cleanliness
- Installation procedures
- Bleeding the system

4. Service and repair fuel transfer pump
- Fuel transfer pump
    - type
        - mechanical
        - electrical
    - location
    - testing
    - removal
- Disassembly of pump (if applicable)
- Identification of parts
- Reassembly procedures
5. Test fuel pump performance
- Procedures to test pump performance
    - pressure

- vacuum
- delivery volume

SUGGESTED LEARNING ACTIVITIES:

1. Check transfer pump performance
- pressure
- vacuum
- delivery

2. Change fuel filters, bleed system and start engine.

SUGGESTED RESOURCES:

1. Diesel Mechanics (Schulz).
2. FOS - Engines (Deere).
3. Auto Service and Repair (Stockel).
4. Service Manual.
5. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV2620 - Injectors

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1360

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to remove, test, rebuild, service and install injectors used on Diesel engine.

OVERVIEW OF OBJECTIVES:

1. Remove, rebuild and install injectors.
2. Test injectors operation.
3. Remove and install fuel injection lines and connections.

CONTENT:

1. Remove, rebuild and install injectors
- Related safety precautions
    - fuel impregnate skin
- Principles of operation of injectors
    - timing
        - mechanical
        - electronic
    - atomization
    - metering
- Types
    - electronic unit injectors
    - hydraulic actuated
    - unit injectors
    - pressure timed injectors
- Nozzle holder
- Types of injection nozzles
    - purpose
- Injector action
- Removal and installation procedures of injectors
- Methods of timing

- pressure timed injectors
- style of injectors
    - unit
- Adjustment

2. Test injectors operation

- Testing the injector
    - opening pressure
    - closing pressure
    - valve seat test
    - back leakage test
    - spray pattern test
    - needle valve lift test
    - adjustment procedures
    - importance of cleanliness
- Locating faulty injector

3. Remove and install fuel injection lines and connections

- Types
- Tensile strength
- Bend radius recommendations
- Removal and installation procedures
- Connectors
- Flares

SUGGESTED LEARNING ACTIVITIES:

1. Remove and install injectors on a Diesel engine.
2. With an injector tester, check and adjust the following on the injector

- opening and closing pressure
- valve seat test
- back leakage test
- spray pattern

SUGGESTED RESOURCES:

1. Diesel Mechanics (Schulz).
2. FOS - Engines (Deere).
3. Service Manual.
4. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV2630 - Injection Pumps

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1360

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to remove, install, time and adjust low and high idle on Diesel fuel injection pump.

OVERVIEW OF OBJECTIVES:

1. Remove and install fuel injection pump and perform timing.
2. Adjust engine low and high idle speed.

CONTENT:

1. Remove and install fuel injection pump and perform timing
- Related safety precautions
  - fuel impregnating skin
  - cleanliness
  - manufacturer's specifications
- Basic principal of operation of the following injection systems
  - in-line pump
  - distributor pump
  - unit injection system
  - pressure time pump
- Metering principles
  - port and helix design
  - sleeves metering design
- Governors (diesel application)
  - types and designs
    - mechanical
    - hydraulic
    - pneumatic
    - servo
    - electronic

- Limiting speed governor
- Variable speed governor
- Knowledge of phasing calibrating
- Timing procedures
    - electronic
    - static
    - skill
- Bleeding the system
- Governor terminology
    - low-idle speed
    - high-idle speed
    - droop speed
    - maximum torque speed
    - torque range speed
    - overspeed
    - governor cut-off speed
    - sensitivity
    - momentary speed
    - hunting
    - stability
    - hysterisis
    - speed regulation
- Minor repair and adjustment procedures
- Lubrication recommendation
- Shut-off
    - mechanical
    - electrical
- Removal and installation procedures for fuel injection pumps

2. Adjust engine low and high idle speed
- Adjusting idle and high idle speed procedures

SUGGESTED RESOURCES:

1. Diesel Mechanics (Schulz).
2. FOS - Engines (Deere).
3. Service Manual.
4. Use appropriate audio-visual material where available.

SUGGESTED LEARNING ACTIVITIES:
1. Remove and install an injection pump and start engine.
2. Check/adjust low and high idle speed on a Diesel engine.

EVALUATIONS:

NAME AND NUMBER: SV2640 - Tune Ups and Diagnosis of Diesel Fuel Systems

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV2570
SV1360
SV2630

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to perform a complete tune-up and diagnose problems on Diesel fuel systems.

OVERVIEW OF OBJECTIVES:

1. Perform tune-up on Diesel engine.
2. Check engine system pressure.
3. Diagnose fuel system problems.

CONTENT:

1. Perform tune-up on Diesel engine
- Tune-up procedures
- Tune-up intervals
- Visual inspection of the engine
- Preliminary check
  - air cleaner condition
  - belt tension
  - battery condition
  - oil and coolant level
- Check following systems
  - air restriction
  - exhaust restriction
  - crankcase blow-by
  - boost pressure
- Procedures to adjust the following components
  - valve bridge
  - valve lash
  - injectors timing

- governor gap
- injector racks
- no load speed
- idle speed
- buffer screw
- injector
    - timing
    - pressure timing

2. Check engine system pressure

- Checking system pressure with manometer
    - air restriction
    - exhaust restriction
    - crankcase blow-by
    - boost pressure
    - air box pressure

3. Diagnose fuel system problems

- Evaluation of engine performance
    - trouble first noticeable
    - similar problems recorded
    - unusual noise
    - trouble noticeable at all speed
    - respond to acceleration or deceleration
    - poor idling
    - hard starting
    - excessive fuel consumption
- Checking fuel lines for leaks or restrictions
- Checking condition of fuel filters
- Checking speed control linkage
- Testing fuel transfer pump performance
    - pressure
    - vacuum
    - delivery
- Diesel exhaust smoke analysis
    - black
    - white
    - blue

SUGGESTED LEARNING ACTIVITIES:

1. Perform a complete tune-up.
2. With appropriate test equipment, check

- air restriction
- exhaust restriction
- crankcase blow-by

- boost pressure

SUGGESTED RESOURCES:

1. Diesel Mechanics (Schulz).
2. FOS - Engines (Deere).
3. Service Manual.
4. Use appropriate audio-visual where available.

EVALUATIONS:

NAME AND NUMBER: SV2650 - Electronic Fuel Control Systems

SUGGESTED DURATION: 60 hours

PREREQUISITES: SV1130
SV2680
SV2620
SV2630
SV2640

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to service, inspect and repair electronic fuel control system on Diesel engines.

OVERVIEW OF OBJECTIVES:

1. Service, inspect and repair or replace electronic engine control systems.

CONTENT:

1. Service, inspect and repair or replace electronic engine control systems\
- Types of electronic control systems
- Advantages of electronic engine control systems
- Electronic engine control components
    - control module
    - throttle sensor
    - fuel rack sensor
    - fuel rack actuator
    - variable timing sensor
    - variable timing actuator
    - vehicle speed sensor
    - clutch and brake switch
    - electronic unit injectors
    - electronic distributor unit
    - Huei systems
- Procedures for using electronic control analyzer programmer
- Importance of following manufacturer's recommendations

SUGGESTED LEARNING ACTIVITIES:

1. With appropriate test equipment, service electronic engine control system to manufacturer's specification.

SUGGESTED RESOURCES:

1. Diesel Mechanics (Schulz).
2. Service Manual.
3. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV1370 - Batteries

SUGGESTED DURATION: 15 hours

PREREQUISITES: SV1100 - SV1110
TS1510 - TS1520
WD1300
SV1130
SV1150 - SV1180

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to remove, service, charge and install batteries used on heavy equipment and truck and transport.

OVERVIEW OF OBJECTIVES:

1. Remove and install batteries.
2. Identify battery connections.
3. Perform battery test.
4. Recharge battery.
5. Replace battery cable and/or terminals.
6. Start engine with booster battery.
7. Diagnose battery problems.

CONTENT:

1. Remove and install batteries
- Safety rules when working with battery
- Storage of Batteries
- Battery construction
    - positive plates
    - negatives plates
    - separators
    - electrolyte
    - chemical action
    - terminals
- Chemical action when discharging
- Chemical action when charging

- Sulfated battery
- Maintenance free battery
- Temperature effects on battery
- Battery polarity
- Battery ratings
    - cold power rating
    - reserve capacity rating
- Battery selection
- Procedures to remove and install battery cables
- Terminal pullers
- Hold down clamp
- Battery maintenance
    - procedures to clean battery
    - battery inspection
    - electrolyte level
    - cell replacement

2. Identifies battery connections
- Battery circuit connections
    - parallel circuits
    - series circuits
    - series parallel circuits

3. Perform battery test
- Battery test
    - hydrometer test
    - electrolyte - Integrohydrometer
        - specific gravity variation
    - parasytic draw
    - light-load test
    - high-discharge test
    - cold cranking test
    - reserve capacity test
- Correcting specific gravity readings to allow for temperature

4. Recharge battery
- Types of chargers
    - slow charge method
    - fast charge method
    - trickle charging
    - battery temperature precautions
    - importance of good ventilation
    - safety precautions with highly explosive gases

5. Replace battery cable terminals
- Types of cable terminals
- Cable size selection

- Methods of fastening terminals to cable (soldered and crimped)
- Importance of installing corrosive inhibitor over terminals
- Voltage drop test

6. Start engine with booster battery
- Importance of proper booster cables
- Proper polarity and connections
- Parallel connections
- Series connections
- Protective glasses
- Safety precautions

7. Diagnose battery problems
- Affects on battery life
  - electrolyte level
  - overcharging
  - undercharging
  - cycling
- Battery hold-down loose or too tight
- Corroded terminals
- Frayed or broken cables
- Cracked case
- Voltage drop test

SUGGESTED LEARNING ACTIVITIES:

1. Remove, service, test and install battery.
2. Hook up for slow and fast charging 12 and 24 volts.
3. Replace terminals on battery cables.
4. Start an engine using booster batteries.

SUGGESTED RESOURCES:

1. FOS - Electrical (Deere).
2. Diesel Mechanics (Schulz).
3. Auto Service and Repair (Stockel).
4. Service Manual.
5. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV1380 - Starting Systems

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1370

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to disassemble, test, repair and assemble starting motors and components.

OVERVIEW OF OBJECTIVES:

1. Disassemble, test, repair and assemble starting motors.
2. Test starter and circuit performance.
3. Diagnose starting system problems.
4. Service and repair air starting systems.
5. Service and repair hydraulic starting systems.
6. Service and repair starting aid components and functions.

CONTENT:

1. Disassemble, test, repair and assemble starting motors
- Principles of operation of starting motor
- Identification of parts
    - solenoid
    - drive mechanism
    - armature
    - field coil
    - pole shoe
    - commutator
    - brushes and holders
- Types of starters
    - permanent magnet
    - electric
    - four poles - two coils
    - four poles - four coils
    - six poles - six coils
    - parallel wound

    - series wound
    - compound wound
    - 12 volt high out-put
    - air
    - hydraulic
- Types of starter drive
    - bendix
    - overrunning clutch
    - dyer
    - follow thru
    - sprag
    - positork
    - friction-clutch
- Types of starter switches
    - magnetic switch
    - solenoid switch
    - series-parallel switch
- Disassembly procedures of starting motor
- Cleaning procedures
- Armature test
- Field coil test
- Solenoid test
- Checking brushes
- Checking bushings
- Resurfacing commutator
- Reassembly procedures
- Pinion clearance check

2. Test starter and circuit performance
- No load test
- Torque test
- Amperage draw test
- Voltage drop test

3. Diagnose starting system problems
- Engine will not crank
- Engine cranks slowly
- Starter turns but will not engage
- Starter makes excessive noise

4. Service and repair air starting systems
- Air motor starting systems
    - circuitry
        - valve
        - supply systems
    - principles of operation

- applications (RPM)
- types of motor
- drive mechanisms
- maintenance procedures
- operational hazards and precautions
- lubrication provisions

5. Service and repair hydraulic starting systems

- Hydraulic starting systems
  - hydraulic circuitry
    - valve
    - supply systems
  - principles of operation
  - type(s) of motors
  - relationship to other hydraulic systems
  - major components and functions
  - drive mechanisms
  - cooling and lubrication provisions

6. Service and repair starting aid components and functions

- Glow plugs
- Intake manifold heater
- Fluid starting aids
- Block heater
- Battery warmer
- Booster battery

SUGGESTED LEARNING ACTIVITIES:

1. Remove, disassemble, test, repair and assemble 12 volts starter.
2. Remove, disassemble, test, repair and assemble heavy duty 24 volts starter.
3. With appropriate test equipment make the following tests on starting circuit

- voltage drop
- amperage draw

SUGGESTED RESOURCES:

1. Diesel Mechanics (Schulz).
2. FOS - Electrical (Deere).
3. Auto Service and Repair (Stockel).
4. Service Manual.
5. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV1390 - Charging System Components

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1370

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to disassemble, test, repair and assemble charging systems and components.

OVERVIEW OF OBJECTIVES:

1. Disassemble, test, repair and assemble alternator.
2. Test alternator performance.
3. Diagnose charging system problems.

CONTENT:

1. Disassemble, test, repair and assemble alternator
- Basic Charging Systems
- Principles of operation of alternators
- Identification of parts
    - stator
    - rotor
    - diodes
    - rectifier bridge
    - diode trio
    - brushes
- Types and functions of regulators
    - mechanical regulator
    - transistorized regulator
    - remote mounted regulator
    - integral type regulator
- Types of alternators
    - brushless alternator
    - 24 volt alternator
    - 12/24 volt alternator
    - oil cooled alternator

- Disassembly procedures of alternator
  - internal circuitry
  - stator test
  - rotor test
  - diodes test
  - regulator test
  - checking bearings condition
  - checking slip ring condition
  - cleaning procedures
  - reassembly procedures

2. Test alternator performance
- Alternator output test
  - voltage
  - amperage
  - appropriate testing equipment

3. Diagnose charging system problems
- No alternator output
- Low alternator output
- High alternator output
- Noisy alternator
- Battery uses too much water

SUGGESTED LEARNING ACTIVITIES:

1. Remove, disassemble, test, repair and assemble an alternator.
2. With appropriate test equipment, check alternator output (amperage and voltage).
3. Check and adjust alternator belt tension.

SUGGESTED RESOURCES:

1. Diesel Mechanics (Schulz).
2. FOS - Electrical (Deere).
3. Auto Service and Repair (Stockel).
4. Service Manual.
5. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV2660 - Ignition Systems and Tune-Ups

SUGGESTED DURATION: 15 hours

PREREQUISITES: SV1300
SV1340
SV1350
SV1370

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to check and test ignition system components and perform tune-ups on gasoline engines.

OVERVIEW OF OBJECTIVES:

1. Check and test components of ignition systems (electronic).
2. Remove, service and install spark plugs.
3. Perform a complete tune-up on a gasoline engine.
4. Diagnose ignition system problems.

CONTENT:

1. Check and test components of ignition systems (electronic)

- Principles of operation of ignition systems
- Components
  - Types of trigoring devices
    - LAD
    - Hall effects
  - magnetic
  - reluctor
  - control unit
  - distributor
  - rotor
  - coil

- Check and test condition of the following components

- pick-up coil
- control unit
- ignition coil
- distributor cap
- rotor

2. Remove, service and install spark plugs
- Construction of spark plug
- Types
- Heat range
- Removal procedures
- Cleaning procedures
- Inspections
- Gapping
- Testing
- Installation procedures

3. Perform a complete tune-up on a gasoline engine
- Types
- Testing procedures
- Tune-up procedures
- Tune-up intervals
- Visual inspection of the engine
- Check air intake system
- Check engine compression
- Adjust ignition timing

4. Diagnose ignition system problems
- No spark at plugs
- Weak or intermittent spark at plugs
- Missing at idle or low speed
- Missing during acceleration
- Missing at all speeds
- Coil failure
- Short spark plug life
- Pre-ignition
- Detonation
- Back fire in intake manifold
- Back fire in exhaust manifold

SUGGESTED LEARNING ACTIVITIES:
1. Check and test high tension leads.
2. Perform a complete tune-up on a gasoline engine.

SUGGESTED RESOURCES:

EVALUATIONS:

NAME AND NUMBER: SV2670 - Air Conditioning Systems

SUGGESTED DURATION: 30 hours

PREREQUISITES: TS1530
SV1130
SV1190
SV1310

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this unit, the apprentice will be able to service, inspect and repair air conditioning systems used on heavy equipment and truck and transport.

OVERVIEW OF OBJECTIVES:

1. Service, inspect and repair air conditioning systems.
2. Diagnose air conditioning problems.

CONTENT:

1. Service, inspect and repair air conditioning systems

- Principles of refrigeration
  - liquid
  - gas
  - state of matter
  - pressure and heat
  - conduction
  - convection
  - radiation
  - refrigerants (freon)
- Refrigeration cycle
  - compression
  - condensation
  - expansion
  - evaporation

- Components of air conditioning systems

  - compressor
  - condenser
  - expansion valve, orifice tubes
  - evaporator
  - lines and connections
  - refrigerants and oil
  - principles of operation of major components
- Air conditioing service tools
  - vacuum pump
  - charging hose
  - gauge and manifold set
  - thermometer
  - refrigerant dispensing valve
  - leak detector
  - goggles
- Servicing the system
  - discharging the system
  - evacuating system using vacuum pump
  - safety rules when handling refrigerants
- Purging the system
- Charging the system
- Checking the system for leaks
- Checking and adding oil to reciprocating piston compressors
- Checking and adding oil to axial piston compressors

2. Diagnose air conditioning problems
- Main categories of problems
  - electrical
  - mechanical
  - refrigeration
- System produces no cooling
- System will not produce sufficient cooling
- System cools intermittently
- System too noisy

SUGGESTED LEARNING ACTIVITIES:

1. Check, remove and replace components of an air conditioning system.

SUGGESTED RESOURCES:

1. FOS - Air Conditioning (Deere).
2. Diesel Equipment II (Schulz).
3. Service Manual.
4. Use appropriate audio-visual material where available.

EVALUATIONS:

NAME AND NUMBER: SV1420 - Wheels and Tires

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1100 - SV1110
TS1510 - TS1520
SV1150
WD2320

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to identify procedures for tire and wheel service, including tire rotation and tubeless and tube type tire repair.

OVERVIEW OF OBJECTIVES:

1. Check wheels for out of round or bent condition using appropriate shop equipment.
2. Remove tires from wheels using appropriate equipment.
3. Repair tires both on and off the vehicle.
4. Rotate tires and torque wheel nuts to manufacturer's specifications.
5. Install tires on wheels using appropriate equipment.
6. Diagnose tire problems and irregular wear patterns.

CONTENT:

1. Check wheels for out of round or bent condition using appropriate shop equipment
    - Wheels
        - types
        - sizes
        - runout
        - wheel nut torque and tightening sequence

2. Remove tires from wheels using appropriate equipment
    - Tire construction
        - types
        - rating

- sizes

3. Repair tires both on and off the vehicle
   - Tire and tube repair
     - dismounting and mounting procedures
     - tire pressures
     - safety

4. Rotate tires and torque wheel nuts to manufacturer's specifications
   - Tire wear
     - causes and effects of abnormal tire wear and failure analysis

5. Install tires on wheels using appropriate equipment
   - Wheel rotation
     - purpose
     - pattern of rotation

6. Diagnose tire problems and irregular wear patterns
   - Tire matching and selection

SUGGESTED LEARNING ACTIVITIES:

- Locate leak, repair, inflate and recheck tubeless tire.
- Remove and install tire.

SUGGESTED RESOURCES:

- Heavy Duty Truck Suspension, Steering & Braking Systems - Robert N Brady
- Service Manuals.
- Learning Activity Package.
- Use appropriate audio visual material where available.

EVALUATION:

NAME AND NUMBER: SV1430 - Wheel Balancing

SUGGESTED DURATION: 15 hours

PREREQUISITES: SV1420

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to balance wheels, both on and off the vehicle.

OVERVIEW OF OBJECTIVES:

1. Statically balance wheels removed from the vehicle.
2. Dynamically balance wheels removed from the vehicle.
3. Dynamically balance wheels on the vehicle.
4. Diagnose problems caused by improper wheel balance.

CONTENT:

1. Statically balance wheels removed from the vehicle
    - Wheel balance
        - static balance
        - dynamic balance
        - wheel weights
        - safety precautions
        - diagnosis

2. Dynamically balance wheels removed from the vehicle

3. Dynamically balance wheels on the vehicle

4. Diagnose problems caused by improper wheel balance

SUGGESTED LEARNING ACTIVITIES:

- Balance wheels (static or dynamic).
- Diagnose problems caused by improper wheel balance.

SUGGESTED RESOURCES:

- Heavy Duty Truck Suspension, Steering & Braking Systems - Robert N Brady.
- Service Manuals.
- Learning Activity Package.
- Use appropriate audio visual material where available.

EVALUATION:

NAME AND NUMBER: SV1440 - Front Axles and Suspension

SUGGESTED DURATION: 45 hours

PREREQUISITES: WD1300
SV1430

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to perform inspection, service and repair of truck front axles and suspensions.

OVERVIEW OF OBJECTIVES:

1. Identify various types of front axles used on medium and heavy duty truck.
2. Remove I - beam type axles used on trucks.
3. Install I - beam type axles used on trucks.
4. Replace king-pins and bushings on trucks.
5. Remove leaf springs from truck front suspension.
6. Install leaf springs in truck front suspension.
7. Remove coil springs from truck front suspension.
8. Install coil springs in truck front suspension.
9. Remove and install truck front suspension shock absorbers.
10. Remove and install truck front suspension ball joints.

CONTENT:

1. Identify various types of front axles used on medium and heavy duty truck
    - Front axles
        - types
        - weight ratings

2. Remove I - beam type axles used on trucks
    - types of front suspensions
        - independent
        - I beam

3. Install I - beam types axles used on trucks

- Kingpins
  - inspection
  - replacement of pins and bushings
  - types

4. Replace king-pins and bushings on trucks
   - Coil springs

5. Remove leaf springs from truck front suspension
   - Safety precautions when working with coil springs

6. Install leaf springs in truck front suspension
   - Leaf springs
     - spring hangers
     - U-bolts
     - springs clips
     - types

7. Remove coil springs from truck front suspension
   - Shock absorbers
     - types
     - replacement procedures

8. Install coil springs in truck front suspension
   - Ball joints
     - types
     - inspection procedures
     - replacement

9. Remove and install truck front suspension shock absorbers
   - Procedures

10. Remove and install truck front suspension ball joints
    - Procedures

SUGGESTED LEARNING ACTIVITIES:

- Remove and replace a solid type front axle.
- Replace kingpins and bushings.
- Remove and replace leaf springs on a front suspension.
- Remove and replace ball joints.
- Diagnose problems with front axles.
- Diagnose problems with front suspension systems.

SUGGESTED RESOURCES:

- Heavy Duty Truck Systems - 2nd edition - Ian Andrew Norman/Robert

Scharff/John A Corinchock.
- Vehicle manufacturer's manuals.
- Learning Activity Package.
- Use appropriate audio visual material where available.

EVALUATION:

NAME AND NUMBER: SV1450 - Steering Components

SUGGESTED DURATION: 45 hours

PREREQUISITES: SV1430
SV1140

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to service steering components and systems.

OVERVIEW OF OBJECTIVES:

1. Service steering columns.
2. Replace steering linkage.
3. Adjust steering linkage.
4. Diagnose problems with steering linkages and components.
5. Remove power steering gear boxes.
6. Overhaul power steering gear boxes.
7. Replace power steering gear boxes.
8. Replace power steering pumps.
9. Overhaul power steering pumps.
10. Diagnose problems with power steering systems.

CONTENT:

1. Service steering columns
    - Standard steering columns and shafts
        - steering wheel removal and replacement
        - shaft and coupling service

2. Replace steering linkage
    - Steering linkage
        - components
        - steering geometry
        - toe-in and toe-out
        - steering wheel centering
3. Adjust steering linkage

- Power steering
  - types
    - integral
    - linkage
  - hoses
  - fluids
  - adjustments

4. Diagnose problems with steering linkages and components
   - Power steering pumps
     - types
     - drives
     - problem diagnosis
     - removal, repair and replacement
     - flow and pressure test

5. Remove power steering gear boxes
   - Power steering gears
     - types
       - hydraulic
     - control valves
     - pressure relief valves
     - adjustments
     - replacement of seals

6. Overhaul power steering gear boxes
   - Leak detection

7. Replace power steering gear boxes
   - Diagnosis

8. Replace power steering pumps

9. Overhaul power steering pumps

10. Diagnose problems with power steering systems

SUGGESTED LEARNING ACTIVITIES:

- Disassemble and reassemble steering columns.
- Disassemble and assemble steering linkage.
- Adjust steering linkage.
- Disassemble, assemble and adjust a power steering gear.
- Pressure and flow test a power steering pump.
- Disassemble and assemble power steering pumps.
- Diagnose power steering problems.

SUGGESTED RESOURCES:

- Heavy Duty Truck Systems - 2nd edition - Norman/Scharff/Corinchock.
- Service Manuals.
- Learning Activity Package.
- Use appropriate audio visual material where available.

EVALUATION:

NAME AND NUMBER: SV2810 - Wheel Alignment

SUGGESTED DURATION: 45 hours

PREREQUISITES: SV1420 - SV1450

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to perform wheel alignments.

OVERVIEW OF OBJECTIVES:

1. Perform wheel alignment, maintaining tolerances as indicated in The Manufacturers Service Manual.
2. Diagnose faults to steering and suspension components relating to wheel alignment.
3. Perform rear wheel alignment

CONTENT:

1. Perform wheel alignment, maintaining tolerances as indicated in The Manufacturers Service Manual
    - Wheel alignment
        - caster
        - camber
        - steering axis inclination
        - included angle
        - toe-in
        - toe-out on turns
        - centerline
        - diagnosing alignment problems

2. Diagnose faults to steering and suspension components relating to wheel alignment.
    - Adjustments
        - shim pack
        - eccentric
        - slotted

3. Rear wheel alignment.
    - Tracking/thrust angle

SUGGESTED LEARNING ACTIVITIES:

- Perform two and all wheel alignments.
- Diagnose problems caused by improper alignment.

SUGGESTED RESOURCES:

- Heavy Duty Truck Systems - 2nd edition - Norman/Scharff/Corinchock.
- Service Manuals.
- Learning Activity Package.
- Use appropriate audio visual material where available.

EVALUATION:

NAME AND NUMBER: SV1460 - Rear Suspension Systems

SUGGESTED DURATION: 75 hours

PREREQUISITES: SV1430

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to perform service and repair on Rear Suspension Systems.

OVERVIEW OF OBJECTIVES:

1. Identify the types of rear suspension used on modern single axle systems.
2. Identify the types of rear suspension used on tandem axle systems.
3. Remove and install shock absorbers on rear suspension.
4. Service spring suspension with torque rods.
5. Service equalizing beam suspension.
6. Service rubber cushion type suspension.
7. Service torsion bar suspension.
8. Service air bag (spring) suspension.

CONTENT:

1. Identify the types of rear suspension used on modern single axles systems
    - Rear suspension
        - single axle
        - tandem axle
        - torque rods
        - equalizing beams
        - leaf type springs
        - rubber cushion type
        - orsion bars
        - air bags
        - radius rod

2. Identify the types of rear suspension used on tandem axle systems
    - Service checks
        - U-bolts

- spring ends
- shackle brackets
- spring pins
- shock absorbers
- radius Rods
- equalizers

3. Remove and install shock absorbers on rear suspension
   - System Overhaul
     - replacement procedures

4. Service spring suspension with torque rods
   - Maintenance
     - alignment methods

5. Service equalizing beam suspension

6. Service rubber cushion type suspension

7. Service torsion bar suspension

8. Service air bag (spring) suspension

SUGGESTED LEARNING ACTIVITIES:

- Identify the types of rear suspension used on modern single axle systems.
- Identify the types of rear suspension used on tandem axle systems.
- Remove and install shock absorbers.
- Service spring suspension with torque rods.
- Service equalizing beam suspension.
- Service Torsion bar suspension.
- Service air bag (spring) suspension.
- Diagnose problems and make repairs to rear suspension systems.

SUGGESTED RESOURCES:

- Heavy Duty Truck Systems - 2nd edition - Norman/Scharff/Corinchock.
- Service Manuals.
- Learning Activity Package.
- Use appropriate audio visual material where available.

EVALUATION:

NAME AND NUMBER: SV2690 - Frames and Chassis

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV2810
SV1460

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to service and repair truck frames and chassis.

OVERVIEW OF OBJECTIVES:

1. Identify truck frame types.
2. Locate areas of frame damage.
3. Perform frame pre-alignment checks.
4. Identify frame straightening techniques.
5. Replace frame rails or crossmembers.

CONTENT:

1. Identify truck frame types
   - Basic frame design

2. Locate areas of frame damage
   - Types of frame damages
   - Frame rail elements

3. Perform frame pre-alignment checks
   - Frame strength

4. Identify frame straightening techniques
   - Frame selection

5. Replace frame rails or crossmembers
   - Frame bending moments
   - Frame metal identification
   - Frame equipment installation

SUGGESTED LEARNING ACTIVITIES:

- Identify truck frame types.
- Locate areas of frame damage.
- Perform frame pre-alignment checks.
- Replace frame rails or crossmembers.

SUGGESTED RESOURCES:

- Heavy Duty Truck Systems - 2nd edition - Norman/Scharff/Corinchock
- Service Manuals.
- Learning Activity Package.
- Use appropriate audio visual material where available.

EVALUATION:

NAME AND NUMBER: SV1470 - Basic Anti-Lock Brakes

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1420
SV1270
SV1370
SV1130

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to service vehicles that are equipped with anti-lock brakes.

OVERVIEW OF OBJECTIVES:

1. Locate and identify the components of a truck and transport basic anti-lock brake system.
2. Remove components of an anti-lock brake system.
3. Install components of an anti-lock brake system.
4. Diagnose anti-lock brakes.

CONTENT:

1. Locate and identify the components of a truck and transport basic anti-lock brake system
   - Modulator
     - purpose
     - location
     - precautions when servicing

2. Remove components of an anti-lock brake system
   - Wheel sensors
     - location
     - types
     - adjustments

3. Install components of an anti-lock brake system

- Dash warning lights

4. Diagnose anti-lock brakes
   - Fail relay
     - purpose
     - location
   - Trouble codes

SUGGESTED LEARNING ACTIVITIES:

- Locate components of an anti-lock brake system.
- Remove and replace components of an anti-lock brake system.
- Inspect a vehicle equipped with anti-lock brake system and check the system for correct operation.
- Troubleshoot anti-lock brake system problems.

SUGGESTED RESOURCES:

- Heavy Duty Truck Systems - 2nd edition - Norman/Scharff/Corinchock.
- Vehicle Service Manuals.
- Learning Activity Package.
- Use appropriate audio visual material where available.

EVALUATION:

NAME AND NUMBER: SV1480 - Dual Air Brake Systems

SUGGESTED DURATION: 45 hours

PREREQUISITES: SV1420
SV1270

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to service dual air brake systems.

OVERVIEW OF OBJECTIVES:

1. Identify the components of dual air brake systems.
2. Explain the operating principles of dual air brake systems.
3. Service control valves used on dual air brake systems.
4. Service trailer brakes.

CONTENT:

1. Identify the components of dual air brake systems
    - Dual air brake systems
        - basic of operation
        - identification of components
        - primary reservoir
        - secondary reservoir
        - foot valve
        - spring brake valve
        - tractor protection valve
        - double check valve
        - dual pressure gauges-primary and secondary
        - parking control valves
        - plumbing layout

2. Explain the operating principles of dual air brake systems
    - Primary systems
3. Service control valves used on dual air brake systems
    - Secondary systems

4. Service trailer brakes
    - Procedures

5. Components of dual air brake systems

SUGGESTED LEARNING ACTIVITIES:

- Identify the components of dual air brake systems.
- Explain the operation of dual air brake systems.
- Test and service dual air brake components.
- Diagnose dual air brake system malfunction.

SUGGESTED RESOURCES:

- Heavy Duty Truck Systems, 2nd edition, Norman/Scharff/Corinchock.
- Vehicle Service Manuals.
- Learning Activity Package.

EVALUATION:

NAME AND NUMBER: SV2700 - Electronic Components of Anti-Lock Brakes

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1470

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to service and repair trucks equipped with anti-lock brakes.

OVERVIEW OF OBJECTIVES:

1. Use test equipment to locate problem components and circuits in a truck anti-lock brake system.
2. Make repairs to or replace faulty components of truck anti-lock brake systems using manufacturers trouble-shooting guide and service manuals.
3. Diagnose electronic components of truck anti-lock brakes.

CONTENT:

1. Use test equipment to locate problem components and circuits in a truck anti-lock brake system
    - Anti-lock brakes
        - description
        - components
    - Control module
        - inputs
        - outputs
    - Failure warning
    - Safety precautions
    - Systems self diagnosis
    - Fault codes and fault code tables
    - Visual inspections
    - Diagnostic procedures
    - Test equipment
        - types
        - uses
    - Repair procedures

2. Make repairs to or replace faulty components of truck anti-lock brake systems using manufacturers trouble-shooting guide and service manuals
    - Procedures

3. Diagnose electronic components of truck anti-lock brakes
    - Procedures

SUGGESTED LEARNING ACTIVITIES:

- Remove, replace and adjust wheel sensors on an anti-lock brake system.
- Using test equipment, locate problems with an anti-lock brake system and make repairs.
- Diagnose electronic components of anti-lock brakes.

SUGGESTED RESOURCES:

- Heavy Duty Truck System - 2nd edition - Norman/Scharff/Corinchock.
- Service Manuals.
- Learning Activity Package for MPR/FMR 1331 (I-24).
- Use appropriate audio visual material where available.

EVALUATION:

NAME AND NUMBER: SV2710 - Engine Clutches

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1100
WD1300
SV1150 - SV1180
WD2320 -SV1280

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to service, repair and adjust engine clutches in trucks.

OVERVIEW OF OBJECTIVES:

1. Remove transmissions.
2. Install transmissions.
3. Replace clutch assemblies.
4. Adjust clutch linkages and/or clutch brakes.
5. Replace pilot bearings.
6. Check flywheel for run-out.
7. Diagnose clutch system problems.

CONTENT:

1. Remove transmissions
    - Transmission removal

2. Install transmissions
    - Clutch assembly
        - facings
        - cushioning device
        - torsional devices
        - clutch types
            - push
            - pull
    - Pressure plates
        - coil

- diaphram
- angle spring

3. Replace clutch assemblies
   - Clutch linkage and pedal
     - types
       - mechanical
       - hydraulic
       - pneumatic
     - master and slave cylinder
     - adjustments

4. Adjust clutch linkages and/or clutch brakes
   - Clutch release bearing and fork
     - types
     - replacement procedures

5. Replace pilot bearings
   - Clutch housing and clutch shaft

6. Check flywheel for run-out
   - Pilot bearings and bushings

7. Diagnose clutch system problems
   - Flywheel
     - cleaning and checking for runout
     - ring gear

SUGGESTED LEARNING ACTIVITIES:

- Remove, inspect and replace a clutch assembly.
- Inspect and adjust clutch linkage.
- Replace clutch release mechanisms.
- Replace pilot bearings.
- Check flywheel for runout.
- Remove and replace transmission.
- Diagnose clutch system problems.

SUGGESTED RESOURCES:

- Heavy Duty Truck Systems - 2nd edition - Norman/Scharff/Corinchock.
- Service Manuals.
- Learning Activity Package.
- Use appropriate audio visual material where available.

EVALUATION:

NAME AND NUMBER: SV2720 - Manual Transmissions

SUGGESTED DURATION: 60 hours

PREREQUISITES: SV2710

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to service and repair manual transmissions in trucks.

OVERVIEW OF OBJECTIVES:

1. Identify components of manual transmissions used in trucks.
2. Explain operation of components of manual transmissions used in trucks.
3. Overhaul manual transmissions used in trucks.
4. Service transmission shift linkage.
5. Diagnose manual transmissions used in trucks.
6. Identify components of a double or triple countershaft transmission used in trucks.
7. Explain operation of components of a double or triple countershaft transmission used in trucks.
8. Identify components of an auxiliary transmission used in trucks.
9. Explain operation of components of an auxiliary transmission used in trucks.
10. Explain operation of compound gearboxes.
11. Identify air shift components.
12. Diagnose and repair air shift component problems.
13. Install, service and repair “power” takeoff.

CONTENT:

1. Identify components of manual transmissions used in trucks
    - Principles of operation
        - mechanical advantages
        - gear ratio
        - types of gears
        - gears terminology
        - power flow

2. Explain operation of components of manual transmissions used in trucks
   - Types of transmission
     - sliding gear
     - collar shift
     - synchromesh

3. Overhaul manual transmissions used in trucks
   - Transmission components
     - shaft
     - gears
     - bearings
     - seals
     - synchronizers
     - shifter rail anf forks
     - shift controls
     - shift interlock mechanism

4. Service transmission shift linkage
   - Auxiliary transmission
     - function
     - principles of operation
     - lubrication provisions
     - shifting methods
     - relation to main transmission

5. Diagnose manual transmissions used in trucks
   - Twin and triple countershaft transmission
     - advantages
     - operation

6. Identify components of a double or triple countershaft transmission used in trucks
   - Transfer drive
     - principles of operation
     - types and designs
     - functions
     - relationship to power train system

7. Explain operation of components of a double or triple countershaft transmission used in trucks
   - Transfer drive
     - disassembly and assembly procedures
     - inspection of parts
     - precautions
     - importance of cleanliness
     - manufacturer's specifications
     - lubrication level

- maintenance

8. Identify components of an auxiliary transmission used in trucks
   - Power take off
     - Functions
     - Types and designs
     - Principles of operation
     - Service and alignment procedures
     - Installation precautions
     - Allowable tolerances
     - Manufacturer's specifications
     - Common failures

9. Explain operation of components of an auxiliary transmission used in trucks
   - Services
     - overhaul procedures
     - diagnosis

10. Explain operation of compound gearboxes

11. Identify air shift components

12. Diagnose and repair air shift component problems

13. Install, service and repair "power" takeoff

SUGGESTED LEARNING ACTIVITIES:

- Disassemble, service and repair manual transmissions.
- Remove, repair and install shift linkage.
- Diagnose problems in manual transmissions and determine repairs needed to restore to proper working order.

SUGGESTED RESOURCES:

- Heavy Duty Truck Systems - 2nd edition - Norman/Scharff/Corinchock.
- Service Manuals.
- Learning Activity Package

EVALUATION:

NAME AND NUMBER: SV2730 - Automatic Transmissions

SUGGESTED DURATION: 90 hours

PREREQUISITES: SV1100 - WD1300
SV1150 - SV1180
WD2320
SV1280

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to service and overhaul automatic transmissions in trucks.

OVERVIEW OF OBJECTIVES:

1. Remove automatic transmissions in trucks.
2. Install automatic transmissions in trucks.
3. Identify components of automatic transmissions used in trucks.
4. Overhaul automatic transmissions used in trucks.
5. Perform maintenance services on automatic transmissions in trucks.
6. Diagnose problems in truck automatic transmissions.

CONTENT:

1. Remove automatic transmissions in trucks
    - Torque converters
        - types
        - construction
        - operation
        - removal, checking and replacement

2. Install automatic transmissions in trucks
- Automatic transmissions
    - Components
        - planetary gear sets
        - oil pumps
        - pressure regulator valves
        - servos

- bands
- clutches
- spool valves
- balance valves
- manual control valves
- shifter valves
- governors
- throttle valves
- compensator valves
- valve body
- upshift valves
- downshift valves

- Transmission cooling and lubrication
- Power flow
- Two speed
- Three speed
- Four speed
- Transmission operation
- Manual control mechanisms

3. Identify components of automatic transmissions used in trucks

- Automatic transmission repairs
  - Stall test
  - Problem diagnosis
  - Overhaul procedures

4. Overhaul automatic transmissions used in trucks

- Automatic transmission service
  - selection of fluid
  - fluid level, cleanliness
  - changing fluid and filters
  - external gasket and seal replacement
  - band adjustment
  - throttle and shift linkage
  - towing or pushing precautions
  - modulators

5. Perform maintenance services on automatic transmissions in trucks
   - Automatic transmission removal and installation

6. Diagnose problems in truck automatic transmissions
   - Diagnosis

SUGGESTED LEARNING ACTIVITIES:

- Identify components of an automatic transmission.
- Remove and install an automatic transmission.

- Overhaul an automatic transmission.
- Perform maintenance service on automatic transmission by adjusting bands and shift linkage, changing fluid and filters, and repairing minor leaks.
- Diagnose problems in automatic transmissions.

SUGGESTED RESOURCES:

- Heavy Duty Truck Systems - 2nd edition - Norman/Scharff/Corinchock.
- Service Manuals.
- Learning Activity Package.

EVALUATION:

NAME AND NUMBER: SV2740 - Transfer Cases

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1100 - WD1300
SV1150 - SV1180
WD2320
SV1280

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to service and overhaul transfer cases in trucks.

OVERVIEW OF OBJECTIVES:

1. Remove truck transfer cases using manufacturer's methods.
2. Install truck transfer cases using manufacturer's methods.
3. Overhaul transfer cases used in trucks.
4. Diagnose problems in truck transfer cases.

CONTENT:

1. Remove truck transfer cases using manufacturer's methods
    - Transfer cases
        - purpose
        - components
        - types
            - part time four wheel drive
            - full time four wheel drive
        - operating precautions
        - lubricants
        - transfer case problems diagnosis
        - transfer case overhaul
        - PTO service
        - diagnosis

2. Install truck transfer cases using manufacturer's methods

3. Overhaul transfer cases used in trucks

4. Diagnose problems in truck transfer cases

SUGGESTED LEARNING ACTIVITIES:

- Remove and reinstall transfer case using manufacturer's service manual.
- Disassemble, inspect, repair or replace faulty components and reassemble transfer case according to manufacturer's specifications.
- Diagnose problems in a transfer case following procedures.

SUGGESTED RESOURCES:

- Heavy Duty Truck Power Trains - Robert N Brady.
- Service Manuals.
- Learning Activity Package.
- Use appropriate audio visual material where available.

EVALUATION:

NAME AND NUMBER: SV2750 - Drive Axle Assemblies

SUGGESTED DURATION: 45 hours

PREREQUISITES: SV1100 - WD1300
SV1150 - SV1180
WD2320
SV1280

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to service and repair truck drive axle assemblies.

OVERVIEW OF OBJECTIVES:

1. Remove drive axle bearings and seals.
2. Install drive axle bearings and seals.
3. Remove differential assemblies.
4. Install differential assemblies.
5. Overhaul differential assemblies.
6. Diagnose problems with drive axle assemblies.
7. Remove interaxle differential (power divider).
8. Install interaxle differential (power divider).
9. Overhaul interaxle differential (power divider).
10. Diagnose problems with interaxle differential (power divider).

CONTENT:

1. Remove drive axle bearings and seals
    - Rear hubs
        - types

2. Install drive axle bearings and seals
    - Rear axle assemblies
        - components
        - types
        - wheel hub attachment
        - types and replacement of oil seals

- types and replacement of rear wheel bearings
- axle shaft removal and installation

3. Remove differential assemblies
   - Differential removal

4. Install differential assemblies
   - Differential (standard)
     - types
       - removable carrier
       - integral carrier
       - single speed
       - two speeds
       - double reduction
     - components
     - operation
     - adjustments
     - lubrication

5. Overhaul differential assemblies
   - Differential (limited slip)
     - types
     - operation
     - adjustments
     - lubrication

6. Diagnose problems with drive axle assemblies
   - Power divider
     - principles of operation
     - purpose
     - types and designs
     - method of shifting

7. Remove interaxle differential (power divider)
   - Two speed axles
     - control mechanism
     - electric control
     - air control

8. Install interaxle differential (power divider)
   - Differential locks
     - principles of operation
     - purpose
     - types and designs
       - mechanical
       - hydraulic

- nonspin
- torque proportional

9. Overhaul interaxle differential (power divider)
   - Problem diagnosing

10. Diagnose problems with interaxle differential (power divider)
    - Replacement

SUGGESTED LEARNING ACTIVITIES:

- Remove and re-install drive axles with their bearings and seals.
- Remove and replace differential assemblies.
- Disassemble, inspect, repair, reassemble and adjust differentials (two-speed and power divider type).
- Diagnose problems with drive axle assemblies.

SUGGESTED RESOURCES:

- Heavy Duty Truck Systems - 2nd edition - Norman/Scharff/Corinchock.
- Learning Activity Package.
- Service Manuals.

EVALUATION:

NAME AND NUMBER: SV2760 - Gasoline Fuel Injection Systems

SUGGESTED DURATION: 60 hours

PREREQUISITES: SV1100 - SV1110
TS1510 - TS1520
SV1130
SV1150 - WD2320
SV1300 - SV1340
SV1370 - SV2660

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to service, diagnose operational deficiencies and carry out corrective maintenance on gasoline electronic fuel injection systems used on medium duty trucks.

OVERVIEW OF OBJECTIVES:

1. Identify components of gasoline fuel injection systems.
2. Make repairs to gasoline fuel injection systems.
3. Diagnose problems in truck gasoline fuel injection systems.

CONTENT:

1. Identify components of gasoline fuel injection systems
    - Engine fuel requirements
    - Purpose and advantage of computerized fuel control
    - How computers function
        - ECM
    - Input signals
        - TPS
        - MAP
        - RPM
        - VSS
        - CTS
        - O2
        - output signals
            - effects on engine operation and emission control

- Fuel Injection Types
  - types of systems
    - single point (throttle body) injection
    - multi point (port) injection
- Fuel Supply System
  - fuel tanks and lines
  - fuel pumps
  - construction and operation
  - testing
- Fuel filters
  - construction
  - testing and service
- Pressure regulators
- Injectors
  - location, construction, operation
  - TBI fuel
  - port fuel
- Testing
  - precautions regarding 12 Volt system
  - flow testing
  - balance tests
- Service
  - cleaning
  - replacement
- IAC (Idle Air Control) Systems
- Construction and operation
- Testing and service
- Minimum air rate
  - checking
  - adjusting

2. Make repairs to gasoline fuel injection systems
   - General precautions when servicing computer systems
     - battery boosting and charging
     - disconnecting or connecting computer components
     - clamping diodes (see General Motors Info)
     - checking resistance of system actuators before placing ECM
     - use of electric welding equipment
     - static electricity precautions

3. Diagnose problems in truck gasoline fuel injection systems
   - system Diagnosis
     - isolating computer versus non-computer problems
       - compression
       - cylinder condition
       - valve operation

- camshaft condition
- cam timing
- exhaust system restriction
- air intake system condition
- ignition timing
- fuel

- trouble or fault codes
  - getting codes from computer
  - reading codes
  - interpreting codes
  - problems or symptom
  - erasing codes
- scanning tools and readout tools
- operating modes for computerized fuel systems
  - key on
    - engine not turning
  - cranking
  - normal run modes
    - idle to w/o throttle
  - clear flood
  - limp - home
  - acceleration
  - deceleration
- electric governors

SUGGESTED LEARNING ACTIVITIES:

- Diagnose problems in gasoline fuel injection systems.
- Service gasoline fuel injection systems.
- Repair gasoline fuel injection systems.
- Install components of gasoline fuel injection systems.
- Test components of gasoline fuel injection systems.

SUGGESTED RESOURCES:

- Computerized Engine Controls - Dick H King.
- Service Manuals.
- Learning Activity Package.
- Use appropriate audio visual material where available.

EVALUATION:

NAME AND NUMBER: SV2770 - Emission Controls

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV2760

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to service and repair vehicle Emission Control Systems.

OVERVIEW OF OBJECTIVES:

1. Demonstrate awareness of Legislated Emission Standards.
2. Identify components of vehicle emission control systems.
3. Describe operation of vehicle emission control systems.
4. Test components of vehicle emission control systems using instruments, equipment and procedures recommended by the manufacturer.
5. Repair components of vehicle emission control systems using procedures recommended by the manufacturers.
6. Replace components and make final adjustments to vehicle emission control systems as recommended by the manufacturers.
7. Diagnose problems that occur in vehicle emission control systems.

CONTENT:

1. Demonstrate awareness of Legislated Emission Standards
    - Emission controls
        - pollution standards
        - legan emission levels
        - PCV valve service
        - EGR valve service
        - air pump service
        - catalytic converter service
        - fuel evaporation controls and systems
        - vacuum hose routing and diagram
        - heated air intake systems
        - aneroid system
2. Identify components of vehicle emission control systems

3. Describe operation of vehicle emission control systems

4. Test components of vehicle emission control systems using instruments, equipment and procedures recommended by the manufacturer

5. Repair components of vehicle emission control systems using procedures recommended by the manufacturers

6. Replace components and make final adjustments to vehicle emission control systems as recommended by the manufacturers

7. Diagnose problems that occur in vehicle emission control systems

SUGGESTED LEARNING ACTIVITIES:

- Locate components of vehicle emission control systems.
- The trainee will test, replace and adjust emission control system components.
- Diagnose problems caused by emission control components.

SUGGESTED RESOURCES:

- Auto Fuel and Emission Control Systems - Duffy/Smith.
- Service Manual for the truck being serviced.
- Learning Activity Package.

EVALUATION:

NAME AND NUMBER: SV1490 - Lighting Systems

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1100 - SV1130
SV1150 - SV1170
SV1370

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to service motor vehicle lighting systems.

OVERVIEW OF OBJECTIVES:

1. Aim headlights according to equipment manufacturer's instruction and government safety inspection regulations.

CONTENT:

1. Aim headlights according to equipment manufacturer's instruction and government safety inspection regulations
   a. Headlight aiming
   - aiming equipment
   - aiming procedures
   - replacement procedures

   b. Placement procedures
   - inspect test and repair lighting systems
   - lighting
     - bulb identification
     - headlights and circuits
     - park lights
     - brake lights
     - signal lights
     - emergency flasher
     - fuses and circuit breakers
     - fusible links

   c. Diagnose lighting systems problems

- wiring diagrams
- wire and terminal connection
- interior lighting
    - dome lights
    - dash lights
    - glove compartment light
    - courtesy light
    - illuminated entry
    - day-time running lights

SUGGESTED LEARNING ACTIVITIES:

- Aim headlights according to manufacturer's instructions and NB safety inspection regulations.
- Use test instruments to check for opens, shorts, and grounds in lighting system.
- Make repairs to lighting systems by replacing bulbs, fuses, or circuit breakers.
- Use wiring diagrams to locate circuits or components of circuits in a lighting system wiring harness.
- Diagnose lighting system problems.

SUGGESTED RESOURCES:

- Mid/Heavy Duty Truck Electrical and Electronic Systems - Robert N Brady.
- Service Manuals.
- Learning Activity Package.
- Use appropriate audio visual material where available.

EVALUATION:

NAME AND NUMBER: SV1500 - Wiring Harness and Accessories

SUGGESTED DURATION: 30 hours

PREREQUISITES: SV1370

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to diagnose and repair wiring harness and vehicle accessories.

OVERVIEW OF OBJECTIVES:

1. Evaluate the performance of dash instruments to determine the accuracy of the gauge readings.
2. Diagnose, repair or replace, wiring harnesses and related components.

CONTENT:

1. Evaluate the performance of dash instruments to determine the accuracy of the gauge readings.
    - indicators
        - oil, temperature, and fuel gauges
        - indicator lights
    - safety devices
        - seat belt warning
        - headlight on warning
        - key-in-switch warning
        - security alarm
    - horns
        - horn
        - controls
        - relays
    - windshield wiper and washers
    - dash removal
    - accessories
    - radio, antenna, clock, lighter, window defoggers

2. Diagnose, repair or replace, wiring harnesses and related components.

- Wiring harness
  - schematics
  - connectors
  - routing
  - circuit Protection
  - wire Repair
  - fault Tracing
- Diagnose electrical system problems
  - wiring diagrams
- Weather proof connectors
- Vapor proof connectors

SUGGESTED LEARNING ACTIVITIES:

- Evaluate the performance of dash instruments to determine the accuracy of the gauge readings.
- Inspect and replace faulty safety indicator devices such as brake warning, low oil pressure warning, and speedometers to insure safe operation of vehicle.
- Replace or repair wiring harness.
- Diagnose problems relating to wiring harness and accessories.

SUGGESTED RESOURCES:

- Mid/Heavy Duty Truck Electrical and Electronic Systems - Robert N. Brady
- Service Manuals.
- Learning Activity Package
- Use appropriate audio visual material where available.

EVALUATION:

NAME AND NUMBER: SV2780 - Fifth Wheels

SUGGESTED DURATION: 15 hours

PREREQUISITES: SV1100 - SV1110
TS1510 - TS1520
SV1150 - WD2320

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to service and repair fifth wheels on trucks.

OVERVIEW OF OBJECTIVES:

1. Identify various types of fifth wheels used on highway trucks.
2. Perform routine maintenance on fifth wheels that are used on trucks.
3. Diagnose problems and make adjustments on fifth wheels that are used on trucks.

CONTENT:

1. Identify various types of fifth wheels used on highway trucks
    - Fifth wheels
        - purpose
        - operation
        - uncoupling
        - shimming
        - jaw removal and installation
        - safety check
        - lubrication
        - maintenance

2. Perform routine maintenance on fifth wheels that are used on trucks
    - Diagnosis

3. Diagnose problems and make adjustments on fifth wheels that are used on trucks

SUGGESTED LEARNING ACTIVITIES:

- Inspect and adjust the jaws of a fifth wheel unit.
- Perform maintenance on a fifth wheel unit.
- Diagnose problem on fifth wheels.

SUGGESTED RESOURCES:

- Heavy Duty Truck Systems - 2nd edition - Norman/Scharff/Corinchock.
- Service Manuals.
- Learning Activity Package.
- Use appropriate audio visual material where available.

EVALUATION:

NAME AND NUMBER: SV2790 - Government Safety Inspections

SUGGESTED DURATION: 7 hours

PREREQUISITES: Entire Program

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the apprentice will be able to perform a motor vehicle safety inspection as is required in the province of NB.

OVERVIEW OF OBJECTIVES:

1. Perform a safety inspection on a motor vehicle using the New Brunswick Motor Vehicle Safety Inspection Guidelines.

CONTENT:

1. Perform a safety inspection on a motor vehicle using the New Brunswick Motor Vehicle Safety Inspection Guidelines.
   - General description of safety inspection.
   - Purpose
   - Inspection procedures.
   - Government specifications

SUGGESTED LEARNING ACTIVITIES:

- Perform safety inspections

SUGGESTED RESOURCES:

- NB Government Safety Inspection Manual
- Learning Activity Package
- Use appropriate audio visual material where available.

EVALUATION:

NAME AND NUMBER: SV2800 - Preventative Maintenance Inspections

SUGGESTED DURATION: 30 hours

PREREQUISITES: Entire Program

EVALUATIONS: Theory and practical applications require a minimum pass mark of 70%

OUTCOME:

Upon successful completion of this course, the trainee will be able to perform a preventative maintenance inspection on used and fleet vehicles.

OVERVIEW OF OBJECTIVES:

1. Perform a preventative maintenance inspection using fleet or manufacturer procedures and check list.

CONTENT:

1. Perform a preventative maintenance inspection using fleet or manufacturer procedures and check list.
    - Inspection of heavy duty vehicles.
    - Tires
        - without tread wear indicators
        - with tread wear indicators
        - regrooved tires
        - mismatching of tires
        - rims and lock rings
        - wheel nuts
        - studs
        - clamps
        - wheels
    - Alignment and suspension.
    - Front suspension
    - Rear suspension
    - Steering
        - linkage and kingpin play
    - Alignment
        - tracking
        - power steering

- Air suspension
- Brakes
  - hydraulic systems
  - air systems
  - air over hydraulic
  - fail safe systems
  - trailer brakes
  - parking brakes
  - air brake anti-lock systems
- Air retractable axles
- Electrical systems
  - lighting
  - safety starting switches
- Vehicle body
  - glazing
  - mirrors
  - floor pan
  - sheet metal
  - fire extinguisher
  - first aid kit
  - seat belts
  - windshield wipers
- Fuel system.
  - leaks
- Exhaust system.
- Emission controls.
- NB safety inspection

SUGGESTED LEARNING ACTIVITIES:

- Perform a preventative maintenance inspection using fleet or manufacturer's check list

SUGGESTED RESOURCES:

- Heavy Duty Truck Systems - 2nd Edition - Norman/Scharff/Corinchock.
- Service Manuals.
- Learning Activity Packages.
- Use appropriate audio visual material where available.

EVALUATION:

REQUIRED RELATED COURSES

COURSE NAME & NUMBER: CM2150 - Workplace Correspondence

DESCRIPTIVE TITLE: Workplace Correspondence

CALENDAR TITLE:

1.0 Type and Purpose Communications 2150 gives students the opportunity to study the principles of effective writing. Applications include letters, memos, and short report writing.

2.0 Major Topics Review of Sentence and Paragraph Construction; Business Correspondence; Informal Report; Job Search Techniques.

PREREQUISITES: Nil

CO-REQUISITES: Nil

COURSE DURATION 45hrs

SUGGESTED TEXT/
LEARNING RESOURCES:

Textbooks: Business English and Communications, Fourth Canadian Edition, Clark, Zimmer, et al., McGraw-Hill Ryerson, 1990

Student Projects and Activities for Business English and Communications,

Fourth Canadian Edition, Clark, et al., McGraw-Hill, 1990

Effective Business Writing, Jennifer MacLennon

Simon and Shuster Handbook for Writers, Second Edition, Troyka Lynn Quitman, Prentice Hall

College English Communication, Third Canadian Edition, Stewart,

Zimmer, et al., McGraw-Hill Ryerson Limited, 1989

Business and Administrative Communication, Second Edition, Kitty O. Locker. IRWIN, 1991

References: Pittman Office Handbook, Smith/Hay-Ellis

The Gregg Reference Manual, Fourth Canadian Edition, Sabin/O'Neill
McGraw Hill Handbook

Other Resources: Business Letter Business (Video), Video Arts

Guest Speakers

Sell Yourself (Video)

COURSE AIMS:

1. To help students understand the importance of well-developed writing skills in business and in career development.
2. To help students understand the purpose of the various types of business correspondence.
3. To examine the principles of effective business writing.
4. To examine the standard formats for letters and memos.
5. To provide opportunities for students to practice writing effective letters and memos.
6. To examine the fundamentals of informal reports and the report writing procedure.
7. To provide an opportunity for students to produce and informal report.

MAJOR TOPICS/TASKS:

1.0 Review of Sentence and Paragraph Construction
2.0 Business Correspondence
3.0 Informal Report/Present Orally

COURSE OUTLINE:

1.0 Review of Sentence and Paragraph Construction

- 1.1 Examining and applying principles of sentence construction
- 1.2 Examining and applying principles of paragraph construction

2.0 Business Correspondence

- 2.1 Examining the value of well-developed business writing skills
- 2.2 Examining principles of effective business writing
- 2.3 Examining business letters and memos

3.0 Informal Report

3.1 Examining the fundamentals of informal business reports

3.2 Applying informal report writing skills

LEARNING OBJECTIVES:

1.0 Review of Sentences and Paragraph Construction

1.1.1 Define a sentence and review the four types.
1.1.2 Identify the essential parts of a sentence, particularly subject and predicate, direct and indirect object.
1.1.3 Differentiate among phrases, clauses, and sentences.
1.1.4 Explore the major concepts related to subject-verb agreement.
1.1.5 Apply rules and principles for writing clear, concise, complete sentences which adhere to the conventions of grammar, punctuation, and mechanics.

1.2 Examine and Apply Principles of paragraph Construction

1.2.1 Discuss the basic purposes for writing.
1.2.2 Define a paragraph and describe the major characteristics of an effective paragraph.
1.2.3 Write well-developed, coherent, unified paragraphs which illustrate the following: A variety of sentence arrangements; conciseness and clarity; and adherence to correct and appropriate sentence structure, grammar, punctuation, and mechanics.

2.0 Business Correspondence

2.1 Examine the Value of Business Writing Skills

2.1.1 Discuss the importance of effective writing skills in business
2.1.2 Discuss the value of well-developed writing skills to career success

2.2 Examine Principles of Effective Business Writing

2.2.1 Discuss the rationale and techniques for fostering goodwill in business communication, regardless of the circumstances
2.2.2 Review the importance of revising and proofreading writing

2.3 Examine Business Letters and Memos

2.3.1 Differentiate between letter and memo applications in the workplace
2.3.2 Identify the parts of a business letter and memo
2.3.3 Explore the standard formats for business letters and memos
2.3.4 Examine guidelines for writing an acceptable letter and memo which convey: acknowledgment, routine request, routine response, complaint,

refusal, and persuasive request, for three of the six types listed

2.3.5 Examine samples of well-written and poorly written letters and memos

3.0 Informal Report

3.1 Examine the Fundamentals of Informal Business Reports

3.1.1 Identify the purpose of the informal report
3.1.2 Identify the parts and formats of an informal report
3.1.3 Identify methods of information gathering

3.2 Apply Informal Report Writing Skills and Oral Reporting Skills

3.2.1 Gather pertinent information
3.2.2 Organize information into an appropriate outline
3.2.3 Draft a five minute informal report
3.2.4 Edit, proofread, and revise the draft to create an effective informal report and present orally using visual aids.

RECOMMENDED EVALUATION:

Required Pass Mark 70%

DEVELOPMENT HISTORY:

Date Developed:
Date Revised: 1999 05 03

Name and Number: Customer Service MR1210

Descriptive Title: Customer Service

Summary Description:

This course focuses on the role of providing quality customer service. It is important to have a positive attitude and the necessary skills to effectively listen and interpret customer concerns about a product, resolve customer problems, and determine customer wants and needs. Students will be able to use the skills and knowledge gained in this course to effectively provide a consistently high level of service to the customer.

Prerequisites: None

Co-requisites: None

Suggested Duration: 30 hrs

Evaluation: Theory and Practical Applications Require a Pass Mark of 70%.

Course Aims:

1. To know and understand quality customer service

2. To know why quality service is important

3. To know and understand the relationship between "service" and "sales"

4. To understand the importance of and to demonstrate a positive attitude

5. To recognize and demonstrate handling of customer complaints

Course Objectives (Knowledge):

1. Providing Quality Service

- Define quality service
- List the types of quality service
- Define Service vs. Sales or Selling
- Explain why quality service is important
- Identify the various types of customers
- Define customer loyalty

2. Determining Customers Wants and Needs

- List four levels of customer needs
- Identify important customer wants and needs
- Identify ways to ensure repeat business

3. Demonstrating a Positive Attitude

- List the characteristics of a positive attitude
- Explain why it is important to have a positive attitude
- List ways that a positive attitude can improve a customer's satisfaction
- Define perception
- Explain how perception can alter us and customers
- Understand how to deal with perception

4. Effectively Communicating with customers

- Describe the main elements in the communication process
- Identify some barriers to effective communication
- Define body language
- Explain how body language would affect customers
- Determine why body language is important
- Define active listening and state why it is important
- Describe the four components of active living
- Contrast good and bad listeners
- List and discuss the steps of the listening process

5. Effectively using Questioning Techniques

- List questioning techniques
- Write two example of an open question
- Perform a questioning and listening role play

6. Using the Telephone Effectively

- List the qualities of a professional telephone voice
- Explain why telephone skills are important
- Demonstrate effective telephone skills

7. Asserting Oneself: Handling Complaints and Resolving Conflict

- Define assertiveness
- Define communication behaviors
- Relate assertions to effective communication
- Practice being assertive
- Understand the process of assertive guidelines for action
- Practice giving an assertive greeting

- Acknowledge multiple customers

8. Dealing with Difficult Customers

- Describe how you would deal with anger
- Complete a guide to controlling feelings
- Determine how you would feel dealing with an upset customer
- Suggest some techniques that might control your own feelings
- Understand leadership styles and the nature of organizations
- List ways to dealing with conflict / customer criticism
- Be aware of certain guidelines when confronting customers
- List ways of preventing unnecessary conflict with customers
- Review current skills and knowledge of customer service
- Develop a customer satisfaction improvement plan

COURSE NAME AND NUMBER: SP2330 - QA/QC

DESCRIPTIVE TITLE: Quality Assurance / Quality Control

DESCRIPTION:

This general studies course requires the use of basic tools and equipment and materials and supplies. It requires controlling drawings and specifications and/or calibrating measuring devices in applicable occupations.It involves interpreting standards, controlling the acceptance of raw materials, controlling quality variables and documenting the process. It includes information on quality concepts, codes and standards, documentation, communications, human resources, company structure and policy, teamwork and responsibilities.

PREREQUISITES: None

CO-REQUISITES: None

SUGGESTED DURATION: 30 Hrs

COURSE AIMS:

1. To develop the skills and knowledge required to apply quality assurance/quality control procedures

2. To develop an awareness of quality management principles and processes

COURSE OBJECTIVES (KNOWLEDGE):

1. Describe the reasons for quality assurance and quality plans.

2. Explain the relationship between quality assurance and quality control.

3. Describe quality control procedures as applied to the production and checking of engineering drawings in applicable occupations.

4. Describe quality control procedures as applied to the acceptance and checking of raw materials.

5. Explain the role of communications in quality management.

6. Explain why it is important for all employees to understand the structure of the company and its production processes.

7. Explain how human resource effectiveness is maximized in a quality managed organization.

8. Explain the role of company policy in quality management.

9. Explain the purpose of codes and standards.

10. Explain the concepts of quality

    a. cost of quality
    b. measurement of quality
    c. quality control and quality assurance
    d. elements of quality
    e. elements of the quality audit
    f. quality standards
    g. role expectations and responsibilities

11. Explain the structure of quality assurance and quality control

    a. Define quality assurance, quality control and documentation terminology
    b. Describe organizational charts
    c. List the elements of a quality assurance system
    d. Explain the purpose of the quality assurance manual
    e. Describe quality assurance procedures
    f. Explain the key functions and responsibilities of personnel

12. Complete quality assurance/quality control documentation

    a. Describe methods of recording reports in industry
    b. Describe procedures of traceability (manual and computer-based recording)
    c. Identify needs for quality control procedures

MAJOR TASKS / SUBTASKS (SKILLS):

1. Apply quality control to projects

    a. Follow QA/QC procedures for drawings, plans and specifications in applicable occupations.
    b. Calibrate measuring instruments and devices in applicable occupations.
    c. Interpret required standards
    d. Follow QA/QC procedures for accepting raw materials
    e. Carry out the project
    f. Control the quality elements (variables)

g. Complete QA/QC reports

EVALUATION:

Pass Mark Required 70%

DEVELOPMENT HISTORY:

Date Developed: February 1994
Date Revised: April, 1999

COURSE NAME & NUMBER: MC1050 - Introduction to Computers

DESCRIPTIVE TITLE: Introduction to Computers

CALENDAR ENTRY:

Type and Purpose This course is designed to give the student an introduction to computer systems. Particular emphasis is given to word processing, spreadsheet, e-mail and the Internet.

Major Topics Microcomputer System Hardware and Software Components; Word Processing; Electronic Spreadsheets; Electronic Mail and the Internet.

PRE-REQUISITES: Nil

CO-REQUISITES: Nil

SUGGESTED DURATION: 30 hours

SUGGESTED TEXT/

LEARNING RESOURCES:

Textbook(s):

References:

Other Resources:

COURSE AIMS:

1. To provide students with a introduction to computer systems and their operation.

2. To introduce students to popular software packages, their applications and future trends in computer applications.

MAJOR TOPICS:

1. Microcomputer System Hardware and Software Components
2. Word Processing
3. Spreadsheet
4. E-Mail and the Internet

COURSE OUTLINE:

1.0 Microcomputer System Hardware and Software Components

- 1.1 Microcomputer Hardware
  - 1.1.1 System Components
  - 1.1.2 Function of each Component
- 1.2 Microcomputer Software
  - 1.2.1 Software Definition and Types
  - 1.2.2 System Software (Windows 95)
  - 1.2.3 File Management Commands (Windows 95)

2. Word Processing

- 2.1 Keyboarding Techniques
- 2.2 Word Processing
  - 2.2.1 Understanding Word Processing
  - 2.2.2 Create a Document
  - 2.2.3 Save, Open and Edit a Document
  - 2.2.4 Edit a Document: Cut and Paste
  - 2.2.5 Understand Hidden codes.
  - 2.2.6 The Select Feature (Block)
  - 2.2.7 Change Layout Format
  - 2.2.8 Change Text Attributes
  - 2.2.9 Use Auxiliary Tools
  - 2.2.10 Select the Print Feature (number of copies and current document)

3. Electronic Spreadsheet

- 3.1 Spreadsheet Basics
- 3.2 Operate Menus
- 3.3 Create a Worksheet
- 3.4 Use Ranges

3.5 Print a Worksheet
3.6 Edit a worksheet

4. Electronic Mail and the Internet

4.1 Electronic Mail
4.2 The Internet

LEARNING OBJECTIVES:

1. Microcomputer System Hardware and Software Components

1.1 Microcomputer Hardware

1.1.1 System Components

1.1.1.1 Identify major components of a computer system.

1.1.2 Function of each Component

1.1.2.1 Describe the function of the microprocessor.
1.1.2.2 Describe and give examples of I/O DEVICES.
1.1.2.3 Describe primary storage (RAM, ROM, Cache).
1.1.2.4 Define bit, byte, code and the prefixes k.m. and g.
1.1.2.5 Describe secondary storage (diskettes and hard disks, CD ROMS, Zip Drives etc).
1.1.2.6 Describe how to care for a computer and its accessories.

1.2 Microcomputer Software

1.2.1 Software Definition and Types

1.2.1.1 Define software.
1.2.1.2 Describe, operational and application software used in this course.
1.2.1.3 Define file and give the rules for filenames and file extensions..

1.2.2 System Software (Windows 95)

1.2.2.1 Getting Started with Windows
1.2.2.2 Start and quit a Program
1.2.2.3 Get Help
1.2.2.4 Locate a specific file using the **find** function of Win95

1.2.2.5 Changing system settings:wall paper, screen saver, screen resolution, background.
1.2.2.6 Starting a program by using the Run Command
1.2.2.7 Shutting down your computer

1.2.3 File Management Commands (Windows 95)

1.2.3.1 View directory structure and folder content
1.2.3.2 Organizing files and folders
1.2.3.3 Copy, delete, and move files and folders
1.2.3.4 Create folders
1.2.3.5 Maximize and minimize a window
1.2.3.6 Print directory/folder content
1.2.3.7 Describe the Windows 95 taskbar

2. Word Processing

2.1 Keyboarding Techniques

2.1.1 Identify and locate alphabetic and numeric keys
2.1.2 Identify and locate function keys: special keys, home keys, page up key, page down key, numeric key pad, shift keys, punctuation keys, tab key

2.2 Word Processing

2.2.1 Understanding word processing

2.2.1.1 The Windows Component
2.2.1.2 The Menu Bar
2.2.1.3 Menu Indicators
2.2.1.4 The Document Window
2.2.1.5 The Status Bar
2.2.1.6 The Help Feature
2.2.1.7 Insertion Point Movements

2.2.2 Create a document

2.2.2.1 Change the Display
2.2.2.2 The Enter Key
2.2.2.3 Enter Text

2.2.3 Save, Open and Exit a document.

2.2.3.1 Save a document
2.2.3.2 Close a document.
2.2.3.3 Start a new document Window
2.2.3.4 Open a document
2.2.3.5 Exit Word Processor

2.2.4 Edit a Document

2.2.4.1 Add New Text
2.2.4.2 Delete text
2.2.4.3 Basic Format Enhancement (split and join paragraphs, insert text)

2.2.5 Understand Hidden Codes

2.2.5.1 Display Hidden Codes
2.2.5.2 Delete Text Enhancements

2.2.6 The Select Feature

2.2.6.1 Identify a Selection
2.2.6.2 Move a Selection
2.2.6.3 Copy a Selection
2.2.6.4 Delete a Selection
2.2.6.5 Select Enhancements
2.2.6.6 Save a Selection
2.2.6.7 Retrieve a Selection

2.2.7 Change Layout Format

2.2.7.1 Change layout format: (margins, spacing, alignment, paragraph indent, tabs, line spacing, page numbering)

2.2.8 Change Text Attributes

2.2.8.1 Change text attributes: (bold, underline, font, etc.)

2.2.9 Use Auxiliary Tools

2.2.9.1 Spell Check

2.2.10 Select the Print Feature

2.2.10.1 Select the Print Feature: (i.e; number of copies and current document)
2.2.10.2 Identify various options in print screen dialogue box

3. Electronic Spreadsheet

3.1 Spreadsheet Basics

3.1.1 The Worksheet Window

3.2 Operates Menus

3.2.1 Use a Menu Bar
3.2.2 Use a Control Menu
3.2.3 Use a Shortcut Menu
3.2.4 Save, Retrieve form Menus

3.3 Create a Worksheet
3.3.1 Enter Constant Values and Formulas
3.3.2 Use the Recalculation Feature
3.3.3 Use Cell References (relative and absolute references)

3.4 Use Ranges

3.4.1 Type a Range for a Function
3.4.2 Point to a Range for a Function
3.4.3 Select a Range for Toolbar and Menu Commands

3.5 Print a Worksheet
3.5.1 Print to the Screen
3.5.2 Print to the Printer
3.5.3 Print a Selected Range

3.6 Edit a Worksheet
3.6.1 Replace Cell Contents
3.6.2 Insert and Delete Rows and Columns
3.6.3 Change Cell Formats
3.6.4 Change Cell Alignments
3.6.5 Change Column Width
3.6.6 Copy and Move Cells

4. Electronic Mail and the Internet

4.1 Electronic Mail

4.1.1 Compose and send an e-mail message
4.1.2 Retrieve an e-mail attachments
4.1.3 Send an e-mail message with attachments
4.1.4 Retrieve and save e-mail attachments
4.1.3 Print an e-mail message
4.1.4 Delete an e-mail message

4.2 The Internet

- 4.2.1 Overview of the World Wide Web
- 4.2.2 Accessing Web sites
- 4.2.3 Internet Web Browsers
- 4.2.4 Internet Search Engines
- 4.2.5 Searching Techniques

STUDENT EVALUATION:

Required Pass Mark 70%

DEVELOPMENT HISTORY:

Date Designed	1998
Date Revised	1999

COURSE NAME AND NUMBER: SD1700 - Workplace Skills

DESCRIPTIVE TITLE: Workplace Skills

DESCRIPTION:

This course involves participating in meetings, doing safety inspections, completing employment insurance forms, writing letters of employment insurance appeal, and filing a human rights complaint. Includes information on formal meetings, unions, worker's compensation, employment insurance regulations, worker's rights and human rights.

PREREQUISITES: None

CO-REQUISITES: None

SUGGESTED DURATION: 30 Hrs

COURSE AIMS:

1. Participate in meetings (conduct meetings).
2. Be aware of union procedures.
3. Be aware of workers' compensation regulations.
4. Be aware of occupational health and safety regulations.
5. Be aware of employment insurance regulations
6. Be aware of workers' rights.
7. Be aware of human rights

COURSE OBJECTIVES (KNOWLEDGE):

1. Meetings
   a. Explain preparation requirements prior to conducting a meeting
   b. Explain the procedures for conducting a meeting.
   c. Explain participation in meetings.

d. Explain the purpose of motions.
h. Explain the procedure to delay discussion of motions.
i. Explain how to amend and vote upon a motion.

2. Unions
   a. Why do unions exist?
   b. Give a concise description of the history of Canadian labour.
   c. How do unions work?
   d. Explain labour's structure.
   e. Describe labour's social objectives.
   f. Describe the relationship between Canadian labour and the workers.
   g. Describe the involvement of women in unions.

3. Worker's Compensation
   a. Describe the aims, objectives, benefits and regulations of the Workers Compensation Board.
   b. Explain the internal review process.

4. Occupational Health and Safety
   a. Describe the rules and regulations directly related to your occupation.

5. Employment Insurance Regulations
   a. Explain employment insurance regulations
   b. Describe how to apply for employment insurance.
   c. Explain the appeal process.

6. Worker's Rights
   a. Define labour standards.
   b. Explain the purpose of the Labour Standards Act.
   c. List regulations pertaining to:
      i. Hours of work.
      ii. Minimum wage.
      iii. Employment of children.
      iv. Vacation pay

7. Human Rights
   a. Describe what information cannot be included on an application.
   b. Describe what information cannot be included in an interview
   c. Why is there a Human Rights Code?
   d. Define sexual harassment.

MAJOR TASKS / SUBTASKS (SKILLS):

1. Participate in meetings.
   a. Follow the form of getting a motion on the floor
   b. Discuss a motion

c. Amend a motion
d. Vote on a motion.

2. Complete a safety inspection of your shop.

3. Complete an employment insurance application form.

4. Write a letter of appeal.

5. Analyze a documented case of a human rights complaint with special emphasis on the application form, time-frame, documentation needed, and legal advice available.

EVALUATION:

Required Pass Mark 70%

DEVELOPMENT HISTORY:

Date Developed:
Date Revised: April, 1999

Name and Number: Job Search Techniques SD 1710

Descriptive Title: Job Search Techniques

Prerequisites: None

Co-requisites: None

Suggested Duration: 15 hrs.

Evaluation: Theory and Practical Applications Require a Pass Mark of 70%.

Course Objectives (Knowledge):

1. Examine and Demonstrate Elements of Effective Job Search Techniques

- Identify and examine employment trends and opportunities
- Identify sources that can lead to employment
- Discuss the importance of fitting qualifications to job requirements
- Discuss and demonstrate consideration in completing job application forms
- Establish the aim/purpose of a resume
- Explore characteristics of effective resumes, types of resumes, and principles of resume format
- Explore characteristics of and write an effective cover letter
- Explore, and participate in a role play of a typical job interview with commonly asked questions and demonstrate proper conduct
- Explore other employment related correspondence
- Explore the job market to identify employability skills expected by employer
- Conduct a self-analysis and compare with general employer expectations

DEVELOPMENT HISTORY:

Date Developed:

Date Revised: 1999 05 03

Name and Number: Entrepreneurial Awareness SD 1720

Descriptive Title: Entrepreneurial Awareness

Prerequisites: None

Co-requisites: None

Suggested Duration: 15 hrs

Evaluation: Theory and Practical Applications Require a Pass Mark of 70%.

Course Objectives (Knowledge):

1. Explore Self-Employment: An Alternative to Employment

- Identify the advantages and disadvantages of self-employment vs. regular employment
- Differentiate between an entrepreneur and a small business owner
- Evaluate present ideas about being in business

2. Explore the Characteristic of Entrepreneurs

- Identify characteristics common to entrepreneurs
- Relate their own personal characteristics with those of entrepreneurs.
- Evaluate their present ideas about business people

3. Identifying Business Opportunities

- Distinguish between an opportunity and an idea.
- List existing traditional and innovative business ventures in the region.
- Explain the general parameters between which business ventures should fit.
- Summarize the role of such agencies Regional Economic Development Boards, Business Development Corporations, etc.
- Identify potential business opportunities within the region.

4. Demystifying the Entrepreneurial Process.

- Explain the entrepreneurial process
- Describe the purpose of a business plan
- Identify the main ingredients of a business plan
- Summarize the role of such agencies as BDC's, ACOA, Women's Enterprise Bureau etc.
- List other agencies where assistance - financial and otherwise - is available to those interested in starting a business venture.

REQUIRED WORK EXPERIENCES

National Red Seal Certification requires that all Apprentices obtain appropriate industry based work experiences. The required work experiences identified in this section are written in the broadest terms so as to ensure the apprentices receive experiences in each of the required areas and to ensure that employers have a degree of flexibility in applying the terms and conditions implicit in a Contact of Apprenticeship. What is important is that both the apprentice and the employer understand the obligations laid out in this plan of training which is designed to ensure that at the completion of both the technical training and the required hours of work experience the apprentice has both the knowledge and the skills necessary to successfully complete the Red Seal Examination.

REQUIRED WORK EXPERIENCES:

- Experience in diagnosing, maintaining and servicing a variety of braking systems including mechanical, pneumatic hydraulic and electrical.
- Experience in diagnosing, servicing and maintaining steering and suspension systems including tires, wheels, chassis, shocks, control arms, springs, axles, load levelling, king pins, ball joints, manual and power steering.
- Experience in diagnosing, replacing and repairing light assemblies, wipers, instrument panels, gauges, horns, radios and batteries.
- Experience in diagnosing, maintaining and servicing drive lines including differentials, wheel bearings, axles, clutches and universal joints.
- Experience in servicing and repairing hinges, strikers, trim panels, seat assemblies, carpet, seat belts and headliners.
- Experience in diagnosing, servicing and maintaining ignition systems including on-board computers, distributors, spark plugs, wires. Tune-up experience is also required.
- Experience in diagnosing, servicing and repairing starting and charging systems including batteries, relays, switches, voltage regulators, starting motors and alternators.
- Routine S.M.A.W. and oxy-fuel welding and cutting as required.
- Experience in diagnosing, servicing and repair of manual transmissions and transfer cases.
- Experience in rebuilding and replacing cylinder heads.

- Experience in diagnosing, servicing and repairing heavy duty engine blocks, including piston assemblies, sleeves engine blocks, crankshafts and bearings, camshaft and bearings and crankshaft assemblies.

- Experience in diagnosing, overhauling and servicing diesel fuel injection systems.

- Experience in diagnosing, servicing and repairing of automatic transmissions.

- Experience in diagnosing, maintaining and repairing of air conditioning systems.