Occupational Analyses Series

Electrical Rewind Mechanic

1999

Interprovincial Partnerships and Occupational Information Division

Human Resources Partnerships Directorate

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Électromécanicien/ électromécanicienne

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

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This analysis was prepared by the Human Resources Partnerships Directorate. The planning, coordination and processing of the analysis were undertaken by staff members of the Interprovincial Partnerships and Occupational Information Division.

* Indicates original participants

OTHER RELATED OCCUPATIONAL TITLES

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

Electrical Motor Mechanic
Electrical Motor Winder
Winder Electrician

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 (1993)	7281
Cabinetmaker (1992)	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)	2242

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

** **National Occupational Classification**

(Video Equipment)	
Electronics Technician Vol. II (1986) (Audio Equipment)	2242
Electronics Technician Vol. III (1986) (Computer Equipment)	2242
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 (1994)	7312
Floorcovering Installer (1997)	7295
Glazier (1994)	7292
Hairstylist (1997)	6271
Heating (Gas and Oil) Servicer - Commercial and Industrial (1978)	7331
Heavy Equipment Mechanic (1987)	7312
Heavy Equipment Operator (1983)	7421
Industrial Electrician (1997)	7242
Industrial Instrument Mechanic (1988)	2243
Industrial Mechanic (Millwright) (1999)	7311
Insulator (Heat and Frost) (1993)	7293
Ironworker (Generalist) (1993)	7264
Lather (Interior Systems Mechanic) (1994)	7284
Logistics (1992)	0713

Machinist (1992)	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
Motor Vehicle Repairer (Truck and Transport) (1983)	7321
New Home Builder and Residential Renovation Contractor (1992)	0712
Oil Burner Mechanic (1997)	7331
Painter and Decorator (1993)	7294
Partsperson (1995)	1472
Plumber (1996)	7251
Power Engineer (1997)	7351
Powerline Technician (1996)	7244
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
Welder (1996)	7265

REQUESTS FOR THESE PUBLICATIONS SHOULD BE FORWARDED TO:

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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.

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Guide to Analysis

Analysis

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 review, edit, and translation to ensure conformity with the nationally approved format.

The analysis is forwarded 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.

Trends

Any shifts or changes in technology which completion of the sub-tasks are identified under this heading.

Related Components

All components of a specified project being undertaken by the electrical rewind mechanic.

Tools and Equipment

All tools and equipment necessary for the electrical rewind mechanic to complete a task.

VALIDATION METHOD

At the request of the Canadian Council of Directors of Apprenticeship (CCDA), the Standardization Sub-committee 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 Read 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 that province/territory.

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 "D")

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 Human Resources Development Canada (HRDC). In turn, HRDC 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 "E")

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

SCOPE OF THE ELECTRICAL REWIND MECHANIC OCCUPATION

The title AElectrical Rewind Mechanic@ defines a person who, because of his or her knowledge, training and abilities, is capable of repairing and rebuilding electrical machines, systems and equipment. This scope of work performed by an electrical rewind mechanic includes, but is not limited to, the maintenance, testing and repair of electric motors, transformers, switchgears and other electrical apparatus.

Electrical rewind mechanics are employed by independent electrical repair shops, service shops of electrical equipment manufacturers and maintenance departments of manufacturing companies. In addition to other tasks, mechanics must interpret drawings and specifications, determine the need, extent and type of repairs required, and prepare time and cost estimations reports. They also use a great variety of mechanical and electrical tools as well as advanced equipment, machinery and techniques.

Furthermore, electrical rewind mechanics may specialize in working with certain types of apparatus, such as electric motors or transformers, or in performing certain functions, such as winding coils. However, the list of equipment installed, repaired and maintained may include the following:

- electrical measuring devices;
- electrical machine components;
- all types of electro-mechanical equipment;
- electrical switching circuits;
- electrical fans, blowers and pumps;
- transformers;
- single phase motors;
- magnetic switches and control circuits;
- phase converters;
- three phase motors, starters and controllers;
- synchronous machines;
- industrial electronic controls;
- electric welders;
- eddy current clutches, couplings, brakes and brake pads;
- inverter and vector drives;
- static and dynamic balancing;
- programmable controllers;
- mechanical machine components;
- alternating current and direct current power supplies.

OCCUPATIONAL OBSERVATIONS

New processes and demands within this industry has altered the tasks an electrical rewind mechanic must perform. The trends indicate a need for updating and upgrading in technical information and skills in order for the electrical rewind mechanic to be current and knowledgeable of new equipment, techniques and processes. The training and learning process builds a foundation for the improvement of future skills.

The diversity of required tasks to be performed necessitates a broader base of knowledge in the fields of basic work skills and business practices. Welding, brazing and soldering are essential basic skills whose techniques and equipment are also in a steady state of change. New business practices such as quality assurance imposes yet more responsibility on to the electrical rewind mechanic in terms of diversity.

Self reliance is scattered throughout the analysis. The electrical rewind mechanic has to be empowered to make major decisions and held responsible and accountable. Decisions to either repair / replace components or equipment, whether they are mechanical, electrical or electronic, can have dramatic effects on cost and on time. The significance of proper decision making is vital in these economic times.

New and improved products and protection methods have reduced the amount of winding work an electrical rewind mechanic must perform. Industry has become more proactive by scheduling more preventive maintenance programs. Although there may be less winding work, the advent of new and different types of equipment necessitates the electrical rewind mechanic to have a diverse knowledge of a wide variety of equipment, be aware of new processes and procedures and to be self reliant.

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 onself, 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

TECHNICAL OCCUPATIONAL SKILLS AND PROCEDURES

Trends: *There is a trend toward acquisition of basic work skills which will be used with the advent of new equipment, methods and techniques. The employee is required to be more self-reliant, cost-effective and better at troubleshooting and diagnostics. The requirement to be more diversified requires a broader knowledge base.*

Task 1 Uses tools safely and skilfully.

Related Components: Refer to Scope of Analysis.

Tools and Equipment: Refer to Appendix A.

Sub-task

1.01 Uses hand and power tools, compressed air and pneumatic tools safely and skilfully.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

1.01.01 ability to maintain tools in safe working condition

1.01.02 ability to operate hand and power tools, and compressed air and pneumatic tools in a safe manner

1.01.03 ability to select the appropriate hand or power tools and compressed air or pneumatic tools to perform a specific task

1.01.04 ability to operate hand and power tools and compressed air and pneumatic tools competently

Sub-task

1.02	**Uses shop tools safely and skilfully.**	**Supporting Knowledge & Abilities**

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

1.02.01	ability to maintain welding machines (welding as a tool)
1.02.02	ability to select the attachment required for cutting while taking the necessary safety precautions
1.02.03	ability to clean, store and take care of torch tips
1.02.04	knowledge of engine lathe maintenance and operation
1.02.05	ability to operate an engine lathe to perform a specific task competently

Task 2 **Performs welding, brazing and soldering operations.**

Related Components: Refer to Scope of Analysis.

Tools and Equipment: Refer to Appendix A.

Sub-task

2.01	**Performs welding operations.**	**Supporting Knowledge & Abilities**

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

2.01.01	knowledge of the principles of operation of electric welding

Supporting Knowledge & Abilities

2.01.02	knowledge of the principles of operation of gas welding
2.01.03	knowledge of characteristics of oxygen and acetylene and the recommended handling and storage methods of the same
2.01.04	knowledge to determine welding conditions
2.01.05	ability to select proper welding process
2.01.06	ability to perform TIG, MIG and Stick welding

Sub-task

2.02 Performs brazing and soldering operations.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

2.02.01	knowledge of proper techniques of using soldering irons and torches
2.02.02	ability to use the proper techniques of using soldering irons and torches
2.02.03	knowledge of proper techniques of brazing
2.02.04	ability to apply the proper techniques of brazing

Task 3 Performs occupational related functions.

Related Components: Refer to Scope of Analysis.

Tools and Equipment: Refer to Appendix A.

Sub-task

3.01 Moves/lifts equipment. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

3.01.01	knowledge of rigging and hoisting and lifting and moving equipment and procedures
3.01.02	ability to move and lift equipment
3.01.03	knowledge of lifting (by hand) practices

Sub-task

3.02 Performs finishing. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

3.02.01	knowledge of finishing procedures, such as painting, storage and shipping protection
3.02.02	ability to paint, store and ship equipment

Sub-task

3.03 Commissions equipment. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

3.03.01	knowledge of commissioning mechanical, electrical and electronic systems
3.03.02	ability to commission mechanical, electrical and electronic systems

Task 4 Assesses systems and equipment.

Related Components: Refer to Scope of Analysis.

Tools and Equipment: Refer to Appendix A.

Sub-task

4.01 Performs visual inspection of system.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

4.01.01	knowledge of mechanical, electrical and electronic systems
4.01.02	ability to visually detect obvious error indication and to correct
4.01.03	ability to visually inspect systems for damage
4.01.04	knowledge of error messages
4.01.05	ability to access error messages from systems
4.01.06	ability to eliminate non-essential messages
4.01.07	ability to interface, download data and interpret

Sub-task

4.02 Assesses condition of equipment.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

4.02.01	knowledge of specifications, nameplate data, drawings and service manuals
4.02.02	ability to interpret specifications, nameplate data, drawings and service manuals

Supporting Knowledge & Abilities

4.02.03	knowledge of construction, operation, and function of mechanical, electrical and electronic equipment
4.02.04	ability to determine the proper operation of mechanical, electrical and electronic systems within an entire process

Sub-task

4.03 Selects system measuring/testing equipment.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

4.03.01	knowledge of measuring/testing equipment
4.03.02	ability to identify and use proper measuring/testing equipment

Sub-task

4.04 Conducts system measurements/tests and documents.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

4.04.01	knowledge of proper testing procedures
4.04.02	ability to properly use testing equipment
4.04.03	knowledge of documentation and procedures
4.04.04	ability to apply documentation procedures

Sub-task

4.05 Analyzes results of system check.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

4.05.01 knowledge of acceptable system specifications

4.05.02 ability to diagnose mechanical, electrical or electronic systems as being at fault

Task 5 Checks mechanical, electrical and electronic components and systems.

Related Components: Refer to Scope of Analysis.

Tools and Equipment: Refer to Appendix A.

Sub-task

5.01 Performs visual inspection of components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

5.01.01 knowledge of mechanical, electrical and electronic components

5.01.02 ability to perform a visual check of mechanical, electrical and electronic components for signs of damage

5.01.03 knowledge of operating characteristics of components

5.01.04 ability to run components and assess operation

5.01.05 ability to lockout systems for inspection, testing and component removal

Sub-task

5.02 Disassembles defective components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

5.02.01 knowledge of component removal procedures

5.02.02 ability to correctly remove system components

Sub-task

5.03 Selects appropriate measuring/testing equipment.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

5.03.01 knowledge of testing/measuring equipment

5.03.02 ability to select the proper testing/measuring equipment used for system components

Sub-task

5.04 Conducts measurements/ tests and documents.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

5.04.01 knowledge of proper testing procedures used on components of mechanical, electrical and electronic system

5.04.02 knowledge of acceptable cleaning procedures

5.04.03 knowledge of safe component removal procedures

5.04.04 knowledge of proper tagging and identification

Supporting Knowledge & Abilities

procedures

5.04.05 ability to correctly perform tests on components from mechanical, electrical and electronic systems

Sub-task

5.05 Evaluates results.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

5.05.01 knowledge of acceptable specifications and tolerances

5.05.02 ability to assess results and determine appropriate actions

Sub-task

5.06 Removes defective part(s).

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

5.06.01 ability to correctly remove components from mechanical, electrical and electronic systems

Task 6 Repairs/replaces defective mechanical, electrical and electronic part(s)/components.

Related Components: Refer to Scope of Analysis.

Tools and Equipment: Refer to Appendix A.

Sub-task

6.01 Disassembles defective part(s) if required.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

6.01.01 knowledge of isolation of parts and components

6.01.02 knowledge of applicable replacement components

6.01.03 ability to properly handle discreet and integrated components to ensure their protection

6.01.04 ability to disassemble and remove components from system

Sub-task

6.02 Assesses work to be performed.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

6.02.01 ability to evaluate cost/time factors

6.02.02 knowledge of source materials and/or substitutes

6.02.03 ability to source materials or substitutes

Sub-task

6.03 Replaces part(s)/ components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

6.03.01 knowledge of replacement procedures for

Supporting Knowledge & Abilities

components within mechanical electrical, and electronic systems

6.03.02 ability to correctly replace components in mechanical, electrical and electronic systems

Sub-task

6.04 Repairs and assembles part(s)/components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

6.04.01 knowledge of repairing components in mechanical, electrical and electronic systems

6.04.02 knowledge of repair procedures

6.04.03 ability to correctly repair components within mechanical, electrical and electronic systems

6.04.04 ability to correctly reassemble components back into the mechanical, electrical and electronic systems

Sub-task

6.05 Tests part(s)/components for correct operation.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

6.05.01 ability to perform required tests

6.05.02 ability to verify correct operation of replacement or repaired components

Sub-task

Supporting Knowledge & Abilities

6.06 Installs part(s)/component(s) into system. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

6.06.01	knowledge of installation procedures of components into mechanical, electrical and electronic systems
6.06.02	ability to install part(s)/component(s) within fits, tolerances and alignment requirements of the system

Task 7 Checks for correct system operation.

Related Components: Refer to Scope of Analysis.

Tools and Equipment: Refer to Appendix A.

Sub-task

7.01 Performs final system inspection. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

7.01.01	knowledge of system inspection procedures
7.01.02	ability to analyze correct operation of systems

Sub-task

7.02 Operates systems. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

7.02.01	knowledge of operation and specifications of mechanical, electrical and electronic systems
7.02.02	ability to check correct operation without line voltage

Sub-task

7.03 Conducts measurements/ test(s) on system and documents.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

7.03.01	ability to check operation with line voltage

Sub-task

7.04 Evaluates system results.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

7.04.01	ability to assess that all systems are operating within specifications
7.04.02	ability to interpret test and measurement readings

Task 8 Tests systems and equipment.

Related Components: Refer to Scope of Analysis.

Tools and Equipment: Refer to Appendix A.

Sub-task

8.01 Selects appropriate measuring/testing system procedures.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	no	yes	yes	yes	yes	yes	yes	yes	yes	NV

8.01.01 knowledge of the components in a system

8.01.02 ability to determine tests required to adequately determine components status

8.01.03 knowledge of test equipment required to perform procedures

Sub-task

8.02 Performs tests on systems.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	no	yes	yes	yes	yes	yes	yes	yes	yes	NV

8.02.01 knowledge of components specifications and tolerances

8.02.02 ability to assess tests that will not damage equipment or components

8.02.03 ability to connect test equipment to components being tested

8.02.04 ability to read and document results

Supporting Knowledge & Abilities

8.02.05 knowledge of layout procedures for testing

		equipment and components
	8.02.06	ability to set up components for testing
	8.02.07	knowledge of learned techniques
	8.02.08	ability to interpret manufacturer=s specifications

Sub-task

8.03 Evaluates results on newly-installed equipment.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	no	yes	yes	yes	yes	yes	yes	yes	yes	NV

8.03.01	knowledge of insulation principles
8.03.02	knowledge of principles of mechanics, electricity and electronics
8.03.03	knowledge of applicable mechanical, electrical and electronic laws and their application
8.03.04	knowledge of vibration analysis
8.03.05	knowledge of components specifications and tolerances
8.03.06	ability to determine status of components under testing

Task 9 Documents work in progress.

Related Components: Refer to Scope of Analysis.

Tools and Equipment: Refer to Appendix A.

Sub-task

9.01 Uses correct forms and/or charts.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

9.01.01	knowledge of quality assurance and report writing
9.01.02	knowledge of documentation procedures
9.01.03	ability to complete quality assurance documents

Sub-task

9.02 Records all visually defective components or missing components.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

9.02.01	knowledge of mechanical, electrical and electronic systems and components
9.02.02	ability to document components that are absent or non-functional

Sub-task

9.03 Records all nameplate data.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

9.03.01	knowledge of technical terms

Supporting Knowledge & Abilities

9.03.02	ability to document equipment data

Sub-task

9.04 Records all replacement components/parts. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

9.04.01	knowledge of proper part numbers or identification number
9.04.02	ability to record instructions
9.04.03	ability to use precise descriptions

BLOCK B

ROTATING EQUIPMENT

Trends: There is a trend toward less winding work due to better products, better protection of electrical equipment and better preventive and proactive maintenance.

Task 10 Reconditions and repairs rotating equipment.

Related Components: Refer to Scope of Analysis.

Tools and Equipment: Refer to Appendix A.

Sub-task

10.01 Rewinds equipment. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

10.01.01	knowledge of occupational skills and procedures
10.01.02	ability to perform occupational skills and procedures
10.01.03	knowledge of correct winding procedures and equipment
10.01.04	knowledge of electrical and electronic theory
10.01.05	ability to clean and insulate core
10.01.06	ability to strip and record all winding data
10.01.07	ability to wind coils, redesign windings, and install coils and connections
10.01.08	ability to varnish and bake
10.01.09	knowledge of operation and function of coils

Sub-task

10.02 Bands armature. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

10.02.01	knowledge of banding materials
10.02.02	ability to use banding lathe

Sub-task

10.03 Machines or replaces rings and/or commutators. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK

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

10.03.01	knowledge of common machining practices
10.03.02	knowledge of undercutting and deburring armatures
10.03.03	ability to undercut and deburr
10.03.04	ability to perform armature tests

Sub-task

10.04 Balances rotating parts. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

10.04.01	knowledge of balancing procedures
10.04.02	knowledge of balancing equipment
10.04.03	ability to use balancing equipment
10.04.04	ability to assess mechanical fits/tolerances and alignment procedures

BLOCK C

STATIONARY EQUIPMENT

Trends: There is a trend toward less winding work due to better products, better protection of electrical equipment and better preventive and proactive maintenance.

Task 11 Checks and repairs stationary equipment.

Related Components: Refer to Scope of Analysis.

Tools and Equipment: Refer to Appendix A.

Sub-task

11.01 De-energizes stationary equipment.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	NV

11.01.01	knowledge of protective equipment
11.01.02	knowledge of de-energizing process and procedures
11.01.03	ability to remove secondary loads
11.01.04	ability to lock out and tag equipment
11.01.05	ability to isolate equipment from energy source

Sub-task

11.02 Conducts oil tests.

Supporting Knowledge & Abilities

(NOT COMMON CORE)

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	no	no	yes	no	yes	yes	yes	yes	yes	no	NV

Supporting Knowledge & Abilities

11.02.01	knowledge of oil theory and handling methods
11.02.02	knowledge of oil-sampling collection procedure

11.02.03	knowledge of oil-handling equipment and procedures
11.02.04	ability to collect oil samples

Sub-task

11.03 Drains/fills/filters oil. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

11.03.01	ability to maintain oil integrity and levels

Sub-task

11.04 Repairs stationary equipment. **Supporting Knowledge & Abilities**

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

11.04.01	knowledge of stationary equipment construction and operating characteristics
11.04.02	knowledge of core material, core types and stacking procedures
11.04.03	ability to unstack and dismantle cores and coils
11.04.04	knowledge of winding methods and materials
11.04.05	knowledge of equipment connections
11.04.06	ability to wind and connect coils

Supporting Knowledge & Abilities

11.04.07	ability to identify damaged cores
11.04.08	ability to assemble and stack cores and coils

11.04.09	knowledge of assembly procedures for equipment
11.04.10	ability to perform required tests on repaired equipment

Task 12 Assembles electrical/electronic control panel.

Related Components: Refer to Scope of Analysis.

Tools and Equipment: Refer to Appendix A.

Sub-task

12.01 Determines location of components, installs and wires the same.

Supporting Knowledge & Abilities

NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK
ND	yes	yes	yes	no	yes	no	yes	yes	yes	yes	NV

12.01.01	knowledge of characteristics and function of electrical components, layout procedures and use of measuring tools
12.01.02	knowledge of layout and marking procedures and use of drilling and tapping equipment
12.01.03	knowledge of circuitry and joining electrical wiring and components
12.01.04	ability to lay out and install components for control panels
12.01.05	ability to test assembled control panels

APPENDICES

TOOLS AND EQUIPMENT

Manuals and Texts

blueprints
booklet on hand signals
Canadian Electrical Code Book Part 1
Canadian Standards Association
company policy, forms & charts
data cards for machines
Electrical Apparatus Service Association manual
frame dimension charts
Institute of Electrical Electronic
National Electrical Manufacturers
power tool operation and training
Quality Assurance manuals
safety films
specification sheets
System International conversion tables
textbooks and training manuals on
Workers' Compensation Act
Workplace Hazardous Materials Information System book

Electrical Tools

ammeters
bridge and milliohmeter
capacitor testers
continuity testers
core loss testers
current transformers
growler
hi-pot tester
internal growlers
load banks
meggers
multimeters
ohmmeters
potential transformers
power factor meters
power supply
shunts and multipliers
single-phase variable power supply c/w
surge comparison testers
test lights
test panel
variable voltage supply
voltmeters
wattmeters

Mechanical Tools and Accessories

air tools
barricades
bearing pullers
chisels
cleaning agents
dial gauge
dollies
fire extinguisher
grease guns
grinders
hand tools
hoisting & rigging equipment
lathes
machine safety guards
micrometer
milling machine
oxygen/acetylene gas
portable fencing
punches
safety glasses and shields

screwdrivers
side cutters
sockets
soft faced hammers
stethoscope
temperature probe
vernier
vibration analyzer
welder
welding machine
welding protective clothing
welding rods
wrenches

GLOSSARY

boolean algebra	a simple mathematical system based on binary arithmetic and the basis for digital logic operations.
hi-pot	a high potential test where a high voltage is applied between the windings and the metal enclosure, core, or other windings.
megger	also known as a megohmmeter. This is an instrument designed for measuring insulation resistance.
milliohmmeter	an instrument that measures very small values of resistance.
multimeter	an instrument that functions as a voltmeter, ohmmeter or ammeter.
phasor	rotating vector.
prony brake	a braking method where a pulley is applied to a motor and a lever arm of known length is clamped around the pulley. A spring scale can be used to determine the torque of the motor by applying T = length X force.
undercutter	machine designed to cut the mica between commutator bars lower than the surface of the commutator bars.

LIST OF ACRONYMS

ac	alternating current
AWG	American Wire Guage
CFM	cubic feet per minute
dc	direct current
MIG	metal inert gas welding
PLC=s	programmable logic controller
QA	quality assurance
rms	root, mean, square or effective value of ac
TIG	Tungsten-inert gas welding
VPI	vacuum pressure impregnated
WHMIS	Workplace Hazardous Materials Information System

BLOCKS AND TASKS WEIGHTING

BLOCK A TECHNICAL OCCUPATIONAL SKILLS AND PROCEDURES

	NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK	National Average
%	ND	30	50	60	50	32	70	50	50	20	20	NV	43%

Task 1 Uses tools safely and skilfully.

	NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK	
%	ND	10	5	8	5	7	10	15	5	10	20	NV	10%

Task 2 Performs welding, brazing and soldering operations.

	NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK	
%	ND	10	15	8	10	8	10	5	5	5	5	NV	8%

Task 3 Performs occupational related functions.

	NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK	
%	ND	5	15	7	5	7	8	20	5	10	10	NV	9%

Task 4 Assesses systems and equipment.

	NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK	
%	ND	20	15	15	5	9	8	10	5	15	10	NV	11%

Task 5 Checks mechanical, electrical and electronic components and systems.

	NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK	
%	ND	20	15	17	25	16	15	10	20	25	20	NV	18%

Task 6 Repairs/replaces defective mechanical, electrical and electronic part(s)/components.

	NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK	
%	ND	10	15	17	25	25	15	15	20	15	10	NV	17%

Task 7 Checks for correct system operation.

	NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK	
%	ND	10	15	10	10	10	8	10	20	5	10	NV	11%

Task 8 Tests systems and equipment.

	NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK	
%	ND	10	0	10	10	13	15	10	15	10	10	NV	10%

Task 9 Documents work in progress.

	NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK	
%	ND	5	5	8	5	5	11	5	5	5	5	NV	6%

BLOCK B ROTATING EQUIPMENT

	NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK	National Average
%	ND	60	25	25	25	45	25	30	25	50	65	NV	38%

Task 10 Reconditions and repairs rotating equipment.

	NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK	
%	ND	100	100	100	100	100	100	100	100	100	100	NV	100%

BLOCK C STATIONARY EQUIPMENT

	NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK	National Average
%	ND	10	25	15	25	23	5	20	25	30	15	NV	19%

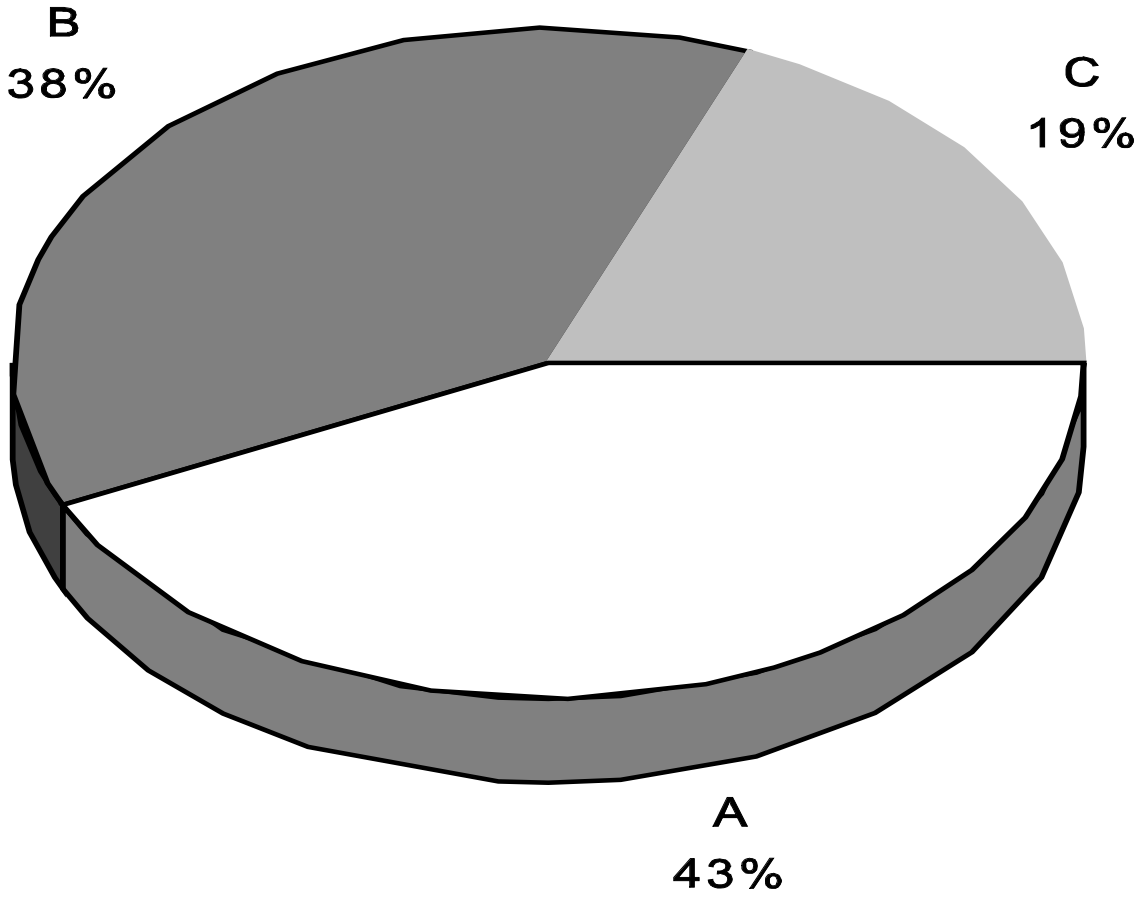
Task 11 Checks and repairs stationary equipment.

	NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK	
%	ND	100	90	70	100	68	100	50	80	50	75	NV	78%

Task 12 Assembles electrical/electronic control panel.

	NF	NS	PE	NB	PQ	ON	MA	SK	AB	BC	NT	YK	
%	ND	0	10	30	0	32	0	50	20	50	25	NV	22%

PIE CHART*
Electrical Rewind Mechanic



TITLES OF BLOCKS

Block A	Technical Occupational Skills and Procedures	Block C	Stationary Equipment
Block B	Rotating Equipment		

* The average number of questions, derived from the collective decision made by workers within the occupation from all areas of Canada, which will be placed on a one-hundred question interprovincial examination to assess each block of the analysis.

ELECTRICAL REWING MECHANIC (1999)

BLOCKS	TASKS	SUB-TASKS
A **Technical Occupational Skills and Procedures**	**1.** Uses tools safely and skilfully.	1.01 Uses hand and power tools, compressed air and pneumatic tools safely and skilfully.
		1.02 Uses shop tools safely and skilfully.
	2. Performs welding, brazing and soldering operations.	2.01 Performs welding operations.
		2.02 Performs brazing and soldering operations.
	3. Performs occupational related functions.	3.01 Moves/lifts equipment.
		3.02 Performs finishing.
		3.03 Commissions equipment.
	4. Assesses systems and equipment.	4.01 Performs visual inspection of system.
		4.02 Assesses condition of equipment.
		4.03 Selects system measuring/testing equipment.
		4.04 Conducts system measurements/tests and documents.
		4.05 Analyzes results of system check.
	5. Checks mechanical, electrical and electronic components and systems.	5.01 Performs visual inspection of components.
		5.02 Disassembles defective components.
		5.03 Selects appropriate measuring/testing equipment.
		5.04 Conducts measurements/ tests and documents.
		5.05 Evaluates results.
		5.06 Removes defective part(s).
	6. Repairs/replaces defective mechanical, electrical and electronic part(s)/components.	6.01 Disassembles defective part(s) if required.
		6.02 Assesses work to be performed.
		6.03 Replaces part(s)/ components.
		6.04 Repairs and assembles part(s)/components.
		6.05 Tests part(s)/components for correct operation.
		6.06 Installs part(s)/component(s) into system.
	7. Checks for correct system operation.	7.01 Performs final system inspection.
		7.02 Operates systems.
		7.03 Conducts measurements/ test(s) on system and documents.
		7.04 Evaluates system results.
	8. Tests systems and equipment.	8.01 Selects appropriate measuring/testing system procedures.
		8.02 Performs tests on systems.
		8.03 Evaluates results on newly-installed equipment.

	BLOCKS	TASKS	SUB-TASKS			
		9. Documents work in progress.	9.01 Uses correct forms and/or charts.	9.02 Records all visually defective components or missing components.	9.03 Records all nameplate data.	9.04 Records all replacement components/parts.
B	**Rotating Equipment**	**10.** Reconditions and repairs rotating equipment.	10.01 Rewinds equipment.	10.02 Bands armature.	10.03 Machines or replaces rings and/or commutators.	10.04 Balances rotating parts.
C	**Stationary Equipment**	**11.** Checks and repairs stationary equipment.	11.01 De-energizes stationary equipment.	11.02 Conducts oil tests.	11.03 Drains/fills/filters oil.	11.04 Repairs stationary equipment.
		12. Assembles electrical/electronic control panel.	12.01 Determines location of components, installs and wires the same.			