



ONTARIO COLLEGE OF TRADES
ORDRE DES MÉTIERS DE L'ONTARIO

Apprenticeship
Training Standard

Schedule of Training

Relay and
Instrumentation
Technician

Trade Code: 288R

Development Date: 2008

Please Note: Apprenticeship Training and Curriculum Standards were developed by the Ministry of Training, Colleges and Universities (MTCU). As of April 8th, 2013, the Ontario College of Trades (College) has become responsible for the development and maintenance of these standards. The College is carrying over existing standards without any changes.

However, because the Apprenticeship Training and Curriculum Standards documents were developed under either the *Trades Qualification and Apprenticeship Act* (TQAA) or the *Apprenticeship and Certification Act, 1998* (ACA), the definitions contained in these documents may no longer be accurate and may not be reflective of the *Ontario College of Trades and Apprenticeship Act, 2009* (OCTAA) as the new trades legislation in the province. The College will update these definitions in the future.

Meanwhile, please refer to the College's website (<http://www.collegeoftrades.ca>) for the most accurate and up-to-date information about the College. For information on OCTAA and its regulations, please visit: <http://www.collegeoftrades.ca/about/legislation-and-regulations>

RELAY AND INSTRUMENTATION TECHNICIAN

<u>CONTENTS</u>	<u>PAGE</u>
Preface	1
Definitions	2
Important Directions to the Apprentice.....	4
Important Directions for the Sponsor/Employer & Supervisor/Trainer.....	4
Notice/Declaration for Collection of Personal Information	5
Roles and Responsibilities of Apprentice, Sponsor/Employer and Supervisor/Trainer	6
Skill Set Completion Form.....	8
Learning Outcome Completion Form	8
Apprentice Completion Form.....	9
 <u>TRAINING CONTENT</u>	
A. Description/Duties	10
B. On-the-Job Training Performance Objectives	
6201.0 Protect Self and Others.....	11
6202.0 Communicate.....	13
6203.0 Select, Maintain and Use Tools and Equipment	15
6204.0 Perform Common Trade Practices	17
6205.0 Diagnose and Repair Data Acquisition and Code Systems.....	18
6206.0 Diagnose and Repair Devices and Computers	19
6207.0 Test Vital Signal Control Relays.....	20
6208.0 Diagnose and Repair Power Systems	21
C. Learning Outcomes	23
Apprentice Record.....	25

RELAY AND INSTRUMENTATION TECHNICIAN

PREFACE

This Schedule of Training was developed by the Ministry of Training, Colleges, and Universities (MTCU), in partnership with the Industry Advisory Committee and in consultation with representatives from the industry. This document is intended to be used by apprentice, supervisor/trainer and sponsor/employer as a "blueprint" for training and as a prerequisite for completion and certification.

This training document becomes the apprentice's only record of workplace training performance.

Supervisor/trainer and apprentice are required to sign off and date the skills following each successful acquisition unless a skill is marked shaded (optional).

The care and maintenance of this training document are the joint responsibility of the apprentice and the sponsor/employer. By signing off the skill, the supervisor/trainer and the apprentice are indicating that the apprentice has demonstrated competence of the skill. This training standard has been developed specifically for documenting the apprentices' acquisition of skills of the trade.

DEFINITIONS

ACA

Apprenticeship and Certification Act, 1998

Certificate of Apprenticeship (CofA)

Certification issued to individuals who have demonstrated that they have completed an apprenticeship in Ontario.

Certificate of Qualification (CofQ)

Certification issued to C of Q applicants who have achieved a passing grade on the certification exam for their trade.

Competence

The ability of an individual to perform a skill repeatedly and without assistance in the workplace to the standard set out in the Training Standard or Schedule of Training.

Competency Analysis Profile

A document that identifies the training needs of an individual trade and details the skills/skill sets that must be demonstrated.

Industry Committee (IC) - under the ACA and Provincial Advisory Committee (PAC) under the TQAA

Under the ACA and TQAA, the Minister may appoint a provincial committee in any trade or group of trades to advise the Minister in matters relating to the establishment and operation of apprenticeship training programs and trades qualifications.

Journey person or Equivalent

A person who has acquired the knowledge and skills in a trade, occupation or craft as attested to by a provincial or territorial authority.

Mandatory

Status assigned to unshaded individual skills, skill sets or general performance objective which must be signed off for the apprentice to complete their program.

Optional

Status assigned to shaded individual skills, skills sets or general performance objective for which sign-off is not required for the apprentice to complete the program.

Schedule of Training

An apprenticeship training standard which includes the on-the-job performance objectives and off-the-job learning outcomes

RELAY AND INSTRUMENTATION TECHNICIAN

Sign-off

Signature of the sponsor/employer of record or an individual, to whom that sponsor or employer has delegated signing authority, indicating an apprentice's achievement of competence.

Skill

Individual skill described in the Training Standard (note: does not mean the larger skill groups referred to in the Training Standard as Skill Sets, Training Units, or General Performance Objective, but the individual skills that make up those groups).

Skill Sets

Group of individual skills found in the Training Standard (may also be called Training Unit or General Performance Objective)

Skill Set Completion Form (and Learning Outcome Completion Form)

Lists all skill sets and includes space for sign-off by sponsor/employer of record.

Sponsor/Employer

Means a person that has entered into a registered training agreement under which the person is required to ensure that an individual is provided with workplace-based training in a trade, other occupation or skill set as part of an apprenticeship program approved by the Director.

Sponsor/Employer of Record

Refers to the sponsor or employer documented as the signatory to the current training agreement or contract. In order for a sponsor/employer to be considered for the training of apprentices, they must identify that the workplace has qualified journeypersons or equivalent on site and can identify that the workplace has the tools, equipment, materials, and processes which have been identified by Provincial Advisory Committees (PACs) or Industry Committees (ICs) to be required for the trade.

Supervisor

An individual, who oversees the execution of a task, oversees the actions or work of others.

Trainer

A qualified trainer in a compulsory trade is a journeyperson with a Certificate of Qualification or in a voluntary trade is an individual who is considered equivalent to a journeyperson with a Certificate of Qualification.

TQAA

Trades Qualification and Apprenticeship Act.

Training Standard

A document that has been written in concise statements, which describe how well an apprentice must perform each skill in order to become competent. In using the document, trainers will be able to ensure that the apprentice is developing skills detailed for the occupation.

IMPORTANT DIRECTIONS

Apprentice

1. All complete skills or skill sets must be signed and dated by both the apprentice and sponsor/employer when either all terms of the contract have been completed or the apprentice leaves the employ of the employer.
2. It is the responsibility of the apprentice to inform the local apprenticeship Employment Office regarding the following changes:
 - change of sponsor/employer address;
 - change of apprentice name or address;
 - transfer to a new sponsor/employer.
3. The Skill Set Completion Form and Learning Outcome Completion Form must be completed and signed by the current sponsor/employer and presented to the local apprenticeship Employment Office at the fulfillment of all terms of a Training Agreement.
4. The apprentice completion form with the Completed and Authorized Schedule of Training must be presented to the local apprenticeship Employment Office.

Sponsors/Employers and Supervisors/Trainers

The Schedule of Training identifies skills and supporting learning outcomes required for this trade/occupation and its related training program.

This Schedule of Training has been written in concise statements which describe how an apprentice must perform each skill/outcome in order to become competent. Competence means being able to perform the task to the required standard.

In using this training standard, supervisors/trainers will be able to ensure that the apprentice is developing the skills detailed for the trade/occupation.

Supervisors/Trainers and apprentices are required to sign off and date the skills following each successful acquisition.

Sponsors/Employers participating in this training program will be designated as the Signing Authority and are required to attest to successful achievement by signing the appropriate box included at the end of each skill set.

RELAY AND INSTRUMENTATION TECHNICIAN

NOTICE/DECLARATION FOR COLLECTION OF PERSONAL INFORMATION

1. At any time during your apprenticeship training, you may be required to show this training standard to the Ministry of Training, Colleges and Universities (the Ministry). You will be required to disclose the signed Apprenticeship Completion form to the Ministry in order to complete your program. The Ministry will use your personal information to administer and finance Ontario's apprenticeship training system, including confirming your completion and issuing your certificate of apprenticeship.
2. The Ministry will disclose information about your program completion and your certificate of apprenticeship to the Ontario College of Trades, as it is necessary for the College to carry out its responsibilities.
3. Your personal information is collected, used and disclosed by the Ministry under the authority of the Ontario College of Trades and Apprenticeship Act, 2009.
4. Questions about the collection, use and disclosure of your personal information by the Ministry may be addressed to the:

Manager, Employment Ontario Contact Centre
Ministry of Training, Colleges and Universities
33 Bloor St. E, 2nd floor, Toronto, Ontario M7A 2S3
Toll-free: 1-800-387-5656; Toronto: 416-326-5656
TTY: 1-866-533-6339 or 416-325-4084.

ROLES & RESPONSIBILITIES OF APPRENTICE, SPONSOR/EMPLOYER AND SUPERVISOR/TRAINER

Apprentice “Apprenticeship is Learning On-the-job”

- Practice safe work habits.
- Use your apprenticeship training standard as a journal to keep track of which skills you have achieved.
- Talk over your training plan with your Training Consultant, Employer, Union, or Sponsor.
- Know what tools are required for your trade and how to use them.
- Ask questions and keep asking.
- Talk to your employer about your training needs.
- Demonstrate enthusiasm and good work habits.
- Ensure that you and your supervisor/trainer sign off skill/skill sets upon demonstration of competency.

Sponsor/Employer “Training is an Investment”

- Demonstrate safe work habits.
- Attest to successful achievement by signing the skill/skills sets.
- Provide opportunities and time for the apprentice to learn the trade.
- Offer practical trade training experiences that cover all of the skill sets.
- Foster work ethics that support training while minimizing productivity losses.
- Set out clear expectations, then recognize or reward performance excellence.
- Involve both the apprentice and supervisor/trainer in developing the training plan.
- Use the Training Standard as a monitoring tool and part of regular performance evaluations.
- Select supervisors/trainers with good communication skills and who work well with others.
- Encourage supervisors/trainers to take upgrading courses - (e.g. Train the Trainer, Mentor Coach, etc).
- Complete the Skill Set Completion Form once the apprentice has demonstrated competency in the training.
- Ensure that the apprentice always works under the direction of or has access to a qualified supervisor/trainer.
- Vary the apprentice’s exposure to all the skills set out in the training standard.

RELAY AND INSTRUMENTATION TECHNICIAN

Supervisor/Trainer

- Demonstrate safe work habits.
- Treat apprentices fairly and with respect.
- Use the Training Standard as a guide to evaluating competence in each skill area. In using the Training Standard, supervisors/trainers will be able to ensure that the apprentice is developing skills detailed for the trade/occupation.
- Review the Training Standard with the apprentice and develop a training plan.
- Respond fully to all questions.
- Be patient. Explain what is to be done then, show how it is done, and then let the apprentice demonstrate the task.
- Provide continuous feedback.
- Sign off individual skills/skill sets once the apprentice demonstrates competence in the skill.

Suggestions for Assessing the Progress of the Apprentice in the Workplace

- Use informal daily observation.
- Provide constructive feedback to build confidence.
- Allow the supervisor/trainer time to teach and demonstrate the skills.
- Take prompt action wherever problems occur.
- Conduct regular performance reviews involving the apprentice, supervisor/trainer and sponsor/employer.
- Use the Training Standard as the reference for establishing the competency of the apprentice.

RELAY AND INSTRUMENTATION TECHNICIAN

SKILL SET COMPLETION FORM

SKILLS SETS	TITLE	SIGNING AUTHORITY
6201.0	PROTECT SELF AND OTHERS	
6202.0	COMMUNICATE	
6203.0	SELECT, MAINTAIN AND USE TOOLS AND EQUIPMENT	
6204.0	PERFORM COMMON TRADE PRACTICES	
6205.0	DIAGNOSE AND REPAIR DATA ACQUISITION AND CODE SYSTEMS	
6206.0	DIAGNOSE AND REPAIR DEVICES AND COMPUTERS	
6207.0	TEST VITAL SIGNAL CONTROL RELAYS	
6208.0	DIAGNOSE AND REPAIR POWER SYSTEMS	

NOTE ON SHADED PERFORMANCE OBJECTIVES AND SKILLS:

- Shaded performance objectives and skill sets are optional. The shaded skills do not have to be demonstrated or signed-off for completion of the on-the-job component of the apprenticeship
- The learning outcomes will cover all of the skill sets, both shaded and unshaded.

LEARNING OUTCOMES COMPLETION FORM

Date of Completion	Organization Name(s)	SIGNING AUTHORITY

RELAY AND INSTRUMENTATION TECHNICIAN

APPRENTICE COMPLETION FORM

APPRENTICE NAME	
Print	
Signature	
Social Insurance Number	

Skill Sets and Learning Outcomes when completed should be signed by the Supervisor/Trainer and presented with this completion form to your local apprenticeship Employment Office. Any supporting documentation should also be attached.

In-school Completed Yes () No () Not applicable ()
(Proof to be provided)

Hours completed as
Per Contract: Yes () No () Not applicable ()

SPONSOR/EMPLOYER INFORMATION	
Name	
Address	
Telephone	
E-mail Address	
Signature of Signing Authority	

RELAY AND INSTRUMENTATION TECHNICIAN

A. DESCRIPTION/DUTIES

A **RELAY AND INSTRUMENTATION TECHNICIAN** performs some or all of the following:

- Protect Self and Others
- Communicate
- Select, Maintain and Use Tools and Equipment
- Perform Common Trade Practices
- Diagnose and Repair Data Acquisition and Code Systems
- Diagnose and Repair Devices and Computers
- Test Vital Signal Control Relays
- Diagnose and Repair Power Systems

A **RELAY AND INSTRUMENTATION TECHNICIAN** demonstrates knowledge of:

- Different styles and types of CNC programming
- Types of numerically controlled machines including horizontal, vertical, turning, and machining centres, wire EDM, solid EDM, plasma cutters, laser cutters, computer communicators
- CNC machining capabilities
- Characteristics and features of Numerical Control Technology and capabilities including conversational, G-Code programming, adaptive controllers, PLCs, manual programming, interfacing, CAD capabilities, CAM capabilities, 2D programming, and 3D programming

BENCHMARK/GUIDELINE TOTAL TRAINING TIMEFRAMES: (ON-THE-JOB AND OFF-THE-JOB):

8,000 hours

Includes 320 hours of in-school training.

RELAY AND INSTRUMENTATION TECHNICIAN

B. ON-THE-JOB PERFORMANCE OBJECTIVES

6201.0 PROTECT SELF AND OTHERS

6201.01 **Work in a safe manner** by adhering to all relevant legislation and all company rules and policies and procedures including: WHMIS, Subway/SRT Rulebook, Corporate Policy, Signals Procedural Manual.

Date Completed

Apprentice

Supervisor/Trainer

6201.02 **Select, wear, use and maintain all appropriate personal protective devices** including protective vest, hard hat, safety boots and safety eye wear according to OHSA and company policy.

Date Completed

Apprentice

Supervisor/Trainer

6201.03 **Identify hazards** including train movement, tripping hazards, high voltage equipment and mechanical device movement.

Date Completed

Apprentice

Supervisor/Trainer

6201.04 **Perform housekeeping duties to ensure a safe working environment** by: removing and disposing excess or unwanted materials; positioning equipment; identifying the location of First Aid supplies and equipment; maintaining adequate heat, light and ventilation; and, erecting protective barriers and signs in accordance with OHSA, site procedures and company policy.

Date Completed

Apprentice

Supervisor/Trainer

RELAY AND INSTRUMENTATION TECHNICIAN

6201.05 **Practice first aid in emergency situations to treat conditions** including burns, abrasions, bleeding, cuts and wounds so that the condition of the victim is stabilized and prepared for further treatment, according to employer standards and first aid procedures.

Date Completed

Apprentice

Supervisor/Trainer

6201.06 **Identify and use fire extinguishers and fire fighting equipment** including portable Class A, B and C extinguishers to suppress fires in accordance with OHSA, site procedures and company policy.

Date Completed

Apprentice

Supervisor/Trainer

6201.07 **Identify, interpret and apply all applicable safety Acts, regulations, codes and directives** including OHSA, WHMIS and manufacturer specifications to ensure all work is performed safely with no damage to equipment or injury to persons in accordance with company policy and standards.

Date Completed

Apprentice

Supervisor/Trainer

6201.08 **Follow emergency procedures** as directed by supervisory personnel and Emergency Medical Services (EMS).

Date Completed

Apprentice

Supervisor/Trainer

RELAY AND INSTRUMENTATION TECHNICIAN

6202.0 COMMUNICATE

6202.01 Read and interpret drawings including engineering drawings and schematics.

Date Completed

Apprentice

Supervisor/Trainer

6202.02 Read and interpret technical documentation including manuals, regulations and written instructions.

Date Completed

Apprentice

Supervisor/Trainer

6202.03 Communicate effectively with supervisor and co-workers verbally by listening attentively and giving and receiving instructions and feedback to ensure communication is comprehensible, concise, accurate and timely in accordance with company standards and procedures.

Date Completed

Apprentice

Supervisor/Trainer

6202.04 Communicate electronically by using email, paging and radio systems to ensure communication is comprehensible, accurate and timely in accordance with company standards and procedures.

Date Completed

Apprentice

Supervisor/Trainer

6202.05 Write job related reports and documentation including occurrence and fault reports and work orders by using computers or appropriate forms as required by company policy.

Date Completed

Apprentice

Supervisor/Trainer

RELAY AND INSTRUMENTATION TECHNICIAN

6202.06 **Build effective working relationships in a team environment** by collaborating, consulting and interacting with co-workers, other trades and suppliers to achieve effective results.

Date Completed

Apprentice

Supervisor/Trainer

6202.07 **Recognize roles and responsibilities of supervisory personnel** and take action as directed in emergency situations in accordance with company policy and procedures.

Date Completed

Apprentice

Supervisor/Trainer

6202.08 **Demonstrate leadership within a team environment** by ensuring the safety, effectiveness and proper training of assistants and providing support to co-workers.

Date Completed

Apprentice

Supervisor/Trainer

RELAY AND INSTRUMENTATION TECHNICIAN

6203.0 SELECT, MAINTAIN AND USE TOOLS AND EQUIPMENT

6203.01 **Select and use tools and equipment** ensuring that tools and equipment are the correct ones for the job, in good condition and no damage is caused to the equipment or injury to persons in accordance with manufacturer's specifications, government regulations and company standards.

Date Completed

Apprentice

Supervisor/Trainer

6203.02 **Select, maintain and use hand tools** including wrenches, fastening tools, measuring tools, cutting tools, grinding tools, contact pressure gauges and torque screwdrivers and wrenches in accordance with manufacturer's recommendations, OHSA, WHMIS and company policy.

Date Completed

Apprentice

Supervisor/Trainer

6203.03 **Select, maintain and use power tools and accessories** including drills, grinders, circular saws, drill press, pedestal grinder, soldering equipment, drill bits, saw blades, grinding wheels, cords, connecting devices, housings and control devices, by inspecting, lubricating, and preventing damage to the tool or operator in accordance with OHSA, manufacturer's specifications and company standards.

Date Completed

Apprentice

Supervisor/Trainer

6203.04 **Select, maintain, use and repair electrical and electronic tools and equipment** including multi-meters, meggers, frequency counters, decibel meter, track circuit tester, shunt boxes, audio and high frequency instruments, electronic impedance bridge, various oscilloscopes, component tester, calibration equipment, meter calibration standards, multi-amp high speed timer, multi-function generators, digital meters, logic analyzers, signal generators, transistor testers, circuit board tester, transistorized volt meters, amp-meters, ohm-meters, ground detection equipment, fault locators, phase test units, relay test units, desktop and laptop diagnostic software and protocol converter, in accordance with manufacturer's recommendations and company policy.

Date Completed

Apprentice

Supervisor/Trainer

6203.05 **Select, maintain and use pneumatic power tools and accessories** including

RELAY AND INSTRUMENTATION TECHNICIAN

anti-static devices, low torque impact wrenches, pneumatic grinders and air nozzle tool in accordance with OHSA, manufacturer's specifications and company standards.

Date Completed

Apprentice

Supervisor/Trainer

6203.06 **Clean, repair and calibrate portable and fixed meters and instruments** such as ammeters, volt meters, watt meters, watt-hour meters, recording meters, multi-scale meters, analyzers, ohm-meters, phase angle meters, meggers and oscilloscopes in accordance with manufacturer's recommendations and company policy.

Date Completed

Apprentice

Supervisor/Trainer

6203.07 **Clean, repair and calibrate specialized test equipment** such as high frequency circuit tester, ultra sonic rail flaw detector and signal system I.P.H.C. units in accordance with manufacturer's recommendations and company policy.

Date Completed

Apprentice

Supervisor/Trainer

RELAY AND INSTRUMENTATION TECHNICIAN

6204.0 **PERFORM COMMON TRADE PRACTICES**

6204.01 Ensure functionality and compatibility of divergent systems by modifying various components including power supplies and code systems as directed by engineering personnel.

Date Completed

Apprentice

Supervisor/Trainer

6204.02 Set-up microprocessor driven equipment by entering established protocols, network connections and configurations according to job specifications, manufacturer's specifications and company policies and procedures.

Date Completed

Apprentice

Supervisor/Trainer

6204.03 Repair and adjust rectifiers and battery chargers as required according to manufacturer's specifications.

Date Completed

Apprentice

Supervisor/Trainer

6204.04 Perform quality checks on newly purchased equipment such as power supplies and rectifiers to ensure accordance with manufacturer's specifications.

Date Completed

Apprentice

Supervisor/Trainer

6204.05 Perform mathematical calculations in order to set relays to manufacturer's specifications.

Date Completed

Apprentice

Supervisor/Trainer

RELAY AND INSTRUMENTATION TECHNICIAN

6205.0 **DIAGNOSE AND REPAIR DATA ACQUISITION AND CODE SYSTEMS**

6205.01 Determine nature of failure by troubleshooting and diagnosing data acquisition devices and code system components including event and pen recorders, voice frequency carrier systems and field code units by testing circuitry and referring to manufacturer's schematic drawings and engineering drawings.

Date Completed

Apprentice

Supervisor/Trainer

6205.02 Repair and/or replace circuit board and/or specific component as required with the use of digital multi-meters and soldering irons in accordance with manufacturer's specifications and engineering drawings.

Date Completed

Apprentice

Supervisor/Trainer

6205.03 Test data acquisition devices or code system components for proper operation by using oscilloscopes, digital multi-meters, laptops and calibration equipment in accordance with manufacturer's specifications and engineering drawings.

Date Completed

Apprentice

Supervisor/Trainer

6205.04 Record all required information using the approved computer-based work order system in accordance with company policies.

Date Completed

Apprentice

Supervisor/Trainer

RELAY AND INSTRUMENTATION TECHNICIAN

6206.0 **DIAGNOSE AND REPAIR DEVICES AND COMPUTERS**

6206.01 Determine nature of failure of control devices, computers and/or their components such as code computers for remote control of the subway system, microprocessor based interlocking control computers for the safe movement of trains, and programmable logic controllers (PLC's) for remote control and communication of interlocking plants, by troubleshooting and diagnosing power supplies, boards, modules and I/O devices with the use of oscilloscopes, digital multi-meters and referring to manufacturer's schematic drawings and engineering drawings.

Date Completed

Apprentice

Supervisor/Trainer

6206.02 Repair and/or replace control devices, computers and/or their components as required with the use of digital multi-meters and soldering irons in accordance with manufacturers specifications and engineering drawings.

Date Completed

Apprentice

Supervisor/Trainer

6206.03 Test control devices, computers and/or their components for proper operation by using oscilloscopes, digital multi-meters, test jigs, laptops and calibration equipment in accordance with manufacturer's specifications and engineering drawings.

Date Completed

Apprentice

Supervisor/Trainer

6206.04 Record all required information using the approved computer-based work order system in accordance with established company policies.

Date Completed

Apprentice

Supervisor/Trainer

RELAY AND INSTRUMENTATION TECHNICIAN

6207.0 TEST VITAL SIGNAL CONTROL RELAYS (VSCR)

6207.01 **Receive, test and record incoming specifications of vital signal control relays** used for the safe control and manipulation of trains on the subway and Scarborough Rapid Transit (SRT) system by using relay test stand and digital multi-meters according to approved work method and established practices of Signals Engineering and Maintenance.

Date Completed

Apprentice

Supervisor/Trainer

6207.02 **Overhaul VSCR** by removing the cover, cleaning the interior, burnishing the contacts, testing and adjusting the relay's components as per manufacturer's specifications, approved work method and established practices of Signals Engineering and Maintenance.

Date Completed

Apprentice

Supervisor/Trainer

6207.03 **Test and record specifications** of the overhauled vital signal control relay using relay test stand and digital multi-meters ensuring readings comply with manufacturer's specifications and in accordance with approved work method and established practices of Signals Engineering and Maintenance.

Date Completed

Apprentice

Supervisor/Trainer

6207.04 **Record all required information** using the approved computer-based work order system in accordance with set policies and approved work method.

Date Completed

Apprentice

Supervisor/Trainer

RELAY AND INSTRUMENTATION TECHNICIAN

6208.0 **DIAGNOSE AND REPAIR POWER SYSTEMS**

6208.01 **Receive and interpret verbal or written communication** of failure of back-up power systems, motor alternators, inverters or converters in accordance with company policy.

Date Completed

Apprentice

Supervisor/Trainer

6208.02 **Assess physical and electrical hazards** in work area and remove hazards in accordance with company policy.

Date Completed

Apprentice

Supervisor/Trainer

6208.03 **Troubleshoot and diagnose equipment** using digital multi-meter, frequency meter and oscilloscope as required by manufacturer's schematics and specifications and approved work method.

Date Completed

Apprentice

Supervisor/Trainer

6208.04 **Repair and replace faulty system components** as required by manufacturer's specifications and approved work method.

Date Completed

Apprentice

Supervisor/Trainer

6208.05 **Test functionality** of back-up power systems, motor alternators, inverters or converter system according to company policies and procedures and approved work method.

Date Completed

Apprentice

Supervisor/Trainer

RELAY AND INSTRUMENTATION TECHNICIAN

6208.06 **Maintain functionality** of power-backup systems, motor alternators, inverters, converters and sub-station over-current relays using digital multi-meter, frequency meter and oscilloscope and proprietary test apparatus as part of regular preventative and re-active maintenance cycle in accordance with manufacturer's specifications and approved work methods.

Date Completed

Apprentice

Supervisor/Trainer

6208.07 **Record all required information** using the approved computer-based work order system in accordance set policies and approved work method.

Date Completed

Apprentice

Supervisor/Trainer

C. LEARNING OUTCOMES - 320 hours

S0101 Signal System Relays Overview

The apprentice is able to identify and describe all features of Signal System Relays:

- Identify and describe an overview of Signals System
- Identify and describe theory and operation of a Relay
- Identify and describe operation of Line Relays
- Identify and describe operation of Timer Relays
- Identify and describe operation of Code Transmitter Relays
- Identify and describe operation of Track Relays
- Identify and describe operation of Signal Track Circuits
- Identify and describe operation of Specialized Relays (i.e. Locking, Pulse, non-vitals, Solid State)
- Identify and describe operation of Ground Detectors and Relays
- Display ability to specify, test and Overhaul Line, Timer, Code and Track Relays
- Overhaul Relays in the Signal System
- Identify and describe Relay Nomenclature and Terms as Used in the Signal System
- Operate Maximo and Relay Callout
- Demonstrate knowledge of Quality Management Systems

S0102 Signal Power Supply Systems

The apprentice is able to identify and describe all features of Signal Power Supply Systems

- Identify and describe an overview of the Signal Power Supply Systems
- Identify and describe and Operation of various Battery Chargers
- Identify and describe and Operation of Power Supplies
- Identify and describe and Operation of Inverters
- Identify and describe and Operation of Motor Alternator Sets and Control Circuits
- Identify and describe and Operation of A/C Transfer Switches
- Specify, Test and Overhaul Battery Chargers and Power Supplies
- Specify, Test and Overhaul Inverters
- Specify, Test and Overhaul Motor Alternator Sets
- Specify, Test and Overhaul Transfer Switches

S0103 Substations Overcurrent Protection Systems

The apprentice is able to identify and describe all features of Substations Overcurrent Protection Systems

- Identify and describe entrance procedure and cautionary measures while in the substation
- Demonstrate knowledge of Substation Operation and Electrical Layout
- Identify and describe Power Distribution and Circuit Protection
- Identify and describe the Operation of A/C Overcurrent Relays Disc Operated Type
- Identify and describe the Operation of A/C Overcurrent Relays Solid State Type
- Identify and describe Method and Procedure for Overcurrent Calculations
- Calculate values for Overcurrent Protection Relay Operation
- Check, Test, Adjust and Calibrate Disc Operated Type Relays
- Check, Test, Adjust and Calibrate of Solid State Type Relays
- Troubleshoot and Repair Procedures of Overcurrent Relays

S0104 Electronic Equipment and Systems

The apprentice is able to identify and describe all features of Electronic Equipment and Systems:

- Develop and Establish Proper Soldering Techniques on Multilayered Circuit Boards
- Identify and describe Proper Uses of Test and Measuring Equipment
- Identify and describe Principles and Application of Electronic Circuitry as Applied in Signal System
- Identify and describe Operation of Signal Code Systems GRS Type L
- Identify and describe Operation of Signal Code Systems WABCO Type 549
- Identify and describe Operation of Signal Code Systems_ Alstom Field Code Units_VPI
- Identify and describe Operation of Signal Code Systems_ GE Global Systems VHLC
- Identify and describe Operation of PLC as Applied to Signal System
- Identify and describe Board Level Troubleshooting and Repair Procedures
- Test and Calibrate Testing and Measurement Equipment

RELAY AND INSTRUMENTATION TECHNICIAN

APPRENTICE RECORD

APPRENTICE NAME (Print):

SPONSOR/EMPLOYER INFORMATION	
Training Agreement #	
Name	
Address	
Telephone	
E-mail Address	

SUMMARY OF TRAINING	
Employment Start Date	
Employment End Date	
Total hours of training & instruction between dates of employment.	

Date Completed

Apprentice

Supervisor/Trainer

RELAY AND INSTRUMENTATION TECHNICIAN

APPRENTICE RECORD

APPRENTICE NAME (Print):

SPONSOR/EMPLOYER INFORMATION	
Training Agreement #	
Name	
Address	
Telephone	
E-mail Address	

SUMMARY OF TRAINING	
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Apprentice

Supervisor/Trainer

You will be required to disclose this signed form to the Ministry of Training, Colleges and Universities in order to complete your program. The Ministry will use your personal information to administer and finance Ontario's apprenticeship training system. For further information please see the notice/declaration for collection of personal information that is referenced in the table of contents of this training standard.