

**HV OPERATOR TRAINING**  
**RESTRICTED**  
**SWITCHING OVERHEAD**



**RSO** LOG BOOK



*Enabling the establishment, consistency and portability of agreed industry standards across  
the Victorian Electricity Supply Industry*

**TRAINEE NAME**

Name

Issue date

**EMPLOYER****MANAGER APPROVAL**

Name

Signature

Issue date

**EXAMPLE ONLY  
NOT TO BE USED**

## INTRODUCTION

This Log assists the trainee in documenting evidence of the practical (on-the-job) component of HV Switching to enable them to be assessed for authorisation to perform High Voltage Switching Operations (RSO) on the Victorian Electricity Supply Industry (VESI) High Voltage Distribution Networks.

All items listed in the Log shall be completed and submitted to the Distribution Network for assessment with all accompanying evidence within 12 months or as stipulated by the Distribution Network.

### Accompanying evidence

- A diary recording a brief account of daily activities and any fault switching carried out.
- All Access Authorities, Applications and Switching Instructions associated with the trainee's switching tasks.

## PRE-REQUISITE

Participants shall have completed initial training as stipulated in the VESI Skills and Training guideline for High Voltage Switching – RSO.

## SCOPE

Perform High Voltage Switching, Earthing and issue Electrical Access Authorities on:

- All pole type substations.
- Spur and SWER lines and associated apparatus.

RSO excludes metal enclosed switch gear and the underground network.

## USE OF LOG BOOK

- The trainee completing this Log shall be under the guidance of a mentor.
- The trainee shall carry the Log Book at all times during the training period and have the mentor print, sign and date when applicable.
- The mentor shall print their name, sign and date specific items when they have assessed that the trainee has a complete understanding of the task.
- The trainee shall remain under the direct supervision of the mentor whilst they are operating on a network as an RSO in training.

## ROLES AND RESPONSIBILITIES

### Employer

- Shall ensure mentoring of trainees is carried out by a person that has current competencies and authorisation to carry out the work.
- Provide suitable tools, equipment and vehicles for the tasks being undertaken.
- Monitor trainee progress.
- Ensure that the Log Book is completed correctly and signed off prior to assessment by the Distribution Network.

### Team Leader/Supervisor/Manager

- Appoint mentor that has current competencies and authorisation to carry out the work.
- Assist with the planning and scheduling of RSO class operator work.
- Ensure that suitable tools, equipment and vehicles are available for use.
- Ensure that the Log Book is completed correctly and signed off. Submit the Log Book and accompanying evidence to the Distribution Network's responsible person for review and verification **prior** to the assessment.

### Mentor:

- Work with the trainee at all times, reviewing the work practices and standards of the trainee's tasks/work.
- Maintain direct visual and audible contact with the trainee whilst they are switching on a network.
- Forward planning and scheduling of appropriate 'RSO' class switching activities.
- Ensure that the Log Book is completed correctly and signed off prior to assessment by the Distribution Network.

### Trainee:

- Maintain an up-to-date Log Book and provide evidence of activity completion as described in the Log Book.
- Record in a diary a brief account of daily activities and any fault switching carried out.
- Gain the experience and knowledge required.
- Ensure that the Log Book is completed correctly and signed off prior to assessment by the Distribution Network.

**1. SAFETY REQUIREMENTS**

**Correct Personal Safety Equipment (PPE) eg.:**

Hard Working Gloves, Hearing Protection, Safety Glasses, Safety Harnesses, Safety Helmets, Safety Boots, Pole Top Rescue Kit and Personal Tool Kit.....

**Correct Operating Equipment:**

Insulated Gloves (HV), Insulated Gloves (LV), Insulated Sleeve (HV), Insulated Mat (HV), Operating Sticks, Modiewark, Approved Earth & Short Circuits .....

**Conduct risk assessment of the work environment incorporating:**

Personal safety (operator safety), work crew safety, SWMS & JSEA and public safety .....   
 Provide JSEA copies x 10 .....

**2. PROCEDURES**

**Reference Manuals:**

Knowledge of and understands the use of your Distribution Network's Operations and Distribution Switchgear Manuals, and VESI Fieldworker Handbook and Green Book .....

**Control Centre Familiarisation/Visit** (optional as directed by Distribution Network)

Understands Control Centre planned work processes including communicating red marking of instructions to operators .....

**Local Operations Planning**

Understands the significance and general procedures of local planning operations .....

**Communication:**

Understands correct protocols used to communicate with Control Centre, other Operating, Contracting and Emergency personnel, Work Crews and the general public.....

**Apparatus Labelling and Numbering:**

Understands use of Pole/Lis Numbers, Switch Numbers, Cable Labels and Substation Names.....

**Operating Instructions:**

Understands use for:

- Planned Work .....
- Unplanned Work .....
- Faults and Emergency .....
- Tick & Cross Check .....
- Outcomes / Consequences of Operating Steps .....

**Ferroresonance: (See Appendix A)**

Demonstrated an understanding of what constitutes a possible ferroresonant circuit and how to minimise risks of de-energising / re-energising possible ferroresonant circuits on single phase switchgear.....

**Tags**

Has correctly identified or can demonstrate the correct application and functions of the following tags associated with Access Authorities

- Caution Under Access Authority .....
- Caution Re-Operation (CRO) .....
- In-operable .....

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**2. PROCEDURES continued**

<p><b>Access Authorities:</b> Written, issued and cancelled a minimum of the following Access Authorities and provide copies:</p> <ul style="list-style-type: none"> <li>• Electrical Access Permit (EAP) x 10.....<input type="checkbox"/></li> <li>• Permit to Work (PTW) x 1 (or understanding of) .....<input type="checkbox"/></li> <li>• Statement of Isolation of Low Voltage (SILV) x 1 (or understanding of).....<input type="checkbox"/></li> <li>• Personal Safety &amp; Service Clearance (PSSC) x 2 .....<input type="checkbox"/></li> <li>• Sanction for Test (Overhead ABC) x 1 if available. Otherwise have an understanding .....<input type="checkbox"/></li> <li>• Personal Safety &amp; Service Clearance (PSSC) x 1.....<input type="checkbox"/></li> </ul>			
<p><b>Earthing Procedures:</b> Understands Safe to Earth Test, Priority Earthing, Discharging, Application/Technique, Operational Earthing (Point of Access to all sources of Supply).....<input type="checkbox"/></p>			
<p><b>SWER</b> Performed or has an understanding of a Safe to Approach Test at a SWER structure.....<input type="checkbox"/> Performed or has an understanding of energisation of a SWER substation .....<input type="checkbox"/></p>			
<p><b>Commissioning New Equipment</b> Checked Labelling, received PSSC – Clearance Procedure, and performed LV Phase Outs, Phase Rotation &amp; Voltage Testing.....<input type="checkbox"/></p>			

**3. DISTRIBUTION SYSTEM EQUIPMENT**

<p><b>Identified Distribution Substations:</b></p> <ul style="list-style-type: none"> <li>• Single and two pole aerial substation .....<input type="checkbox"/></li> <li>• Ground type substation.....<input type="checkbox"/></li> <li>• Underground substation .....<input type="checkbox"/></li> <li>• Kiosk substation.....<input type="checkbox"/></li> <li>• SWER ISO substation .....<input type="checkbox"/></li> </ul>			
<p><b>Understands Transformers:</b></p> <ul style="list-style-type: none"> <li>• Transformer ratings .....<input type="checkbox"/></li> <li>• Fuse types .....<input type="checkbox"/></li> <li>• Primary winding taps (dual range).....<input type="checkbox"/></li> <li>• Secondary winding taps.....<input type="checkbox"/></li> <li>• Neutral connections.....<input type="checkbox"/></li> <li>• Earth connections .....<input type="checkbox"/></li> <li>• Number of LV circuits.....<input type="checkbox"/></li> </ul>			
<p><b>Identify 3rd Party assets:</b></p> <ul style="list-style-type: none"> <li>• Fibre optical lines.....<input type="checkbox"/></li> <li>• Tramway traction .....<input type="checkbox"/></li> <li>• Railway traction .....<input type="checkbox"/></li> <li>• Telecommunication lines.....<input type="checkbox"/></li> <li>• Electrolysis.....<input type="checkbox"/></li> <li>• Supervisory.....<input type="checkbox"/></li> <li>• Other network distribution and sub transmission circuits.....<input type="checkbox"/></li> </ul>			

**4. SWITCHING/OPERATING**

<p><b>Demonstrated how to identify the correct switching device to be operated using:</b></p> <ul style="list-style-type: none"> <li>Switch number, Switch type, Geographical location, electrical location and LV cable destinations ..... <input type="checkbox"/></li> </ul>			
<p><b>Conducted the following checks on switchgear:</b></p> <ul style="list-style-type: none"> <li>Pre and Post Operation / Serviceability, Safety of Operation, Switchgear Rating..... <input type="checkbox"/></li> </ul>			
<p><b>Demonstrated the correct method for:</b></p> <ul style="list-style-type: none"> <li>Operating a switching device..... <input type="checkbox"/></li> <li>Relationship of HV &amp; LV ..... <input type="checkbox"/></li> <li>Locking &amp; Tagging ..... <input type="checkbox"/></li> </ul>			
<p><b>HV Fuses:</b> Understands characteristics and operation of BA, EDO and PFF</p>			
<p><b>Kaon Fuse Saver:</b> Understand the characteristic and operation of, including remote control.</p>			
<p><b>HV Switches:</b> Has operated the following three (3) as a minimum:</p> <ul style="list-style-type: none"> <li>Arc Chute Switch (Ganged)..... <input type="checkbox"/></li> <li>Mid Span Isolators ..... <input type="checkbox"/></li> <li>Manual Gas Switch..... <input type="checkbox"/></li> </ul> <p>and has an understanding of the following:</p> <ul style="list-style-type: none"> <li>Arc Chute Switch (Single Phase)..... <input type="checkbox"/></li> <li>Load Interrupter (Ganged) ..... <input type="checkbox"/></li> <li>Expulsion Interrupter Switch ..... <input type="checkbox"/></li> <li>Flicker Blade Switch ..... <input type="checkbox"/></li> <li>Side Break Rotary Switch (Optional) ..... <input type="checkbox"/></li> <li>Single Blade Isolators ..... <input type="checkbox"/></li> <li>Ganged Isolators ..... <input type="checkbox"/></li> <li>Automatable Gas Switch ..... <input type="checkbox"/></li> </ul>			
<p><b>Live Line Clamps</b> Has lifted and stowed Live Line Clamps at:</p> <ul style="list-style-type: none"> <li>Distribution Substation..... <input type="checkbox"/></li> <li>Tee Off Pole ..... <input type="checkbox"/></li> </ul>			
<p><b>Transformers HV &amp; LV</b> Has Isolated, Earthed, Commissioned &amp; Tested the following Transformers:-</p> <ul style="list-style-type: none"> <li>Overhead Distribution ..... <input type="checkbox"/></li> <li>Ground Type (where possible)..... <input type="checkbox"/></li> </ul>			
<p><b>Automatic Circuit Reclosers &amp; Control Boxes</b> Understands suppression of remote control, auto reclose, and opening and closing of the ACR, for eg.</p> <ul style="list-style-type: none"> <li>Remote Controlled SWER ACR electronic control box..... <input type="checkbox"/></li> </ul>			
<p><b>Fault Indicators</b> Understands the operation, reading and re-setting (if applicable)</p>			
<p><b>HV Customer Networks</b> Has operated or is able to demonstrate an understanding ..... <input type="checkbox"/></p>			

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5. PROTECTION SYSTEMS, FUNCTIONS & FAULT LOCATION

**Fault Location and Analysis:**

- Involvement in fault activity and restoration.....
- Use of diagrams.....
- Direction from NCC.....
- Fault Indicators .....
- Other Operating Personnel .....
- Co-ordination and communication with  
Emergency Services.....

**Understanding of Reclose Function:**

- Auto-reclose.....
- Suppression.....
- Live Line Sequence .....
- Single / multiple shot re-close.....

**Understanding of Basic Protection Systems:**

- Overcurrent.....
- Earth Fault.....


Comments:

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# Appendix A

## WHAT IS FERRORESONANCE ?

Ferroresonance causes an unstable **VOLTAGE** situation. The voltages that can occur may far exceed the voltage rating of the HV equipment (up to 7 times).

## WHEN CAN FERRORESONANCE OCCUR?

Ferroresonance can occur when the capacitance of an **insulated cable** (HV U/G, or HVABC) and the inductance of a **transformer** (anywhere within the switching zone) are energised, or de-energised as a combination, on a **single phase switching device** (HV fuses, or isolators).

## WHAT CAUSES FERRORESONANCE ?

Ferroresonance is caused when the capacitance of an **insulated cable** (HV U/G, or HVABC) **and** the inductance of a **transformer** (anywhere within the switching zone) become “tuned” or “matched” to each other and are energised, or de-energised as a combination, on a **single phase switching device** (HV fuses, or isolators). This causes a resonating effect between the inductive and capacitive voltages, which can produce voltages up to 7 times the operating voltage.

## EXPERIENCING FERRORESONANCE IN THE FIELD

If ferroresonance occurs in the field, some of the following events may happen:

- The single phase switching device **you** are using may **flash-over**.
- The ACR or CB may operate.
- The LA's or HV equipment may be damaged.

## OPERATING AROUND FERRORESONANCE

Once you have identified the **possibility** of ferroresonance, you should use the following steps:

1. Energise or de-energise the switching zone (combination) on a gang operated switch.
2. Contact the Control Room for instructions.

**NOTE:** A load-buster tool is **ONLY** for breaking current and cannot be used for ferroresonance because it is a voltage situation.



# STATEMENT OF NOMINATION FOR HV OPERATOR AUTHORISATION

I / we recommend that (Name of Trainee)

.....

be assessed for authorisation for High Voltage Operator Level

## **RESTRICTED SWITCHING OVERHEAD RSO**

	Name	Signed	Date
Mentor/s	NOT TO BE USED		

Supervisor			
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Manager			
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