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ABSTRACT

This analysis covers tasks performed by a farm equipment mechanic, an occupational title some provinces and territories of Canada have also identified as agricultural machinery technician, agricultural mechanic, and farm equipment service technician. A guide to analysis discusses development, structure, and validation method; scope of the occupation; trends; and safety. To facilitate understanding the nature of the occupation, work performed is divided into these categories: (1) blocks, the largest divisions in the analysis that reflect distinct operations relevant to the occupation; (2) tasks, the distinct activities that in combination make up the logical and necessary steps the worker is required to perform to complete a specific assignment in a block; and (3) sub-tasks, the smallest divisions into which it is practical to subdivide any work activity and which, in combination, fully describe all duties constituting a task. Other components of a task are trends, related components, tools and equipment, and supporting knowledge and abilities. Each sub-task is accompanied by results of a validation by all provinces/territories. The 8 blocks, which include 46 tasks are the following: skills; engines and engine systems; drive train systems; hydraulic systems; electrical and electrical systems; steering and braking systems; structural components and accessories; and crop equipment. Appendixes include a list of tools and equipment; glossary; blocks and tasks weighting; and task profile chart. (YLB)

Occupational Analyses Series

Farm Equipment Mechanic

2000

Interprovincial Partnerships and Occupational Information Division

Division des Partenariats interprovinciaux et Information sur les carrières

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The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this occupational analysis as the national standard for the occupation of farm equipment mechanic.

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OTHER RELATED OCCUPATIONAL TITLES

This analysis covers tasks performed by a farm equipment mechanic whose occupational title has been identified by some provinces and territories of Canada under the following names:

- Agricultural Machinery Technician
- Agricultural Mechanic
- Farm Equipment Service Technician

LIST OF PUBLISHED OCCUPATIONAL ANALYSES *

TITLE	NOC** Code
Appliance Service Technician (1997)	7332
Aquaculture Technician (1977)	2221
Arts Administrator (1989)	0114
Automotive Painter (1995)	7322
Automotive Service Technician (1998)	7321
Automotive Technician - Automatic Transmission (1990)	7321
Automotive Technician - Electrical/Electronics (1992)	7321
Automotive Technician - Engine Repair and Fuel Systems (1989)	7321
Automotive Technician - Front-End (1989)	7321
Automotive Technician - Manual Transmission, Driveline and Brakes (1990)	7321
Aviation Machinist (1994)	7231
Baker (1997)	6252
Blaster (Surface) (1987)	7372
Boilermaker (1994)	7262
Bricklayer (2000)	7281
Cabinetmaker (2000)	7272
Carpenter (1998)	7271
Cement Finisher (1995)	7282
Construction Electrician (1994)	7241
Cook (1997)	6242
Electrical Rewind Mechanic (1999)	7333
Electronics Technician - Consumer Products (1997)	2242
Electronics Technician Vol. I (1986) (Video Equipment)	2242
Electronics Technician Vol. II (1986) (Audio Equipment)	2242
Electronics Technician Vol. III (1986) (Computer Equipment)	2242

* **Red Seal analyses are indicated in bold**

** **National Occupational Classification**

Electronics Technician Vol. IV (1986) (Office Equipment)	2242
Electronics Technician Vol. VI (1986) (Communication Equipment)	2242
Electronics Technician Vol. VII (1986) (Signaling Equipment)	2242
Electronics Technician Vol. VIII (1986) (Navigation Equipment)	2242
Electronics Technician Vol. IX (1986) (Video Game Equipment)	2242
Electronics Technician Vol. X (1987) (CADD Equipment)	2242
Electronics Technician Vol. XI (1987) (CAM Equipment)	2242
Electronics Technician Vol. XII (1987) (Robotics Equipment)	2242
Electronics Technician Vol. XIII (1987) (Biomedical and Laboratory Equipment)	2242
Electronics Technician Vol. XIV (1987) (Industrial Process-Control Equipment)	2243
Farm Equipment Mechanic (2000)	7312
Floorcovering Installer (1997)	7295
Glazier (1994)	7292
Hairstylist (1997)	6271
Heating (Gas and Oil) Servicer - Commercial and Industrial (1978)	7331
Heavy Duty Equipment Mechanic (1998)	7312
Heavy Equipment Operator (1983)	7421
Industrial Electrician (1997)	7242
Industrial Instrument Mechanic (2000)	2243
Industrial Mechanic (Millwright) (1999)	7311
Insulator (Heat and Frost) (2000)	7293
Ironworker (Generalist) (1993)	7264
Lather (Interior Systems Mechanic) (1994)	7284
Logistics (1992)	0713
Machinist (1998)	7231
Major Electrical Appliance Repairer (1984)	7332

Mobile Crane Operator (1997)	7371
Motorcycle Mechanic (1995)	7334
Motor Vehicle Body Repairer (Metal and Paint) (1997)	7322
New Home Builder and Residential Renovation Contractor (1992)	0712
Oil Burner Mechanic (1997)	7331
Painter and Decorator (2000)	7294
Partsperson (1995)	1472
Plumber (1996)	7251
Power Engineer (1997)	7351
Powerline Technician (1996)	7244
Recreation Vehicle Mechanic (2000)	7383
Refrigeration and Air Conditioning Mechanic (1997)	7313
Roofer (1997)	7291
Sheet Metal Worker (1997)	7261
Sprinkler System Installer (1995)	7252
Steamfitter-Pipefitter (1996)	7252
Steel Fabricator (Fitter) (1994)	7263
Tool and Die Maker (1997)	7232
Truck-Trailer Repairer (1994)	7321
Truck and Transport Mechanic (2000)	7321
Welder (1996)	7265

REQUESTS FOR THESE PUBLICATIONS SHOULD BE FORWARDED TO:

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Hull, Quebec K1A 0J9

FOREWORD

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to co-operate with provincial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. To this end, Human Resources Development Canada sponsors a program, under the guidance of the Canadian Council of Directors of Apprenticeship (CCDA), to develop a series of occupational analyses.

The Occupational Analysis Program has the following objectives:

- to identify and group the tasks performed by skilled workers in particular occupations;

- to identify those tasks that are performed by skilled workers in every province and territory;

- to develop instruments for use in the preparation of interprovincial standards "Red Seal" examinations and curricula for training leading to the certification of skilled workers;

- to facilitate the mobility, in Canada, of trainees and skilled workers;

- to supply employers and employees, and their associations, industries, training institutions and governments with analyses of the tasks performed in particular occupations.

TABLE OF CONTENTS

GUIDE TO ANALYSIS

DEVELOPMENT OF ANALYSIS

A draft analysis is developed by a knowledgeable consultant who, with the assistance of a committee of industry experts in the field, identifies all the tasks performed in the occupation.

The draft is then assigned to occupational analysts at Human Resources Development Canada for translation and then returned to the consultant for review to ensure conformity with the nationally approved format.

The consultant will then forward a copy of this analysis to provincial/territorial authorities for validation by specialists in the field. Their recommendations are assessed and incorporated into the final draft which also includes the identification of the common core tasks performed in the occupation.

The occupational analysis is published in both official languages.

STRUCTURE OF ANALYSIS

To facilitate the understanding of the nature of the occupation, the work performed is divided into the following divisions:

A. **BLOCK** - is the largest division within the analysis and reflects a distinct operation relevant to the occupation.

B. **TASK** - is the distinct activity that, combined with others, makes up the logical and necessary steps the worker is required to perform to complete a specific assignment within a "BLOCK".

C. **SUB-TASK** - is the smallest division into which it is practical to subdivide any work activity and, combined with others, fully describes all duties constituting a "TASK".

Supporting Knowledge & Abilities

The element of skill and knowledge that an individual must acquire to adequately perform the task is identified under this heading.

Trends

Any shifts or changes in technology which affects the block are identified under this heading.

Related Components

All components of a specified task being undertaken by the farm equipment mechanic are identified under this heading.

Tools and Equipment

All tools and equipment necessary for the farm equipment mechanic to complete a task are identified under this heading.

VALIDATION METHOD

At the request of the Canadian Council of Directors of Apprenticeship (CCDA), the Standardization SubCommittee developed a method for the validation of the national Red Seal occupational analyses.

A draft of the analysis is sent to all provinces/territories for validation. Each jurisdiction rates the sub-tasks and applies percentage ratings to blocks and tasks. This method for the validation of the national occupational analyses identifies common core tasks across Canada for a specific occupation. This feature facilitates the weighting of the Interprovincial Red Seal examinations.

DEFINITIONS

YES:	the sub-task is performed by workers in the occupation in a specific jurisdiction.
NO:	the sub-task is not performed by workers in the occupation in a specific jurisdiction.
BLOCK %:	the average number of questions (items), derived from the collective decision made by workers within the occupation from all areas of Canada, which will be placed on an interprovincial examination to assess each block of the analysis.
TASK %:	the average number of questions (items), derived from the collective decision made by workers within the occupation from all areas of Canada, which will be placed on an interprovincial examination to assess each task of the analysis.
NV:	Not Validated by a province/territory.
ND:	Not Designated in a province/territory.

PROVINCIAL/TERRITORIAL ABBREVIATIONS

NF:	Newfoundland and Labrador
NS:	Nova Scotia
PE:	Prince Edward Island
NB:	New Brunswick
QC:	Quebec
ON:	Ontario
MB:	Manitoba
SK:	Saskatchewan
AB:	Alberta
BC:	British Columbia
NT:	Northwest Territories

YK: Yukon

COMMON CORE

The criteria for determining common core are dependant on the performance of sub-tasks. If 70 percent of the responding jurisdictions (excluding NVs and NDs) perform the sub-task, it shall be considered common core.

Interprovincial Red Seal examinations are based on the common core identified through this validation process. This process identifies what will be assessed through the interprovincial examination.

BLOCKS AND TASKS WEIGHTING (APPENDIX "B")

This appendix represents the block and task percentages as submitted by each jurisdiction.

Each jurisdiction, with the use of a provincial/territorial occupational advisory committee, validates the content, places percentages on blocks and tasks, and indicates whether or not the sub-tasks are performed by the skilled workers within the occupation. The results of this exercise are submitted to the consultant who then analyzes the data and develops this appendix which provides the individual jurisdictional validation results as well as the national averages of all responses.

PIE CHART (APPENDIX "C")

The graph depicts the national percentages assigned to blocks in the analysis.

SCOPE OF THE FARM EQUIPMENT MECHANIC OCCUPATION

The farm equipment mechanic is a competent tradesperson who, through knowledge, ability and practical skills, is capable of setting-up, performing pre-delivery work, servicing and repairing modern farm tractors, machinery and attachments used in farm enterprises, such as nursery and landscape, tobacco, fruit and vegetable, cash crop, dairy farm, and animal husbandry. The farm equipment mechanic also works on compact utility tractors and equipment regardless of power size.

The mechanic must have the ability to diagnose engine and engine systems, hydraulics, electrical, drive train, brakes and steering systems. He/she must be able to analyze failed parts and components, and correct malfunctions. He/she must also be able to prove or demonstrate through testing and machine operation that the work performed was complete and successful. Furthermore, the mechanic must be able to communicate work details effectively to those concerned and make recommendations relating to the proper service operation and maintenance of the equipment.

The mechanic is aware of fabrication, repair or rebuild possibilities by specialty shops, and can, therefore, recommend such "outside service". He/she is at ease with both, electronic and computerized test devices and is able to obtain, read and interpret whatever data may be required for the job. He/she understands design, construction, performance and safety of crop equipment. "Crop Equipment" means any equipment or machinery designed and used for agricultural or horticultural use and includes attachments.

The analysis recognizes similarities or overlaps in the work of other tradespersons, such as the automotive service technician, truck and transport mechanic, heavy duty equipment mechanic, refrigeration and air-conditioning mechanic, small engine mechanic, and welder.

OCCUPATIONAL OBSERVATIONS

The farming industry, as with all sectors of the economy, is experiencing new directions and rapid change as technology, environmental legislation and customer satisfaction impact the equipment processes of the farm equipment mechanics.

The advent of precision farming where farmers utilize on board field computers for automatic guidance and crop monitoring of planting, spraying and removal has impacted the farm equipment machinery. The farm equipment mechanic deals on a regular basis with electronically controlled functions that continue to develop in sophistication as precision farming advances.

Globalization of the industry has also resulted in standardization of basic power, hydraulic and transmission systems. This leads to more uniformity between systems and more standardized design and operation of controls of farm implements. As the industry standardizes, the manufacturers' seek to differentiate themselves by providing new technology which increases farming efficiencies. This in turn requires the farm equipment mechanic to continually update, not only in specialized areas, but in all areas of the trade.

As the manufacturers' compete in technology, they have also turned to customer satisfaction as the leading driver of change. This has resulted in advances in cab comfort, more advanced steering and braking systems as well as increases in variable speed transmissions. The farm equipment mechanic must not only be customer focused as he/she completes his job but strive to understand the changes within the industry.

Farming is a critical components of modern society. As demands for productivity increase so do the demands for environmental protection. Environmental protection laws not only change the nature of oils, lubricants and emissions but also engine design and rubber track tractors.

The advent of precision farming, of globalization, of customer satisfaction and of environmental legislation converge on farm equipment design and operation. The farm equipment mechanic, as an occupation, continues to increase in sophistication and skills, as the mechanic sets up, services, maintains and repairs the equipment that supports modern farming.

SAFETY

Safe working procedures and conditions, accident prevention and the preservation of health are of primary importance to industry in Canada. These responsibilities are shared and require the joint efforts of government, employers and employees. It is imperative that all parties become aware of circumstances which may lead to injury or harm. Safe learning experiences and environments can be created by controlling the variables and behaviours that may contribute to cause an accident or injury.

It is generally recognized that a safety-conscious attitude and work practices contribute to a healthy, safe and accident-free working environment.

It is imperative to apply and be familiar with the Occupational Health and Safety Act and Regulations. As well, it's essential to determine workplace hazards and take measures to protect oneself, co-workers, the public and the environment.

As safety education is an integral part of a training in all jurisdictions, personal safety practices are not recorded in this document. However, the technical safety aspect relating to each task and sub-task are included throughout this analysis.

ANALYSIS

BLOCK A

OCCUPATIONAL SKILLS

Trends: *There is a growing need for diagnostic skills due to the increasing sophistication of equipment and to reduce overall costs of repairs. The computer is increasingly being used for diagnostics, function calibration, programming, service and parts information. There is an increased use of highly specialized tools such as recovery systems for refrigerants, machine specific tools. Awareness of customer needs is on-going.*

Task 1 **Applies technical information.**

Related Components: Farm equipment machinery (power source or driven), schematic diagrams, work orders, micro-fiche, parts catalogues.

Tools and Equipment: Laptop computer, computer, technical manuals.

Sub-task

1.01 **Accesses technical information.**

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

1.01.01 knowledge of technical information sources

1.01.02 ability to access technical information from books and bulletins

1.01.03 ability to access technical information from electronic sources such as Internet, CD ROM, disk and from microfiche

Sub-task

1.02 **Analyzes technical information.**

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

1.02.01	knowledge of farm equipment principles, operations and terms
1.02.02	ability to analyze technical information to facilitate repair
1.02.03	ability to identify individual unit and/or components of farm equipment

Task 2 **Uses tools and equipment.**

Related Components: Farm equipment machinery (power source or driven), refrigerants, nitrogen, cleaners, thread sealer, wood blocks, wedges, lubricants.

Tools and Equipment: Hand and power tools, shop equipment, electrical tools and equipment, hydraulic tools and equipment, measuring tools, air conditioning tools, engine and fuel system tools, power train tools.

Sub-task

2.01 **Uses general tools.**

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

2.01.01	knowledge of general tools types and their application
2.01.02	ability to determine the proper tool for the task to be done
2.01.03	ability to select and operate general tools
2.01.04	ability to use hand tools properly
2.01.05	ability to perform preventative maintenance on tools
2.01.06	ability to use power tools

Sub-task

2.02 Uses specialized tools. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

2.02.01	knowledge of farm equipment specialized tools and their application
2.02.02	ability to select the proper specialized tools as recommended by the manufacturer
2.02.03	ability to use specialized electrical tools and equipment
2.02.04	ability to use specialized hydraulic tools and equipment
2.02.05	ability to use specialized measuring tools and equipment
2.02.06	ability to use specialized air conditioning tools and equipment
2.02.07	ability to use specialized engine fuel system tools
2.02.08	ability to use specialized power train tools and equipment
2.02.09	ability to operate specialized tools properly
2.02.10	ability to perform preventative maintenance on specialized tools

Task 3 Uses lifting tools.

Related Components: Chains, equalizers, special adaptors.

Tools and Equipment: Lifting tools and equipment, such as hoists, gantry cranes and supporting devices.

Sub-task

3.01 Uses hoisting equipment. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

3.01.01	knowledge of hoisting tool types and their applications
3.01.02	ability to determine proper hoisting device with sufficient capacity such as gantry crane, ratchet cable hoist
3.01.03	ability to determine proper sling such as cables, chains, nylon straps
3.01.04	ability to use support devices to secure load such as jack stands
3.01.05	ability to attach hoisting device to load and operate hoist safely

Sub-task

3.02 Uses lifting devices. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

3.02.01	knowledge of lifting tool types and their applications
3.02.02	ability to determine proper lifting device with sufficient capacity such as jacks, forklift, manufacturers' special lifting equipment
3.02.03	ability to operate lifting device in specified location to lift load safely
3.02.04	ability to perform preventative maintenance on lifting tools
3.02.05	ability to use support devices to secure load such as jack stands

Task 4 **Uses welding, cutting and heating equipment.**

Related Components: Frames, hitches, attachment, fabricating, non-factory attachment.

Tools and Equipment: Welding, cutting and heating equipment such as ocy-acetylene torch, welders, plasma cutter, cut-off saw, horizontal bandsaw, grinder.

Sub-task

4.01 Uses welding equipment. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

4.01.01	knowledge of welding equipment and their application
4.01.02	ability to recognize different metals such as iron, steel, cast iron, aluminum and stainless steel to be welded
4.01.03	ability to select welding process
4.01.04	ability to select proper welding rods for the metal being welded
4.01.05	ability to select and operate welding equipment such as oxy-acetylene, electric welding (stick welders, MIG welders)
4.01.06	ability to recommend specialty welding
4.01.07	ability to maintain welding equipment
4.01.08	ability to perform welding operations (repair buckets, front-end loaders, reinforcing frames, etc.)

Sub-task

4.02 Uses cutting equipment. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

4.02.01	knowledge of trade related cutting equipment and their applications
4.02.02	ability to recognize different metals such as steel, aluminum, stainless steel to be cut
4.02.03	ability to determine cutting process
4.02.04	ability to select and operate cutting equipment such as oxy-acetylene cutting, electric arc cutting with special cutting rods or carbon arc cutting, plasma cutting
4.02.05	ability to maintain cutting equipment

Sub-task

4.03 Uses heating equipment.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

4.03.01	knowledge of types of trade related heating equipment and their applications
4.03.02	ability to recognize different metals such as iron, steel, cast iron, aluminum, stainless steel to be heated
4.03.03	ability to determine heating process
4.03.04	ability to select and operate heating equipment such as oxy-acetylene torch, propane torch, electric carbon arc
4.03.05	ability to perform preventative maintenance on heating equipment

BLOCK B

ENGINES AND ENGINE SYSTEMS

Trends: *Increased use of electronic management systems such as fuel injection timing. Increased use of turbo-charged engines and inter-cooling systems to increase horsepower without increasing engine size. Service intervals are increasing with the use of high quality lubricants and filters and the development of more efficient engines. Changes in engine design such as fuel and air mixtures is being driven by increased awareness of environmental concerns.*

Task 5 **Maintains engines and engine systems.**

Related Components: Tractors, combines, self-propelled harvester, self-propelled sprayer, self-propelled swather, engine drive generator, skid steers, forklifts, block, crankshaft, cylinder head, fuel system, intake and exhaust system, cooling and oil systems.

Tools and Equipment: Hand and power tools, pressure washer, lube and oil equipment.

Sub-task

5.01 Maintains lubrication systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

5.01.01	knowledge of lubrication systems operation, its component parts and their function
5.01.02	knowledge of fluid classification (viscosity, API)
5.01.03	ability to change oil and oil filters
5.01.04	ability to interpret manufacturers' specifications
5.01.05	ability to prepare an oil analysis

Sub-task

5.02 Maintains cooling systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

5.02.01	knowledge of cooling systems operation its component parts and their function
5.02.02	knowledge of coolant classification
5.02.03	ability to clean and flush cooling system
5.02.04	ability to check coolant conditions
5.02.05	ability to check coolant levels
5.02.06	ability to check coolant strength

Sub-task

5.03 Maintains intake and exhaust systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

5.03.01	knowledge of intake and exhaust systems operation, its component parts and their function
5.03.02	ability to check, clean and replace air filters
5.03.03	ability to check air intake and exhaust systems for leaks
5.03.04	ability to perform valve adjustments

Sub-task

5.04 Maintains fuel systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

5.04.01	knowledge of fuel systems operation, its component parts and their function
5.04.02	knowledge of fuel additives and their manufacturers' recommended application
5.04.03	ability to check and replace fuel filters
5.04.04	ability to check and remove water contaminates

Sub-task

5.05 Maintains engine control systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

5.05.01	knowledge of engine control systems operation, its component parts and their function
5.05.02	ability to maintain terminals and electronic connectors
5.05.03	ability to complete a visual check

Task 6 Diagnoses engine performance.

Related Components:	Basic engine (long block, short block), cooling system, lubrication system, fuel system, intake and exhaust system, engine control system.
Tools and Equipment:	Hand and power tools, engine fuel system tools and equipment, electrical tools and equipment, dynometer, pressure washer.

Sub-task

6.01 Inspects engines and engine systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

6.01.01	knowledge of recommended manufacturers' procedures for engine inspection
6.01.02	ability to complete sensory inspection (sight, sound, feel, smell)
6.01.03	ability to use diagnostic tools

Sub-task

6.02 Tests engines and engine systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

6.02.01	knowledge of recommended manufacturers' procedures for engine and engine system testing procedures
6.02.02	ability to complete dynamometer engine performance test
6.02.03	ability to complete compression test
6.02.04	ability to complete injection test
6.02.05	ability to complete oil pressure test
6.02.06	ability to determine turbo-boost pressure
6.02.07	ability to complete cylinder leakage test
6.02.08	ability to complete crankcase pressure test

Task 7 **Repairs basic engines.**

Related Components: Gas, propane, diesel, cooling systems, fuel systems, auxiliary drive, electrical wires, linkages, A/C components, intake and exhaust systems, hydraulic lines, accessories and attachments, head, oil pan, oil pump, cylinder (piston), crankshaft and balance timing train, camshaft, flywheel.

Tools and Equipment: Hand and power tools, shop equipment, measuring tools, pullers, engine fuel system tools, specialized tools and equipment.

Sub-task

7.01 Removes engine.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	no	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

7.01.01 knowledge of engine operation, its component parts and their function

7.01.02 knowledge of recommended manufacturers' procedures for engine removal

7.01.03 ability to follow recommended manufacturers' procedures for engine removal

7.01.04 ability to remove fasteners and framework

7.01.05 ability to install safety stands

7.01.06 ability to remove engine from chassis

Sub-task

7.02 Disassembles engines.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	no	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

7.02.01 knowledge of recommended manufacturers' procedures for engine disassembly

7.02.02 ability to follow recommended manufacturers' procedures for engine disassembly

Supporting Knowledge & Abilities

7.02.03	ability to remove fuel systems
7.02.04	ability to remove cooling systems
7.02.05	ability to remove intake and exhaust systems
7.02.06	ability to remove cylinder head, crankshaft, camshaft, pistons, connecting rods and liners and related components

Sub-task

7.03 Analyzes components. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

7.03.01	knowledge of recommended manufacturers' wear limitations
7.03.02	ability to clean components
7.03.03	ability to determine if components are within acceptable tolerances
7.03.04	ability to determine serviceability

Sub-task

7.04 Reassembles engines. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

7.04.01	knowledge of manufacturers' specifications for engine assembly
7.04.02	ability to follow manufacturers' specifications for engine assembly
7.04.03	ability to install connecting rods, pistons and liners, camshaft, crankshaft, cylinder head and related components

Supporting Knowledge & Abilities

7.04.04	ability to install intake and exhaust systems
7.04.05	ability to install internal cooling systems
7.04.06	ability to install fuel systems

Sub-task

7.05 Installs engines. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

7.05.01	knowledge of recommended manufacturers' procedures for engine installation
7.05.02	ability to install engine following manufacturers' specification
7.05.03	ability to install and torque fasteners
7.05.04	ability to remove safety stands and lifting devices
7.05.05	ability to install accessories (power steering system, air conditioning, compressors, intake and exhaust manifolds, accessory drive systems, cooling systems)

Sub-task

7.06 Tests engines. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

7.06.01	knowledge of recommended manufacturers' procedures for engine testing
7.06.02	ability to perform engine oil pressure test
7.06.03	ability to perform engine break-in procedures

Supporting Knowledge & Abilities

7.06.04	ability to perform leak tests
7.06.05	ability to determine any uncharacteristic noises

Task 8 **Repairs lubrication systems.**

Related Components: Oil pump, filter and housing, lines, seals, piston cooling jet, oil cooler, by-pass valve.

Tools and Equipment: Hand and power tools, measuring tools, specialized tools and equipment.

Sub-task

8.01 Removes lubrication system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

8.01.01	knowledge of lubricating systems operation, its component parts and their function
8.01.02	ability to remove oil pump
8.01.03	ability to remove oil pressure regulator valve
8.01.04	ability to remove oil coolers

Sub-task

8.02 Disassembles lubrication system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

8.02.01	knowledge of manufacturers' specifications for disassembly
8.02.02	knowledge of component construction
8.02.03	ability to disassemble oil pump
8.02.04	ability to disassemble oil pressure regulator valve
8.02.05	ability to disassemble oil coolers

Sub-task

8.03 Analyzes lubrication system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

8.03.01	knowledge of lubrication system components
8.03.02	ability to flush oil cooler
8.03.03	ability to visually inspect
8.03.04	ability to determine if components are within acceptable tolerances

Sub-task

8.04 Reassembles lubrication system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

8.04.01	knowledge of recommended manufacturers' procedures for reassembly of lubrication system components
8.04.02	knowledge of component construction

Supporting Knowledge & Abilities

8.04.03	ability to reassemble oil pressure regulator and valve
8.04.04	ability to reassemble oil pump
8.04.05	ability to reassemble oil coolers

Sub-task

8.05 Installs lubrication system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

8.05.01	knowledge of recommended manufacturers' procedures for lubrication system components installation
8.05.02	ability to install oil coolers
8.05.03	ability to install oil pressure regulator valve
8.05.04	ability to install filters
8.05.05	ability to install oil pumps

Sub-task

8.06 Tests lubrication systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

8.06.01	knowledge of recommended manufacturers' procedures for testing lubrication systems
8.06.02	ability to test oil pressure

Task 9 **Repairs cooling systems.**

Related Components: Radiator, reservoir, fans and hubs, water pump, shutter control and actuators, hoses and lines, thermostat, heat exchanger, seals and gaskets.

Tools and Equipment: Hand and power tools, antifreeze tester, pressure tester, water pump service tool, water vacuum pump hydraulic or manual, rad comb (straightener), specialized tools and equipment.

Sub-task

9.01 Removes cooling system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

9.01.01	knowledge of cooling systems operation, component parts and their function
9.01.02	knowledge of recommended manufacturers' procedures for removing cooling system components
9.01.03	ability to remove radiator cap
9.01.04	ability to remove coolant
9.01.05	ability to remove water pump
9.01.06	ability to remove radiator
9.01.07	ability to remove thermostat
9.01.08	ability to remove heat exchanger
9.01.09	ability to remove cooling fan and hub

Sub-task

9.02 Disassembles cooling system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

9.02.01	knowledge of recommended manufacturers' procedures for disassembling cooling system components
9.02.02	ability to disassemble water pump
9.02.03	ability to disassemble shrouding and fan

Sub-task

9.03 Analyzes cooling system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

9.03.01	knowledge of recommended manufacturers' procedures for analyzing cooling system components
9.03.02	ability to inspect system components
9.03.03	ability to determine malfunctions
9.03.04	ability to determine repair process
9.03.05	ability to analyze viscous fan drives
9.03.06	ability to analyze radiator conditions
9.03.07	ability to analyze thermostat
9.03.08	ability to analyze heat exchanger
9.03.09	ability to analyze cooling system
9.03.10	ability to analyze radiator cap

Sub-task

9.04 Reassembles cooling system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

9.04.01	knowledge of recommended manufacturers' procedures for reassembling cooling system components
9.04.02	ability to assemble shrouding and fan
9.04.03	ability to reassemble water pump

Sub-task

9.05 Installs cooling system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

9.05.01	knowledge of recommended manufacturers' procedures for installing cooling system components
9.05.02	ability to install cooling fan and shroud
9.05.03	ability to install heat exchanger
9.05.04	ability to install thermostat
9.05.05	ability to install radiator
9.05.06	ability to install water pump
9.05.07	ability to install coolant
9.05.08	ability to install radiator cap

Sub-task

9.06 Tests cooling systems. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

9.06.01	knowledge of recommended manufacturers' procedures for testing cooling systems
9.06.02	ability to pressure test cooling system
9.06.03	ability to test engine block and rad temperature

Task 10 Repairs intake and exhaust systems.

Related Components: Manifold, turbo charger, blower, catalytic convertors, intercoolers, exhaust system, muffler, air filter.

Tools and Equipment: Hand and power tools, oxy and acetylene, measuring tools, specialized tools and equipment.

Sub-task

10.01 Removes intake and exhaust system components. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

10.01.01	knowledge of intake and exhaust systems operation, its component parts and their function
10.01.02	knowledge of recommended manufacturers' procedures for removing intake and exhaust system components
10.01.03	ability to remove intake manifold
10.01.04	ability to remove exhaust manifold
10.01.05	ability to remove turbo chargers

Supporting Knowledge & Abilities

10.01.06	ability to remove mufflers
10.01.07	ability to remove air cleaner assembly
10.01.08	ability to remove intercooler

Sub-task

10.02 Disassembles intake and exhaust system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

10.02.01	knowledge of component parts and their construction
10.02.02	knowledge of recommended manufacturers' procedures for disassembling intake and exhaust system components
10.02.03	ability to disassemble turbo chargers
10.02.04	ability to disassemble intercooler

Sub-task

10.03 Analyzes intake and exhaust system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

10.03.01	knowledge of recommended manufacturers' procedures for analyzing intake and exhaust system components
10.03.02	ability to determine turbo charger tolerance

Supporting Knowledge & Abilities

10.03.03	ability to determine cracked or damaged intake or exhaust manifolds
10.03.04	ability to visually inspect intercooler

Sub-task

10.04 Reassembles intake and exhaust system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

10.04.01	knowledge of component parts and their construction
10.04.02	knowledge of recommended manufacturers' procedures for reassembling exhaust system components
10.04.03	ability to reassemble turbo chargers
10.04.04	ability to reassemble intercooler

Sub-task

10.05 Installs intake and exhaust system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

10.05.01	knowledge of recommended manufacturers' procedures for installing intake and exhaust system components
10.05.02	ability to install mufflers
10.05.03	ability to install turbo chargers
10.05.04	ability to install exhaust manifold

Supporting Knowledge & Abilities

10.05.05	ability to install intake manifold
10.05.06	ability to install air cleaner assembly
10.05.07	ability to install intercooler

Sub-task

10.06 Tests intake and exhaust systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

10.06.01	knowledge of testing procedures
10.06.02	knowledge of recommended manufacturers' procedures for testing intake and exhaust system components
10.06.03	ability to test manifold pressure

Task 11 Repairs fuel systems.

Related Components: Injectors, injection pump, fuel lines, transfer pump, fuel filters, governors, fuel tank, carburetor, vaporizer, specialized tools and equipment.

Tools and Equipment: Hand and power tools, injector tester, nozzle puller and service tools, timing tools, vacuum and pressure gauges, refractometer.

Sub-task

11.01 Removes fuel system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

11.01.01	knowledge of fuel systems types such as diesel, carburetted, propane, their operation, their component parts and their function
11.01.02	knowledge of recommended manufacturers' procedures for removing fuel system components
11.01.03	ability to remove diesel fuel systems (fuel injection pump, lines and filters, fuel transfer pump, injection nozzles)
11.01.04	ability to remove carburetted fuel systems
11.01.05	ability to remove propane fuel systems

Sub-task

11.02 Disassembles fuel system components.

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

11.02.01	knowledge of recommended manufacturers' procedures for disassembling fuel system components
11.02.02	ability to disassemble diesel fuel system components
11.02.03	ability to disassemble carburetted fuel system components
11.02.04	ability to disassemble propane fuel system components (vaporizer)

Sub-task

11.03 Analyzes fuel system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

11.03.01	knowledge of recommended manufacturers' procedures for analyzing fuel system components
11.03.02	ability to analyze injector pump and injectors condition and pressure (spray pattern and cracking pressure)
11.03.03	ability to analyze carburetor condition and wear
11.03.04	ability to analyze vaporizer condition

Sub-task

11.04 Reassembles fuel system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

11.04.01	knowledge of recommended manufacturers' procedures for reassembling fuel system components
11.04.02	ability to assemble propane fuel component systems
11.04.03	ability to reassemble carburetted fuel component systems
11.04.04	ability to reassemble diesel fuel component systems

Sub-task

11.05 Installs fuel system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

11.05.01	knowledge of recommended manufacturers' procedures for installing fuel system components
11.05.02	ability to install propane fuel systems
11.05.03	ability to install carburetted fuel systems
11.05.04	ability to install diesel fuel systems (fuel injection pump, lines and filters, fuel transfer pump, injection nozzles)

Sub-task

11.06 Tests fuel systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

11.06.01	knowledge of testing procedures
11.06.02	ability to test fuel supply pressures
11.06.03	ability to visually check for leaks
11.06.04	ability to test fuel consumption
11.06.05	ability to adjust fuel system

Task 12 Repairs engine control systems.

Related Components: Governor, electronic and manual fuel controls, safety shut down, aneroid, push rod, lifters, gaskets and seals.

Tools and Equipment: Hand and power tools, multimeter, computers, specialized tools and equipment, measuring tools.

Sub-task

12.01 Removes engine control system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

12.01.01	knowledge of engine control systems operation, its component parts and their function
12.01.02	knowledge of recommended manufacturers' procedures for removing engine control system components
12.01.03	ability to remove governor
12.01.04	ability to remove aneroid (air fuel control)
12.01.05	ability to remove electronic control modules (ECM)

Sub-task

12.02 Disassembles engine control system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

12.02.01	knowledge of governor construction and operation
12.02.02	knowledge of recommended manufacturers' procedures for disassembling engine control system components
12.02.03	ability to disassemble governor

Sub-task

12.03 Analyzes engine control system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

12.03.01 knowledge of recommended manufacturers' procedures for analyzing engine control system components

12.03.02 ability to analyze governor wear pattern

Sub-task

12.04 Reassembles engine control system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

12.04.01 knowledge of governor construction and operation

12.04.02 knowledge of recommended manufacturers' procedures for reassembling engine control system components

12.04.03 ability to reassemble governor

Sub-task

12.05 Installs engine control system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

12.05.01 knowledge of recommended manufacturers' procedures for installing engine control system components

12.05.02 ability to install electronic control modules (ECM)

Supporting Knowledge & Abilities

12.05.03 ability to install aneroid (air fuel control)

12.05.04 ability to install governor

Sub-task

12.06 Tests engine control systems. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

12.06.01 knowledge of recommended manufacturers' procedures for testing engine control systems

12.06.02 ability to test electronic control module

12.06.03 ability to test governor performance

12.06.04 ability to test aneroid

BLOCK C

DRIVE TRAIN AND DRIVE TRAIN SYSTEMS

Trends: *Increased use of electronic control power shifts for more efficient, smoother shifting. Increased use of variable speed transmissions with a wide range of working speeds.*

Increased use of rubber track tractors with improved pull power and less compaction. In the future, tractor speed will adjust according to its load.

Task 13 Maintains drive train systems.

Related Components: Tractors, harvesting equipment, sprayers, skidsteer loaders, stationary power unit, clutches, drive lines, transmissions and gear boxes, differential, drives.

Tools and Equipment: Hand and power tools, pressure washer, lubricating equipment, specialized tools and equipment.

Sub-task

13.01 Checks fluid levels.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

13.01.01	knowledge of drive train principles
13.01.02	knowledge of drive train systems operation, its components parts and their function
13.01.03	ability to check transmission fluid levels
13.01.04	ability to check gear boxes fluid levels
13.01.05	ability to check final drives fluid levels
13.01.06	ability to check differential fluid levels
13.01.07	ability to prepare oil analysis

Sub-task

13.02 Lubricates drive lines.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

13.02.01	knowledge of manufacturers' specifications for lubricating components
13.02.02	ability to lubricate drive lines
13.02.03	ability to lubricate linkages

13.02.04 ability to lubricate pivot points

Sub-task

13.03 Conducts preventative maintenance procedures.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

13.03.01 knowledge of equipment manufacturers' recommended scheduled maintenance

13.03.02 ability to follow preventative maintenance schedule

13.03.03 ability to change filters

13.03.04 ability to change fluids

13.03.05 ability to check accumulator pressures

13.03.06 ability to clean coolers

13.03.07 ability to check belt drive tension and condition

13.03.08 ability to check chain drive tension and condition

13.03.09 ability to visually inspect fluid conditions

Task 14 Diagnoses drive train systems.

Related Components: Clutches, drive lines, transmissions and gear boxes, differential, belts and chains.

Tools and Equipment: Hand and power tools, shop equipment, hydraulic tools and equipment, measuring tools, multimeters, specialized tools and equipment.

Sub-task

14.01 Inspects drive trains.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

14.01.01	knowledge of drive train systems operations and component parts
14.01.02	ability to complete sensory inspection (sight, sound, feel, smell)
14.01.03	ability to test run and drive

Sub-task

14.02 Measures components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

14.02.01	knowledge of recommended manufacturers' procedures for measuring components
14.02.02	ability to measure tolerances on drive train components such as final drive, drive lines
14.02.03	ability to measure excessive shaft clearances and runout
14.02.04	ability to measure clutch and brake pedal free travel
14.02.05	ability to measure belt and chain tension
14.02.06	ability to check components alignment
14.02.07	ability to perform transmission controller tests
14.02.08	ability to analyze components

Sub-task

14.03 Diagnoses failures.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

14.03.01	knowledge of manufacturers' diagnostic procedures for drive train system failures
14.03.02	ability to determine common problems in clutch failures
14.03.03	ability to determine common problems in drive line failures
14.03.04	ability to determine transmission failures
14.03.05	ability to determine differential failures
14.03.06	ability to determine belt and chain drive failures

Task 15 Repairs clutches.

Related Components: Overrunning clutches, spring-applied clutches, over centre clutches, fluid pressure applied clutches, electro-magnetic clutches.

Tools and Equipment: Hand and power tools, shop equipment, hydraulic tools and equipment, measuring tools, multimeters, specialized tools and equipment.

Sub-task

15.01 Removes clutches.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

15.01.01	knowledge of different clutch types and applications
15.01.02	ability to follow manufacturers' recommended

procedures for clutch removal

15.01.03 ability to remove fasteners and framework

Supporting Knowledge & Abilities

15.01.04 ability to install safety stands

15.01.05 ability to remove clutch from chassis

Sub-task

15.02 Disassembles clutch components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

15.02.01 knowledge of clutch components and their operating characteristics

15.02.02 ability to disassemble clutch following manufacturers' specifications

15.02.03 ability to disassemble single and dual stage clutches

15.02.04 ability to disassemble wet or dry clutch

15.02.05 ability to disassemble multi-disc clutch pack

15.02.06 ability to disassemble electro-magnetic clutches

15.02.07 ability to disassemble overrunning clutches

Sub-task

15.03 Analyzes clutch components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

15.03.01 knowledge of recommended manufacturers procedures for analyzing clutch components

15.03.02 ability to clean components

Supporting Knowledge & Abilities

15.03.03 ability to determine wear tolerances

15.03.04 ability to determine serviceability

Sub-task

15.04 Reassembles clutch components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

15.04.01 knowledge of recommended manufacturers' procedures for specifications for reassembling clutch

15.04.02 ability to follow manufacturers' specifications for clutch assembly

15.04.03 ability to reassemble single and dual stage clutches

15.04.04 ability to reassemble wet or dry clutch

15.04.05 ability to reassemble multi-disc clutch pack

15.04.06 ability to reassemble electro-magnetic clutches

15.04.07 ability to reassemble overrunning clutches

Sub-task

15.05 Installs clutches.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

15.05.01 knowledge of recommended manufacturers' procedures for clutch installation

Supporting Knowledge & Abilities

15.05.02 ability to follow manufacturers' recommended procedures for clutch installation

15.05.03 ability to install single or dual stage clutches

15.05.04 ability to install wet and/or dry clutches

15.05.05 ability to install multi-disc clutch packs

15.05.06 ability to install electro-magnetic clutches

Sub-task

15.06 Tests clutches.

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

15.06.01 knowledge of recommended manufacturers' procedures for testing clutches

15.06.02 ability to test for pressure

15.06.03 ability to test for leaks

15.06.04 ability to test for proper engagement and disengagement

Task 16 Repairs drive lines.

Related Components: Primary power shafts, secondary power shafts.

Tools and Equipment: Hand and power tools, shop equipment, measuring tools, specialized tools and equipment.

Sub-task

16.01 Removes drive lines.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

16.01.01 knowledge of drive line types and their applications

16.01.02 knowledge of recommended manufacturers' procedures for removing a variety of drive line types

16.01.03 ability to remove fasteners

16.01.04 ability to remove primary power shafts

16.01.05 ability to remove secondary power shafts

Sub-task

16.02 Disassembles drive lines.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

16.02.01 knowledge of recommended manufacturers' procedures for disassembling drive lines

16.02.02 ability to disassemble universal joint assembly

16.02.03 ability to disassemble drive line and flanges

16.02.04 ability to disassemble bearings from shaft

16.02.05 ability to remove sprockets

Sub-task

16.03 Analyzes drive line

Supporting Knowledge & Abilities

components.

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

16.03.01 knowledge of recommended manufacturers' procedures for analyzing drive lines

16.03.02 ability to visually inspect drive lines for common problems such as cracks, dents, heat stress, alignment

16.03.03 ability to clean components

16.03.04 ability to determine wear tolerances

16.03.05 ability to determine serviceability

Sub-task

16.04 Reassembles drive lines.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

16.04.01 knowledge of recommended manufacturers' procedures for drive line assembly

16.04.02 ability to follow manufacturers' recommended procedures for drive line assembly

16.04.03 ability to install sprockets

16.04.04 ability to reassemble bearings to shaft

16.04.05 ability to reassemble drive line and flanges

16.04.06 ability to reassemble universal joint assembly

Sub-task

16.05 Installs drive lines.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

16.05.01	knowledge of recommended manufacturers' procedures for installing drive lines
16.05.02	ability to install drive lines
16.05.03	ability to install and align primary drive lines
16.05.04	ability to install and align secondary drive lines

Sub-task

16.06 Tests drive lines.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

16.06.01	knowledge of drive line operation
16.06.02	knowledge of recommended manufacturers' procedures for testing drive lines
16.06.03	ability to test shafts for run out
16.06.04	ability to test for alignment
16.06.05	ability to test for end play
16.06.06	ability to properly perform wheel dynometer test

Task 17 Repairs transmissions and gear boxes.

Related Components: Power shift transmissions, mechanical shift transmissions, bevel gear box, spur gear box, planetary gear box, gears, shafts, bearings and bushings.

Tools and Equipment: Hand and power tools, hydraulic tools, shop equipment, measuring tools, multimeter, specialized tools and equipment.

Sub-task

17.01 Removes transmissions and gear boxes.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

17.01.01	knowledge of transmission and gear box operation, their component parts and function
17.01.02	knowledge of recommended manufacturers' procedures for removal of transmissions and gear boxes
17.01.03	ability to install safety stands
17.01.04	ability to remove connecting parts such as frames, cabs, etc.
17.01.05	ability to remove transmissions from chassis
17.01.06	ability to remove gear boxes from chassis

Sub-task

17.02 Disassembles transmissions and gear boxes.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

17.02.01	knowledge of recommended manufacturers' procedures for disassembly
17.02.02	ability to disassemble power shift transmissions
17.02.03	ability to disassemble manual gear transmissions
17.02.04	ability to disassemble various gear boxes such as

angle gear boxes, reduction drive gear boxes

Sub-task

17.03 Analyzes transmission and gear box components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

17.03.01	knowledge of recommended manufacturers' procedures for analyzing transmission and gear boxes components
17.03.02	ability to clean components
17.03.03	ability to determine wear tolerances
17.03.04	ability to determine serviceability
17.03.05	ability to inspect shafts, gears, bearings for broken teeth and gears, and bearing failure

Sub-task

17.04 Reassembles transmissions and gear boxes.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

17.04.01	knowledge of recommended manufacturers' procedures for reassembling transmissions and gear boxes
17.04.02	ability to follow manufacturers' recommended procedures for transmission assembly
17.04.03	ability to reassemble power shift transmissions
17.04.04	ability to reassemble manual gear transmissions

	17.04.05	ability to reassemble various gear boxes such as angle gear boxes, reduction drive gear boxes

Sub-task

17.05 Installs transmissions and gear boxes.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

17.05.01	knowledge of recommended manufacturers' procedures for installing transmissions and gear boxes
17.05.02	ability to align and install gear boxes in chassis
17.05.03	ability to align and place transmissions in chassis
17.05.04	ability to attach connecting parts such as frames, cabs, etc.
17.05.05	ability to remove safety stands

Sub-task

17.06 Tests transmissions and gear boxes.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

17.06.01	knowledge of recommended manufacturers' procedures for testing transmissions and gear boxes
17.06.02	ability to test and calibrate transmission shift control functions
17.06.03	ability to perform transmission noise tests

17.06.04 ability to perform transmission pressure tests

17.06.05 ability to ensure all gears are functional

Task 18 Repairs differentials.

Related Components: Gears, shafts, bearings, housings.

Tools and Equipment: Hand and power tools, gauges, shop tools, specialized tools and equipment.

Sub-task

18.01 Removes differentials. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

18.01.01 knowledge of differentials, their operation, the component parts and their function

18.01.02 knowledge of recommended manufacturers' procedures for differential removal

18.01.03 ability to install safety stands

18.01.04 ability to remove differentials from self-propelled farm machines

Sub-task

18.02 Disassembles differentials. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

18.02.01 knowledge of recommended manufacturers' procedures for differential disassembly

18.02.02 ability to follow manufacturers' recommended

	procedures for differential disassembly
18.02.03	ability to remove fasteners
18.02.04	ability to remove and separate housings
18.02.05	ability to remove crown and pinion gears

Supporting Knowledge & Abilities

18.02.06	ability to remove spider pins from bevel pinions
18.02.07	ability to remove differential lock clutches
18.02.08	ability to remove bearings

Sub-task

18.03 Analyzes differential components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

18.03.01	knowledge of recommended manufacturers' procedures for analyzing differential components
18.03.02	ability to clean components
18.03.03	ability to inspect for breakage and for cracks
18.03.04	ability to determine serviceability
18.03.05	ability to inspect bushing and bevel gear pins for wear allowance
18.03.06	ability to inspect bearings

Sub-task

18.04 Reassembles differentials.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

18.04.01	knowledge of recommended manufacturers' procedures for reassembling differential components
18.04.02	ability to install differential clutches
18.04.03	ability to install spider pins and bevel pinions

Supporting Knowledge & Abilities

18.04.04	ability to assemble housings
18.04.05	ability to install crown and pinion gears
18.04.06	ability to adjust crown and pinion gears for backlash, pinion depth and bearing pre-loads
18.04.07	ability to install fasteners
18.04.08	ability to install bearings

Sub-task

18.05 Installs differentials.

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

18.05.01	knowledge of recommended manufacturers' procedures for installing differentials
18.05.02	ability to install differentials in self-propelled farm machines
18.05.03	ability to remove safety stands

Sub-task

18.06 Tests differentials.

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

18.06.01	knowledge of recommended manufacturers'

		differential test procedures
	18.06.02	ability to perform differential noise tests
	18.06.03	ability to perform pressure tests
	18.06.04	ability to conduct test drive

Task 19 **Repairs belt and chain drives.**

Related Components: Belts, pulleys, sprockets, chains, bearings, housings, shafts.

Tools and Equipment: Hand and power tools, shop equipment, measuring equipment, specialized tools and equipment.

Sub-task

19.01 Removes belt and chain drive components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

19.01.01	knowledge of belt and chain drive component parts and their operating characteristics
19.01.02	knowledge of recommended manufacturers' procedures for removal of belt and chain components
19.01.03	ability to follow recommended manufacturers' procedures for removal
19.01.04	ability to remove shields and fasteners
19.01.05	ability to remove belts, pulleys and sheaves from chassis
19.01.06	ability to remove chains and sprockets from chassis

Sub-task

19.02 Disassembles belt and chain drive components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

19.02.01 knowledge of recommended manufacturers' procedures for disassembling belt and chain drive components

Supporting Knowledge & Abilities

19.02.02 ability to disassemble pins, connections and splices on various equipment such as conveyors

19.02.03 ability to disassemble various sheaves

19.02.04 ability to disassemble conveyor chain

19.02.05 ability to disassemble elevator paddle chains

Sub-task

19.03 Analyzes belt and chain drive components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

19.03.01 knowledge of recommended manufacturers' procedures for analyzing belt and chain drive components

19.03.02 ability to clean components

19.03.03 ability to determine wear tolerances on all components

19.03.04 ability to determine belt serviceability such as belt separation, burnt spots, holes, cracks

19.03.05 ability to determine chain serviceability such as pin wear, roller damage, seized links

Sub-task

19.04 Reassembles belt and chain drive components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

19.04.01	knowledge of belt and chain drive assembly
19.04.02	knowledge of recommended manufacturers' procedures for reassembling belt and chain drive components
19.04.03	ability to reassemble elevator paddle chains
19.04.04	ability to reassemble conveyor chains
19.04.05	ability to reassemble various sheaves
19.04.06	ability to reassemble pins, connections and splices on various equipment such as conveyor belts

Sub-task

19.05 Installs belt and chain drives.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

19.05.01	knowledge of belt and chain drive component parts and their operating characteristics
19.05.02	knowledge of recommended manufacturers' procedures for installing belt and chain drive components
19.05.03	ability to follow manufacturers' recommended procedures for installation
19.05.04	ability to install chains and sprockets in chassis

19.05.05	ability to install belts, pulleys and sheaves in chassis
19.05.06	ability to align and adjust belt and chain drives
19.05.07	ability to install shields and fasteners

Sub-task

19.06 Tests belt and chain drives. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

19.06.01	knowledge of recommended manufacturers' procedures for testing belt and chain drives
19.06.02	ability to test for alignment
19.06.03	ability to test belt and chain tension

BLOCK D

HYDRAULICS AND HYDRAULIC SYSTEMS

Trends: *Increased use of pressure/flow compensated hydraulic systems which will provide only the oil flow and pressure that is needed to do the job. Electrical controls are increasingly being used over hydraulic controls to eliminate mechanical linkages, cables and rods. Increased use of hydraulics on implements such as air seeders, planters.*

Task 20 **Maintains hydraulic systems.**

Related Components: Open center, close center and pressure/flow compensated hydraulic systems, pumps, motors, valves, reservoirs, lines, filters, coolers, fluids, electro-hydraulic valves, accumulators, actuators.

Tools and Equipment: Hand tools, oil transfer units, specialized tools and equipment.

Sub-task

20.01 Performs scheduled maintenance.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

20.01.01	knowledge of recommended manufacturers' maintenance schedules
20.01.02	ability to follow manufacturers' maintenance list

Sub-task

20.02 Maintains hydraulic systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

20.02.01	knowledge of hydraulic system service requirements
20.02.02	ability to follow manufacturers' specifications
20.02.03	ability to replenish oil levels
20.02.04	ability to check oils
20.02.05	ability to change oil and filters
20.02.06	ability to prepare oil analysis
20.02.07	ability to clean oil cooler

Task 21 **Diagnoses hydraulic systems.**

Related Components: Open center, close center and pressure/flow compensated hydraulic systems, pumps, motors, valves, reservoirs, lines, filters, coolers, fluids, electro-hydraulic valves, accumulators, actuators.

Tools and Equipment: Hand and power tools, hydraulic tools and equipment, specialized tools and equipment.

Sub-task

21.01 Checks flows and pressures. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

21.01.01 knowledge of hydraulic system principles and characteristics

21.01.02 ability to check hydraulic oil levels

21.01.03 ability to use test equipment to perform tests

21.01.04 ability to follow manufacturers' schematics and flow charts

Sub-task

21.02 Isolates components. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

21.02.01 knowledge of hydraulic sub-systems and their functions

21.02.02 ability to determine steering circuit and pump circuit repairs

21.02.03 ability to determine malfunctions in pumps, valves, 3 point hitch, regulated circuits

Task 22 **Repairs pump systems.**

Related Components: Shafts, gears, pistons, valves, seals and gaskets, wear components, bearings, lines, motors.

Tools and Equipment: Hand and power tools, lifting equipment, measuring tools, hydraulic tools and equipment, specialized tools and equipment.

Sub-task

22.01 Removes pumps.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

22.01.01	knowledge of pump operation, its component parts and functions
22.01.02	knowledge of recommended manufacturers' procedures for pump removal
22.01.03	ability to remove radial piston pump
22.01.04	ability to remove axial piston pump
22.01.05	ability to remove internal and external gear pump

Sub-task

22.02 Disassembles pumps.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

22.02.01	knowledge of recommended manufacturers' procedures for disassembling various pumps
22.02.02	ability to disassemble radial piston pump
22.02.03	ability to disassemble axial piston pump
22.02.04	ability to disassemble external and internal gear pump

Sub-task

22.03 Analyzes components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

22.03.01	knowledge of recommended manufacturers' procedures for analyzing pump components
22.03.02	ability to inspect shafts, bearings, swash plates, pistons, pump housing for wear and damage
22.03.03	ability to inspect gears for wear or cracks, pump housing tolerance

Sub-task

22.04 Reassembles pump components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

22.04.01	knowledge of recommended manufacturers' reassembly procedures for various pumps
22.04.02	ability to reassemble radial piston pump
22.04.03	ability to reassemble axial piston pump
22.04.04	ability to reassemble external and internal gear pump

Sub-task

22.05 Installs pumps.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

22.05.01 knowledge of pump operation, its component parts and functions

22.05.02 knowledge of recommended manufacturers' procedures for pump installation

22.05.03 ability to install radial piston pump

Supporting Knowledge & Abilities

22.05.04 ability to install axial piston pump

22.05.05 ability to install internal and external gear pump

Sub-task

22.06 Tests pumps.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

22.06.01 knowledge of recommended manufacturers' pump testing procedures

22.06.02 ability to test pumps

Task 23 Repairs hydrostatic systems.

Related Components: Fixed and variable displacement pumps and motors, reservoir, filter, control valve, relief valve.

Tools and Equipment: Hand and power tools, lifting equipment, measuring tools, hydraulic test tools and equipment, miscellaneous tools, specialized tools and equipment.

Sub-task

23.01 Removes hydrostatic system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

23.01.01 knowledge of hydrostatic system operations, its component parts and function

Supporting Knowledge & Abilities

23.01.02 knowledge of recommended manufacturers' procedures for removing hydrostatic system component

23.01.03 ability to remove hydrostatic pump

23.01.04 ability to remove charge pump

23.01.05 ability to remove hydrostatic motor

23.01.06 ability to remove control valve and attaching lines

Sub-task

23.02 Disassembles hydrostatic system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

23.02.01 knowledge of recommended manufacturers' procedures for disassembling hydrostatic system components

23.02.02 ability to disassemble charge pump

23.02.03 ability to disassemble hydrostatic pump

23.02.04 ability to disassemble hydrostatic motor

23.02.05 ability to disassemble hydrostatic control valve

Sub-task

23.03 Analyzes hydrostatic system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

23.03.01 knowledge of recommended manufacturers' procedures for analyzing hydrostatic system components

Supporting Knowledge & Abilities

23.03.02 knowledge of recommended manufacturers' wear limitations

23.03.03 ability to diagnose failures

23.03.04 ability to inspect for broken parts such as pistons, bearings

23.03.05 ability to determine common problems

23.03.06 ability to measure to determine wear limitations

Sub-task

23.04 Reassembles hydrostatic system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

23.04.01 knowledge of recommended manufacturers' procedures for reassembling hydrostatic system components

23.04.02 ability to assemble and adjust according to specifications

23.04.03 ability to reassemble charge pump

23.04.04 ability to reassemble hydrostatic pump

23.04.05 ability to reassemble hydrostatic motor

23.04.06 ability to reassemble hydrostatic control valve

Sub-task

23.05 Installs hydrostatic system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

23.05.01	knowledge of recommended manufacturers' procedures for installing hydrostatic system components
23.05.02	ability to install control valve and attaching lines
23.05.03	ability to install hydrostatic motor
23.05.04	ability to install charge pump
23.05.05	ability to install hydrostatic pump

Sub-task

23.06 Tests hydrostatic systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

23.06.01	knowledge of recommended manufacturers' procedures for testing hydrostatic systems
23.06.02	ability to perform leakage test
23.06.03	ability to perform pressure test
23.06.04	ability to perform torque test

Task 24 **Repairs control systems.**

Related Components: Pilot, manual, electronic operated valves.

Tools and Equipment: Hand and power tools, hydraulic tools and equipment, specialized tools and equipment.

Sub-task

24.01 Removes control system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

24.01.01	knowledge of control system operation, its component parts and their function
24.01.02	knowledge of recommended manufacturers' procedures for removing control system components
24.01.03	ability to remove manual control such as solid linkage
24.01.04	ability to remove pilot operated controls such as electric over hydraulic

Sub-task

24.02 Disassembles control system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

24.02.01	knowledge of recommended manufacturers' procedures for disassembling control system components
24.02.02	ability to disassemble manual controls, cables and linkages

24.02.03	ability to disassemble valves such as solenoid, spool and poppet
24.02.04	ability to disassemble detent assemblies

Sub-task

24.03 Analyzes control system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

24.03.01	knowledge of recommended manufacturers' procedures for analyzing control system components
24.03.02	ability to inspect manual controls, cables and linkages for free operation
24.03.03	ability to inspect valves for damage
24.03.04	ability to inspect detent assembly for ball and spring wear and other problems

Sub-task

24.04 Reassembles control system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

24.04.01	knowledge of recommended manufacturers' procedures for reassembling control system components
24.04.02	ability to reassemble manual controls, cables and linkages

24.04.03	ability to reassemble valves such as solenoid, spool and poppet
24.04.04	ability to reassemble detent assemblies

Sub-task

24.05 Installs control system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

24.05.01	knowledge of recommended manufacturers' procedures for installing control system components
24.05.02	ability to install manual control such as solid linkage
24.05.03	ability to install pilot-operated controls such as electric over hydraulic
24.05.04	ability to adjust various control system component configurations

Sub-task

24.06 Tests control systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

24.06.01	knowledge of recommended manufacturers' procedures for testing control system
24.06.02	ability to perform pressure test
24.06.03	ability to test for internal and external leakage

24.06.04	ability to test for neutral adjustment
24.06.05	ability to test lever position

Task 25 Repairs actuators and lines.

Related Components: Hydraulic cylinders, accumulators, lines.

Tools and Equipment: Hand and power tools, measuring tools, hydraulic tools and equipment, specialized tools and equipment.

Sub-task

25.01 Removes actuators and lines.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

25.01.01	knowledge of actuator operation, its components parts and function
25.01.02	knowledge of recommended manufacturers' procedures for removing actuators and lines
25.01.03	ability to remove hydraulic cylinders
25.01.04	ability to remove lines, hoses and fittings

Sub-task

25.02 Disassembles actuators and lines.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

25.02.01	knowledge of recommended manufacturers'

procedures for disassembling actuators and lines

25.02.02 ability to disassemble single acting cylinder

25.02.03 ability to disassemble double acting cylinder

Sub-task

25.03 Analyzes actuators and lines.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

25.03.01 knowledge of recommended manufacturers' procedures for analyzing actuators and lines

25.03.02 ability to check rod for straightness, pitting and scoring

25.03.03 ability to check barrel for straightness, pitting and scoring

25.03.04 ability to check for piston damage such as scoring and dents

25.03.05 ability to check packings for wear

Sub-task

25.04 Reassembles actuators and lines.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

25.04.01 knowledge of recommended manufacturers' procedures for reassembling actuators and lines

25.04.02 ability to reassemble single acting cylinder

25.04.03 ability to reassemble double acting cylinder

Sub-task

25.05 Installs actuators and lines. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

25.05.01	knowledge of recommended manufacturers' procedures for installing actuators and lines
25.05.02	ability to install hydraulic cylinders
25.05.03	ability to install lines and hoses

Sub-task

25.06 Tests actuators and lines. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

25.06.01	knowledge of recommended manufacturers' procedures for testing actuators and lines
25.06.02	ability to perform pressure test
25.06.03	ability to check for external and internal leaks
25.06.04	ability to check for full extension and retraction
25.06.05	ability to service accumulators

Task 26 Repairs hydraulic cooling systems.

Related Components: Air flow heat exchanger, lines, pressure relief valve.

Tools and Equipment: Hand and power tools, measuring tools, specialized tools and equipment.

Sub-task

26.01 Removes hydraulic cooling system components. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

26.01.01	knowledge of hydraulic cooling system operation, its component parts and their function
26.01.02	knowledge of recommended manufacturers' procedures for removing hydraulic cooling system components
26.01.03	ability to remove heat exchanger
26.01.04	ability to remove lines and relief valves

Sub-task

26.02 Analyzes hydraulic cooling system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

26.02.01	knowledge of recommended manufacturers' procedures for analyzing hydraulic cooling system components
26.02.02	ability to disassemble cooling system components
26.02.03	ability to complete flow, pressure and temperature tests
26.02.04	ability to determine whether to repair or replace

Sub-task

26.03 Installs hydraulic cooling system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

26.03.01	knowledge of recommended manufacturers' procedures for installing hydraulic cooling system components
26.03.02	ability to install lines and relief valves

26.03.03 ability to install heat exchanger

Sub-task

26.04 Tests hydraulic cooling systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

26.04.01 knowledge of recommended manufacturers' procedures for testing hydraulic cooling system components

26.04.02 ability to test for air flow

26.04.03 ability to test for temperature differential

BLOCK E

ELECTRICAL AND ELECTRICAL SYSTEMS

Trends: *Increased use of electronically-controlled functions such as those necessary for fuel and transmission management, equipment performance and monitoring. Increased utilization of global positioning systems, for areas such as field mapping, on-the-go soil sampling and crop productivity as well as guidance systems for rotation of farming equipment.*

Task 27 **Maintains electrical systems.**

Related Components: Batteries, starter, alternator, cables and connections, wiring, lighting and auxiliary components, electronic control and monitoring systems, belts and drives, solenoids, switches, relays, modules, fuses, connectors, wires, wire terminals, sensors, actuators, motors, instrument gauges, sound systems.

Tools and Equipment: Hand and power tools, shop equipment, electrical tools and equipment, electronic test equipment, computers, specialized tools and equipment.

Sub-task

27.01 Maintains battery fluid levels.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

27.01.01 knowledge of electrical systems and their component parts, function and operating characteristics

27.01.02 knowledge of recommended manufacturers' specifications for battery fluid levels

27.01.03 ability to maintain electrolyte in the batteries

27.01.04 ability to check fluid levels

Sub-task

27.02 Checks belt tension and condition.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

27.02.01 knowledge of recommended manufacturers' specifications for belt tension and condition

27.02.02 ability to check and adjust belt tension and alignment using hand or belt tension tool

27.02.03 ability to determine condition of belt

Sub-task

27.03 Cleans components and connections.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

27.03.01 ability to identify the cleaning requirements of electrical components such as baking soda, chemicals

27.03.02 ability to clean electrical components such as battery terminals and cable connections

Task 28 Diagnoses electrical and electronic systems.

Related Components: Lead acid batteries, starter, alternator, cables and connections, wiring, lighting and auxiliary components, electronic control and monitoring systems, belts and drives, solenoids, switches, relays, modules, fuses, connectors, wires, wire terminals, sensors, actuators, motors, instrument gauges, sound systems.

Tools and Equipment: Hand and power tools, shop equipment, electrical tools and equipment, specialized tools and equipment.

Sub-task

28.01 Tests electrical systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

28.01.01	knowledge of the operation of electrical systems and components parts such as sensors, actuators, motor, solenoids, switches, relays, modules
28.01.02	ability to inspect and test electrical components such as light systems, instrument gauges, wipers, sound systems
28.01.03	ability to operate and interpret results of test equipment

Sub-task

28.02 Tests electronic systems. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

28.02.01	knowledge of electronic systems for engine management, transmission control, linkage control as well as field work computers
28.02.02	ability to visually inspect electronic systems
28.02.03	ability to test voltage, resistance and current

Sub-task

28.03 Diagnoses failures. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

28.03.01	knowledge of recommended manufacturers' procedures for diagnosing failures
28.03.02	ability to isolate problem using related electrical tools and equipment, such as volt, ohm and amp meter
28.03.03	ability to identify problems such as corrosion, seizing, electrical shorts and grounds

28.03.04 ability to trace wiring diagrams to isolate malfunctioning components

Task 29 Repairs charging systems.

Related Components: Alternator, generator, regulators, battery, cables, wiring, fuses and circuit breakers, gauges, switches, belts.

Tools and Equipment: Hand and power tools, shop equipment, electrical tools and equipment, specialized tools and equipment.

Sub-task

29.01 Removes charging system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

29.01.01 knowledge of recommended manufacturers' precautions to safeguard electrical components such as diodes and transistors

29.01.02 ability to remove charging system components using hand and power tools and shop equipment

29.01.03 ability to remove batteries, fan belts, alternators, diodes and wires

Sub-task

29.02 Disassembles charging system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

29.02.01 knowledge of recommended manufacturers' procedures for disassembling charging system components

29.02.02 ability to disassemble alternators and generators

29.02.03	ability to disassemble wiring harnesses and bulkhead connectors

Sub-task

29.03 Analyzes charging system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

29.03.01	knowledge of procedures to perform tests including voltage drop tests, output tests and circuit drain
29.03.02	ability to inspect and test charging system components for shorts, grounds, opens and mechanical defects
29.03.03	ability to conduct static and dynamic tests of charging circuit

Sub-task

29.04 Reassembles charging system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

29.04.01	knowledge of recommended manufacturers' specifications, such as torques and settings, and procedures for reassembling system components
29.04.02	ability to reassemble alternators and generators
29.04.03	ability to reassemble wiring harnesses and bulkhead connectors

Sub-task

29.05 Installs charging system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

29.05.01 knowledge of recommended manufacturers' procedures for installing charging system components

Supporting Knowledge & Abilities

29.05.02 ability to install charging system components using hand and power tools and shop equipment

29.05.03 ability to install batteries, fan belts, alternators, diodes and wires

Sub-task

29.06 Tests charging systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

29.06.01 knowledge of recommended manufacturers' procedures for testing charging systems

29.06.02 ability to check voltage and amperage

29.06.03 ability to inspect and test for shorts, grounds and opens

29.06.04 ability to check charging system output

Task 30 Repairs starting systems.

Related Components: Starter and solenoid, cables and connectors, battery, relays, motors, switches.

Tools and Equipment: Hand and power tools, shop equipment, electrical tools and equipment, specialized tools and equipment.

Sub-task

30.01 Removes starting system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

30.01.01	knowledge of staring systems operations and primary components
30.01.02	ability to unhook batteries
30.01.03	ability to remove wires, ignition switch and safety switch
30.01.04	ability to remove solenoid and starter

Sub-task

30.02 Disassembles starting system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

30.02.01	knowledge of starting system component parts and their operation
30.02.02	ability to disassemble a starter following manufacturers' recommended procedures
30.02.03	ability to disassemble solenoid
30.02.04	ability to disassemble wiring harnesses

Sub-task

30.03 Analyzes starting system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

30.03.01 knowledge of common problems in a starter

30.03.02 ability to visually inspect system components for poor or loose connections, burnt wires, or blown fuses

Supporting Knowledge & Abilities

30.03.03 ability to check solenoid action

Sub-task

30.04 Reassembles starting system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

30.04.01 knowledge of starting system component parts and their operation

30.04.02 ability to reassemble a starter following manufacturers' recommended procedures

30.04.03 ability to reassemble solenoid

30.04.04 ability to reassemble wiring harnesses

Sub-task

30.05 Installs starting system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

30.05.01 knowledge of starting systems operations and primary components

30.05.02	ability to install solenoid and starter
30.05.03	ability to connect wires, ignition switch and safety switch
30.05.04	ability to install batteries
30.05.05	ability to attach battery cables

Sub-task

30.06 Tests starting systems. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

30.06.01	knowledge of recommended manufacturers' procedures for testing starting systems
30.06.02	ability to test starting system using current draw tests, no load tests, engine speed tests and voltage drops

Task 31 Repairs ignition systems.

Related Components:	Magneto, coil, condenser, points, distributor, high tension leads, spark plugs, switches, resistors, wiring, ignition module, relay, pickup coil, distributor cap, rotor, wiring harness.
Tools and Equipment:	Hand and power tools, shop tools and equipment, electrical tools and equipment, specialized tools and equipment.

Sub-task

31.01 Removes ignition system components. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK

ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

31.01.01 knowledge of recommended manufacturers' procedures for removing ignition system components

31.01.02 ability to remove points

31.01.03 ability to remove condensers

31.01.04 ability to remove coils

Supporting Knowledge & Abilities

31.01.05 ability to remove distributor

31.01.06 ability to remove high tension wires

31.01.07 ability to remove spark plugs

31.01.08 ability to remove distributor cap and rotor

31.01.09 ability to remove pickup coil and module

Sub-task

31.02 Disassembles distributor.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

31.02.01 knowledge of recommended manufacturers' procedures for disassembling distributor

31.02.02 ability to remove gear shaft

31.02.03 ability to remove weights

31.02.04 ability to remove points and condensor

31.02.05 ability to remove pickup coil and module

Sub-task

31.03 Analyzes ignition system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

31.03.01 knowledge of recommended manufacturers' procedures for analyzing ignition system components

31.03.02 ability to visually inspect for wear

Supporting Knowledge & Abilities

31.03.03 ability to measure wear to ensure specifications and requirements

31.03.04 ability to test high tension leads

31.03.05 ability to check points

31.03.06 ability to check pick-up coil and module

Sub-task

31.04 Reassembles distributor.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

31.04.01 knowledge of recommended manufacturers' procedures for reassembling ignition system components

31.04.02 ability to install gear shaft

31.04.03 ability to install weights

31.04.04 ability to install points

31.04.05 ability to install pickup coil and module

Sub-task

31.05 Installs ignition system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

31.05.01 knowledge of recommended manufacturers' procedures for installing ignition system components

31.05.02 ability to install points

Supporting Knowledge & Abilities

31.05.03 ability to install condensers

31.05.04 ability to install coils

31.05.05 ability to install distributor

31.05.06 ability to install high-tension wires

31.05.07 ability to install spark plugs

31.05.08 ability to install distributor cap and rotor

31.05.09 ability to install pickup coil and module

Sub-task

31.06 Tests ignition systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

31.06.01 knowledge of recommended manufacturers' procedures for testing ignition systems

31.06.02 ability to check dwell and timing

31.06.03 ability to check voltage, amperage and resistance

Task 32 **Repairs electrical conductors.**

Related Components: Wiring, single and multiple connectors, fuses, circuit breakers.

Tools and Equipment: Hand and power tools, shop tools and equipment, electrical tools and equipment, specialized tools and equipment.

Sub-task

32.01 Removes electrical system conductors.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

32.01.01	knowledge of recommended manufacturers' procedures for removing electrical system conductors
32.01.02	ability to remove wiring harnesses
32.01.03	ability to remove bulkhead connectors
32.01.04	ability to remove fuses
32.01.05	ability to remove fusible links

Sub-task

32.02 Disassembles electrical system conductors.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

32.02.01	knowledge of recommended manufacturers' procedures for disassembling electrical system conductors
32.02.02	ability to disassemble bulkhead connectors
32.02.03	ability to remove wires from harness

32.02.04 ability to pull fuses

Sub-task

32.03 Analyzes electrical system conductor components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

32.03.01 knowledge of recommended manufacturers' procedures for analyzing electrical system conductors

32.03.02 ability to check wires, fuses and fusible links for opens, shorts or grounds

32.03.03 ability to visually inspect for breakage

Sub-task

32.04 Reassembles electrical system conductor components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

32.04.01 knowledge of recommended manufacturers' procedures for reassembling electrical system conductors

32.04.02 ability to reassemble bulkhead connectors

32.04.03 ability to attach wires to harness

32.04.04 ability to install fuses

Sub-task

32.05 Installs electrical system

Supporting Knowledge & Abilities

conductors.

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

32.05.01 knowledge of recommended manufacturers' procedures for installing electrical system conductors

32.05.02 ability to install wiring harnesses

32.05.03 ability to install bulkhead connectors

Supporting Knowledge & Abilities

32.05.04 ability to install fuses

32.05.05 ability to install fusible links

Sub-task

32.06 Tests electrical system conductors.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

32.06.01 knowledge of recommended manufacturers' procedures for testing electrical system conductors

32.06.02 ability to check voltage drop

32.06.03 ability to test for shorts, opens and grounds

Task 33 Repairs electronic components.

Related Components: Microprocessors, monitors, computer control units, electronic display, display control units, switches, sensors, global positioning satellite (GPS) systems, potentiometers.

Tools and Equipment: Hand and power tools, shop equipment, electrical tools and equipment, specialized tools and equipment.

Sub-task

33.01 Removes electronic components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

33.01.01	knowledge of recommended manufacturers' procedures for removing electronic components
33.01.02	ability to remove engine management system
33.01.03	ability to remove electronic transmission control
33.01.04	ability to remove electronic linkages control
33.01.05	ability to remove field work computers

Sub-task

33.02 Installs electronic components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

33.02.01	knowledge of recommended manufacturers' procedures for installing electronic components
33.02.02	ability to install field work computers
33.02.03	ability to install electronic linkages controls
33.02.04	ability to install electronic transmission controls
33.02.05	ability to install engine management systems

Sub-task

33.03 Tests or reprograms electronic components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

33.03.01 knowledge of recommended manufacturers' procedures for testing electronic components

33.03.02 ability to test electronic systems for voltage, resistance and current

Supporting Knowledge & Abilities

33.03.03 ability to reprogram electronic components using laptops and/or base computers

33.03.04 ability to visually inspect electronic systems for common problems

33.03.05 ability to perform computer self-diagnostic test

Task 34 Repairs accessories.

Related Components: Motors, electric clutch, solenoids, gauge senders, gauge sensors, lights, switches, warning devices.

Tools and Equipment: Hand and power tools, shop equipment, electrical tools and equipment, specialized tools and equipment.

Sub-task

34.01 Removes accessories.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

34.01.01 knowledge of recommended manufacturers' procedures for removing accessories

34.01.02 ability to remove fan motors

34.01.03 ability to remove lighting accessories

34.01.04 ability to remove motors

34.01.05	ability to remove brush holders
34.01.06	ability to remove electric clutches

Sub-task

34.02 Disassembles accessories. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

34.02.01	knowledge of recommended manufacturers' procedures for disassembling accessories
34.02.02	ability to disassemble accessories such as light systems, electric clutches, and motors

Sub-task

34.03 Analyzes accessories. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

34.03.01	knowledge of recommended manufacturers' procedures for analyzing accessories
34.03.02	ability to analyze accessory components referring to manufacturers' recommended specifications and procedures
34.03.03	ability to inspect and test for shorts, grounds, opens and mechanical defects

Sub-task

34.04 Reassembles accessories. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK

ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

34.04.01 knowledge of recommended manufacturers' procedures for reassembling accessories

Supporting Knowledge & Abilities

34.04.02 ability to assemble electric clutches

34.04.03 ability to reassemble lighting systems and motors

Sub-task

34.05 Installs accessories.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

34.05.01 knowledge of recommended manufacturers' procedures for installing accessories

34.05.02 ability to install fan motors

34.05.03 ability to install lighting accessories

34.05.04 ability to install motors

34.05.05 ability to install brushes

34.05.06 ability to install electric clutches

Sub-task

34.06 Tests accessories.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

34.06.01 knowledge of recommended manufacturers' procedures for testing procedures

34.06.02 ability to inspect and test for shorts, grounds,

opens and mechanical defects

BLOCK F

STEERING AND BRAKING SYSTEMS

Trends: *Increased use of equipment braking systems in larger implements. Increased use of sophisticated steering geometry to accomplish shorter turn radius. Increased use of differential steering for track tractors.*

Task 35 **Maintains steering systems.**

Related Components: Standard steering systems, power assist steering systems, hydrostatic steering systems, steering wheel, steering gear box, drag link, tie rod, spindles, orbital steering unit, hydraulic lines, cylinders, valves.

Tools and Equipment: Hand and power tools, shop equipment, hydraulic tools and equipment, measuring tools, specialized tools and equipment.

Sub-task

35.01 Maintains fluid levels.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

35.01.01	knowledge of steering system maintenance requirements
35.01.02	ability to maintain fluid levels in steering reservoir to specified levels with correct fluid
35.01.03	ability to maintain mechanical steering systems
35.01.04	ability to maintain power assist steering systems
35.01.05	ability to maintain hydrostatic steering systems

Sub-task

35.02 Adjusts steering systems operation.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

35.02.01	knowledge of steering operation and malfunctions
35.02.02	ability to adjust mechanical steering operation
35.02.03	ability to adjust power assist steering operation
35.02.04	ability to adjust hydrostatic steering operation

Sub-task

35.03 Lubricates pivot points.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

35.03.01	knowledge of lubricants
35.03.02	ability to lubricate ball joints
35.03.03	ability to lubricate king pins and spindles
35.03.04	ability to lubricate cylinder holders

Task 36 Maintains braking systems.

Related Components: Mechanical braking systems, mechanical over hydraulic braking systems, hydraulic over mechanical braking systems, mechanical over wet braking systems, hydraulic brakes, brake pedals, master cylinders or linkage, lines, hydraulic or mechanical actuators, brake drums or discs, friction material, hand brakes.

Tools and Equipment: Hand and power tools, shop equipment, hydraulic tools and equipment, measuring tools, specialized tools and equipment.

Sub-task

36.01 Maintains fluid levels.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

36.01.01	ability to maintain fluid levels in brake reservoir to specified levels with correct fluid
36.01.02	ability to maintain mechanical brakes
36.01.03	ability to maintain mechanical over hydraulic brakes
36.01.04	ability to maintain hydraulic over mechanical brakes
36.01.05	ability to maintain mechanical over wet brakes
36.01.06	ability to maintain hydraulic brakes

Sub-task

36.02 Adjusts braking systems operations.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

36.02.01	ability to adjust mechanical brakes
36.02.02	ability to adjust mechanical over hydraulic brakes
36.02.03	ability to adjust hydraulic over mechanical brakes
36.02.04	ability to adjust mechanical over wet brakes
36.02.05	ability to adjust hydraulic brakes

Sub-task

36.03 Lubricates linkages. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

36.03.01 ability to lubricate brake linkage points as recommended by manufacturer

36.03.02 ability to ensure free play of brake pedal

Task 37 Diagnoses steering and braking systems.

Related Components: Standard steering systems, power assist steering systems, hydrostatic steering systems, steering wheel, steering gear box, drag link, tie rod, spindles, orbital steering unit, hydraulic lines, valves, cylinders, mechanical braking systems, mechanical over hydraulic braking systems, hydraulic over mechanical braking systems, mechanical over wet braking systems, hydraulic brakes, brake pedals, master cylinders or linkage, lines, hydraulic or mechanical actuators, brake drums or discs, friction material, hand brakes, springs.

Tools and Equipment: Hand and power tools, shop equipment, hydraulic tools and equipment, measuring tools, specialized tools and equipment.

Sub-task

37.01 Diagnoses steering systems. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

37.01.01 knowledge of recommended manufacturers' procedures for diagnosing steering system components

37.01.02 ability to visually inspect steering for wear, binding or leaks

37.01.03	ability to check and measure steering adjustments
37.01.04	ability to diagnose problems in steering systems and components such as steering box, ball joints, steering cylinders, lines, steering motor

Sub-task

37.02 Diagnoses braking systems. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

37.02.01	knowledge of recommended manufacturers' procedures for diagnosing braking systems
37.02.02	ability to visually inspect brakes for wear, linkage binding or adjustments on pedal and linkage
37.02.03	ability to check and measure internal and external adjustment
37.02.04	ability to check oil reservoir, oil rings (hydraulic) and circuitry leaks
37.02.05	ability to perform external hydraulic pressure and vacuum check
37.02.06	ability to diagnose problems in braking systems and components such as master cylinder, slave cylinder, calipers, discs, rotors, shoes, drums, bands, boosters, accumulators, springs

Task 38 Repairs steering system components.

Related Components:	Standard steering systems, power assist steering systems, hydrostatic steering systems, steering wheel, steering gear box, drag link, tie rod, spindles, orbital steering unit, hydraulic lines, cylinders, valves.
Tools and Equipment:	Hand and power tools, shop equipment, hydraulic tools and equipment, measuring tools, specialized tools and equipment.

Sub-task

38.01 Removes steering system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

38.01.01	knowledge of steering system and its operation, its component parts and function
38.01.02	knowledge of recommended manufacturers' procedures for removing steering system components
38.01.03	ability to remove standard steering system components
38.01.04	ability to remove power assist steering system components
38.01.05	ability to remove hydrostatic steering system components

Sub-task

38.02 Disassembles steering system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

38.02.01	knowledge of recommended manufacturers' procedures for disassembling steering system components
38.02.02	ability to disassemble standard, power-assisted and hydrostatic gear boxes
38.02.03	ability to disassemble gear box linkages
38.02.04	ability to disassemble steering arm and spindles

38.02.05	ability to disassemble ball joints and/or valves
38.02.06	ability to disassemble pin and bushing assembly

Sub-task

38.03 Analyzes steering system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

38.03.01	knowledge of recommended manufacturers' procedures for analyzing steering system components
38.03.02	ability to determine worn or out-of-specification parts
38.03.03	ability to identify broken or damaged components
38.03.04	ability to inspect and replace required parts as per manufacturers' specifications

Sub-task

38.04 Reassembles steering system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

38.04.01	knowledge of recommended manufacturers' procedures for assembling steering system components
38.04.02	ability to reassemble pin and bushing assembly
38.04.03	ability to reassemble ball joints and/or valves
38.04.04	ability to reassemble steering arm and spindles

38.04.05	ability to reassemble gear box linkages
38.04.06	ability to reassemble gear boxes

Sub-task

38.05 Installs steering system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

38.05.01	knowledge of recommended manufacturers' procedures for installing steering system components
38.05.02	ability to install standard steering system components
38.05.03	ability to install power assist steering system components
38.05.04	ability to install hydrostatic steering system components

Sub-task

38.06 Tests steering system.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

38.06.01	knowledge of recommended manufacturers' procedures for testing steering system
38.06.02	ability to make final adjustments
38.06.03	ability to check full travel (left and right)
38.06.04	ability to test steering pressure and response

38.06.05 ability to test drive unit

Task 39 Repairs braking system components.

Related Components: Mechanical braking systems, mechanical over hydraulic braking systems, hydraulic over mechanical braking systems, mechanical over wet braking systems, hydraulic brakes, brake pedals, master cylinders or linkage, lines, hydraulic or mechanical actuators, brake drums or discs, friction material, hand brakes, springs.

Tools and Equipment: Hand and power tools, shop equipment, hydraulic tools and equipment, measuring tools, specialized tools and equipment.

Sub-task

39.01 Removes braking system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

39.01.01 knowledge of recommended manufacturers' procedures for removing brake system components

39.01.02 ability to secure weight of unit properly

39.01.03 ability to remove wheels and accessories required to access brakes

39.01.04 ability to remove brake assembly from unit

Sub-task

39.02 Disassembles braking system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

39.02.01 knowledge of brake components and their functions

39.02.02 knowledge of recommended manufacturers' procedures for disassembling braking system components

Supporting Knowledge & Abilities

39.02.03 ability to disassemble drum and disc brake assemblies

39.02.04 ability to disassemble linkage

Sub-task

39.03 Analyzes braking system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

39.03.01 knowledge of recommended manufacturers' procedures for analyzing braking system components

39.03.02 ability to use proper safety procedures in cleaning brakes area

39.03.03 ability to measure parts as per manufacturers' specifications

39.03.04 ability to determine parts that are reusable and parts that have to be replaced as per manufacturers' specification

Sub-task

39.04 Reassembles braking system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

39.04.01	knowledge of recommended manufacturers' procedures for reassembling braking system components
39.04.02	ability to reassemble linkage
39.04.03	ability to reassemble drum and disc brake assemblies

Sub-task

39.05 Installs braking system components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

39.05.01	knowledge of recommended manufacturers' procedures for installing braking system components
39.05.02	ability to install and align new components
39.05.03	ability to install brake assembly in unit
39.05.04	ability to attach and align wheels and accessories

Sub-task

39.06 Tests braking system.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

39.06.01	knowledge of recommended manufacturers' procedures for testing braking system
39.06.02	ability to test firmness of brake pedal and wheel resistance
39.06.03	ability to test brakes for reaction time and even wheel braking

BLOCK G

STRUCTURAL COMPONENTS AND ACCESSORIES

Trends: *Operators' environments are becoming increasingly sophisticated with user-friendly controls, air ride seats, sound proof surroundings and cab suspensions. Front axle suspension systems are improving safety and ride. Increased use of front hitches and PTO's for front mounted equipment for one pass cultivation and crop handling capacities.*

Task 40 **Repairs air conditioning system.**

Related Components: Compressor, receiver dryer, expansion valve, condenser, evaporator, lines, types of air conditioning systems, fan belt, blower motors, cab air filters.

Tools and Equipment: Hand tools, air conditioning tools and equipment, specialized tools and equipment.

Sub-task

40.01 Maintains air conditioning systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	no	ND	ND

40.01.01	knowledge of recommended manufacturers' procedures for maintaining air conditioning system
40.01.02	ability to clean air conditioning filters
40.01.03	ability to clean air conditioning evaporator
40.01.04	ability to clean air conditioner components

Sub-task

40.02 Diagnoses air conditioning systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	no	ND	ND

Supporting Knowledge & Abilities

40.02.01	knowledge of air conditioning system, equipment and operation
40.02.02	knowledge of recommended manufacturers' procedures for diagnosing air conditioning systems
40.02.03	ability to follow refrigerant handling procedures
40.02.04	ability to check belt drive condition and tension
40.02.05	ability to conduct and interpret pressure tests
40.02.06	ability to isolate component parts
40.02.07	ability to test for leaks
40.02.08	ability to determine refrigerant type
40.02.09	ability to isolate faulty system components
40.02.10	ability to determine repair or replacement

Sub-task

40.03 Repairs air conditioning systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	no	ND	ND

40.03.01	knowledge of environmental regulations for removal and addition of refrigerant in air conditioning system
40.03.02	ability to evacuate, recover and recharge into the system
40.03.03	ability to repair and/or replace air conditioning system components
40.03.04	ability to clean system and components
40.03.05	ability to test system operation

Task 41 Repairs operators' environment.

Related Components: Seats, operator control, steering column, cab controls such as fan controls, heating and cooling controls, light switches, windshield wipers, starting and shut-off switches, radio, electrical convenience outlets, non-cab controls such as clutch and brake pedals, hydraulics, PTO engagement, differential.

Tools and Equipment: Hand and power tools, air conditioning equipment, specialized tools and equipment.

Sub-task

41.01 Repairs operators' controls. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

41.01.01 knowledge of recommended manufacturers' procedures for repairing operator's controls

41.01.02 ability to inspect and repair cab controls such as fan control and fan motors, heating and cooling, light and signal switches, wiper motor switches, hydraulic controls

41.01.03 ability to inspect and repair non-cab controls such as clutch pedal, brake pedal, hydraulic controls, PTO engagement, differentials

41.01.04 ability to inspect and repair other controls such as steering, engine speed adjustment and hand brakes

Sub-task

41.02 Repairs seats. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

41.02.01 knowledge of seat repair procedures for areas such as front and back mount, forward and backward movement, height and weight adjustment lumbar adjustment

Supporting Knowledge & Abilities

41.02.02	ability to inspect and repair air ride seat suspension
41.02.03	ability to inspect and repair spring seat suspension
41.02.04	ability to inspect and repair hydraulic seat suspension

Sub-task

41.03 Repairs heating systems. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

41.03.01	knowledge of heating system operation and components parts
41.03.02	ability to test and repair water heating systems
41.03.03	ability to test and repair electric heating systems
41.03.04	ability to test and repair diesel heating systems
41.03.05	ability to test and repair propane heating systems

Task 42 Repairs frames.

Related Components:	Tractors, self-propelled equipment, all drawn implements, platforms, cabs, canopies and protective equipment, fibreglass, fibreglass materials.
Tools and Equipment:	Power and hand tools, lifting equipment, miscellaneous welding equipment, shop tools and equipment, specialized tools and equipment.

Sub-task

42.01 Repairs equipment framework.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

42.01.01	knowledge of recommended manufacturers' procedures for repairing equipment framework
42.01.02	ability to inspect frame for cracks, twists, stress, mounts and loose fastening devices
42.01.03	ability to weld and gusset frames
42.01.04	ability to adjust or re-install fastening devices
42.01.05	ability to recommend specialty repair

Sub-task

42.02 Ensures integrity of roll-over protective structure (ROPS).

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

42.02.01	knowledge of recommended manufacturers' specifications to ensure integrity of ROPS
42.02.02	ability to inspect ROPS for loose fasteners, cracks and bends
42.02.03	ability to replace ROPS following manufacturers' recommended specifications and procedures

Sub-task

42.03 Repairs equipment body.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	no	ND	ND

Supporting Knowledge & Abilities

42.03.01	knowledge of different types of body materials such as fibreglass and sheet metal
42.03.02	ability to inspect for dents, cracks and rust
42.03.03	ability to sandblast rust and apply body fill
42.03.04	ability to repair fibreglass
42.03.05	ability to weld and bond
42.03.06	ability to install new sheet metal components
42.03.07	ability to prepare surface prior to applying paint

Sub-task

42.04 Repairs pivot points.

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

42.04.01	knowledge of recommended manufacturers' procedures for repairing pivot points
42.04.02	ability to inspect and determine serviceability
42.04.03	ability to replace pins and bushing
42.04.04	ability to replace links and points
42.04.05	ability to lubricate pivot points

Task 43 Repairs suspensions.

Related Components:	Self-propelled equipment, leaf springs, air bags.
Tools and Equipment:	Hand and power tools, miscellaneous, lifting equipment, measuring tools, welding equipment, specialized tools and equipment.

Sub-task

43.01 Repairs wheels/tracks.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

43.01.01	knowledge of recommended manufacturers' procedures for repairing wheels/tracks
43.01.02	ability to inspect wheels/tracks for cracks
43.01.03	ability to work with steel, cast and power adjust wheels
43.01.04	ability to fasten wheels and tracks to tractors
43.01.05	ability to replace pins and bushings on track units
43.01.06	ability to adjust wheel and track spacing
43.01.07	ability to torque wheel nuts and lugs
43.01.08	ability to adjust wheel toe-in
43.01.09	ability to install dual wheels

Sub-task

43.02 Repairs under-carriage.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	no	ND	ND

43.02.01	knowledge of recommended manufacturers' procedures for repairing under-carriage
43.02.02	ability to inspect under-carriage for cracks or worn components
43.02.03	ability to diagnose common problems to facilitate repair procedures
43.02.04	ability to repair track idlers, tensions, guides and guards

Supporting Knowledge & Abilities

43.02.05	ability to test for true movement and any distortion in metal

Sub-task

43.03 Repairs pivot points.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

43.03.01	knowledge of recommended manufacturers' procedures for repairing pivot points
43.03.02	ability to inspect pivot points and bearing for wear
43.03.03	ability to replace pins, bushings, bearings
43.03.04	ability to test for proper operation

Sub-task

43.04 Repairs cushioning devices.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	no	ND	ND

43.04.01	knowledge of recommended manufacturers' procedures for cushioning devices
43.04.02	ability to test cushioning devices and determine repair or replacement
43.04.03	ability to replace air bag systems
43.04.04	ability to replace leaf spring systems

Sub-task

43.05 Ballasts equipment.

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

43.05.01	knowledge of recommended manufacturers' procedures for equipment ballasting
43.05.02	ability to determine equipment applications
43.05.03	ability to calculate ballasting requirements for the application such as horsepower and weight
43.05.04	ability to calculate weight distribution
43.05.05	ability to adjust weight distribution by loading tires
43.05.06	ability to ballast equipment such as combines, cultivators, disc harrows for specific applications

BLOCK H

CROP EQUIPMENT

Trends: *Increased use of precision farming equipment methods and techniques to determine end of row, depth control, self-leveling and row tracking. Increased use of automatic monitoring systems such as moisture testing, soil sampling and camera spraying for crop plant removal. Increased use of large square balers for improved storage, shipping, reduced production costs and minimum till equipment for fewer passes, lower crop input costs and less soil erosion.*

Task 44 **Repairs tillage and seeding equipment.**

Related Components: Plough, disc, cultivator, harrow, discers, tillers, sub-soilers, aerators, planters, drills, air seeders, transplanters, rock pickers and rakes, rollers, packers, spreaders (seed and fertilizer).

Tools and Equipment: Power and hand tools, measuring tools, multimeter, welding equipment, hydraulic press and jacks, tire gauge, tachometer, flowmeter, specialized tools and equipment.

Sub-task

44.01 Repairs tillage equipment.

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

44.01.01	knowledge of tillage equipment operation and component parts
44.01.02	ability to determine required repairs
44.01.03	ability to set up equipment
44.01.04	ability to complete a pre-delivery inspection (PDI)
44.01.05	ability to level components
44.01.06	ability to replace broken components
44.01.07	ability to replace wear parts

Sub-task

44.02 Repairs seeding equipment. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

44.02.01	knowledge of seeding equipment operation and component parts
44.02.02	ability to determine required repairs
44.02.03	ability to set up equipment
44.02.04	ability to complete a PDI
44.02.05	ability to field adjust depth, level and feed rates
44.02.06	ability to program monitors
44.02.07	ability to program field mapping systems
44.02.08	ability to repair seed and fertilizer distribution systems such as fans, hoses, manifolds, plenums, tanks
44.02.09	ability to replace broken components
44.02.10	ability to replace wear parts

Task 45 Repairs harvesting equipment.

Related Components:	Sickle bar, flail and disc mowers, swathers (windrowers), conditioners, tedders, headers, rakes, swath turner, swath roller, vegetable harvester, combines, thresher, screeners, separators, balers, forage harvesters, mixer mills, augers, forage blowers, fans, elevators, belt conveyors, bale shredders, baggers, bale wrappers, bale wagons, bale stackers, other material handling equipment.
Tools and Equipment:	Hand and power tools, shop equipment, pullers, presses, lifting equipment, welding equipment, measuring tools, electrical tools, specialized tools and equipment.

Sub-task

45.01 Repairs cutting equipment.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

45.01.01	knowledge of cutting equipment operation and component parts
45.01.02	ability to set up equipment
45.01.03	ability to complete a PDI
45.01.04	ability to determine required repairs
45.01.05	ability to sharpen cutters
45.01.06	ability to adjust clearances on shear bars, fans, blowers, headers, cutter bars (floatation and angle), flex headers
45.01.07	ability to replace worn knives, guards, keepers, rotary blade, flail hammers
45.01.08	ability to perform regular and preventative maintenance

Sub-task

45.02 Repairs gathering equipment.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

45.02.01	knowledge of gathering equipment operation and component parts
45.02.02	ability to set up equipment
45.02.03	ability to complete a PDI
45.02.04	ability to determine required repairs

Supporting Knowledge & Abilities

45.02.05	ability to adjust feeder chains, elevators, augers, rakes
45.02.06	ability to replace pick-up belts, wear parts, pick-up fingers and other broken components
45.02.07	ability to maintain metal detection systems
45.02.08	ability to perform regular and preventative maintenance

Sub-task

45.03 Repairs processing equipment.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

45.03.01	knowledge of processing equipment operation and component parts
45.03.02	ability to set up equipment
45.03.03	ability to complete a PDI
45.03.04	ability to determine required repairs
45.03.05	ability to adjust feeder chains, beater bars, cylinder, concave clearance, screens, fanning mills, knife clearances, knotters, blower clearance
45.03.06	ability to replace worn or broken parts
45.03.07	ability to perform regular and preventative maintenance

Sub-task

45.04 Repairs delivery equipment. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

45.04.01	knowledge of delivery equipment operation and component parts
45.04.02	ability to set up equipment
45.04.03	ability to complete a PDI
45.04.04	ability to determine required repairs
45.04.05	ability to adjust elevator chains, conveyor belts, rollers, augers
45.04.06	ability to adjust electronic monitors
45.04.07	ability to replace worn or broken parts
45.04.08	ability to perform regular and preventative maintenance

Task 46 Repairs spraying and irrigation equipment.

Related Components:	Pumps, valves, monitors, marker systems, delivery systems, turbine drives.
Tools and Equipment:	Hand and power tools, shop tools, welding and cutting equipment, lifting equipment, electrical tools and equipment, measuring tools, specialized tools and equipment.

Sub-task

46.01 Repairs pumps. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

Supporting Knowledge & Abilities

46.01.01	knowledge of pump operating principles, its component parts and function
46.01.02	ability to repair diaphragm pumps
46.01.03	ability to repair centrifugal pumps
46.01.04	ability to repair piston pumps

Sub-task

46.02 Repairs distribution systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK
ND	yes	yes	yes	NV	yes	yes	yes	yes	yes	ND	ND

46.02.01	knowledge of distribution systems, its components parts and their function
46.02.02	ability to clean and/or replace nozzles
46.02.03	ability to repair pipes
46.02.04	ability to repair suction manifolds and valves
46.02.05	ability to calibrate for correct nozzle

APPENDICES

TOOLS AND EQUIPMENT

Power and Hand Tools

bushing, bearing and seal driver sets
chisels
crimpers
files
fin comb
hammers
inspection lights, inspection mirrors
magnetic pick-up tools
pliers (side cutters, snap ring pliers, etc.)
probe lights
punches
screwdrivers
testing wiring harness
tire gauges
wrenches (sockets, hex keys, etc.)

Shop Equipment

Hydraulic Power

hydraulic pumps, airover
hydraulic pumps, electric
hydraulic pumps, hand operated
hydraulic rams
ram/pump set

Lifting Equipment

A-frames
hoisting equipment
hydraulic jacking system (air and electric)
hydraulic ram jacks
load positioning sling
mobile floor cranes
overhead cranes
service jacks with special adapters
wheel and axle lifts
work benches

Miscellaneous

air systems (with compressors, filters, regulator, lubricators, hoses, quick couplers, adapters and reels)
automatic lube systems
belt lacing tools
cleaning guns/pressure washers
cut-off saw
degreasing and steam cleaning equipment
grinder
heli-coil repair kits
hydraulic hose assembly equipment
horizontal bandsaw
hose clamp and locking tools
lathe
lube bucket pumps
lubrication and oiling equipment
nitrogen accumulator charging kits
painting equipment
parts washers and brushes
recovery and recycling equipment (fuel, oil, antifreeze
rotary hand pumps
tube and pipe bending and flaring tools
vices

Pullers

dowel pullers
post-lock pullers
puller sets and components
slide hammers

Presses

C-frame presses
hydraulic shop presses
open throat presses
rivet presses
roll bed shop presses

Rolling Stock

lift trucks
low beds
service trucks

Welding Equipment

electric arc welding and cutting equipment (with power supply, welding machine, electrode holder, ground clamps, protective shielding, welders clothing)
oxy-acetylene welding/cutting equipment (with cylinders, pressure regulators, welding torch, hoses, welders clothing)
plasma cutting (with electrical current and air, hoses, welders, protective shielding)

Stands and Holders

blocking
engine repair stands with component adapter sets
holding fixtures
shop and floor stands
support stands
tractor splitting stands

Specialized Electrical Tools and Equipment

alternator test stands
battery chargers
battery load testers
circuit continuity testers
computer engine analyzers
connector special tools
coolant/battery testers
digital tachometer testers
electronic control circuit diagnostic testers
electronic diagnostic boxes
electronic heat guns
electronic resistance testers
fibre optic scanners
gauge testers
hydrometer
ignition analyzers
laptop computer
multimeters (analog/digital)
soldering equipment
solenoid testers
spark testers
starting/charging analyzers
timer testers (light)
volt-ohm-amp meters

Specialized Hydraulic Tools and Equipment

digital pressure gauge testers
pressure test kits (for calibrating gauges and testing)
flow meter kits (analog or digital)
flow test kits
hose crimpers
hydraulic cylinder service benches
hydraulic drive test kits (hydrostatic transmission)
hydraulic fittings (connectors, elbows, adapters, orifice adapter, couplers, plugs, caps, tees, crosses)
hydraulic/hydrostatic system analyzers
hydraulic pressure gauges
hydrostatic gauge protectors and snubbers
in-line hydraulic testers
inspection lights
nitrogen accumulator charging kits
oil evacuators
oil transfer units (with or without vacuum pump or filtration unit)
power shift transmission test kits
rubber stoppers/leak detector kits
tachometer/temperature readers
thermometer
universal pressure test kits
vacuum pump kits
valve reseating tool kits
valve test fixtures

Specialized Measuring Tools

depth micrometers
dial calipers
dynamometer
electronic sprayer nozzle tester
emission analyzers
feeler gauges
fuel consumption meter
hole gauges
infra red temperature sensors
inside micrometers
outside callipers (spring and firm joint)
outside micrometers
plastigage
rulers
sound level meter
speed indicators (mechanical)
spring compression tester
squares
stop watches (mechanical/digital)
straight-edges
tachometer (digital photo/strobe light)
tape measure
taper gauges
telescoping gauge sets
torque angle gauge
torque wrenches
verniers

Specialized Air-Conditioning Tools and Equipment

air-conditioning fitting kits (with tees, caps, reducers, elbows, tubes, adapters)
air-conditioning test equipment kits
carry chargers
charging cylinders
compressor special tools
detergent
electronic leak detectors
flushing equipment kits
identifiers
pressure hoses
reclaiming and recovery equipment
safety shut-off valves
thermal limiter testers
thermometers
vacuum hoses
vacuum pumps
valve depressors

Specialized Engine, Fuel Systems Tools and Equipment

antifreeze testers
camshaft service tools (bushing)
compression leakage testers
compression testers
con rod bushing service tools
cylinder liner service tools, removers (puller), installer, ridge reamer, height gauge
diesel fuel injection nozzle testers
dynamometers
engine lifting devices
engine repair stands
flywheel service tools
glaze breaker
holding tools and fixtures
hone set (flexible cylinder hone)
injection pump service tools
manifold pressure testers (with adapters)
manometers
nozzle service tools, nozzle pullers
pin bushing drivers
piston pin service tools
radiator pressure tester and pressure pumps
ring compressors
ring expanders
ring groove cleaners
ring groove wear gauges
timing tools
vacuum gauge
valve guide knurlers
valve inspection benches
valve magnetic follower holder kits
valve refacers
valve seat cutters
valve seat grinders
valve seat - inserts – guide service tools
vibration test equipment
water pump service tools
water vacuum gauges

Specialized Power Train Tools and Equipment

adapters to jacking stands
holding fixtures, service stands
bearing heaters/ovens
clutch service and adjusting special tools
differential/final drive and axle special tools
dynamometer
hydrostatic drives special tools
transmission services and adjusting special tools

BLOCKS AND TASKS WEIGHTING

BLOCK A OCCUPATIONAL SKILLS

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	National Average
%	ND	15	5	5	NV	4	10	2	10	5	ND	ND	7%

Task 1 Applies technical information.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	40	50	1	NV	30	40	40	60	40	ND	ND	38%

Task 2 Uses tools and equipment.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	20	35	31	NV	20	25	30	20	30	ND	ND	26%

Task 3 Uses lifting tools.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	15	5	30	NV	20	15	15	10	25	ND	ND	17%

Task 4 Uses welding, cutting and heating equipment.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	25	10	38	NV	30	20	15	10	5	ND	ND	19%

BLOCK B ENGINES AND ENGINE SYSTEMS

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	National Average
%	ND	13	20	18	NV	15	15	15	10	15	ND	ND	15%

Task 5 Maintains engines and engine systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	9	5	10	NV	10	15	5	20	5	ND	ND	10%

Task 6 Diagnoses engine performance.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	25	15	21	NV	10	20	25	20	30	ND	ND	21%

Task 7 Repairs basic engines.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	12	15	13	NV	25	15	10	20	30	ND	ND	17%

Task 8 Repairs lubrication systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	10	15	10	NV	5	10	10	5	5	ND	ND	9%

Task 9 Repairs cooling systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	10	15	11	NV	5	10	10	5	5	ND	ND	9%

Task 10 Repairs intake and exhaust systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	10	7	10	NV	7	10	10	5	5	ND	ND	8%

Task 11 Repairs fuel systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	12	20	18	NV	25	10	10	15	10	ND	ND	15%

Task 12 Repairs engine control systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	12	8	7	NV	13	10	20	10	10	ND	ND	11%

BLOCK C DRIVE TRAIN AND DRIVE TRAIN SYSTEMS

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	National Average
%	ND	12	20	13	NV	14	15	20	20	20	ND	ND	17%

Task 13 Maintains drive train systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	10	5	8	NV	10	10	10	10	5	ND	ND	9%

Task 14 Diagnoses drive train systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	28	20	25	NV	10	20	15	20	40	ND	ND	22%

Task 15 Repairs clutches.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	14	20	13	NV	15	10	20	20	10	ND	ND	15%

Task 16 Repairs drive lines.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	10	5	16	NV	20	10	10	10	10	ND	ND	11%

Task 17 Repairs transmissions and gear boxes.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	14	25	13	NV	35	25	20	20	20	ND	ND	22%

Task 18 Repairs differentials.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	14	15	13	NV	5	15	20	10	10	ND	ND	13%

Task 19 Repairs belt and chain drives.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	10	10	12	NV	5	10	5	10	5	ND	ND	8%

BLOCK D HYDRAULICS AND HYDRAULIC SYSTEMS

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	National Average
%	ND	15	20	16	NV	24	15	20	20	20	ND	ND	18%

Task 20 Maintains hydraulic systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	8	5	6	NV	4	10	15	5	5	ND	ND	7%

Task 21 Diagnoses hydraulic systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	28	30	26	NV	8	25	25	30	40	ND	ND	26%

Task 22 Repairs pump systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
													19%

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	20	15	18	NV	30	20	10	20	15	ND	ND	

Task 23 Repairs hydrostatic systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	20	15	24	NV	20	15	15	10	15	ND	ND	17%

Task 24 Repairs control systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	8	25	7	NV	25	20	15	20	15	ND	ND	17%

Task 25 Repairs actuators and lines.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	8	5	11	NV	10	5	10	5	5	ND	ND	7%

Task 26 Repairs hydraulic cooling systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	8	5	8	NV	3	5	10	10	5	ND	ND	7%

BLOCK E ELECTRICAL AND ELECTRICAL SYSTEMS

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	National Average
%	ND	15	20	16	NV	20	15	20	20	25	ND	ND	19%

Task 27 Maintains electrical systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	7	5	5	NV	3	10	10	20	5	ND	ND	8%

Task 28 Diagnoses electrical and electronic systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	30	30	26	NV	19	25	25	40	45	ND	ND	30%

Task 29 Repairs charging systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	13	15	13	NV	19	15	10	5	15	ND	ND	13%

Task 30 Repairs starting systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	13	15	11	NV	19	15	10	5	15	ND	ND	13%

Task 31 Repairs ignition systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	8	15	10	NV	1	10	5	5	5	ND	ND	8%

Task 32 Repairs electrical conductors.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	8	2	7	NV	19	5	5	5	5	ND	ND	7%

Task 33 Repairs electronic components.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	13	15	14	NV	15	10	25	10	5	ND	ND	13%

Task 34 Repairs accessories.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	8	3	14	NV	5	10	10	10	5	ND	ND	8%

BLOCK F STEERING AND BRAKING SYSTEMS

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	National Average
%	ND	5	7	12	NV	5	10	10	10	5	ND	ND	8%

Task 35 Maintains steering systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	15	5	16	NV	15	10	10	10	10	ND	ND	12%

Task 36 Maintains braking systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	15	5	16	NV	15	15	10	10	10	ND	ND	12%

Task 37 Diagnoses steering and braking systems.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	30	40	28	NV	40	25	30	40	40	ND	ND	34%

Task 38 Repairs steering system components.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	20	25	20	NV	15	25	25	20	20	ND	ND	21%

Task 39 Repairs braking system components.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	20	25	20	NV	15	25	25	20	20	ND	ND	21%

BLOCK G STRUCTURAL COMPONENTS AND ACCESSORIES

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	National Average
%	ND	5	3	5	NV	8	10	5	5	5	ND	ND	6%

Task 40 Repairs air conditioning system.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	30	40	25	NV	45	35	40	60	0	ND	ND	34%

Task 41 Repairs operators' environment.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	25	30	28	NV	5	20	15	10	60	ND	ND	24%

Task 42 Repairs frames.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	30	15	22	NV	5	25	20	15	10	ND	ND	18%

Task 43 Repairs suspensions.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	15	15	25	NV	45	20	25	15	30	ND	ND	24%

BLOCK H CROP EQUIPMENT

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	National Average
%	ND	20	5	15	NV	10	10	8	5	5	ND	ND	10%

Task 44 Repairs tillage and seeding equipment.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	
%	ND	30	30	36	NV	35	30	25	35	25	ND	ND	31%

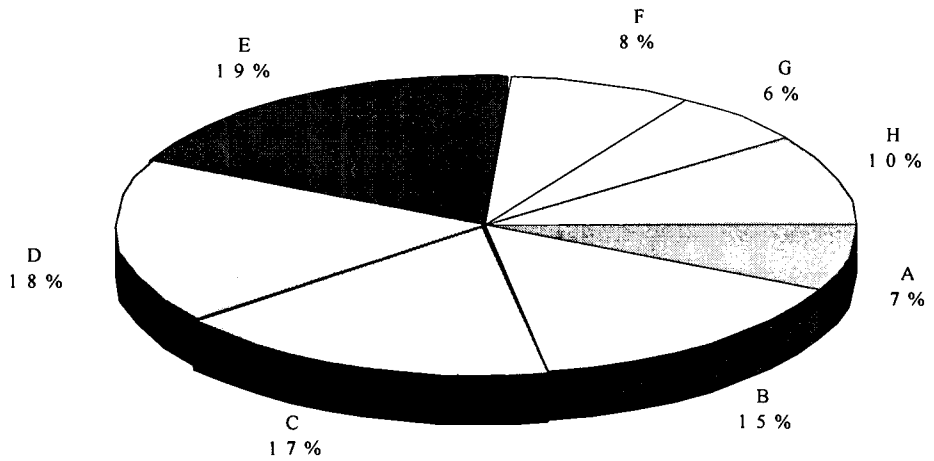
Task 45 Repairs harvesting equipment.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	42%
%	ND	50	35	38	NV	35	40	50	35	50	ND	ND	

Task 46 Repairs spraying and irrigation equipment.

	NF	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	27%
%	ND	20	35	26	NV	30	30	25	30	25	ND	ND	

PIE CHART*
Farm Equipment Mechanic



TITLES OF BLOCKS

Block A	Occupational Skills	Block E	Electrical and Electrical Systems
Block B	Engines and Engine Systems	Block F	Steering and Braking Systems
Block C	Drive Train and Drive Train Systems	Block G	Structural Components and Accessories
Block D	Hydraulics and Hydraulic Systems	Block H	Crop Equipment

* The average percentage of the total number of questions on an interprovincial examination, assigned to assess each block of the analysis, as derived from the collective input from workers within the occupation from all areas of Canada. Interprovincial examinations typically have from one hundred up to one hundred and fifty multiple choice questions on each examination.

FARM EQUIPMENT MECHANIC (2000)

BLOCKS	TASKS	SUB-TASKS
A OCCUPATIONAL SKILLS	1. Applies technical information.	1.01 Accesses technical information.
		1.02 Analyzes technical information.
	2. Uses tools and equipment.	2.01 Uses general tools.
		2.02 Uses specialized tools.
	3. Uses lifting tools.	3.01 Uses hoisting equipment.
		3.02 Uses lifting devices.
	4. Uses welding, cutting and heating equipment.	4.01 Uses welding equipment.
		4.02 Uses cutting equipment.
		4.03 Uses heating equipment.
B ENGINES AND ENGINE SYSTEMS	5. Maintains engine and engine systems.	5.01 Maintains lubrication systems.
		5.02 Maintains cooling systems.
		5.03 Maintains intake and exhaust systems.
		5.04 Maintains fuel systems.
		5.05 Maintains engine control systems.
	6. Diagnoses engine performance.	6.01 Inspects engines and engine systems.
		6.02 Tests engines and engine systems.
	7. Repairs basic engines.	7.01 Removes engines.
		7.02 Disassembles engines.
		7.03 Analyzes components.
		7.04 Reassembles engines.
		7.05 Installs engines.
		7.06 Tests engines.
	8. Repairs lubrication systems.	8.01 Removes lubrication system components.
		8.02 Disassembles lubrication system components.
		8.03 Analyzes lubrication system components.
		8.04 Reassembles lubrication system components.
		8.05 Installs lubrication system components.
		8.06 Tests lubrication systems.
	9. Repairs cooling systems.	9.01 Removes cooling system components.
		9.02 Disassembles cooling system components.
		9.03 Analyzes cooling system components.
		9.04 Reassembles cooling system components.
		9.05 Installs cooling system components.
		9.06 Tests cooling systems.

* NOT COMMON CORE

	10. Repairs intake and exhaust systems.	10.01 Removes intake and exhaust system components.	10.02 Disassembles intake and exhaust system components.	10.03 Analyzes intake and exhaust system components.	10.04 Reassembles intake and exhaust system components.	10.05 Installs intake and exhaust system components.	10.06 Tests intake and exhaust systems.
	11. Repairs fuel systems.	11.01 Removes fuel system components.	11.02 Disassembles fuel system components.	11.03 Analyzes fuel system components.	11.04 Reassembles fuel system components.	11.05 Installs fuel system components.	11.06 Tests fuel systems.
	12. Repairs engine control systems.	12.01 Removes engine control system components.	12.02 Disassembles engine control system components.	12.03 Analyzes engine control system components.	12.04 Reassembles engine control system components.	12.05 Installs engine control system components.	12.06 Tests engine control systems.
C	**Drive Train and Drive Train Systems**						
	13. Maintains drive train systems.	13.01 Checks fluid levels.	13.02 Lubricates drive lines.	13.03 Conducts preventative maintenance procedures.			
	14. Diagnoses drive train systems.	14.01 Inspects drive trains.	14.02 Measures components.	14.03 Diagnoses failures.			
	15. Repairs clutches.	15.01 Removes clutches.	15.02 Disassembles clutch components.	15.03 Analyzes clutch components.	15.04 Reassembles clutch components.	15.05 Installs clutches.	15.06 Tests clutches.
	16. Repairs drive lines.	16.01 Removes drive lines.	16.02 Disassembles drive lines.	16.03 Analyzes drive line components.	16.04 Reassembles drive lines.	16.05 Installs drive lines.	16.06 Tests drive lines.
	17. Repairs transmissions and gear boxes.	17.01 Removes transmissions and gear boxes.	17.02 Disassembles transmissions and gear boxes.	17.03 Analyzes transmission and gear box components.	17.04 Reassembles transmissions and gear boxes.	17.05 Installs transmissions and gear boxes.	17.06 Tests transmissions and gear boxes.
	18. Repairs differentials.	18.01 Removes differentials.	18.02 Disassembles differentials.	18.03 Analyzes differential components.	18.04 Reassembles differentials.	18.05 Installs differentials.	18.06 Tests differentials.

* NOT COMMON CORE

FARM EQUIPMENT MECHANIC (2000)

BLOCKS	TASKS	SUB-TASKS					
	19. Repairs belt and chain drives.	19.01 Removes belt and chain drive components.	19.02 Disassembles belt and chain drive components.	19.03 Analyzes belt and chain drive components.	19.04 Reassembles belt and chain drive components.	19.05 Installs belt and chain drives.	19.06 Tests belt and chain drives.
D Hydraulics and Hydraulic Systems	20. Maintains hydraulic systems.	20.01 Performs scheduled maintenance.	20.02 Maintains hydraulic systems.				
	21. Diagnoses hydraulic systems.	21.01 Checks flows and pressures.	21.02 Isolates components.				
	22. Repairs pump systems.	22.01 Removes pumps.	22.02 Disassembles pumps.	22.03 Analyzes components.	22.04 Reassembles pump components.	22.05 Installs pumps.	22.06 Tests pumps.
	23. Repairs hydrostatic systems.	23.01 Removes hydrostatic system components.	23.02 Disassembles hydrostatic system components.	23.03 Analyzes hydrostatic system components.	23.04 Reassembles hydrostatic system components.	23.05 Installs hydrostatic system components.	23.06 Tests hydrostatic systems.
	24. Repairs control systems.	24.01 Removes control system components.	24.02 Disassembles control system components.	24.03 Analyzes control system components.	24.04 Reassembles control system components.	24.05 Install control system components.	24.06 Tests control systems.
	25. Repairs actuators and lines.	25.01 Removes actuators and lines.	25.02 Disassembles actuators and lines.	25.03 Analyzes actuators and lines.	25.04 Reassembles actuators and lines.	25.05 Installs actuators and lines.	25.06 Tests actuators and lines.
	26. Repairs hydraulic cooling systems.	26.01 Removes hydraulic cooling system components.	26.02 Analyzes hydraulic cooling system components.	26.03 Installs hydraulic cooling system components.	26.04 Tests hydraulic cooling systems.		

* NOT COMMON CORE

FARM EQUIPMENT MECHANIC (2000)

	BLOCKS	TASKS	SUB-TASKS					
E	Electrical and Electrical Systems	27. Maintains electrical systems.	27.01 Maintains battery fluid levels.	27.02 Checks belt tension and condition.	27.03 Cleans components and connections			
		28. Diagnoses electrical and electronic systems.	28.01 Tests electrical systems.	28.02 Tests electronic systems.	28.03 Diagnoses failures.			
		29. Repairs charging systems.	29.01 Removes charging system components.	29.02 Disassembles charging system components.	29.03 Analyzes charging system components.	29.04 Reassembles charging system components.	29.05 Installs charging system components.	29.06 Tests charging systems.
		30. Repairs starting systems.	30.01 Removes starting system components.	30.02 Disassembles starting system components.	30.03 Analyzes starting system components.	30.04 Reassembles starting system components.	30.05 Installs starting system components.	30.06 Tests starting systems.
		31. Repairs ignition systems.	31.01 Removes ignition system components.	31.02 Disassembles distributor.	31.03 Analyzes ignition system components.	31.04 Reassembles distributor.	31.05 Installs ignition system components.	31.06 Tests ignition systems.
		32. Repairs electrical conductors.	32.01 Removes electrical system conductors.	32.02 Disassembles electrical system conductors.	32.03 Analyzes electrical system conductor components.	32.04 Reassembles electrical system conductor components.	32.05 Installs electrical system conductors.	32.06 Tests electrical system conductors.
		33. Repairs electronic components.	33.01 Removes electronic components.	33.02 Installs electronic components.	33.03 Tests or reprograms electronic components.			
		34. Repairs accessories.	34.01 Removes accessories.	34.02 Disassembles accessories.	34.03 Analyzes accessories.	34.04 Reassembles accessories.	34.05 Installs accessories.	34.06 Tests accessories.
F	Steering and Braking Systems	35. Maintains steering systems.	35.01 Maintains fluid levels.	35.02 Adjusts steering systems operation.	35.03 Lubricates pivot points.			

* NOT COMMON CORE

FARM EQUIPMENT MECHANIC (2000)

BLOCKS	TASKS	SUB-TASKS
	36. Maintains braking systems.	36.01 Maintains fluid levels.
		36.02 Adjusts braking systems operations.
		36.03 Lubricates linkages.
	37. Diagnoses steering and braking systems.	37.01 Diagnoses steering systems.
		37.02 Diagnoses braking systems.
	38. Repairs steering system components.	38.01 Removes steering system components.
		38.02 Disassembles steering system components.
		38.03 Analyzes steering system components.
		38.04 Reassembles steering system components.
		38.05 Installs steering system components.
		38.06 Tests steering system.
	39. Repairs braking system components.	39.01 Removes braking system components.
		39.02 Disassembles braking system components.
		39.03 Analyzes braking system components.
		39.04 Reassembles braking system components.
		39.05 Installs braking system components.
		39.06 Tests braking system.
G Structural Components and Accessories	40. Repairs air conditioning system.	40.01 Maintains air conditioning systems.
		40.02 Diagnoses air conditioning systems.
		40.03 Repairs air conditioning systems.
	41. Repairs operators' environment.	41.01 Repairs operators' controls.
		41.02 Repairs seats.
		41.03 Repairs heating systems.
	42. Repairs frames.	42.01 Repairs equipment framework.
		42.02 Ensures integrity of roll-over protective structure (ROPS).
		42.03 Repairs equipment body.
		42.04 Repairs pivot points.
	43. Repairs suspensions.	43.01 Repairs wheels/tracks.
		43.02 Repairs under-carriage.
		43.03 Repairs pivot points.
		43.04 Repairs cushioning devices.
		43.05 Ballasts equipment.
H Crop Equipment	44. Repairs tillage and seeding equipment.	44.01 Repairs tillage equipment.
		44.02 Repairs seeding equipment.

* NOT COMMON CORE

FARM EQUIPMENT MECHANIC (2000)

BLOCKS	TASKS	SUB-TASKS
45. Repairs harvesting equipment.		45.01 Repairs cutting equipment.
		45.02 Repairs gathering equipment.
		45.03 Repairs processing equipment.
		45.04 Repairs delivery equipment.
46. Repairs spraying and irrigation equipment.		46.01 Repairs pumps.
		46.02 Repairs distribution systems.

* NOT COMMON CORE

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