

I. STATION-TO-STATION SCHEME

A Station-to-Station scheme typically takes care of a pair of two station boards in a 3 breaker Main-Tie-Main configuration and an automatic fast transfer requirement is often not considered in system designs, although this may be critical incase of important auxiliaries being provided on the station boards.

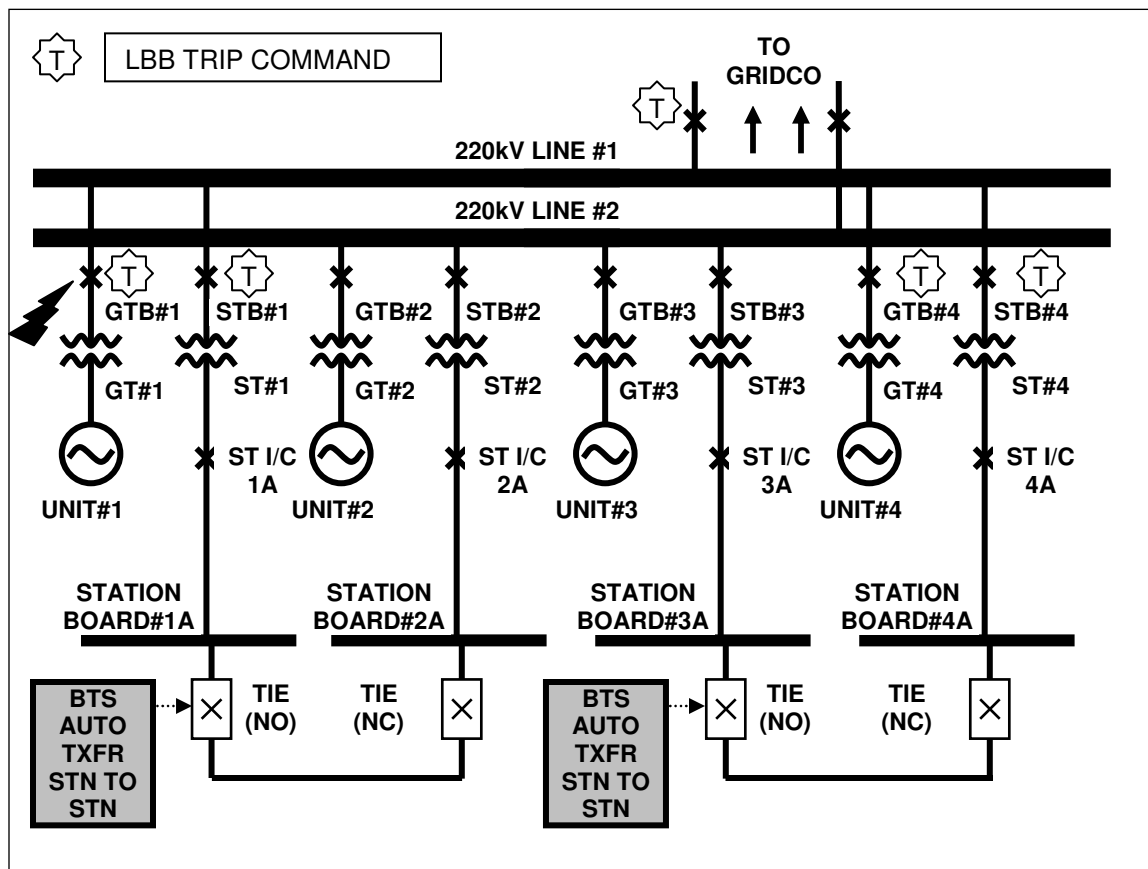


Fig. 8. 4x210 MW Thermal Power Plant – LBB Trip resulting in Unit & Station Board AC Failure

This case study is about an exceptional incident at Khaperkheda TPS consisting of 4 210 MW units (say Unit#1-4) had 2 units each feeding into separate 220kV lines (say Unit#1,4 – Line#1 & Unit#2,3 – Line#2). This installation was provided with automatic fast transfer schemes only for Unit-to-Station, and Manual-Only schemes for Station-to-Station fast bus transfer.

Incidentally, the Station Transformers ST#1,4 for Unit#1,4 were also connected to Line#1, and ST#2,3 for Unit#2,3 were connected to Line#2 which is not a standard

practice in the interest of redundancy. Unit#1 was being withdrawn for shutdown, when its Generator Transformer Breaker (GTB#1) mal-operated and did not trip. This resulted in an LBB condition on the Line#1, tripping all the feeds from that line in the plant, which included GTB#4 for Unit#4 (operating at full load) along with STB#1, 4. Protective logics immediately initiated a Unit-to-Station transfer for Unit#1, 4; which successfully transferred Unit#1,4 unit boards to ST#1,4 respectively.

However, this was not of any use since ST#1, 4 had also lost its incoming feed from Line#1. The backup DG Supply also malfunctioned and failed to startup. Thus both Units#1,4 suffered total AC Failure. Had there been an automatic Station-to-Station Scheme, the station boards fed from ST#1, 4 could have transferred to ST#2, 3 avoiding this condition.

As a matter of fact, Unit#4 suffered station battery bank failures for both its backup DC supply banks due to the sudden surge in load, and the DC Jacking Oil Pump (JOP) also lost supply within a few minutes of this event leading to severe damage to its turbine bearings and several months of unit outage. Automatic station-to-station bus transfer schemes are thus recommended for this plant.