

1. SCOPE

This document details the application of SOP 334 (Applicable to Power Isolators Type DSB 132kV disconnector with Type PT motor powered mechanism) issued by the Energy Networks Association.

2. ISSUE RECORD

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Issue Date	Issue No	Author	Amendment Details
June 2006	1	Kevin Butter	Initial issue

3. ISSUE AUTHORITY

Author	Owner	Issue Authority
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4. SOP DETAILS

SWITCHGEAR TYPE:	Power Isolators Type DSB 132kV double-break (RCP) disconnecter with Type PT motor powered mechanism.
ORIGINATING DNO	United Utilities
DATE:	17 May 2006
NUMBER INSTALLED IN ENERGY NETWORKS NORTH:	33
NUMBER INSTALLED IN ENERGY NETWORKS SOUTH:	51
REASON:	Grid Transformer 132kV disconnecter closed of its own accord. Transformer 33kV circuit-breaker was open at the time, so no load transfer occurred and disconnecter was undamaged. (See Additional Information below)
STATUS IN INITIATING DNO:	“There must be no live operation of the above switch type. There must be no access to the isolator control cabinet of the above switches. In addition, the following access restriction will apply:- Access to substation compounds containing the above switchgear is limited to essential operational activities only when the switchgear is live” (6 units affected in initiating DNO)
SPEN APPLICATION:	SOP will NOT be applied in Energy Networks at this time. (See Additional Information below)
UPDATE:	Initial issue. This SOP will be re-assessed if further information is received from UU or manufacturer.
REMEDIAL ACTION:	No remedial action is planned at this time.

5. ADDITIONAL INFORMATION

5.1 Background

Photograph 1 shows the PT mechanism mag-bolt and “upper limit switch” in the normal position (disconnecter fully open or fully closed and not under operation). Under healthy conditions, the mag-bolt would be electrically operated when a valid open or close command is given. The normally open upper limit switch is closed by the mag-bolt when the mag-bolt is fully raised. Photograph 2 shows the mag-bolt plunger, limit switch operating plate and “bottom limit switches” in the normal position. The mag-bolt plunger, which is permanently attached to the operating plate, keeps lower limit switches open. When disconnecter is operated the mag-bolt lifts which allows the lower limit switches to close.

In the incident in question, a piece of the plastic moulding had broken off the side of the normally closed lower limit switch. This piece of plastic had then become wedged between the lower limit switch and the mag-bolt operating plunger. The lower limit switch was thus released to its normally closed position. The mag-bolt plunger was in a higher position than normal due to being wedged on top of the piece of plastic broken from the lower limit switch. The effect being that the mag-bolt was sufficiently raised to close the normally open upper limit switch.

When both the upper and lower limit switches are closed the control relay is energized, regardless of interlocking status. When the closed relay is energized the disconnecter will change state from open position to closed position and vice-versa. Normally the control relay would be de-energised at the end of disconnecter travel, but because the mag-bolt was held in the “up position” then the disconnecter would continue changing state.

In the incident in United Utilities, the disconnecter closed without being commanded to do so, but the associated 33kV circuit-breaker was open so disconnecter did not switch any load. The disconnecter was undamaged and no one was injured. As a result of the incident, United Utilities have decided to apply a SOP to the six disconnectors of this type on their network.

5.2 Assessment by Energy Networks

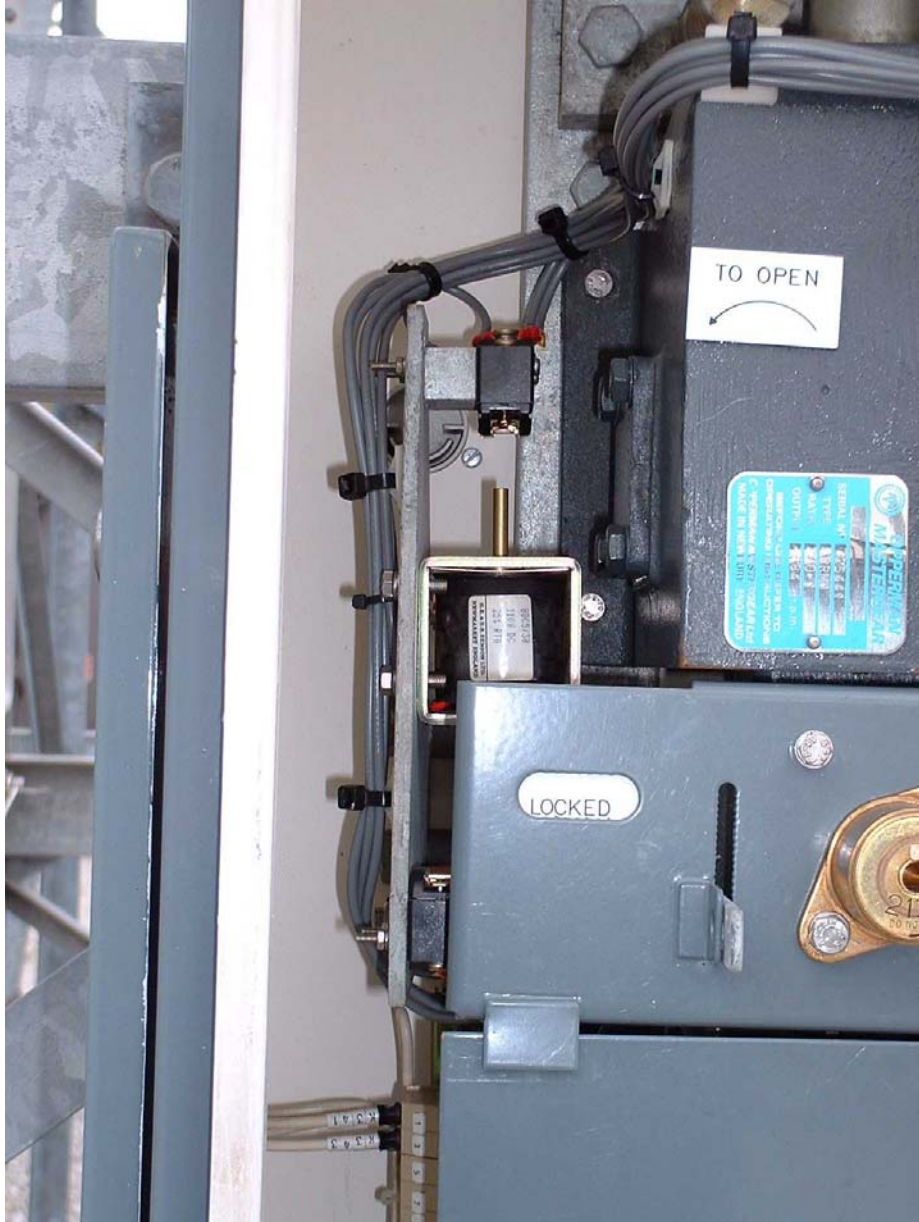
Energy Networks has carried out assessment of the incident in conjunction with the manufacturer and have considered typical control circuits used by Energy Networks in Power Isolators Type PT mechanisms. This has established that if an object was wedged between the lower limit switch and mag-bolt plunger sufficient to operate both the upper and lower limit switches that this would cause the disconnecter to incorrectly operate in the manner described above.

However, in considering whether to apply a similar SOP within Energy Networks, the likelihood of such an event has been assessed. It is considered, that the likelihood of a re-

occurrence of a similar incident whereby part of the lower limit switch could become detached and then be forced upwards and become lodged between the limit switch contacts and mag-bolt plunger plate is extremely remote. It is also believed that the mag-bolt would have to be in the raised position to allow the object to be pushed between the plunger plate and limit switch contacts. Under healthy operating conditions, the mag-bolt can only be raised electrically when an open or close operation is commanded after interlocking conditions have been confirmed. In the event of such an occurrence, then risk to operator would be low as disconnecter would not be required to operate outside its normal operating duty.

It has therefore been decided that the SOP applied in UU will NOT be applied in Energy Networks at this time.

United Utilities are still investigating the incident and considering possible modifications. Should further information become available then the action taken by Energy Networks will be further considered.



Photograph 1



Photograph 2.