

1 Q. Identify all equipment on the Island Interconnected System primarily used for  
2 voltage support and outline the nature of the support provided and the extent  
3 to which each contributes to voltage support for the system.  
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6 A. Continuous voltage control is provided by the static excitation systems of  
7 Hydro's hydraulic and thermal generation sources. Additional voltage  
8 support equipment in the form of shunt capacitor banks, shunt reactors and  
9 transmission class voltage regulators are required on the Island  
10 Interconnected System. Shunt capacitor banks are used to increase voltage  
11 levels. Shunt reactors are used to reduce voltage levels on lightly loaded  
12 long transmission lines. Voltage regulators are used to maintain load side  
13 bus voltages to within a predefined bandwidth about a fixed set point. Both  
14 capacitors and reactors are used to assist in maintaining system voltage  
15 levels between 95 and 105% of rating. Switching of shunt capacitor banks  
16 and reactors produce discrete changes in local bus voltages.  
17

18 The following shunt capacitor banks are located on the Island Interconnected  
19 System:  
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- 21 • one 3 MVAR, 66 kV bank at Grand Bay providing an approximate 3 to 4%  
22 change in local bus voltage on switching;
- 23 • two 26.4 MVAR, 66 kV banks at Hardwoods Terminal Station, each  
24 providing an approximate 2 to 3% change in local bus voltage on  
25 switching;
- 26 • one 24 MVAR, 46 kV bank at Long Harbour Terminal Station providing an  
27 approximate 4 to 5% change in local bus voltage on switching;

- one 25.2 MVAR, 66 kV bank and one 26.4 MVAR, 66 kV bank at Oxen Pond Terminal Station, each providing an approximate 2 to 3% change in local bus voltage on switching; and
- three, 3.0 MVAR, 69 kV banks at St. Anthony Airport Terminal Station, each providing an approximate 4 to 5% change in local bus voltage on switching.

The capacitor banks at Grand Bay and St. Anthony Airport provide necessary voltage support to meet the load requirements of the Doyles – Port aux Basques and Great Northern Peninsula radial transmission systems respectively. The capacitor banks at Long Harbour, Oxen Pond and Hardwoods have been sized to enhance the transfer capability of the 230 kV transmission system.

The following shunt reactors are located on the Island Interconnected System:

- two, 5 MVAR, 138 kV reactors at Plum Point Terminal Station, each providing an approximate 5% change in bus voltage on switching; and
- one, 5 MVAR, 138 kV reactor at Bear Cove Terminal Station providing an approximate 5% change in bus voltage on switching.

The shunt reactors at Plum Point and Bear Cove provide the necessary voltage support to the Great Northern Peninsula transmission system under light load conditions.

One transmission class voltage regulator is located on the Island Interconnected System at Hawke's Bay Terminal Station. This 10.8 MVA, 66 kV voltage regulator provides a +/- 10% change in bus voltage in steps of 0.625%.