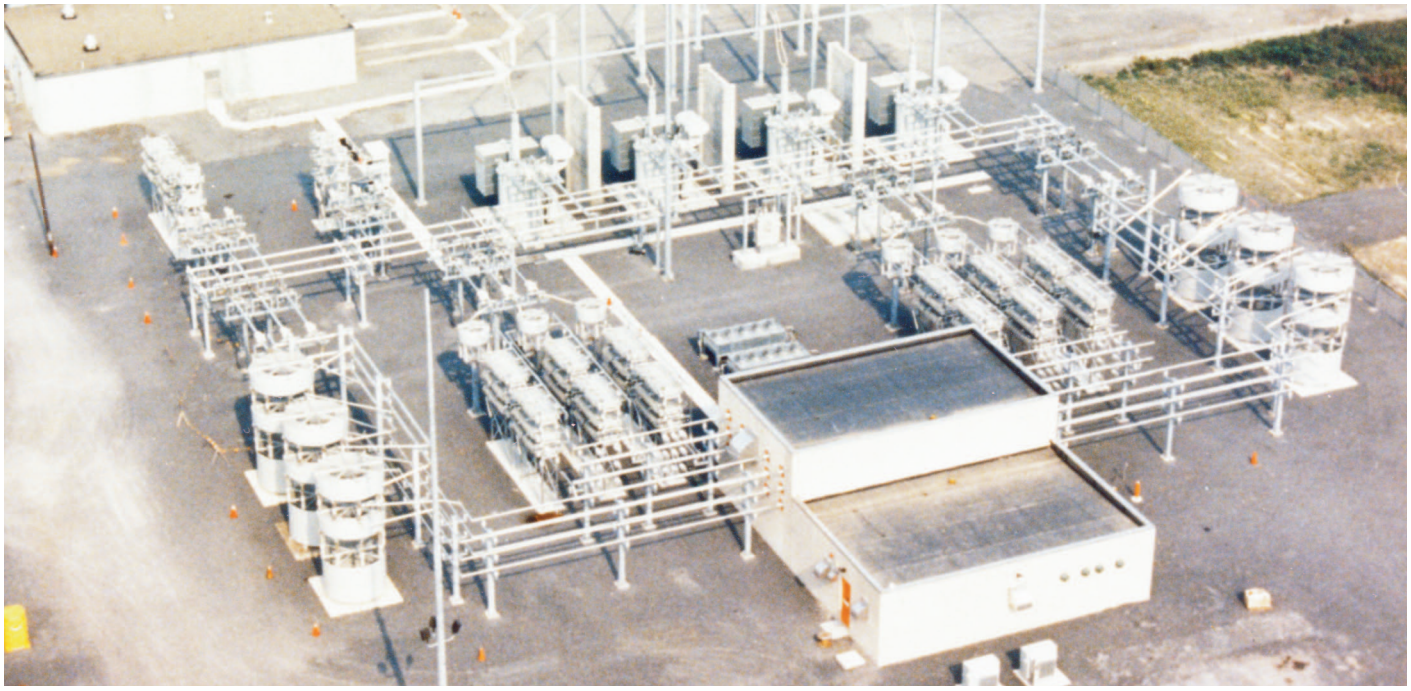
# SVC to enable power boost into the New York area



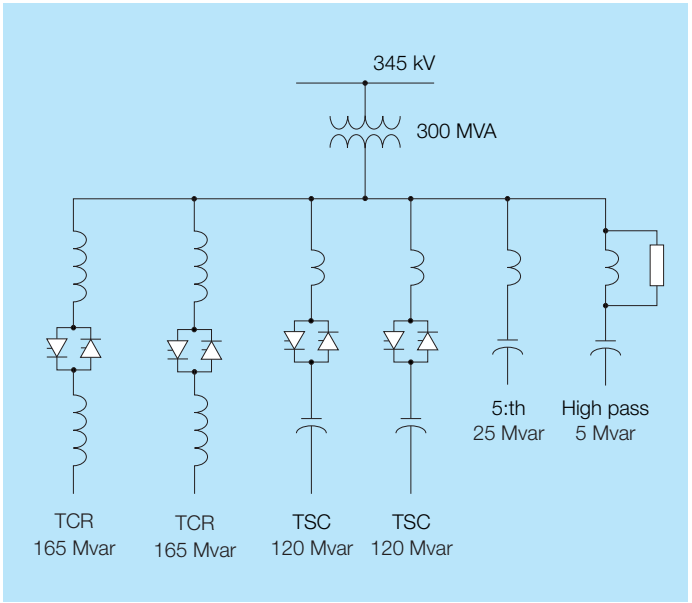
A static var compensator (SVC) rated at 300 Mvar inductive to 270 Mvar capacitive supplied by ABB was commissioned in 1988 in the Leeds 345 kV substation of Niagara Mohawk Power Company near Catskill, N.Y. The compensator, which was installed on a turn-key basis, performs the dual task of providing dynamic voltage control as well as power oscillation damping for a double circuit 345 kV transmission system stretching some 300 kilometers (185 miles) from the Marcy substation near Utica, N.Y. to East Fishkill, where power is fed into Con Edison's New York City cable network. With this investment, the power transfer capability from the north into the New York area has been boosted by a considerable amount.

While the New York Power Authority (NYPA) was the overall responsible organization for the Marcy South Project, the utility operating in the Leeds area – Niagara Mohawk Power Corporation (NMPC) – was given the task of implementing the SVC in the system. The SVC was commissioned during the summer months, coinciding with an all time record breaking power load due to unusually hot weather conditions in the area.

The SVC consists of two thyristor-controlled reactors (TCR), each rated at 165 Mvar, two thyristor-switched capacitors (TSC), each rated at 120 Mvar and two filter banks for harmonic suppression with a total rating of 30 Mvar. Thus the total dynamic range of the SVC goes from 300 Mvar inductive to 270 Mvar capacitive reactive power as seen from the 345 kV side.

The SVC is connected to the 345 kV bus in the Leeds substation by a set of dedicated 345 kV single-phase step-up transformers.

The thyristor valves comprise high power thyristors cooled by a glycol/water mixture and utilizing outdoor dry air cooling towers.



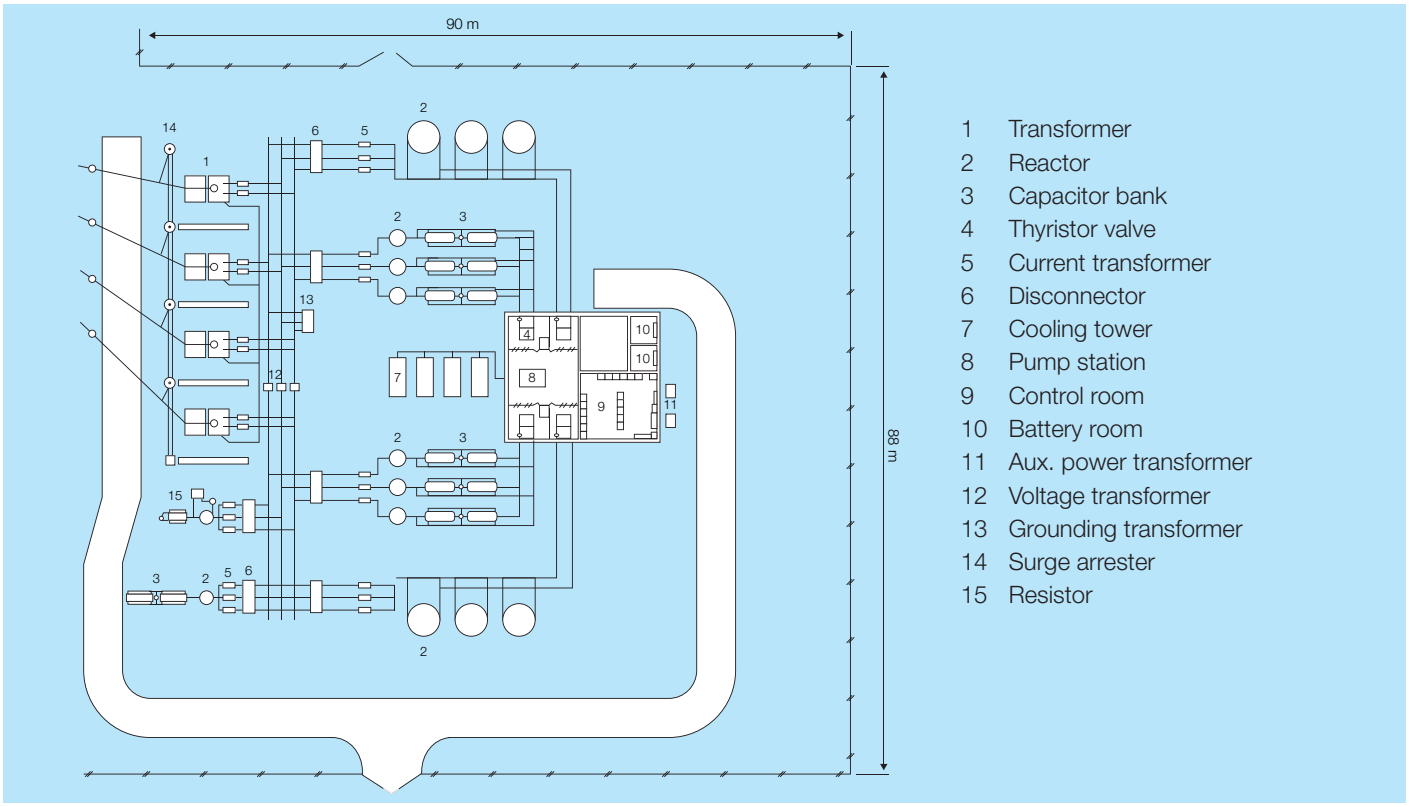

**Single-line diagram**

The control system is of the closed-loop voltage control type with a built-in relaxation circuit to automatically respond to dynamic events in the 345 kV system while at the same time maintaining a dynamic reserve during static conditions.

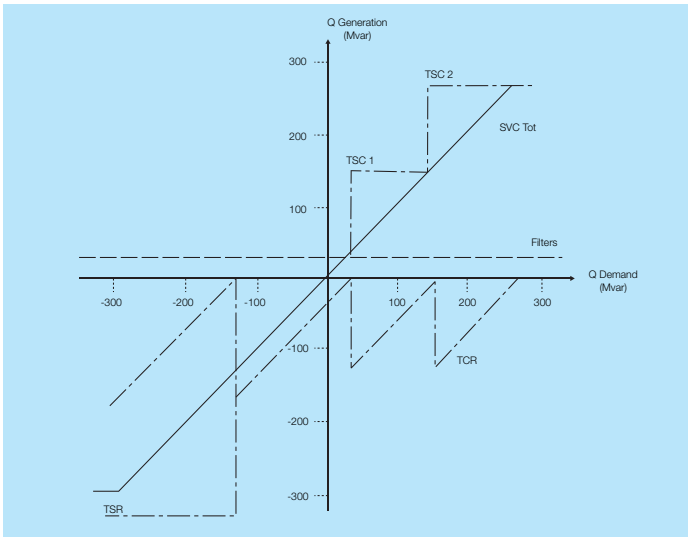
### SVC upgrade

After many years of successful operation, it was decided to upgrade the SVC by replacing vintage key components by the latest technology, thereby extending the life span of the SVC additionally. Thus, the four thyristor valves including cooling plant were exchanged. New protective equipment was installed. The control system was upgraded into ABB's latest generation, MACH 2, a micro-processor based system built around an industrial PC with add-in circuit boards and I/O racks connected via standard type field buses. Facilities for remote operation and supervision are integrated in the system. The upgrade was completed in 2010.

As an added feature, the under-voltage handling capability of the SVC has been extended. Thus, during severe under-voltage events in the grid, the SVC continues to operate as long as the thyristor valve control can synchronize to the system voltage, which is practicable down to voltages as low as 0.3 p.u.




**Layout**




**SVC output versus system demand**

## Technical data

| | |
|---|---|
| Controlled voltage | 345 kV |
| SVC rating | 300 Mvar inductive to 270 Mvar capacitive |
| Control system | Three-phase voltage control by means of a voltage regulator |
| Thyristor valves | Water/glycol cooled three-phase valves with indirect light firing |

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