

**ELECTRICIAN'S**  
**APPRENTICESHIP MANUAL**

March 6, 2001

**MEMORANDUM OF AGREEMENT**  
**APPRENTICESHIP TRAINING PROGRAM**  
**BETWEEN THE**  
**SOO LINE RAILROAD COMPANY**  
**AND**  
**INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS**

The Apprentice Training Program as set forth herein is designed as a cooperative effort on the part of railroad management and the International Brotherhood of Electrical Workers (IBEW) to provide the highest level of training so that the needs of the Soo Line Railroad Company (SOO) for skilled craftsmen can be met to meet the challenge of competition.

*NOTE: The use of gender specific words in this agreement are not intended to restrict the application of this agreement to a particular sex, but are used solely for the purpose of grammatical convenience and clarity.*

**A. TYPES AND TERMS OF APPRENTICESHIP**

1. Except as otherwise provided in this agreement, an apprentice will serve 976 work days during the period of apprenticeship and shall be eligible for advancement to the position of "promoted apprentice" after 732 days.

If needs of the service require, by mutual agreement of the parties, an apprentice may be advanced to promoted apprentice upon demonstration of abilities prior to the 732 days.

2. A "promoted apprentice" will receive the applicable journeyman rate of pay while performing service as "promoted apprentice", and continued apprenticeship training in the craft.

Rates of pay for apprentices under this program shall be as follows:

- 1st Period - 70% of Electrician's rate
- 2nd Period - 75% of Electrician's rate
- 3rd Period - 80% of Electrician's rate
- 4th Period - 85% of Electrician's rate
- 5th Period - 90% of Electrician's rate
- 6th Period - 95% of Electrician's rate

## **B. QUALIFICATIONS AND SELECTION FOR APPRENTICESHIP**

1. All apprentices must be able to speak, read and write the English language and understand at least the first four rules of Mathematics. All apprentices will, in addition, be high school graduates, or equivalency (GED).
2. Except as otherwise provided for herein, applicants for apprenticeship, if accepted, shall serve eight (8) periods of 122 work days each.

In selecting applicants for apprenticeship, the following procedures will be followed:

Information regarding apprenticeship opportunities shall be made available by the Company to all employees through the internal staffing processes (Job Postings):

Application forms, oral interviews, educational records and previous work records will all be applied in determining the qualifications of applicants for selection. Selection of apprentices under this program shall be made from qualified applicants on the basis of qualifications alone and without regard to race, creed, color, national origin, sex, disability or veteran status.

All applications received, will be recorded and will be reviewed by the Human Resources staff. Applicants who qualify as outlined below will be interviewed and the most qualified applicant(s) will be selected for the opening(s). Records of the selection process will be kept for two years, or as otherwise required by law, with copy to be furnished to the designated representative of the Union involved.

Applicants for electrician apprenticeships with pertinent electronics or electrical training will be given first consideration. An apprentice who resigns to accept other employment should not be re-employed as an apprentice in the same craft from which he resigns, except by mutual written agreement of the Parties.

If within the first 122 days, an apprentice does not show satisfactory progress or aptitude in learning the trade, he shall not be retained as an apprentice. There will be an examination for each training module, such examination to be restricted to material covered during that period. This examination, to be given under the direction of the Company, may be a combination of written and oral questioning as

well as questions on practical situations with an 80% grade being required to pass. A demonstration of ability to perform practical application of electrician's work will also be required of all trainees.

If an employee fails the first examination in any period, he/she will be given an opportunity within sixty (60) days to take the examination a second time. An employee who fails an examination a second time in the first half of the program shall not be retained as an apprentice. An employee that fails an examination a third time, in the second half of the program shall not be retained as an apprentice.

This provision supersedes the qualification and discipline rules contained in the Electrician's Agreement.

### **C. COMPLETION OF APPRENTICESHIP**

An apprentice indentured on or after the effective date of this agreement shall, upon completion of his apprenticeship, be given a seniority date as a journeyman mechanic on the roster at the point where he began his apprenticeship retroactive to the date the apprentice began his apprenticeship.

When an apprentice completes the Apprenticeship Program and has been assigned a seniority date at a location, that employee may exercise seniority and displace any junior journeyman at that location.

Seniority between two or more employees hired from outside the Company, employed at the same time on the same seniority roster, will be determined by the order in which the application forms are filed. If the employees are selected for the apprenticeship program from another craft within the company, the seniority between two or more employees will be determined by their seniority date from the roster from which they are selected. If the date of application, or the seniority dating on another Company roster, does not suffice to determine seniority, then seniority will be determined by date of birth, with the employee that is senior in age, being the senior employee on the roster.

An apprentice, who begins training at one point and is subsequently transferred to another point where the training is completed, shall be permitted to select the point at which to establish seniority providing this selection is made within 30 calendar days prior to the date the training is expected to be completed, otherwise the apprentice will be accorded a date at the point where the apprenticeship training first began in accordance with the provisions of paragraphs (a) and (b) of this agreement. Should the apprentice elect to establish seniority at the point where the training started, the seniority date will be the date training started at such point, except as otherwise provided in this agreement.

#### **D. PROBATIONARY PERIOD**

All apprentices shall be subject to a probationary period of 122 workdays, during which they may be dropped, when they have not demonstrated sufficient progress to continue the Apprenticeship Training Program, as determined by the Company. However, when an apprentice is dropped after the 61st day of the probationary period, 5 calendar days' notice will be given to the local chairman. Nothing in this paragraph shall be construed as prohibiting an apprentice from being dismissed or dropped from the apprenticeship program, for cause, through the procedures of Rule 32 of the March 1, 1985 Agreement with the former Soo Line Railroad Company, and Rule 34 of the September 1, 1949, Agreement with the former Milwaukee Road Railroad, as amended, subsequent to the probationary period.

Nothing herein shall be construed to guarantee to an apprentice a position as mechanic upon completion of his apprenticeship, unless his/her journeyman seniority is senior to the seniority of a journeyman hired subsequent to the apprentice starting date, and it does not preclude the hiring of mechanics.

#### **E. APPRENTICESHIP AGREEMENT**

All apprentices must be indentured and they and the IBEW shall be furnished with a copy of the indenture by the Company which will also furnish every opportunity possible for the apprentice to secure a complete knowledge of the trade, including classroom instructions. It is recognized that because the facilities and work vary from point to point and seniority district to seniority district, the training schedules will vary accordingly in order to properly train the apprentice for the work he is most likely to be required to perform as a mechanic. These training schedules are not intended to change classification of work rules or jurisdictional practices. (See Attachment Nos. 1 and 2)

#### **F. RATIO**

The ratio of apprentices to journeymen will be governed by provisions of Rule 41 of the Schedule Agreement. If conditions warrant, by mutual written agreement of the parties, it may be waived.

#### **G. HOURS OF WORK**

The work day and the work week for apprentices shall be Monday through Friday. An apprentice shall not work nights nor allowed to work overtime, unless conditions warrant and by mutual agreement of the local representatives.

Apprentices shall work with and be under the direction of a mechanic of the craft at all times. (This is not to be construed as meaning the apprentice is restricted from working by himself on tasks the apprentice is capable of handling) Two apprentices shall not be assigned to work together as partners.

## **H. RELATED INSTRUCTIONS**

Each apprentice will receive related instruction on the technical theory related to his trade. Related instruction may be given in classrooms or through correspondence lessons or a combination of both with a minimum of 432 hours of related instructions.

## **I. WORK PROCESSES**

It is important that each apprentice promoted as per Section A, 2, be exposed to every type of training available. In order to accomplish this, the work process schedules, in respect to the work days, will be in accordance with the provisions of this Agreement, at the point of training. It is understood that an apprentice not promoted shall return to his status as a helper providing he had helper seniority prior to his assignment as an apprentice.

If an electrician's position is not available at the time the apprentice completes the Apprenticeship Program, and the employee had helper seniority prior to assignment as an apprentice, the employee will return to his helper's position, without loss of helper seniority. When this occurs the employee will retain seniority as an electrician, and continue to accumulate seniority as such.

When an electrician's position does become available, the employee will be considered as exercising seniority to fill the vacancy. When the employee fills an electrician vacancy, the employee will be removed from the helper's roster at that time.

During the apprenticeship period, the apprentice shall receive such instruction and experience in all branches of the trade. The facilities designated for the training of apprentices shall be determined by the Company based on specific needs.

## **J. EXAMINATION OF APPRENTICES**

The Company and the IBEW shall examine the records of the apprentice from time to time to ascertain if satisfactory progress is being made during the term of apprenticeship.

**K. SUPERVISION OF APPRENTICES**

The Company shall designate some person as "Supervisor of Apprentices". He shall be responsible for carrying out the training program as outlined in this program. Adequate records of apprenticeship training shall be maintained for each individual and submitted upon request of the Company and/or IBEW.

**L. SPECIAL PROVISION**

This program, when adopted, will supersede and take the place of the apprentice rules in the Schedule Agreements (Soo and Milwaukee) as they relate to the IBEW, unless changed in accordance with the terms of the Railway Labor Act. However, all other rules applicable to the employees in the Schedule Agreements will govern in the event of any dispute.

**M. REVISION OF APPRENTICE PROGRAM**

The rules herein set forth in this Apprenticeship Program shall remain in effect until revised in accordance with the procedure required by the Railway Labor Act, as amended.

The parties agree to meet and conference with the General Chairperson periodically to discuss the implementation, progress and/or issues that may arise with the Apprenticeship Training Program.

Signed: /s/ Cathryn S. Frankenberg  
Cathryn S. Frankenberg  
AVP – Labor Relations and  
Human Resources – US

Signed: /s/ Dale E. Doyle  
Dale Doyle – IBEW

/s/ Daniel G. Vanneste  
Dan Vaneste – IBEW

Dated: March 6, 2001

ATTACHMENT 1

APPRENTICE INDENTURE

This will certify that \_\_\_\_\_ was employed as  
an apprentice by the \_\_\_\_\_ Railroad at  
\_\_\_\_\_  
\_\_\_\_\_ on \_\_\_\_\_, 20\_\_\_\_, to serve eight (8)  
periods of 122 days each.

\_\_\_\_\_  
Name and Title of Officer in Charge



**ATTACHMENT 2**

**COMPLETION OF APPRENTICESHIP**

This will certify that on \_\_\_\_\_, 20\_\_\_\_, \_\_\_\_\_  
\_\_\_\_\_ completed the course of apprenticeship and is entitled  
to the rates of pay and conditions of service of \_\_\_\_\_.

\_\_\_\_\_  
Name and Title of Officer in Charge



CANADIAN  
PACIFIC  
RAILWAY

Soo Line Railroad Company  
501 Marquette Avenue (55402)  
PO Box 530 (55440)  
Minneapolis Minnesota

Tel (612) 347-8356

In Response Please Refer to  
File:

0-0044-033

June 1, 2001

Mr. Dale Doyle, General Chairman  
Int'l., Brotherhood of Electrical Workers  
360 Robert Street, #315 Empire Building  
St. Paul, MN 55101

Dear Mr. Doyle:

This will confirm your conversation and understanding with Mr. Chuck Kujawa of my staff on March 30, 2001, regarding the intent of the Company's Apprenticeship Program and the intent of the March 6, 2001 Memorandum of Agreement relative to current employees working under the IBEW Agreement.

Pursuant to Section C of the March 6, 2001 Apprenticeship Training Program Agreement, it is the intent of the parties to recognize that when an Apprentice completes the requirements of the program, a Journeyman seniority date will be assigned as of the date he/she began the Apprenticeship. It is not our intent that current employees working in a "setup electrician" status become junior in seniority to Apprentices subsequently entering and completing the Apprentice Program.

Therefore it is understood that "set-up Electrician" Helpers currently in the Program as of March 6, 2001, upon completion of the requirements of the program, will be assigned a Journeyman seniority date, beginning with a date thirty (30) days after the date of the youngest assigned Journeyman presently on the Twin Cities Roster. As each upgraded Electrician Helper completes the terms of the Apprenticeship, he/she will be assigned a date in ascending thirty (30) day intervals.

It is also understood that no Electrician described in the aforementioned paragraph will receive a date earlier than his service date with the Carrier.

If there are no employees working in a "set-up electrician" helper status at the time an apprentice completes the Program, he/she will be allowed a dating retroactive to the date the apprenticeship began.

Sincerely,

Cathryn S. Frankenberg  
AVP - Labor Relations  
and Human Resources - US

I concur,

  
Dale Doyle, General Chairman - IBEW

## APPRENTICESHIP COMMITTEE

1. The Apprenticeship Committee shall consist of the following:

Op. Coordinator  
Frontline Manager  
General Chairman or Designated Representative  
Electricians Apprentice Coordinator -  
(Elected by IBEW Local)

2. The Apprenticeship Committee shall meet with the apprentice once per month for the first six months and then once every three months to evaluate the progress of the apprentice using the Apprentice Evaluation Record as a guide.
3. While the apprentice is attending classes, the Apprenticeship Committee will review with the training officer, who coordinates all training classes or course work, once every four (4) months.
4. The Weekly Labor Log will be used to keep an accurate record to ensure the adequacy of the apprentices work experience and training as outlined in the Apprenticeship - Provisions section of the Apprenticeship Training Manual.
5. The Apprenticeship Committee will determine credit for past service or schooling when applicable.
6. The Apprenticeship Committee will ensure all Evaluation Forms, Grades, and Certificate of Completion are provided to the Personnel Department for the individual's file.
7. The Electrician General Chairman shall be kept informed on the apprentice's progress in accordance with the Apprenticeship Training Program of the bargaining agreement.

## APPRENTICESHIP - PROVISIONS

**EXTENT OF PERIOD OF APPRENTICESHIP:** The term of apprenticeship shall be eight (8) periods of 122 work days each for a total of 976 work days or 7,808 hours. If, within the first half of service (366 work days or 2,928 hours) as an apprentice, such apprentice does not show satisfactory progress or aptitude in learning the trade, the employee will not be retained as an apprentice. This will not supersede the probationary period of 60 days provided in the IBEW collective bargaining agreement. The work day and the work week for apprentices shall be as set forth in the Schedule Agreement.

**SCHOOL ATTENDANCE:** The apprentice shall attend the appropriate technical college one day per week while school is in session and satisfactorily complete the course material for this trade for a minimum total of 512 hours (64 days), or the equivalent, as determined by the Bureau of Apprenticeship Standards. The employer must pay for related instruction hours at the same rate per hour as for service performed. Additional related instruction may be given in classrooms or through correspondence lessons or a combination of both as the employer deems necessary.

**SCHEDULE OF PROCESSES TO BE WORKED:** The apprentice shall be given such instruction and experience in the Electrician's trade to enable him/her to qualify as a competent Electrician at the completion of this contract. For the purpose of securing the best possible results in training of apprentices, it is deemed advisable to work up a schedule of work which is necessary in each area to produce an all around Journeyman Electrician. The number of days which each apprentice will serve on each separate area will be determined by the progress made by the individual apprentice so that he/she will have opportunity to serve a reasonable/necessary time on each area pertaining to this craft. This instruction and experience shall include the following, but not necessarily in this sequence nor all at one time:

	<u>Hours</u>	<u>Days</u>	<u>Tasks</u>
Work and Procedure	80	10	1 - 7
Electrical System	6,752	844	8-12
Courses (CPR)	224	28	
TOTALS	7,056	882	

The Company, with the consent of the Apprentice Training Committee, reserves the right to use approximately 122 work days (976 hours) of the above schedule for miscellaneous related work not mentioned above. If specific tasks required additional time, the employer may make necessary adjustments.

## APPRENTICESHIP – PROVISIONS (CONT'D)

**COMPENSATION TO BE PAID:** Rates of pay for apprentices under this program shall be as follows:

- 1<sup>st</sup> Period - 70% of Electrician's Rate
- 2<sup>nd</sup> Period - 75% of Electrician's Rate
- 3<sup>rd</sup> Period - 80% of Electrician's Rate
- 4<sup>th</sup> Period - 85% of Electrician's Rate
- 5<sup>th</sup> Period - 90% of Electrician's Rate
- 6<sup>th</sup> Period - 95% of Electrician's Rate

Basic skilled rate as of this date is \$17.38 per hour. The same basic skilled rate shall be used for apprentices in this trade in this shop and their wages shall be adjusted appropriately when the rate changes.

**CREDIT PROVISIONS:** Employees presently in service may be allowed to enroll in the apprentice program. Credit may be granted for time already spent in training and/or formal schooling at a college or technical school.

## APPRENTICESHIP ORIENTATION

- I. Orientation
  - A. Welcome
  - B. Explain the Apprenticeship Program
    - 1. History
    - 2. Present Program (976 work days)
    - 3. Classroom/ correspondence courses
- II. Tour Facilities
  - A. Back Shop
  - B. 8-Spot
  - C. Service Island
  - D. B&B
  - E. RIP Track (Meet the Welding Instructor)
- III. Overview of Apprenticeship Book
  - A. Time Required in Each Shop/Area
- IV. Overview of Locomotive Department Organization
  - A. Organization Chart
    - 1. Jim Johnson - Manager - St. Paul Service Area
    - 2. Steve Olson - Operations Coordinator - Back Shop
    - 3. Dave Johnson - Operations Coordinator - Service Island
    - 4. Joe Celtruda - Manager of General Electric Locomotives
    - 5.
- V. Apprenticeship Committee
  - A. Two From Management
    - 1. Operations Coordinator
    - 2. Foreman on Duty
  - B. Two From IBEW
    - 1. The Local Chairperson
    - 2. The Local President

## APPRENTICESHIP ORIENTATION (CONT'D)

### VI. Job Assignment

1. Objective for today
2. What gets in the way of this objective?
3. Special handling
4. Any known safety problems
5. Safety instructions pertaining to the job

### VII. Explain Training Courses

#### A. Complete Correspondence Course Every 2 Weeks

1. Very Critical
2. 85% to Pass \*
3. No. of Courses

#### B. Classroom Training

1. Technical School - Electrical Theory
2. On-site
3. Tests (Both) \*

#### C. On-The-Job Training With an Electrician

#### D. Air Brake Training

1. One Week - Sloan Place

#### E. Welding Class

1. Three Weeks (RIP Track)

### VIII. SAP Orientation

#### A. Computer Training

1. Time Entry
2. Material/Parts

**\* Must pass all tests. Will be dropped from the program after the third (3) failure.**

## APPRENTICESHIP COURSES

### BLOCK A - 4450

(40 Hours)

#### APPLIED ELECTRICITY (Canadian Pacific Railway)

Course on applied electricity. Course includes instructor's notes, student workbook, video on each lesson, script on each lesson.

Title of lessons are:

Lesson 1 - Introduction to Electricity (Video length 21 minutes)

Lesson 2 - AC Power Generation and Distribution (Video length 22 minutes)

Lesson 3 - Circuits, Coils, and Capacitors (Video length 21 minutes)

Lesson 4 - Three-Phase Power Circuits (Video length 23 minutes)

Lesson 5 - Reading Electrical Diagrams (Video length 23 minutes)

Lesson 6 - Electrical Troubleshooting Techniques (Video length 23 minutes)

### BLOCK A - 6003

(4 Hours)

#### OVERHEAD CRANE OPERATION (PENDULUM TYPE) (Canadian Pacific Railway)

Explains parts and operation of a crane and pre-shift safety inspection; looks at the parts and operation of three types of cranes: jib crane, gantry crane, overhead crane; explains common operating principals.

- Attach Sling
- Steady Sling
- Centre Hook
- Lift and Hold
- Hoist Clear



BLOCK A - 6100

(4 Hours)

LIFTING YOUR STANDARDS/DANGER ZONE (Canadian Pacific Railway)

Lifting Your Standards Modules:

Module 1 - Introduction

Module 2 - Basic Statistics

Module 3 - Principles of a Counterbalance Lift Truck

Module 4 - Circle Check

Module 5 - Safe Driving Principles

Module 6 - Propane Cylinder Changing

Module 7 - Battery Care

Module 8 - The Final Act

SHOP TRACK OPERATIONS CURRICULUM (STOC) - ENGINE  
ATTENDANT/TRACKMOBILE OPERATIONS PROGRAM (Canadian Pacific Railway)

The Stoc Engine Attendant/Trackmobile Operations Program covers:

Module 1 - General Railway Safety Practices

- General Railway Safety Do's
- General Railway Safety Don'ts
- Yard Specific Safety Policies
- Shop Track Speeds

Module 2 - Communications Procedures

- Hand/Lamp Signals
- Radio Communications

Module 3 - Servicing of Locomotives

- Taking an oil sample
- Fueling a locomotive
- Pre-fueling inspection form
- Sanding a locomotive

Module 4 - Safety Procedures Before Working with Locomotives

- Clothing/equipment
- Blue flag/light protection
- Derails
- Switches
- Locomotive lock-out device

Module 5 - Moving Locomotive and Building Consists

- Moving locomotives and cars safely
- Starting a locomotive
- Building a locomotive consist
- Consist separation
- Turning locomotives around
- Changing operating cab of a consist
- Conditions to leave locomotives unattended
- Emergency procedures when moving locomotives

## BLOCK A - 6212 (CONT'D)

### Module 6 - Trackmobile Operations

- Trackmobile description
- Securing a trackmobile
- Shift inspection checklist
- Before starting the engine
- After starting the engine
- Whistle, horn and bell signals
- Road operations
- Rail operations
- Coupling to cars
- Moving with loads
- Air brakes
- Testing air brakes
- Uncoupling
- Parking a trackmobile
- Practical exercises

### Module 7 - Safe Handling of Rail Cars

- Different type of rail cars
- Riding rail cars
- Securing the hand brake
- Coupling/uncoupling rail cars
- Moving rail cars

BLOCK A - 6400

(4 Hours)

**GATOR UTILITY VEHICLE TRAINING (JOHN DEERE GATOR) - (Canadian Pacific Railway)**

This course covers the safe operation of utility vehicles. Specific reference and/or concentration is on the John Deere Gator utility vehicle.

Course Content:

1. Introduction
2. Defensive Driving Module
3. Company Vehicle Policy
4. Utility Vehicle Condition Report
5. Pre-inspection Checks
6. Safety Operating Manual

BLOCK A - 6403

(4 Hours)

**BOBCAT (SKID STEER LOADER) OPERATOR (Canadian Pacific Railway)**

The intent of this training course is to impart rules and practices of safe operation to all who use bobcat skid steer loaders. This course is not designed to license or certify operators as skilled or factory authorized operators of skid steer loaders.

After participating in the course, students will be able to:

1. Discuss how weight distribution affects skid steer loader steering and stability.
2. Explain the difference between tipping load and rated operating capacity.
3. Have an understanding of the hydrostatic transmission, and that the loader will react the moment the steering levers are moved.
4. Explain why maintenance is an important factor for safe, efficient, and productive operation.
5. Identify the controls and their functions.
6. Identify the loader's safety features and explain their importance.
7. Explain the steps of safe entry and exit.
8. Explain the reason for changing attachments and the use of the bob-tach system.
9. Know the fundamentals of safe maneuvering, traveling and working with the attachment.
10. Know the fundamentals of efficient maneuvering, traveling and working with the attachment.

**BLOCK A - 9052**

**(16 Hours)**

**GENERAL ELECTRIC AC4400CW LOCOMOTIVE ORIENTATION (Canadian Pacific Railway)**

The General Electric Locomotive Orientation course is a basic orientation on the GE Model AC4400CW locomotive. The course includes both classroom and practical training.

The orientation covers the following:

1. AC4400CW locomotive overview
2. Identification and location of components
3. Shutdown and starting procedures
4. Multiple Unit (MU) set-up procedures
5. Isolating the locomotive
6. Locomotive systems: lube oil/fuel/cooling/central air
7. Victaulic coupling replacement
8. Air compressor operating and controls
9. Locomotive Hi-Ad truck/u-tube/gearcase
10. Operator cab controls, location of switches, functions
11. General overview of IFC, PSC, IFD and DID panel
12. EPIC 3102 airbrake/set-up for lead & trail
13. DID panel diagnostics (Level 1 and 2)
14. IFD displays (Levels 1, 2, 2S), locomotive monitor
15. Fault analysis software (DOS)

BLOCK A - 9055

(16 Hours)

**GENERAL MOTORS SD90MAC LOCOMOTIVE ORIENTATION/SERVICING  
(Canadian Pacific Railway)**

The GM SD90MAC locomotive orientation course is a basic orientation on the GM SD90MAC locomotive. The course includes classroom and, if a locomotive is available, practical training.

The orientation covers the following:

1. GM SD90MAC locomotive review
2. Identification and location of components
3. Shutdown and starting procedures
4. Multiple Unit (MU) set-up procedures
5. Isolating the locomotive
6. Servicing the locomotive
7. Operator cab controls, location of switches, functions
8. General overview of TSI, (Display screens)
9. EPIC 3102 airbrake/set-up for lead & trail

BLOCK A - 9056

(16 Hours)

**GENERAL MOTORS SD90MAC LOCOMOTIVE - ELECTRICAL (Canadian Pacific Railway)**

The GM SD90MAC Locomotive Electrical course is a basic familiarization of the major electrical components, support and control systems of the SD90MAC locomotive. The course includes both classroom and practical training.

The orientation covers the following:

1. SD90MAC locomotive overview
2. Identification and location of components
3. Component description and function
4. Safety precautions when working on HV circuits & components
5. High voltage electrical circuits
6. Electrical control systems such as cooling, air compressor, battery charge & starting
7. Shutdown and starting procedures
8. Multiple Union (MU) set-up procedures
9. Isolating the locomotive
10. Operator cab controls, location of switches, functions
11. General overview of EM2000, EMDEC, ICE
12. EPIC 3102 airbrake/set-up for lead & trail
13. TSI screen monitor and tests

BLOCK A - 9058

(4 Hours)

**LOCOMOTIVE LOC-IT DEVICE TRAINING (Canadian Pacific Railway)**

The locomotive loc-it device training explains the on track locomotive lock out procedures. It also reviews G-2-1 of the Blue Flag procedures. It includes a hands on demonstration.

BLOCK A - 9153

(8 Hours)

**RAILWAY LOCOMOTIVE INSPECTION AND SAFETY RULES (Canadian Pacific Railway)**

This course covers:

**Section 1 - Locomotive Inspection & Safety Rules**

**1.1.0 Locomotive Inspection and Safety Rules**

Part 1 - General

Part 2 - Locomotive Inspection Requirements

**Section 2 - Introduction**

**Section 3 - General Locomotive Orientation**

**Section 4 - Locomotive Inspection**

**4.1.0 Wheel Defects & Gauging**

- Gauges
- Slid flat
- Shelling
- High flange
- Thin flange
- Vertical flange
- Rim thickness

**4.2.0 Truck Components & Assemblies**

- Traction motor gearcase
- Traction motor
- Hyatt journal boxes
- Timken journal boxes

**4.3.0 Truck Assemblies**

- HTC truck assembly
- Flexicoil 3 axle trucks



## BLOCK A - 9153 (CONT'D)

### 4.4.0 Draft Systems

- Lock lever assembly
- Coupler & draft gear slack
- Coupler height
- Draft gear carrier plate
- Coupler retaining pin lock

### 4.5.0 Car Body and Engine room

- Underframe
- Air piping
- Air reservoirs
- Fuel tanks
- Pollution tanks
- Emergency cut-off valves
- Above frame inspection items
- Handbrake
- Engine & engine room
- Cab inspection

### 4.6.0 Electrical Inspection Items

- Traction motor
- Axle generators
- Axle generator cable
- Emergency fuel cut-off
- Receptacle (snowplow)
- Multiple Unit (MU) receptacle
- Lighting
- Control panel
- Control stand arrangement
- Main breaker panel
- Operating checks

### 4.7.0 Operation of Safety Control Vigilance Equipped Units

- General description
- Inspection check

## BLOCK A - 9153 (CONT'D)

### Section 5 - Air Brake System

- Main reservoir system
- Brake valve description & position
- Automatic brake valve
- Independent brake valve
- Air brake test
- Equipment set up and brake test
- Summary

## BLOCK A - 10105

(4 Hours)

OXY-FUEL TORCH SAFETY (FIRST SECTION OF: MULTILINK - WELDING - TRACTION MOTORS - OXY-FUEL TORCH SAFETY, SOLDERING, SILVER BRAZING) (Canadian Pacific Railway)

Course covers:

### 1. Introduction

### 2. Gases

- Oxygen
- Propane
- Acetylene

### 3. Cutting Torch Equipment

- Cylinders
- Regulators
- Hoses
- Torches
- Tips
- Flashback Arrestors
- Reverse Flow Check Valves
- Equipment Summary

### 4. Procedures

- How to set up the cutting equipment
- How to detect a leak
- How to light and turn off the torch
- How to use the cutting torch
- How to shut down the cutting torch

### 5. Torch Malfunctions

- What to do when torch won't stay lit
- How to correct an irregular flame
- Backfires
- Flashbacks

## BLOCK A - 10105 (CONT'D)

### 6. Maintenance and Inspection

- How to inspect the cylinders
- How to maintain the cutting tip
- How to inspect the cutting torch
- How to inspect the hoses
- How to inspect the flashback arrestors

### 7. Safety Summary

The 10 rules of oxy-fuel gas safety

## BLOCK A - 13100

(4 Hours)

### FRA/TC PRESENTATION (Canadian Pacific Railway)

This slide presentation focuses on the FRA requirements found in Part 229 of the Code of Federal Regulations 49 which relates to locomotive safety standards and inspections. It covers items commonly reported by FRA inspectors as defects. Also covered is the requirements for filling out Cab Form F-6180-49. In addition, Cab Form MD-170 for daily inspections and a detailed explanation for filling out this form with the meaning of "one" calendar day is thoroughly covered.

## BLOCK A - 13101

(12 Hours)

### FRA INSPECTOR ACCREDITATION (U.S.) (Canadian Pacific Railway)

This slide presentation focuses on the FRA requirements found in Part 229 of the Code of Federal Regulations 49 which relates to locomotive safety standards and inspections. It covers items commonly reported by FRA inspectors as defects. Also covered is the requirements for filling out Cab Form F-6180-49. In addition, daily inspections and a detailed explanation for filling out this form with the meaning of "one" calendar day is thoroughly covered.

**BLOCK A - 14102**

(4 Hours)

**FALL ARREST SAFETY SYSTEM INSPECTION & USE (Canadian Pacific Railway)**

The course covers the use and inspection of the components of the fall arrest system. The equipment will prevent the worker from falling from an elevated height such as the roof of a freight car. The harness and support system will suspend the worker rather than falling to the ground.

**Course Content:**

- General users instructions
- Use and inspection of the body harness
- Self retracting lifeline inspection
- Inspection of impact indicator
- Rescue procedures
- Maintenance, servicing and storage
- Donning and fitting the harness

## BLOCK A - 15101

(4 Hours)

### SAFE HANDLING OF CUTTING TORCHES (Canadian Pacific Railway)

Safe handling of cutting torches covers the following:

#### 1. Introduction

#### 2. Gases

- Oxygen
- Propane
- Acetylene

#### 3. Cutting Torch Equipment

- Cylinders
- Regulators
- Hoses
- Torches
- Tip
- Flashback arrestors
- Reverse flow check valves
- Equipment summary

#### 4. Procedures

- How to set up the cutting equipment
- How to detect a Leak
- How to light and turn off the torch
- How to use the cutting torch
- How to shut down the cutting torch

#### 5. Torch Malfunctions

- What to do when torch won't stay lit
- How to correct an irregular flame
- Backfires
- Flashbacks

BLOCK A - 15101 (CONT'D)

6. Maintenance and Inspection

- How to inspect the cylinders
- How to maintain the cutting tip
- How to inspect the cutting torch
- How to inspect the hoses
- How to inspect the flashback arrestors

7. Safety Summary

- The 10 rules of oxy-fuel gas safety

BLOCK A - CE.7 - CE.12

(12 Weeks)

ELECTRONICS ON THE RAILS (Railway Educational Bureau)

A detailed study of electronic components used in train control systems. The course begins with a very basic explanation of electronic components and progresses toward combining components with the intent of making them easily understood, describe how they are used, their reliability, efficiency, and ease of maintenance. Detailed drawings and explanations help students to "see" how these components work.

Lesson Code

CE.7	Components-Semiconductors-Diodes- Transistors-Rectifiers
CE.8	Transistors-Controlled Rectifiers-Special Diodes
CE.9	Saturable Transformers-Reactors
CE.10	Control System-Regulations-Controlled Rectifier Applications-Pulse Amplification
CE.11	Applications of Controlled Rectifier-Controlled Rectifiers for Traction Systems-Train Control Systems
CE.12	Train Control Systems-Controls for Positioned Stop-Summary

**BLOCK A - EE.1 - EE.13**

**(26 Weeks)**

**BASIC ELECTRICITY AND ELECTRONICS (Railway Educational Bureau)**

The student will become primarily acquainted with the behavior of electronics to gain a thorough understanding of electron theory. This knowledge is then applied to learning the operations of electrical equipment producing fundamental components, and using these components in working circuits.

**Lesson Code**

<b>EE.1</b>	<b>The Behavior of Electrons and Controlling Electron Motion</b>
<b>EE.2</b>	<b>Electrical Circuits-Electrical Energy and Power</b>
<b>EE.3</b>	<b>Electric Heating and Lighting-Electromagnetism</b>
<b>EE.4</b>	<b>Measuring Instruments and Electrical Effects in Fluids</b>
<b>EE.5</b>	<b>Induced Voltages and Electromagnetic Generators</b>
<b>EE.6</b>	<b>Cells and Batteries</b>
<b>EE.7</b>	<b>Small-Scale Sources of EMP and Electric Motors</b>
<b>EE.8</b>	<b>Alternating Current</b>
<b>EE.9</b>	<b>Capacitors and Their Uses</b>
<b>EE.10</b>	<b>AC Motors and Rectifiers</b>
<b>EE.11</b>	<b>Amplifiers</b>
<b>EE.12</b>	<b>Electrical Communication</b>
<b>EE.13</b>	<b>Solid State AC Power Control Circuits</b>



BLOCK A - EM.1 - EM.3

(6 Weeks)

**ELECTRICAL MAINTENANCE WORK (Railway Educational Bureau)**

Upon completing this course the student will be familiar with the electrical instruments which are in general use (voltmeter, ammeter, millimeter and Megger) and care of the instruments. The student will also learn some practical uses of voltmeters and how to test and take care of diesel locomotive batteries, adjust and maintain the voltage regulators to ensure proper charging current.

Lesson Code

EM.1	Instruments
EM.2	Use of Voltmeters
EM.3	Voltage Regulation, Gravity Readings, Flushing

BLOCK A - GE-1 - GE-8

(16 Weeks)

**DIESEL LOCOMOTIVE MAINTENANCE (Railway Educational Bureau)**

This course will enable the student to become acquainted with the locomotive in general and specifically with those details which relate to performing running maintenance. Running maintenance consists of such work as terminal servicing, minor repair and adjustment, interchanging small components, or any other work functions which will restore the locomotive to service within an eight-hour period.

Lesson Code

GE-1	Locomotive Description and Equipment
GE-2	Control Equipment-Part I Relays
GE-3	Control Equipment-Part II Contactors
GE-4	Control Equipment-Part III, Magnet Valves- Interlocks
GE-5	Control Equipment-Part III Alternator-Static Panels
GE-6	Control Equipment-Part V, Static Voltage Regulator-Panels-Control Switches
GE-7	Rotating Equipment-Part I, General-Commutator Maintenance
GE-8	Rotating Equipment-Part II, Traction Alternator and Generator Traction Motor

BLOCK A - LB.1 - LB.3

(6 Weeks)

**RAILROAD LOCOMOTIVE SAFETY STANDARDS AND LOCOMOTIVE INSPECTION**  
(Railway Educational Bureau)

This course is designed for the student to develop an understanding of the safety rules and regulations based on the Federal Railroad Administration Locomotive Safety Standards and Locomotive Inspection.

Lesson Code

LB.1	Locomotive Safety Standards-Locomotive Inspection
LB.2	Locomotive Safety Standards-Safety Requirements-Brake System, Draft System, Suspension System
LB.3	Locomotive Safety Standards-Safety Requirements-Electrical System, Internal Combustion System, Steam Generators, Cabs and Cab Equipment

BLOCK A - VR.1 - VR.2

(4 Weeks)

**VOLTAGE REGULATOR** (Railway Educational Bureau)

Describe the EMD static voltage regulator, explain the theory of operation of its circuits and components, and to describe a basic operational check. This is explained in three sections: elementary electron and semiconductor theory, and briefly explains capacitor and inductor behavior, explains the operation of the voltage regulator circuits and provides information relating to normal service maintenance.

Lesson Code

VR.1	Static Voltage Regulator-Part I
VR.2	Static voltage Regulator-Part II

BLOCK A - WD.1A - WD.2A

(4 Weeks)

TRACING PHYSICAL SCHEMATIC WIRING DIAGRAMS (Railway Educational Bureau)

Describe the physical schematic wiring diagram along with its associated diagrams and wiring running list book, and to provide a guide to aid in the use and understanding of the diagrams and list.

Lesson Code

WD.1A	Tracing Physical Schematic Wiring Diagrams
WD.2A	Tracing Physical Schematic Wiring Diagrams on Diesel Electric Locomotives

BLOCK B - 4500

(8 Hours)

LOCOMOTIVE BATTERY MAINTENANCE (DL-63-1) (Canadian Pacific Railway)

Students will learn how a battery is constructed and what electrolyte and specific gravity is. The student will learn how to use a refractometer to measure specific gravity and how to load test a battery using a load tester. Also covered are policy issues referred to in DL-63-1, battery dates and filling out battery data sheets. At the completion of this course, the student will have the necessary skills to determine when and why a locomotive battery needs to be replaced.

BLOCK B - 4600

(8 Hours)

EVENT RECORDER DOWNLOADING (Canadian Pacific Railway)

The student will learn fundamental basics of operating a lap top computer. The student will then progress to performing an event recorder download as per DL-74-1.

BLOCK B - 4601

(16 Hours)

EVENT RECORDER QUALIFICATION (Canadian Pacific Railway)

The student will learn how to qualify and assure proper operation of event recorders, speedometers and vigilance equipment manufactured Q-Tron as per DL-74-1.

BLOCK B - 4652

(8 Hours)

ELECTRICAL SCHEDULED MAINTENANCE GUIDE BOOKLET (DL-269) REVIEW  
(Canadian Pacific Railway)

In this course the student will review electrical scheduled maintenance items as per DL-269 requirements. The student will use the Electrical Scheduled Maintenance Guide booklet to review the procedures required to perform the DL-269 tasks.

**BLOCK B - GLEM1 - GLEM 8**

(16 Weeks)

**GUIDE TO LOCOMOTIVE ELECTRICAL MAINTENANCE (Railway Educational Bureau)**

Aids or assists an employee in performing electrical inspections. The book breaks down the major areas of concern to include tips on what to look for to spot potential problems. It follows the BOTTOM to TOP inspection procedure. Safety is always the first concern.

Lesson Code

GLEM-1	Insulation Dielectric Test; Traction Motors and Main Generator
GLEM-2	Main Generator; Auxiliary Generator; Inertial Filter Motor
GLEM-3	Governor, Load Regulator, Fan Contactors, Temperature Switches; AC Cooling Fan Motors; Shutter Control; Compressor Magnet Valve; Traction Motor Blower Motor; Ground Lights and Lights
GLEM-4	Sarco Drain Valve and Heaters; Sander Magnet Valves; Axle Generators; Axle Generators (PTC) Receptacles (Snowplow), (MU) (Battery Charging); Emergency Fuel Cut-Off; Small Motors; Dynamic Braking; Batteries and Contact Tips.
GLEM-5	Contact Tips; Running Work; Running Work (IPS) and Load Test.
GLEM-6	GE Locomotive AC 4400 CW; Recorder/Vigilance Testing; Speedometer Verification; and TSM Locotemp Test Procedures
GLEM-7	Microprocessor Excitation; Locomotive HP Settings; Horsepower Calculation and Calculator; and Qualification Checks
GLEM-8	Component Arrangement; Terminal Boards and Zones; Governor Solenoids; Diagnosis of Ground Relay and Appendices

**BLOCK B - GP.1 - GP.13**

(26 Weeks)

**EMD-GP38 STATIC EXCITATION LOCOMOTIVE MAINTENANCE - ELECTRICAL  
(Railway Educational Bureau)**

Learn the description of the electrical transmission and the power control system used on the GP38 locomotive for static control of main generator excitation. Testing, servicing, troubleshooting and maintenance are included.

**Lesson Code**

GP.1	Static Excitation
GP.2	Excitation System
GP.3	Transition Control System
GP.4	Dynamic Braking System
GP.5	Inspection and Replacement of Contact Tips
GP.6	Electrical Equipment
GP.7	Reference Voltage Checks
GP.8	Testing and Setting Performances Control Panel PCP-8411758
GP.9	Wheel Slip Control System Testing and Setting
GP.10	Transition Control System testing and Setting
GP.11	Dynamic Braking System Testing and Setting
GP.12	Load Test and Horsepower Standardization
GP.13	General Review

BLOCK B - GP.20 - GP.29

(20 Weeks)

EMD-GP-38-2 LOCOMOTIVE TROUBLESHOOTING ELECTRICAL (Railway Educational Bureau)

The student will learn an insight into the physical schematics. Examine a locomotive print, its notations and abbreviations, then explore in depth the major locomotive circuits and systems. First current flow is followed through the circuits for students to see the electrical interactions which are taking place for each circuit; secondly, the simplified circuits will be referred back to the physical schematic, traced and explained. Then, the print ties all the systems together into one locomotive system giving the student a good working knowledge essential to the electrical locomotive troubleshooter.

Lesson Code

GP.20	Physical Schematic-Explanation
GP.21	Starting and Fuel Pump Circuit
GP.22	Generator Field Circuit
GP.23	Excitation System (Part I)
GP.24	Excitation System (Part II)
GP.25	Wheel Slip System (Part I)
GP.26	Wheel Slip System (Part II)
GP.27	Dynamic Brake System
GP.28	Basic Locomotive voltage Supply Circuits
GP.29	Motor Connection Circuit



**EMD GP38-2 LOCOMOTIVE ELECTRICAL EQUIPMENT (Railway Educational Bureau)**

The student will gain knowledge of “on-the-locomotive” maintenance and general familiarization with locomotive components and systems. Also, use the service data pages at the back of some of the sections for reference to applicable maintenance instructions and technical manuals, applicable tool and testing apparatus numbers and specific system values for operation or testing. Metric and U.S. Standard measurements are shown.

**Lesson Code**

GP.51	Electric Rotating Equipment-Control Stand
GP.52	Electrical Cabinets-Control Stand
GP.53	Auxiliary Generator-AR10 Main Generator-D14 Alternator
GP.54	Voltage Regulator-Excitation Limit Backup Protection System
GP.55	Generator Voltage Regulator Module-Silicon Controlled Regulating System-Load Regulator Assembly-Performance Control Module
GP.56	Rate Control Module Sensor Bypass Module-Silicon Controlled
GP.57	Wheel Slip System
GP.58	Dynamic Braking System
GP.59	Dynamic Braking Grid Protection System-Dynamic Brake Protection Module-Dynamic Brake Regulator Module
GP.60	Indicating Lights and Devices
GP.61	Control Circuits and Devices
GP.62	Contact Tips
GP.63	Load Test and Horsepower Standardization-High Potential Tests
GP.64	Troubleshooting-Introduction
GP.65	Troubleshooting Guide
GP.66	General Troubleshooting (Outline I)
GP.67	General Troubleshooting (Outline II)

**EMD SD40-2 LOCOMOTIVE ELECTRICAL EQUIPMENT (Railway Educational Bureau)**

The student will gain knowledge of “on-the-locomotive” maintenance and to provide under separate cover material for general familiarization with locomotive components and systems. Also, lean the service data pages for reference to applicable maintenance instructions and technical manuals, applicable tool and testing apparatus numbers, specific system values for operation or testing. Metric and U.S. Standard units of measurement are shown.

Lesson Code

SD.16	Locomotive Maintenance-Electric Rotating Equipment, Locomotive Control Stand, Electrical Cabinets
SD.17	Electrical Equipment
SD.18	Generators and Voltage Regulator-Auxiliary Generator-AR10 Main Generator
SD.19	D14 Alternator-Voltage Regulator Module, VR
SD.20	Excitation and Power Control System-Excitation Limit Backup Protection System-Load Regulator
SD.21	Generator Excitation Regulating System-Load Regulator Assembly Performance Control Module, PF17 and PF18 (Special Order)
SD.22	Rate Control Module, RC11-Sensor Bypass Module, SB11-Silicon Controlled Rectifier Assembly, SCR-Sensor Module, SE-Voltage Reference Regulator and Throttle
SD.23`	Transition Module
SD.24	Wheel Slip System-Sanding Module, SA10-Wheel Slip Module, WS10-Wheel Slip Bridge Circuit-Wheel Slip Transconductor, WST
SD.25	Dynamic Braking System Excitation and Control-Extended Range Dynamic Brake Module, DE (Special Order)-Dynamic Brake Protection Module, DP-Dynamic Brake Regulator Module, DR-Indicating Lights and Devices
SD.26	Load Test and Horsepower Standardization-High Potential Test for Locomotives in Service
SD.27	Troubleshooting
SD.28	General Electrical Qualifications and Troubleshooting Guide
SD.29A	Troubleshooting Outlines (Part I)
SD.30A	Troubleshooting Outlines (Part II)

BLOCK B - SD40-2

(2 Weeks)

LOCOMOTIVE ELECTRICAL TROUBLESHOOTING FOR SD-40-2 (Railway Educational Bureau)

The student should be able to accurately read a schematic wiring diagram for a diesel-electric locomotive so he/she is able to competently troubleshoot.

Prerequisite: Knowledge in these areas of study or listed courses from The Railway Educational Bureau:

CD-1 CD-2	Circuit Diagrams
MM-33 and MM-39	EMD Maintenance Instructions
VR-1 and VR-2	Voltage Regulators
EM-1 through EM-3	Electrical Maintenance Work
EE-1 through EE-13	Electricity and Electronics
WD-1A and WD-2A	Tracing Physical Schematics, Wiring Diagrams on Diesel Electric Locomotives

Or comparable experience with the SD40-2 Locomotive.

The program contains:

- A section on coloring and numbering the electrical sequence booklet.
- A section on color coding the physical wiring schematic.
- Troubleshooting Exercise.
- All supplies are included-colored pencils, schematic diagram etc.

A Certificate of Achievement is earned with the successful completion of this program.

**BASIC ELECTRICAL COURSE AT TECHNICAL COLLEGE**

**{TO BE ADDED}**

**BLOCK A WORK PRACTICES AND PROCEDURES**

**Task 1** Applies accident prevention principles, practices and techniques to ensure safe, injury-free work performance.

	<u>Sub-tasks</u>	<u>Enabling Objectives</u>	<u>Tools &amp; Equipment</u>
1.01	Practices personal safe work habits to avoid bodily injury.	Knowledge of safe work practices involving lifting of objects, material handling, protective clothing and rational body movement to protect oneself and others from harm	goggles, safety glasses, face shield, screens, guards, protective clothing, mechanical aids, chain falls, come-a-longs, blocks, levers
1.02	Maintains good house-keeping. Observes and promotes safe work environment (general shop).	Ability to identify safety and health hazards  ability to take corrective action or report hazards  ability to maintain shop cleanliness, orderly work area, correct tool storage, clear aisles, proper ventilation, proper shielding and similar requirements	housekeeping tools, waste containers
1.03	Uses and maintains correct and safe tools and equipment for task at hand. Observes and promotes safe work environment (tools and shop equipment).	Knowledge of unsafe tools, such as: mushroomed heads, split handles, frayed cables, bulged hoses, poor electric connections and ground  knowledge of power tool hazards, e.g., pneumatic tools, hydraulic tools  knowledge of compressed air hazards  knowledge of hoist lifting capacities, slings and chains  awareness of spark proof tools	hand tools, power tools, shop equipment, test equipment (see Appendix A)

Task 1	<u>Sub-tasks</u>	<u>Enabling Objectives</u>	<u>Tools &amp; Equipment</u>
1.03		ability to safely use all tools and equipment for purpose intended	
1.04	Operate locomotives and heavy equipment such as: bobcat, forklift, skid loader, trackmobile diligently and safely, observing manufacturer's safety recommendations.	<p>Knowledge of proper locomotive operation, machine capabilities, equipment safety, hazards and similar items</p> <p>ability to mount and dismount from equipment using three-point contact method</p>	manufacturers' manuals
1.05	Assures fire protection.	<p>Knowledge of location of fire extinguishers, fire hoses, fire exists, fire department phone number</p> <p>ability to identify and properly extinguish different types of fires</p> <p>knowledge that ignited clothing falls under Class "A" fires, and that recommended type of extinguisher is used and appropriate measures are taken, i.e., rolling on ground, covering with blanket</p> <p>knowledge of proper storage and handling of flammable materials, liquids, gases</p> <p>knowledge of explosion and implosion hazards</p>	fire extinguishers, sprinkler systems

Task 1

	<u>Sub-tasks</u>	<u>Enabling Objectives</u>	<u>Tools &amp; Equipment</u>
1.05		knowledge of dangers when working with compressed nitrogen, air, caged springs, and similar hazards	
1.06	Applies first aid and reports injuries.	Knowledge of first aid  participation in an approved first aid course	first aid kit

**Task 2**      **Selects, inspects, uses and maintains various hand and power tools, measuring tools and testing equipment with proficiency and safety.**

	<u>Sub-tasks</u>	<u>Enabling Objectives</u>	<u>Tools &amp; Equipment</u>
2.01	Selects and safely uses correct hand tools.	<p>Ability to distinguish between various types and sizes of hand tools</p> <p>knowledge of metric tools and special labor saving tools</p> <p>ability to use proper operating techniques</p> <p>ability to follow equipment manufacturers' instructions on tool usage</p>	appropriate hand and special tools (see Appendix A)
2.02	Selects and safely uses correct power tools.	<p>Knowledge of electric and air power tools, their capacities, limitations, and applications</p> <p>knowledge of metric power tool adapters</p> <p>ability to follow manufacturers' instructions</p>	appropriate hand and special tools (see Appendix A)
2.03	Selects and safely uses correct measuring tools and devices and test equipment.	<p>Ability to follow manufacturers' instructions on correct use of devices and equipment</p> <p>knowledge of tool and test equipment availability and their purpose</p> <p>knowledge of systems on equipment, their functioning, connections and similar details</p> <p>awareness of specific machine adapters and connectors</p>	appropriate measuring tools and/or test equipment (see Appendix A)



Task 2

	<u>Sub-tasks</u>	<u>Enabling Objectives</u>	<u>Tools &amp; Equipment</u>
2.04	Maintains hand and power tools, measuring tools and devices and test equipment.	Knowledge of proper tool care and storage  knowledge and use of good housekeeping practices and preventive maintenance  knowledge of what can or cannot be repaired "in-house"	appropriate hand, power and measuring tools and test equipment
2.05	Reports poorly calibrated, inoperable or unsafe tools and equipment and refrains from their use.	Knowledge of procedures to follow when reporting broken, unsafe or inoperable tools and equipment  ability to follow-up on repair of tools and equipment	

Task 3      Selects, inspects, uses and maintains various shop equipment with proficiency and safety.

	<u>Sub-tasks</u>	<u>Enabling Objectives</u>	<u>Tools &amp; Equipment</u>
3.01	Selects and safely uses correct shop equipment.	<p>Awareness of availability, application and capacities of various shop equipment</p> <p>ability to understand and follow manufacturers' instructions on use of shop equipment</p> <p>knowledge of safe operating techniques</p>	appropriate shop equipment (see Appendix A)
3.02	Maintains shop equipment, reports inoperable or unsafe shop equipment and refrains from its use.	<p>Knowledge of proper shop equipment care and maintenance</p> <p>knowledge of good housekeeping practices</p> <p>knowledge of possible "in-house" repair</p> <p>knowledge of procedures to follow when reporting broken, unsafe or inoperable shop equipment</p> <p>ability to follow-up on repair of tools and equipment</p>	appropriate shop equipment (see Appendix A)

Task 4        Selects, installs or removes conduit, fasteners, and all related couplings, fittings, hoses, electrical wiring and connectors.

<u>Sub-tasks</u>	<u>Enabling Objectives</u>	<u>Tools &amp; Equipment</u>
4.01        Selects, installs or removes various types of fasteners for repair, service and maintenance of heavy equipment.	<p>Knowledge of application, torque values, head markings, sizes, specifications, grades, pitch, materials, threads, strengths, and similar characteristics of fasteners such as: bolts, capscrews, studs, nuts, washers, pins, snap rings, locking wires, keys, rings, rivets, clamps, screws, cotter pins, flat metal locks, specialty fasteners (e.g., spring clips, catches, turn fasteners, wire rope fasteners), plastic fasteners</p> <p>knowledge of metric and other sizes (ISO, ANSI, SAE, SI) conversion tables, charts of tap drill sizes, torque guides understanding of torque and loss of torque and its reasons (e.g., gasket material, sealed surface, time, temperature tensile strength, fatigue, over-torquing)</p>	wrenches (e.g., open end, combination, box, striking, spanner, tubing, socket, adjustable torque, Allen), extensions, screwdrivers, hammers, pliers, snap ring pliers, riveting tools, impact tools, tap and die set (for thread recovery)
4.02        Selects, cuts, shapes, installs, and/or removes conduit, couplings, fittings and hoses.	<p>Ability to bend, shape, flare and fit conduit</p> <p>knowledge of procedures</p> <p>ability to understand and follow manufacturers' instructions</p> <p>ability to diagnose component failures</p>	wrenches, pliers, screwdrivers, hammers, crimpers, pipe bending devices, special tools

Task 4

<u>Sub-tasks</u>	<u>Enabling Objectives</u>	<u>Tools &amp; Equipment</u>
4.02	knowledge of types of conduit (plastic, steel), their properties and correct uses	
4.03	Knowledge of common types of connectors (e.g., circular plastic connectors, pin type, blade type, etc.)  awareness of effects of corrosion, contaminants, plating materials  knowledge of current flow in connectors and wiring  ability to understand and follow manufacturers' instructions, schematics, and wiring diagrams  ability to strip, crimp, solder and bolt cut	connector extracting tools, electrician's pliers, wire strippers, crimping tools, soldering guns, terminal applicators

**Task 5**      **Accesses Job related information from service publications, records, shop controls and other materials and communicates findings to proper source.**

<u>Sub-tasks</u>	<u>Enabling Objectives</u>	<u>Tools &amp; Equipment</u>
<p>5.01      <b>Accesses service/shop/ technical manuals and parts catalogs to:</b></p> <p>a) locate sections and groups</p> <p>b) identify equipment or machine components and attachment details (e.g., make, model, year, serial number, product identification number)</p> <p>c) follow operating, maintenance, testing and repair procedures according to safety standards.</p>	<p>Knowledge of available service literature including bulletins, service letters, special instructions and similar information</p> <p>ability to troubleshoot systematically, explicitly adhering to manufacturers' instructions</p> <p>ability to understand trouble shooting sequences</p> <p>knowledge of imperial and metric measurements, capacities, specifications, and ability to convert and use both</p> <p>knowledge of "normal" machine system functioning and equipment operation</p> <p>ability to read, interpret and use parts catalogs and information</p>	<p>technical and shop manuals, operator's manuals and guides, service letters, bulletins and updates, specification books and other written and graphic materials, parts catalogs and other parts related information</p>
<p>5.02      <b>Follows schematics, diagrams, pictorial layouts, drawings, blueprints and similar material or information.</b></p>	<p>Knowledge of mechanical, hydraulic, electrical, and pneumatic diagrams, schematics and drawings</p> <p>knowledge of electrical, pneumatic and fluid power symbols such as international symbols, JIC (Joint Industry Council) symbols</p>	<p>technical and shop manuals, operator's manuals and guides, service letters, bulletins and updates, specification books and other written and graphic materials, parts catalogs and other parts related information</p>

## Task 5

	<u>Sub-tasks</u>	<u>Enabling Objectives</u>	<u>Tools &amp; Equipment</u>
5.03	Completes work orders, shop orders, purchase orders, parts requisitions, time sheets, report forms, logbooks and similar shop controls.	<p>Ability to properly complete work orders including equipment and customer details, test results, services performed and recommendations regarding additional service required</p> <p>knowledge of work hours expended and work in progress</p> <p>ability to write service reports, fill in parts requisitions, time sheets and logbooks</p> <p>ability to follow established control procedures</p>	service related forms and shop control materials
5.04	Accesses miscellaneous service information and service and training library.	Knowledge of materials available for information and service training from manufacturers, vendors, suppliers, schools and other sources	training materials, tool information (catalogs), wall charts
5.05	Communicates job related information and requirements.	<p>Ability to diagnose and communicate findings verbally and in writing, listing cause and effect</p> <p>awareness of related trades, specialty shops, "outside repair" or sublet possibilities to recommend related repairs (e.g., lineboring, machining, welding, tire repair)</p>	technical and shop manuals, operator's manuals and guides, service letters, bulletins and updates, specification books and other written and graphic materials, parts catalogs and other parts related information

Task 5

Sub-tasks

Enabling Objectives

Tools & Equipment

5.05

ability to discuss service details, maintenance and operation with customer, user, operator

ability to practice good customer relations

Task 6      Retrieves and inputs applicable information using service related computer software programs (e.g., downloading Q-tron, Smartstart, Pulse).

	<u>Sub-tasks</u>	<u>Enabling Objectives</u>	<u>Tools &amp; Equipment</u>
6.01	Retrieves and inputs service related information using computer software programs.	Knowledge of service related software use in workplace but limited to mechanic's involvement  ability to retrieve parts information	computer hardware and software



**Task 7**      **Inspects, monitors performance and operates machinery and equipment.**

	<u>Sub-tasks</u>	<u>Enabling Objectives</u>	<u>Tools &amp; Equipment</u>
7.01	Performs pre-start inspection; completes walk-around inspection; performs daily maintenance; lubricates machines; mounts and dismounts safely and completes safety inspection for locomotives, forklifts, bobcats, trackmobile and skid loader.	<p>Ability to check complete machine and its systems for abnormal conditions prior to starting engine</p> <p>ability to perform daily maintenance inspections according to manufacturers' recommendations</p> <p>ability to mount and dismount safely using three-point contact method</p> <p>ability to identify hazardous areas of equipment (e.g., fan blades/pulleys, exhaust manifolds, etc.)</p>	related electrical tools
7.02	Monitors performance of engine, electrical systems, brake systems, air cleaner indicator warning systems.	<p>Ability to start engine, monitor engine performance and check all instrument gauges for abnormalities</p> <p>ability to monitor electrical systems and brake systems</p> <p>ability to check all systems for "normal" functioning</p> <p>ability to follow applicable manufacturers' recommendations</p>	related electrical tools

Task 7

	<u>Sub-tasks</u>	<u>Enabling Objectives</u>	<u>Tools &amp; Equipment</u>
7.03	Operates machines using safe operating procedures; completes proper draining of locomotives and proper shutdown of all other related equipment.	Knowledge of operating procedures and techniques  knowledge of parking and shut down procedures relevant to machine being operated  knowledge and observance of hand signals and blue flag rules  knowledge of applicable manufacturers' recommendations as well as laws and local by-laws	chains and handbrake

## APPENDIX A

### TOOLS AND SHOP EQUIPMENT

#### Electrical Tools & Equipment

Battery Chargers  
Soldering Equipment  
Digital Tachometer Testers  
Volt-Ohm-Amp Meters  
Multimeters (Analog/Digital)  
Battery Load Testers  
Hydrometers  
Starting/Charging Analyzers

Voltage Detectors  
Gauge Testers  
Electronic Control Circuit Diagnostic Testers  
Electronic Diagnostic Boxes  
Electronic Resistance Testers  
Circuit Continuity Testers

#### Power and Hand Tools

Screwdrivers  
Hammers  
Pliers (sidecutters, snap ring pliers, etc.)  
Wrenches (sockets, hex key, etc.)  
Chisels  
Punches  
Files  
Hacksaws  
Twist Drills  
Screw and Stud Extractors  
Drifts  
Scrapers  
Snips  
Clamps  
Reamers  
Wire Splicers  
Power Band Cut-Off Saw

Crimpers (Hydraulic)  
Magnetic Pick-up Tools  
Inspection Lights  
Inspection Mirrors  
Probe Lights  
Spanner Wrenches  
Tap and Die Sets  
Drills (air and electric)  
Air Impact Wrenches, Drivers, Hammers  
Tubing Cutters  
Grinders - Bench  
Grinders - Portable  
Power Hacksaw  
Wheel Gauge  
Tape  
Straight Edge

#### Shop Equipment

Hydraulic Power  
Hydraulic Rams  
Ram/Pump Set  
Hydraulic Pumps, Hand Operated  
Hydraulic Pumps  
Hydraulic Pumps, Electric

## APPENDIX A

### Shop Equipment Cont'd

#### Lifting Equipment

- Load Positioning Sling

- Hoist Equipment

#### Miscellaneous

- Cleaning Guns/Pressure Washers

- Parts Washers and Brushes

- Air Systems (with Compressor, Filter, Regulator, Lubricator, Hoses, Quick Couplers  
Adapters, and Reels)

- Work-benches

- Vises

#### Rolling Stock

- Service Trucks

- Lift Trucks

APPENDIX B

CANADIAN PACIFIC RAILWAY - U.S.  
APPRENTICESHIP RATING REPORT - PART I

Employee \_\_\_\_\_ Employee No \_\_\_\_\_

Position Title \_\_\_\_\_ Department \_\_\_\_\_

Location \_\_\_\_\_ Employment Date \_\_\_\_\_

1 - Needs Improving

2 - Improving But Not Consistent

3 - Meets Requirements

4 - Exceeds Requirements

COMPETENCY

RATING

COMMENTS

Attendance - is available to cover their work assignment

\_\_\_\_\_

Punctuality/tardiness/leaving early

\_\_\_\_\_

Completes work in a thorough and punctual manner

\_\_\_\_\_

Checks own work accurately and maintains quality

\_\_\_\_\_

Ability and willingness to learn and acquire necessary skills

\_\_\_\_\_

Knowledge, skill and ability to perform work assignments with minimum supervision

\_\_\_\_\_

Follows safety rules and procedures

\_\_\_\_\_

Willingness to work for and with others

\_\_\_\_\_

Treats others with respect

\_\_\_\_\_

Supervisor/Trainer Comments \_\_\_\_\_

\_\_\_\_\_

Employee Comments \_\_\_\_\_

\_\_\_\_\_

I acknowledge I have read this report and it has been reviewed with me.

\_\_\_\_\_  
Employee Signature (Date)

\_\_\_\_\_  
Evaluator Signature (Date)

APPENDIX B

INSTRUCTIONS  
APPRENTICESHIP RATING REPORT - PART I

This report must be completed by the immediate supervisor and trainer, if applicable, for all new hires working in a position covered by a collective bargaining agreement. The supervisor must complete this form twice during the probationary period: once at midpoint and once prior to completion of the probationary period.

Please rate each competency per the scale below. Items rated "Needs Improving" or "Improving But Not Consistent" require an explanation in the comment area. If you need more space for comments, please use the back of this form or an additional sheet.

- |                                 |                         |
|---------------------------------|-------------------------|
| 1. Needs Improving              | 3. Meets Requirements   |
| 2. Improving But Not Consistent | 4. Exceeds Requirements |

The individual completing this report must discuss its contents with the employee. The employee is requested to sign the report as an indication of discussion and review of the report. The employee will have the opportunity to respond to the content of this report in writing if s/he wishes.

Send completed form marked "CONFIDENTIAL" to the Personnel Coordinator who initially recruited or placed the new employee.

APPENDIX B

ELECTRICIAN APPRENTICE EVALUATION - PART II

Apprentice Name \_\_\_\_\_ Craft \_\_\_\_\_

Date \_\_\_\_\_

Task 1 Applies accident prevention principles, practices and techniques to ensure safe, injury-free work performance.

Q. What do you do after your work assignment is completed?

A. \_\_\_\_\_

Q. Are Air Hoses/Air Powered Tools used to clean oil, dirt or dust from yourself or your tools & equipment?

A. \_\_\_\_\_

Q. If there is a fire who would you notify first?

A. \_\_\_\_\_

Q. If your clothes started on fire what would you do?

A. \_\_\_\_\_

Task 2 Selects, inspects, uses and maintains various hand and power tools, measuring tools and testing equipment with proficiency and safety.

Q. What hand tools would you need to inspect Traction Motors and change brushes?

A. \_\_\_\_\_

Q. What is needed to check for Low and High Voltage Grounds?

A. \_\_\_\_\_

Q. What do you do after you have completed the check for High Voltage Grounds?

A. \_\_\_\_\_

APPENDIX B

ELECTRICIAN APPRENTICE EVALUATION - PART II (CONT'D)

Task 3 Selects, inspects, uses and maintains various shop equipment with proficiency and safety.

Q. After you use one of the elevators in 8-Spot what do you do?

A. \_\_\_\_\_

Q. What do you do when you are moving parts or equipment with the Overhead Cranes?

A. \_\_\_\_\_

Task 4 Selects, installs or removes conduit, fasteners, and all related couplings, fittings, hoses, electrical wiring and connectors.

Q. What is used to secure the Top Inspection Cover on a Traction Motor?

A. \_\_\_\_\_

Task 5 Accesses job related information from service publications, records, shop controls and other materials and communicates findings to proper source.

Q. A locomotive is not charging. Where would you look for helpful information?

A. \_\_\_\_\_

Task 6 Retrieves and inputs applicable information using service related computer software programs (e.g., downloading Q-Tron, Smartstart, Pulse).

Q. Where would you find the Lap Top and Speed Simulator needed to download Q-Tron?

A. \_\_\_\_\_



APPENDIX B

ELECTRICIAN APPRENTICE EVALUATION - PART II (CONT'D)

Task 7 Inspects, monitors performance and operates machinery and equipment.

Q. If a Traction Motor is cutout, the Locomotive Loadmeter will not show an indication. Which motor is it?

A. \_\_\_\_\_

Q. When checking an Alerter what are some of the functions that should be checked as a Reset?

A. \_\_\_\_\_

Task 8 Inspects, tests, services and replaces storage batteries; analyzes failures and determines cause.

Q. What do you look for when you are inspecting batteries?

A. \_\_\_\_\_

Q. What tool is used to measure specific gravity?

A. \_\_\_\_\_

Task 9 Inspects, tests, adjusts, replaces components and circuits of electrical charging systems; diagnoses performance; isolates defects within locomotive system or in other machinery; analyzes failures and determines cause.

Q. What defects in a D.C. Auxiliary Generator would cause it not to operate properly?

A. \_\_\_\_\_

Task 10 Inspects, tests, adjusts, replaces components and circuits of electrical starting systems; diagnoses performance; isolates defects within locomotive system or in other machinery; analyzes failures and determines cause.

Q. What are three (3) things that you would check if the locomotive does not start?

A. \_\_\_\_\_

APPENDIX B

ELECTRICIAN APPRENTICE EVALUATION - PART II (CONT'D)

Q. What should you do before starting the locomotive?

A. \_\_\_\_\_

Task 11 Inspects, tests, adjusts, replaces components and circuits of electrical lighting and accessories systems; diagnoses performance; isolates defects within locomotive system or in other machinery; analyzes failures and determines cause.

Q. If the rear headlight does not light, what could be wrong?

A. \_\_\_\_\_

Q. How do you do a radio check? What do you say?

A. \_\_\_\_\_

Task 12 Inspects, tests, replaces components and circuits of electronic information; monitoring and controlling systems; diagnoses performance; isolates defects within locomotive system or in other machinery; analyzes failures and determines cause; adjusts parts and components.

Q. If the Pulse or Q-Tron speed Indicator is not working, what would you check?

A. \_\_\_\_\_

CANADIAN PACIFIC RAILWAY  
ELECTRICIAN APPRENTICESHIP  
WEEKLY LOG

Foreman will enter time apprentice was exposed to work item and initial:

Student Name: \_\_\_\_\_ Employee No: \_\_\_\_\_

Skill	Date -->								
Applies accident prevention principles; works safely									
Selects, inspects, uses and maintains various hand, power and measuring tools with safety and proficiency.									
Selects, inspects, uses and maintains various shop equipment with safety and proficiency.									
Selects, installs or removes conduit, fasteners/couplings, fittings, hoses, wiring and connectors, safely.									
Accesses job related information from various sources and relates the findings to those who need it.									
Retrieves and inputs applicable information using related computer software programs.									
Inspects, monitors performance and operates machinery and equipment safely.									
Inspects, tests, services and replaces storage batteries; analyzes failures and determines cause.									
Inspect, test, adjust, replace components and circuits of the electrical charging system. Isolate defects, determine cause.									
Inspect, test, adjust, replace components and circuits of the electrical starting system. Isolates defects, determines cause.									
Inspect, test, adjust, replace components and circuits of the electrical lighting and accessories system. Isolate defects and determine cause.									
Inspect, test, adjust, replace components and circuits of the electronic information, monitoring and controlling systems. Isolate defects and determine cause.									

## DAILY EVALUATION FOR FOREMAN AND/OR JOURNEYMAN

Apprentice Name \_\_\_\_\_ Date \_\_\_\_\_

Position \_\_\_\_\_ Craft \_\_\_\_\_

1. Does the Apprentice work safely and follow the Safety Rules?  
YES \_\_\_\_\_ NO \_\_\_\_\_
2. Does the Apprentice follow Company Rules?  
YES \_\_\_\_\_ NO \_\_\_\_\_
3. Does the Apprentice follow Good Housekeeping Rules?  
YES \_\_\_\_\_ NO \_\_\_\_\_
4. Does the Apprentice follow the Blue Flag Rules?  
YES \_\_\_\_\_ NO \_\_\_\_\_
5. Does the Apprentice properly care for his/her tools?  
YES \_\_\_\_\_ NO \_\_\_\_\_
6. Does the Apprentice operate rolling equipment safely?  
YES \_\_\_\_\_ NO \_\_\_\_\_
7. Does the Apprentice use the proper material for the job?  
YES \_\_\_\_\_ NO \_\_\_\_\_
8. Does the Apprentice use technical resources?  
YES \_\_\_\_\_ NO \_\_\_\_\_
9. Is the Apprentice able to complete the proper paperwork?  
YES \_\_\_\_\_ NO \_\_\_\_\_
10. Does the Apprentice communicate well with others?  
YES \_\_\_\_\_ NO \_\_\_\_\_
11. Does the Apprentice pass along job information to others?  
YES \_\_\_\_\_ NO \_\_\_\_\_
12. Can the Apprentice develop an electrical diagram with symbols for a diesel engine starting circuit?  
YES \_\_\_\_\_ NO \_\_\_\_\_

DAILY EVALUATION FOR FOREMAN AND/OR JOURNEYMAN (CONT'D)

13. Can the Apprentice successfully operate a Volt-Ohm-Amp Meter, Variable Resistor, Test Lamp, Battery Test Equipment and Charging analyzers?

YES \_\_\_\_\_ NO \_\_\_\_\_

14. Does the Apprentice ask questions?

YES \_\_\_\_\_ NO \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

APPENDIX C

CANADIAN PACIFIC RAILWAY  
MECHANICAL SERVICES  
MAINTENANCE SCHEDULE

SCHEDULE NO: DL-269-G  
PAGE: 1 of 12  
DATE: March 1998  
SUPERSEDES: All

SUBJECT: Annual test - turbos

ISSUE: All SD60, SD40, SD39, GP40, GP39, GP35      DATE:

LOCOMOTIVE:

100 SHOP CONTROL:

SIGNATURE

101 Pre-locomotive inspection.

102 Print LMIS history and attach to work package.

243 Change electrical cabinet filters.

600 ELECTRICAL:

601 Check batteries with hydrometer. If necessary add water to the required level and wash. Inspect and oil battery door hinges. Record reading \_\_\_\_\_

602 Locate and clear low insulation resistance readings.

603 Remove all TM covers. Inspect interior of TM's for defects. Ensure commutator and insulating surfaces are free of oil and debris. Clean string band, brush holder insulators and connecting cables.

Check spring tension and ensure brushes move freely.

Replace short brushes in TM sets. Ensure all TM cover gaskets are in place and in good condition.

Reapply covers and tie wrap in place.

607 Wash and clean AR10 compartment walls, floor, aspirator pit and sump.

609 Inspect auxiliary generator. Replace short brushes.

Ensure commutator and insulating surfaces are clean.

- 611 Inspect DC main generator and D14 alternator slip rings. Ensure commutator and insulating surfaces are free of oil and debris. Clean string band and brush holder insulators. Replace short brushes.
- 612 Remove main generator covers and clean inspection windows. Remove fiber cover from slip rings. Switch polarity of each pair of slip rings at brush connections. Inspect and clean slip rings, fuses, diodes, rectifier assembly, capacitors, suppression resistors and cables. Remove slip ring brushes and install new. Reapply covers.
- 614 Inspect load regulator brushes, coupling and seal.
- 615 Inspect fuel pump motor, commutator and brush holders for excessive oil or carbon. Replace short brushes.  
Note: If ROTRON brushless type pump, clean off any accumulated dirt on housing. (To assist cooling)  
Note: On SD60 units, remove brushes and install new every 6 months.
- 617 Check condition of governor receptacle, connector and harness. Clean and repair as necessary.
- 619 If equipped with the following motors, ensure commutators and brush holders are free of oil and debris. Replace short brushes on turbo lube pump.
- 620 Inspect starter motors. Remove accessible inspection plug and check starters for excessive oil, carbon, damaged/worn brushes, shunts or springs. Check cable connections for tightness. Reapply splash cover.
- 625 Inspect dynamic brake grids and cables.
- 626 Ensure dynamic brake cooling duct is in place. Check that blower motors turn freely. Ensure brush lengths are adequate and that they are free in the holders. Clean creepage surfaces.
- 627 Inspect all power contactors and reversers. Change contactor tips as required. Ensure DB and MTR reversers

are engaging properly in both forward and reverse.

628 Visually inspect electrical cabinet wiring, contactors and relays. Ensure arc chutes and covers are in place.

629 Inspect and service controller as necessary. Check throttle and reverser interlock.

630 Check fitting of doors and latches on electrical cabinets. Ensure door seals are in good condition.

632 Test operation of electric windows. Inspect wiring harnesses, terminals and ensure covers are in place.

633 Inspect cab heater and defroster motors.

634 Clean baseboard heaters.

635 Inspect brushes on furnace fan motor on units with "M" style cabs.

#### 700 RUNNING ELECTRICAL:

703 Check operation and voltage of auxiliary generator in #2 \_\_\_\_\_ and #8 \_\_\_\_\_ throttles.

704 Test operation of all electrical meters.

706 Ensure both elements of baseboard heaters are working.

708 Test operation of low and high idle if equipped.

709 Ensure maximum dynamic brake excitation at load test shunt. Normal maximum is 11.6 millivolts. Record mv \_\_\_\_\_  
If two speed DB, confirm notch #4 RPM above 10 mv (800 amps field). Ensure DB cut-out switch on electrical cabinet is sealed in the "ON" position.

710 Test throttle response #1 through #8.

711 Test operation of the TR module with unit loaded in #1 throttle position.

712 Test operation of TM cut-out switch. Ensure unit loads



with TM's cut-out in each position. Reseal cut-out switch.

- 714 Test the operation of the lead unit power reduction if equipped.(QES units must be in #8 throttle)
- 715 Test operation of DBS switch on locomotives with DB.
- 716 Test operation of IPS switch on locomotives with extended range DB.
- 717 Test wheel slip/PTC circuits for proper operation. Test for wheel slip/pinion slip by restricting moveable contact on "S" power contactor with insulated fiber.
- 718 Test operation of ground relay and auto reset. Use fused milliammeter between ground and generator positive. Excite generator in throttle #1 grid-load-test or open circuit. Ensure GR trips within current specification as follows:

- Main alternator with 8360045 or 8361776 GR 800 - 900 mA
- DC main gen with 8383122 or 8360045 GR 800 - 900 mA
- DC main gen with 8361776 GR (GP7,GP9,SW1200) 016 - 020 mA
- DC main gen with 8361776 GR with 500-ohm load 080 - 100 mA
- DC main gen with 8361776 GR with 50-ohm load 660 - 825 mA

Repeat with milliammeter between ground and generator negative to verify integrity of CRGR (alternator units) or shunt field circuit (DC main gen units).

Note: Reading must be same as positive ground.

On all units, ensure GR auto reset locks out after no more than 4 resets. On QES units, verify generator voltage limit after GR has tripped 4 times is close to 650 volts.

- 719 Test operation of alternator bearing failure alarm if equipped.
- 720 Test operation of alarm silence switch if equipped.
- 721 Test operation of EFCO and throttle emergency stop. Ensure stencil/decal for EFCO is in place and legible.
- 724 On QES microprocessor units, ensure traction motor shutter control opens in DB.

- 725 Test operation of governor shut down alarm.
- 726 Test operation of air compressor low oil pressure switch (CLOPS) if equipped.
- 727 Test operation of time delay relays on turbo lube and lube oil transfer pump.
- 729 Check operation and rotation of TM blower motors and drives if equipped.
- 730 Check operation of Sarco drain valve heater if equipped.
- 731 Test and record insulation resistance to ground.  
Power \_\_\_\_\_ AC \_\_\_\_\_ Control \_\_\_\_\_
- 733 On units with self-load test, record HP \_\_\_\_\_  
MV \_\_\_\_\_ Voltage \_\_\_\_\_
- 744 Test operation of slow speed control if equipped.
  
- 801 Inspect and operate all switches, relays and contactors. Check for mechanical defects and proper adjustment.
  
- 812 Voltage regulator, test charge failure alarm.

SUPERVISOR SIGNATURE: \_\_\_\_\_

CANADIAN PACIFIC RAILWAY  
MECHANICAL SERVICES  
MAINTENANCE SCHEDULE

SCHEDULE NO: DL-269-G  
PAGE: 1 of 6  
DATE: June 1998

SUPERSEDES: ALL  
SUBJECT: PERIODIC TEST 90 DAY 6-MONTH  
ISSUE: All GMD/EMD Units DATE

LOCOMOTIVE

TERMINAL:

505 Test and set main reservoir safety valves every 6 months.

600 ELECTRICAL:

601 Check batteries with hydrometer. If necessary add water to the required level and wash. Inspect and oil battery door hinges.(DL-63-1)

602 Locate and clear low insulation resistance readings.

603 Remove all TM covers. Inspect interior of TM's for defects. Ensure commutator and insulating surfaces are free of oil and debris. Clean string band, brush holder insulators and connecting cables.  
Check spring tension and ensure brushes move freely.  
Replace short brushes in TM sets only.  
Ensure all TM cover gaskets are in place and in good condition. Replace covers and tie wrap in place.

607 Wash and clean AR10 compartment walls, floor, aspirator pit and sump.

609 Inspect auxiliary generator. Replace short brushes.  
Ensure commutator and insulating surfaces are clean.

611 Inspect main generator and D14 alternator slip rings.  
Ensure commutator and insulating surfaces are free of oil and debris. Clean string band and brush holder insulators.  
Replace short brushes.

- 614 Inspect load regulator brush and coupling.
- 615 Inspect fuel pump motor, commutator and brush holders for excessive oil or carbon. Replace short brushes.  
Note: If ROTRON brushless type pump, clean off any accumulated dirt on housing.(To assist cooling)
- 731 Test and record insulation resistance to ground.  
Power \_\_\_\_\_ AC \_\_\_\_\_ Control \_\_\_\_\_
- 625 Inspect dynamic brake grids and cables.
- 628 Visually inspect electrical cabinet wiring, contactors and relays. Ensure arc chutes and covers are in place.
- 630 Check fitting of doors and latches on electrical cabinets. Ensure door seals are in good condition.
- 634 Clean baseboard heaters.
- 635 Inspect brushes on furnace fan motor on units with "M" style cabs.
- 636 Change electrical cabinet filters if equipped.
- 700 RUNNING ELECTRICAL:
- 701 Inspect all power contactors and reversers. Change contactor tips as required. Ensure DB and MTR reversers are engaging properly in both forward and reverse.
- 702 Test operation of electric windows. Inspect wiring harnesses, terminals and ensure covers are in place.
- 703 Check operation and voltage of auxiliary generator in #2 \_\_\_\_\_ and #8 \_\_\_\_\_ throttles.
- 708 Test operation of low and high idle if equipped.
- 709 Ensure maximum dynamic brake excitation at load test shunt. Normal maximum is 11.6 millivolts. Record mv \_\_\_\_\_  
If two speed DB, confirm notch #4 RPM above 10 mv (800 amps field). Ensure DB cut-out switch on electrical

cabinet is sealed in the "ON" position.

- 710 Test throttle response #1 through #8.
- 711 Test operation of the TR module with unit loaded in #1 throttle position.
- 712 Test operation of TM cut-out switch. Ensure unit loads with TM's cut-out in each position. Reseal cut-out switch.
- 714 Test the operation of the lead unit power reduction if equipped.(QES units must be in #8 throttle)
- 717 Test wheel slip/PTC circuits for proper operation. Test for wheel slip/pinion slip by restricting moveable contact on "S" power contactor with insulated fiber.
- 718 Test operation of ground relay and auto reset. Use fused milliammeter between ground and generator positive. Excite generator in throttle #1 grid-load-test or open circuit. Ensure GR trips within current specification as follows:

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DC main gen with 8361776 GR (GP7,GP9,SW1200) 016 - 020 mA  
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Repeat with milliammeter between ground and generator negative to verify integrity of CRGR (alternator units) or shunt field circuit (DC main gen units).

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- 719 Test operation of alternator bearing failure alarm if equipped.
- 720 Test operation of alarm silence switch if equipped.
- 721 Test operation of EFCO and throttle emergency stop. Ensure stencil/decal for EFCO is in place and legible.