



Subject: Traffic Signal Uninterruptible Power Supply Maintenance Standards	
Date: July 31, 2006	Author: Ross Casey
Bulletin Number: TE-2006-04 Bulletin Type: New Policy	Effective Date: Immediately
Audience	Standards Affected
All Personnel Maintaining Ministry Electrical Infrastructure	Performance Based Electrical Maintenance Specifications

Background:

Further to Technical Bulletin TE-2006-01 concerning traffic signal uninterruptible power supply (UPS) policy, the Ministry has developed traffic signal UPS maintenance standards to ensure the proper operation and long life of these devices.

Policy:

Effective immediately; traffic signal UPS maintenance shall be carried out in accordance with the most recent version of Electrical Maintenance Specification Specification E-190.

Procedure:

Personnel maintaining Ministry electrical traffic signals shall ensure that uninterruptible power supplies are operational and function in accordance with their design.

Electrical Maintenance Specification E-190 (version 1 – June/06) is attached and shall form part of Ministry Performance Based Electrical Maintenance Specifications. (See the link below)

http://www.th.gov.bc.ca/publications/eng_publications/electrical/elect_maint_specs.htm

A full QMS complete with the appropriate work procedures and check lists shall be developed for traffic signal UPS maintenance.

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Electrical Maintenance Specification E-190 (Version 1 – June/06)

UNINTERRUPTIBLE POWER SUPPLY (UPS) MAINTENANCE

1. OBJECTIVE

- To ensure that uninterruptible power supplies are operational and function in accordance with their design.

2. GENERAL PERFORMANCE SPECIFICATIONS

2.1 Routine Maintenance Services

The Contractor must:

- a) perform preventative maintenance of uninterruptible power supplies;
- b) repair uninterruptible power supplies;
- c) replace non-functioning uninterruptible power supplies and components;
- d) remove graffiti;
- e) test all uninterruptible power supplies, and
- f) document all uninterruptible power supply activities.

2.2 Additional Services

The Contractor must as and when required by the Ministry:

- a) supply, install and verify operation of uninterruptible power supplies complete with cabinets;

3. DETAILED PERFORMANCE SPECIFICATIONS

3.1 Routine Maintenance Services

The Contractor must:

- a) Repair or replace uninterruptible power supplies and their components, including batteries, in conformance with manufacturers' recommendations. Batteries shall be replaced when their charge falls below 80% of their rated capacity;
- b) perform preventative maintenance;

- c) notify the PHCC of any malfunctioning uninterruptible power supplies causing a traffic disruption and inform the PHCC when repaired;
- d) remove or cover graffiti in accordance with the *Highway Maintenance Specification – Litter Collection and Graffiti Removal*;
- e) document all activities related to electrical maintenance of uninterruptible power supplies including but not limited to field inspections, patrols, testing, complaints received / responses made, and all changes made to the uninterruptible power supplies.

3.1.1 Performance Time Frames

The following establishes the maximum time, from the time the deficiency was detected or reported to the Contractor, within which the Contractor must respond to the deficiency:

- a) uninterruptible power supplies and their components that constitute or have the potential to constitute an immediate safety hazard to the Highway User or cause a traffic disruption, within 1 hour;
- b) uninterruptible power supplies and their components that do not operate as per their original design intent but are not immediate safety hazards, on the next regularly scheduled work day;
- c) uninterruptible power supplies and/or their components that operate as per the original design intent, do not create a safety hazard, and are structurally sound but have identified deficiencies, within 3 months.

The Contractor must:

- a) perform preventative maintenance twice annually at six month intervals;
- b) notify the PHCC of any malfunctioning uninterruptible power supplies causing traffic disruption within 5 minutes from the time the malfunction was detected by or reported to the Contractor and inform the PHCC when repaired;
- c) remove or cover graffiti in accordance with the Performance Time Frames listed in the *Highway Maintenance Specification – Litter Collection and Graffiti Removal*;

- d) document all activities related to electrical maintenance and operations of uninterruptible power supplies immediately.

3.2 Materials

- Refer to 3.1 of the Introduction.

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STANDARD ELECTRICAL EQUIPMENT UNINTERRUPTIBLE POWER SUPPLIES (UPS)

Sample Semi-Annual Preventative Maintenance

1. SCOPE OF WORK

- a. This Preventative Maintenance Procedure is used to:
 - i. Clean and inspect the UPS Cabinet
 - ii. Check the operation of the UPS
 - iii. Verify the condition of the UPS batteries
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2. SCHEDULING

- a. This procedure shall be done once every 6 months
 - b. This procedure shall be done in conjunction with Controller Semi-Annual Preventative Maintenance
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3. CABINETS

- a. Exterior
 - i. Check cabinet is free of corrosion, damage, graffiti, etc.
 - ii. Make sure cabinet is securely mounted
 - iii. Make sure the door operates properly
 - iv. Lightly lubricate the lock, handle and hinges
 - v. Check that the gaskets are intact
- b. Interior
 - i. Vacuum and clean the interior of the cabinet
 - ii. Make sure the cabinet is bonded to ground
 - iii. Check that the cabinet interior is free of the following conditions:
 - 1. Condensation
 - 2. Water Infiltration
 - 3. Poor Drainage
 - iv. Check if wiring, terminals and devices are free of the following conditions:

1. Damage, Wear, Deterioration and Corrosion
2. Evidence of Overheating/Overloading
3. Disconnected or redundant items

4. UPS

a. UPS Unit

- i. Inspect the UPS and wiring for any physical damage
- ii. Record the number of events from the event counter on the Controller maintenance card
- iii. Record the amount of time the UPS has been in Battery mode from the event timer on the Controller maintenance card
- iv. Verify cooling fan operation
- v. Dust the UPS housing

b. Batteries

- i. Inspect the batteries for cracking and swelling
- ii. Inspect the terminals for signs of corrosion or overheating
- iii. Measure individual battery voltage and record on Controller maintenance card (Batteries should be numbered the first time this procedure is completed)
- iv. Replace if measured capacity below 80 % of rated capacity

c. Operational Test

- i. Disconnect the hydro input power to the UPS and ensure proper transfer to battery back up mode
- ii. Check battery voltages under load and record on the Controller Maintenance card
- iii. Return hydro input power to the UPS and ensure proper transfer back to normal mode