



# Maharashtra State Load Despatch Centre

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**Partial Grid Disturbance  
in**

**Mumbai system**

**on**

**18<sup>th</sup> Nov-2010 at 17:45 hrs**

**and**

**21<sup>st</sup> Nov-2010 at 17:10 hrs**



# Maharashtra State Load Despatch Centre

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## **Partial Grid Disturbance in Mumbai sub-urban system on**

**18<sup>th</sup> Nov-2010 at 17:45 hrs**

# Maharashtra System Conditions

## *(Prior to Disturbance)*

■ State Catered Demand	:	<b>13007</b> MW
■ State Generation	:	<b>9583</b> MW
■ Central Sector (Receipt)	:	<b>3424</b> MW
■ System Frequency	:	<b>49.76</b> Hz
■ <u>Mumbai System</u>		
Mumbai Catered Demand	:	<b>2592</b> MW
TPC Hydro	:	<b>186</b> MW
TPC Thermal	:	<b>1257</b> MW
R-Infra Thermal	:	<b>498</b> MW
Exchange with MSETCL	:	<b>658</b> MW

# System Conditions (Prior to Disturbance) [Contd...]

## ■ Transmission Equipments Out:

- 220 kV Salsette {TPC-T} Bus- Coupler : status **OPEN**

*Bus-Coupler is normally kept open in order to control loading on 220 KV Kalwa-Salset D/C*

- 220 kV Borivali {MSETCL}- Borivali {TPC} : status **OPEN**

*Flow on this line normally remains above 300 MW and during Mumbai peak 380 MW. Major source to Borivali is from Kalwa S/s During forced outage of ICT-1 at Kalwa line kept off from 19<sup>th</sup> Oct.*

- 220 kV Kalwa - Borivali {MSETCL}: status **OPEN**

*- planned outage for numerical relay commissioning*

# System Disturbance

## Following lines and units tripped,

- 1] 220 KV Trombay-Salset-I at 17:39 followed by tripping of following lines at 17:45 hrs
- 2] 220 KV Trombay-Salset-II
- 3] 220 KV Boisar(MSETCL)- Dahanu(R)
- 4] 220 KV Boisar(MSETCL)-Versova(R)
- 5] 220 KV Borivali(T)-Aarey(R)-I
- 6] 220 KV Borivali(T)-Aarey(R)-II
- 7] 220/100 KV Borivali(M) 125 MVA ICT-I
- 8] 220/100 KV Borivali(M) 125 MVA ICT-II
- 9] 250 MW Dahanu TPS U-I (Generator)
- 10] 250 MW Dahanu TPS U-II (Generator)

# System Disturbance

## Sequence of Events of disturbance in Mumbai suburban system on 18.11.2010

<i>Sr No</i>	<i>Time</i>	<i>Sequence Events</i>
1	<b>17:39:17</b>	At <b>17:39:17:852 Hrs</b> 220 kV Trombay-Salsette ckt-1 carrying 170 MW, tripped on phase to phase fault caused due to kite string in span 70-71 at Tagorenagar, Vikroli.
2	<b>17:44:43</b>	At <b>17:44:43:868 Hrs</b> 220 kV Trombay-Salsette ckt-2 carrying 290 MW, tripped at 220 kV Salsette end. Earlier both the lines were carrying 170 MW each.
3		Prior to tripping, at 220 kV Salsette, Bus coupler was off.

# System Disturbance (contd ..

## Sequence of Events of disturbance - (Contd....)

<i>Sr No</i>	<i>Time</i>	<i>Sequence Events</i>
4		R-Infra system remain connected to Borivali(Tata) and further to Borivali(MSETCL) on 100 kV BO-BO Lines.
5	<b>17:44:44</b>	Borivali(T) started drawing from Borivali(M) on 100 kV Borivali, due to network configuration. 220/100kV, 2X125 MVA ICT's at MSETCL Borivali, which were carrying 180 MW (Pre fault loading) tripped on over load.
6		Due to tripping of Borivali ICT, Borivali(T) load shifted on Reliance network.
7		This has resulted in reversal of power flow from 190 MW, from Borivali(T) to RInfra Aarey to 274 MW export from RInfra Aarey to Borivali(T).

# System Disturbance (contd ..

## Sequence of Events of disturbance - (Contd....)

<i>Sr No</i>	<i>Time</i>	<i>Sequence Events</i>
8		Reliance network was carrying about 950 MW with a Dahanu generation of 498 MW. Reliance system remained connected to Boiser(M) system.
9	<b>17:45:19</b>	Drawal from Boisar(M) increased and 220 kV Boisar-Versova carrying 319 MW and 220 kV Boisar-Dahanu carrying 229 MW consequently tripped on
10	<b>17:45:19</b>	Load of @ 950 MW remained connected to Reliance network having source of 498 MW, which resulted in dipping of frequency at <b>17:45:19:563Hrs</b> , Automatic load shedding of @ 400 MW was initiated at 48.00 Hz.
11	<b>17:45:20</b>	Due to further frequency dipping to 47.6 Hz, islanding scheme at Aarey operated resulting in tripping of both TPC lines at Aarey at <b>17:45:20:252 Hrs</b>

# System Disturbance (contd ..

## Sequence of Events of disturbance - (Contd....)

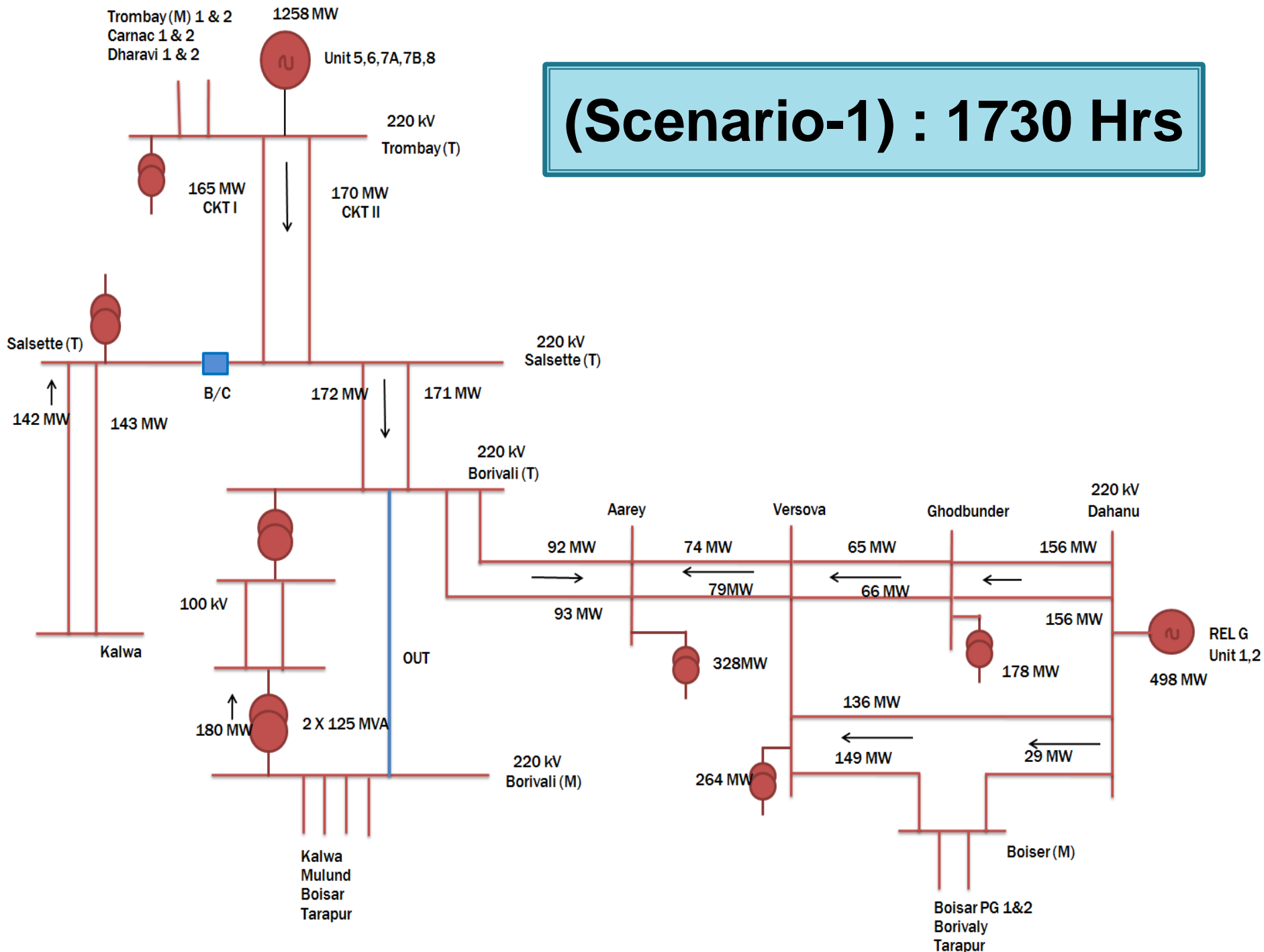
<i>Sr No</i>	<i>Time</i>	<i>Sequence Events</i>
12		Due to load throw off on account of loadshedding on U/f and disconnection of TPCL lines at Aarey, frequency shotup to 51.75 Hz of islanded system.
13	<b>17:45:37</b>	During these frequency oscillations, the GT-1 at Dahanu TPS tripped on overspeed at <b>17:45:37 Hrs.</b>
14	<b>17:45:39</b>	Dahanu unit 2 remained in service with the island load of @ 370 MW. Thereby tripping on under frequency at <b>17:45:39 Hrs.</b>
15		Thus Total AC failure in R Infra network was of 770 MW.

# System Disturbance (contd ..

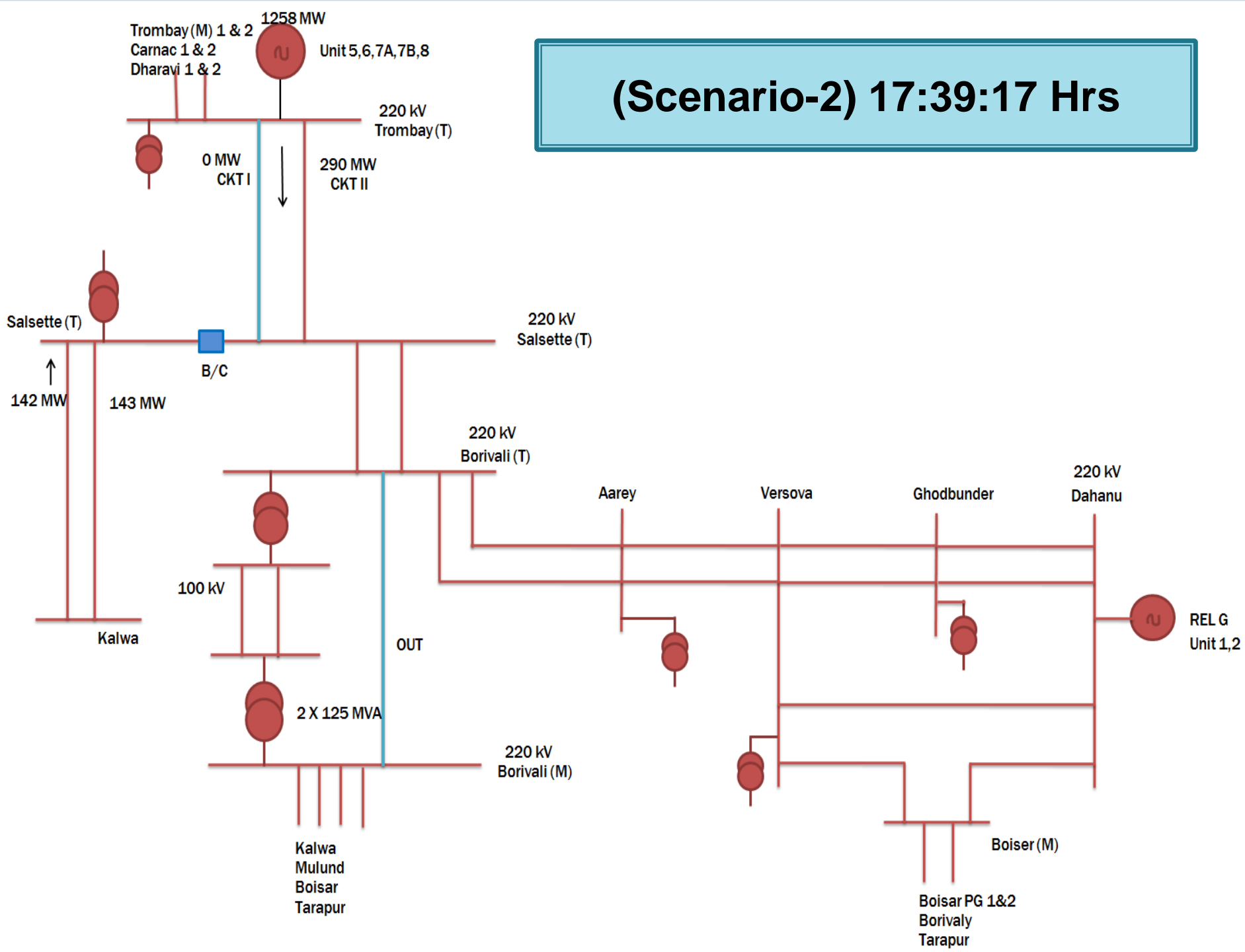
## Sequence of Events of disturbance - (Contd....)

<i>Sr No</i>	<i>Time</i>	<i>Sequence Events</i>
16	17:46:21	220 kV Bus coupler at 220 kV Salsette was closed at <b>17:46:21:564 Hrs</b> and supply to Borivali(T) restored.
17		Total restoration at 19:04 hrs 664MW load was restored in Rel Infra system (400 MW from TPCL and 264 MW from Boisar)
18		Unit-2 synchronized at 20:14 hrs and Unit-1 synchronized at 21:18 hrs.

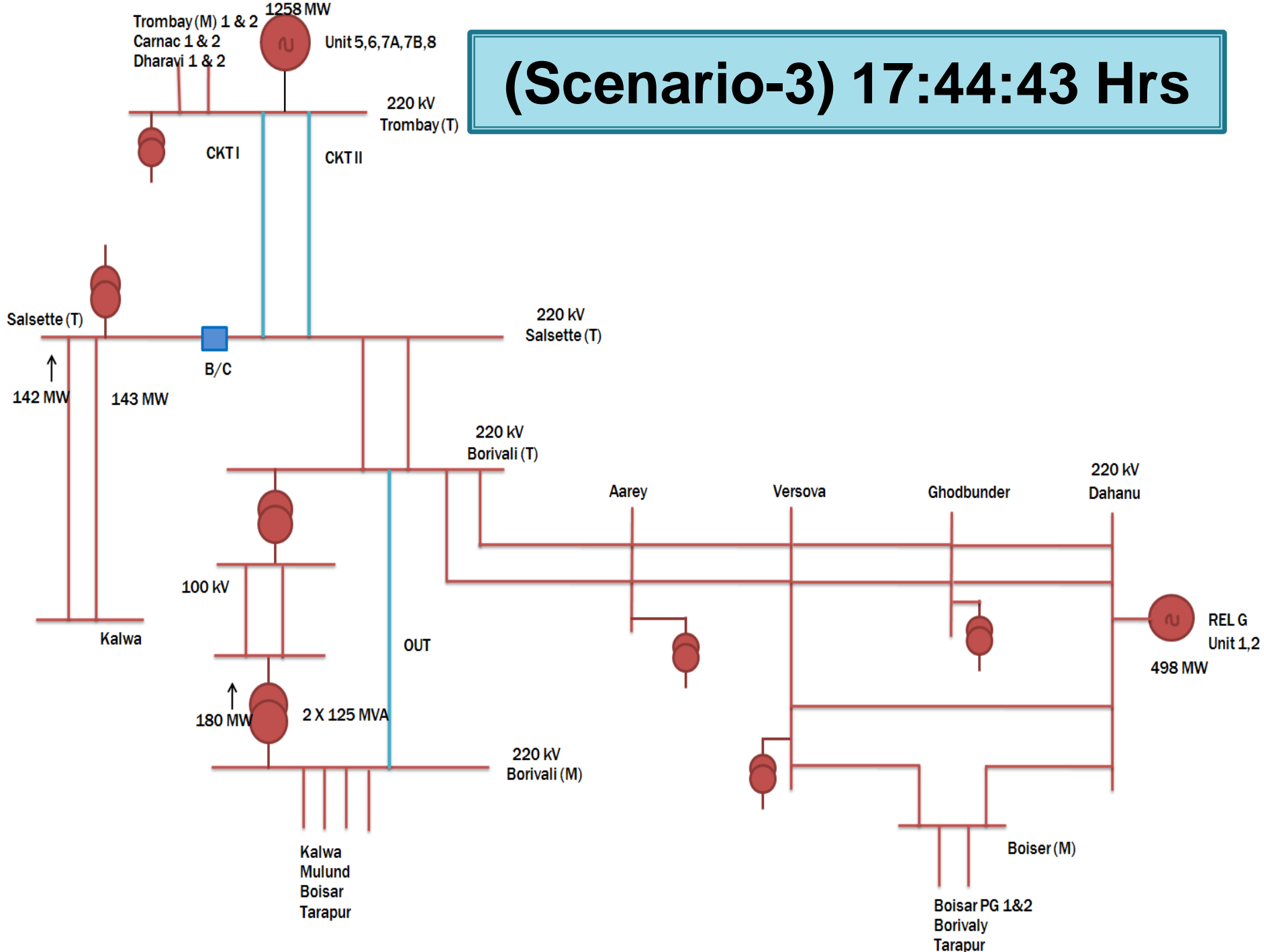
# (Scenario-1) : 1730 Hrs



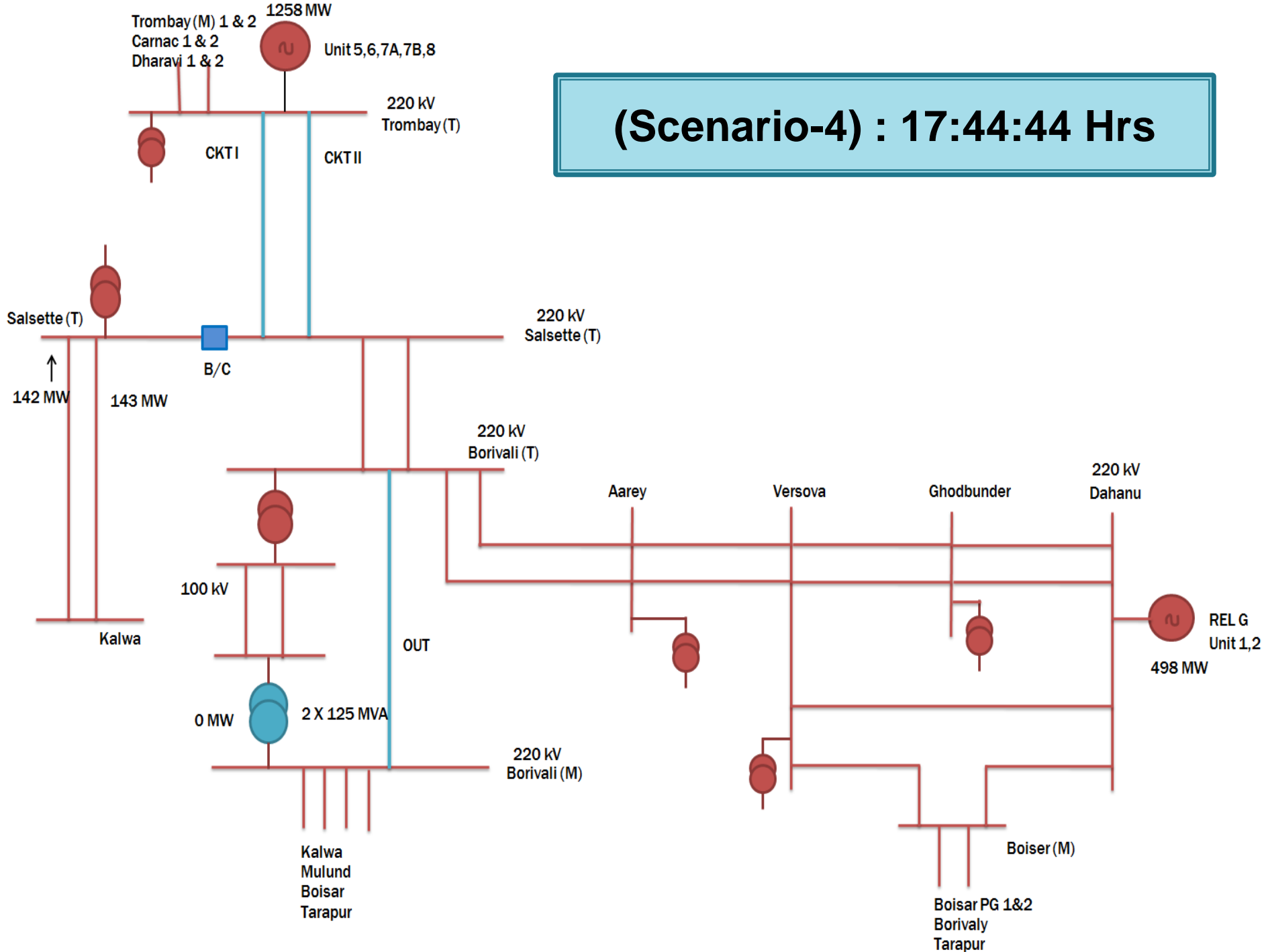
# (Scenario-2) 17:39:17 Hrs

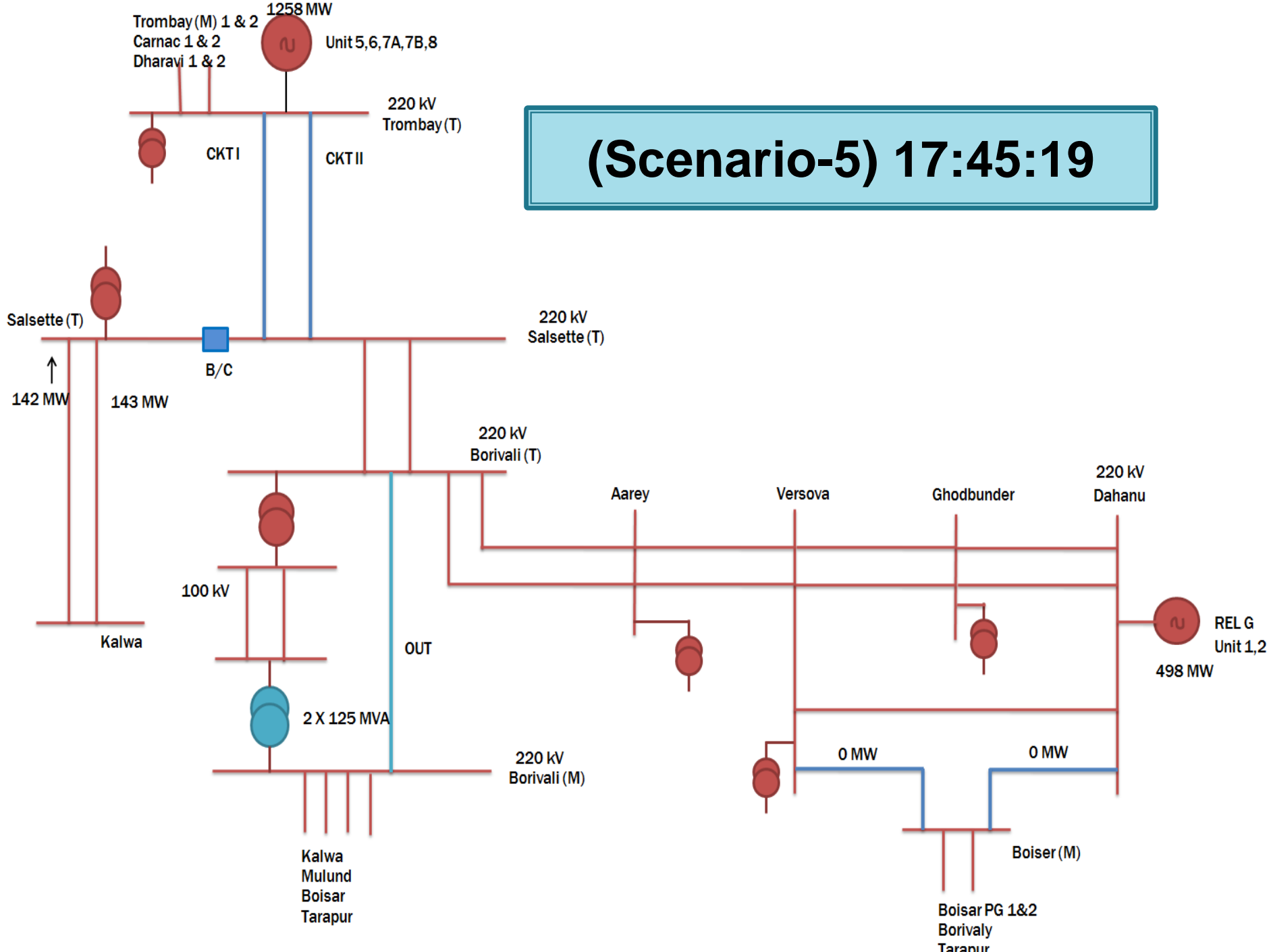


# (Scenario-3) 17:44:43 Hrs

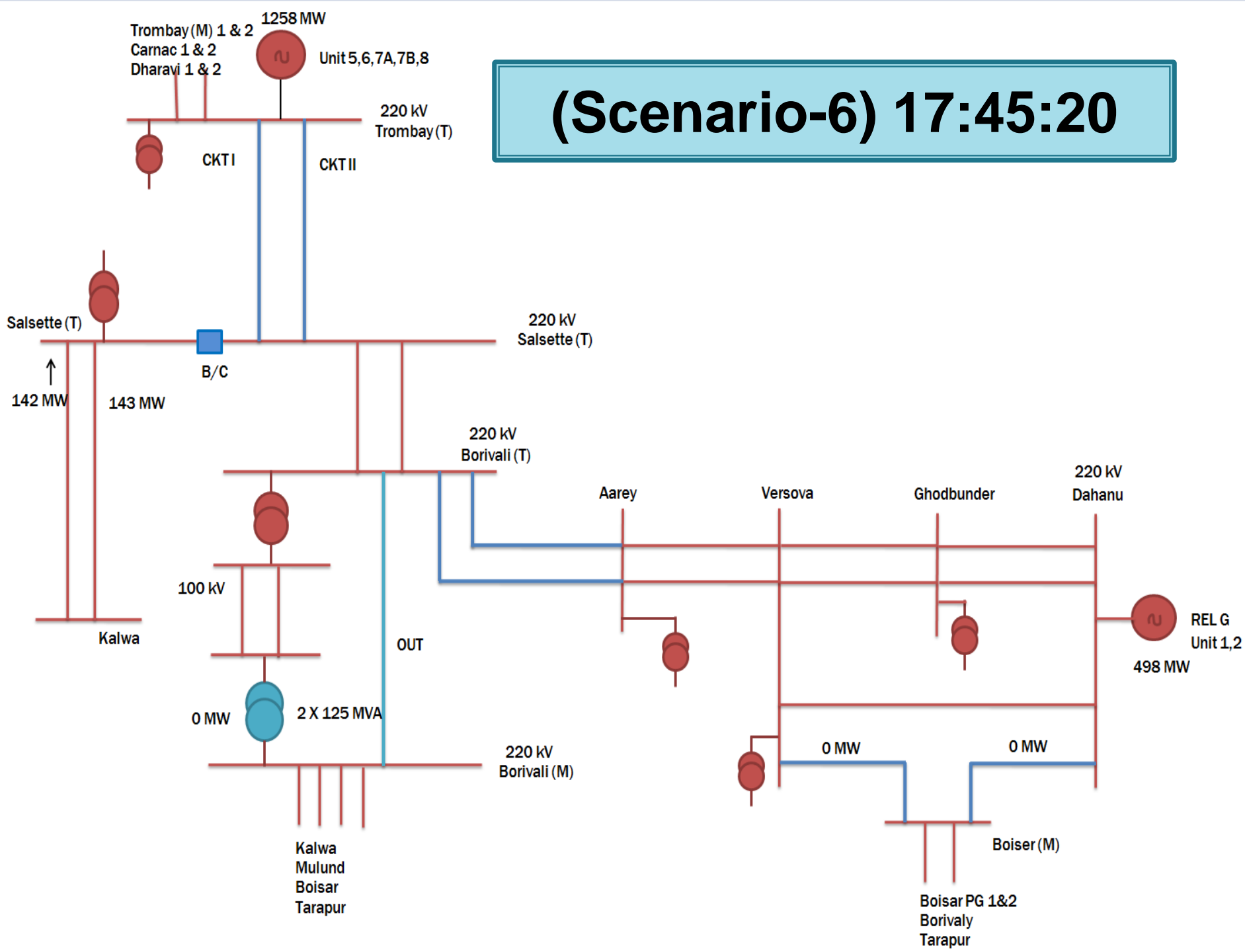


# (Scenario-4) : 17:44:44 Hrs

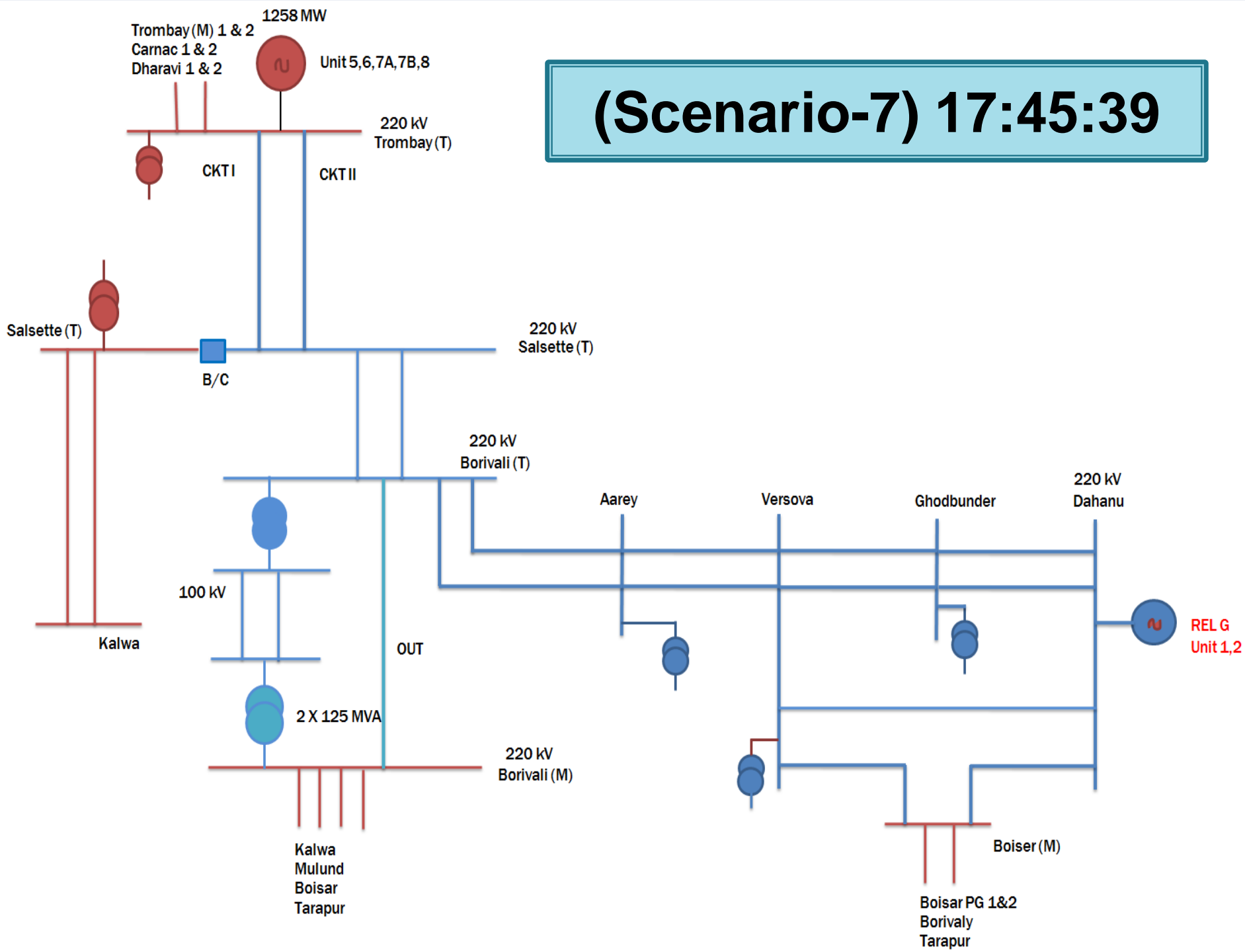




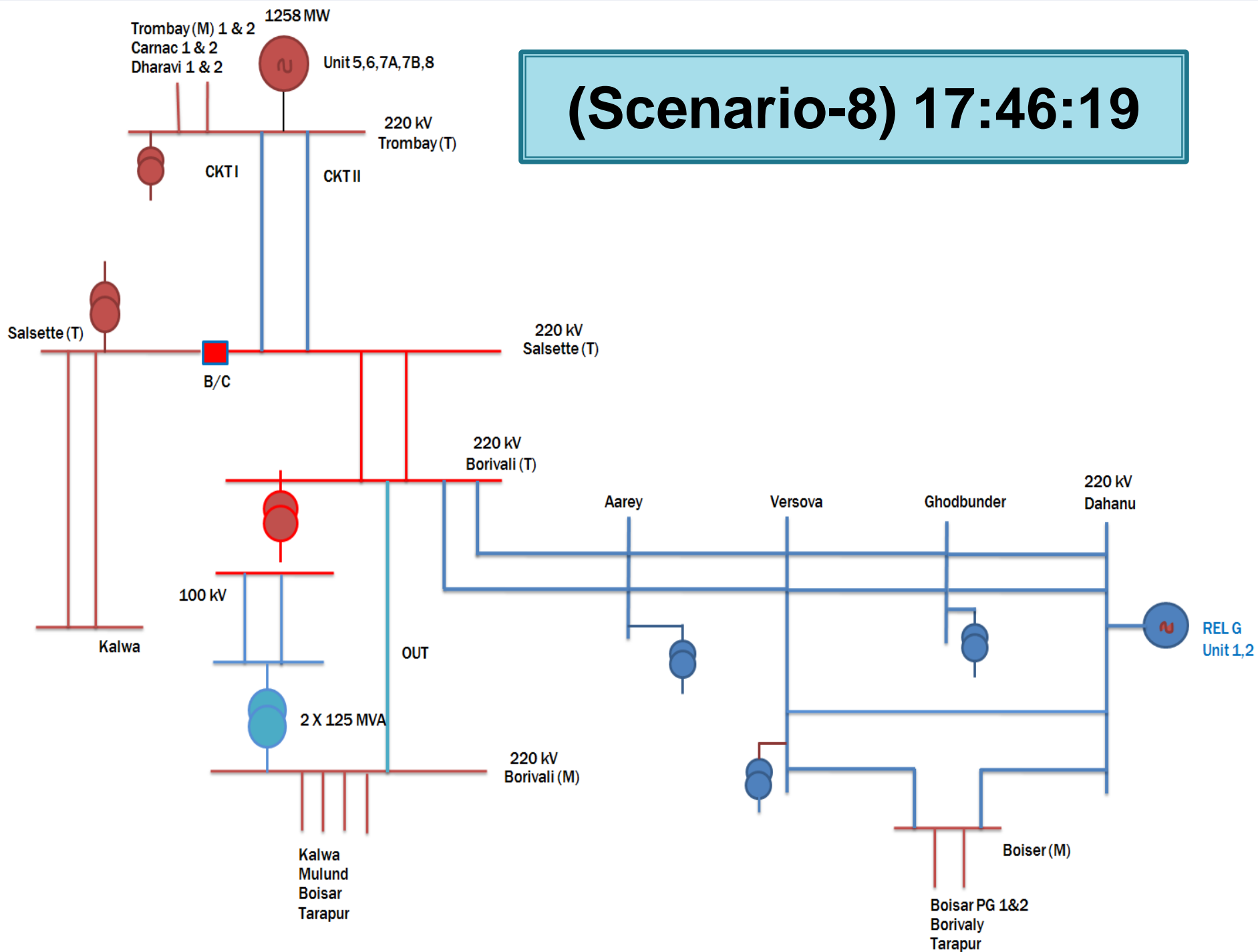
# (Scenario-6) 17:45:20



# (Scenario-7) 17:45:39



# (Scenario-8) 17:46:19



# System Restoration

1] 220 KV Trombay-Salsette-II taken in service at 17:48 hrs

2] 220 KV Borivali (T)-Aarey (R)-I at 17:55 hrs (Aarey sub-station restored)

3] 220 KV Boisar (MSETCL)- Dahanu(R) at 18:03 hrs (aux supply toDTPS)

4] 220 KV Trombay-Salsette-I at 18:12 hrs

5] 220 KV Boisar (MSETCL)-Versova (R) at 18:15 hrs

6] 220/100 KV Borivali(M) 125 MVA ICT-I at 18:06 hrs

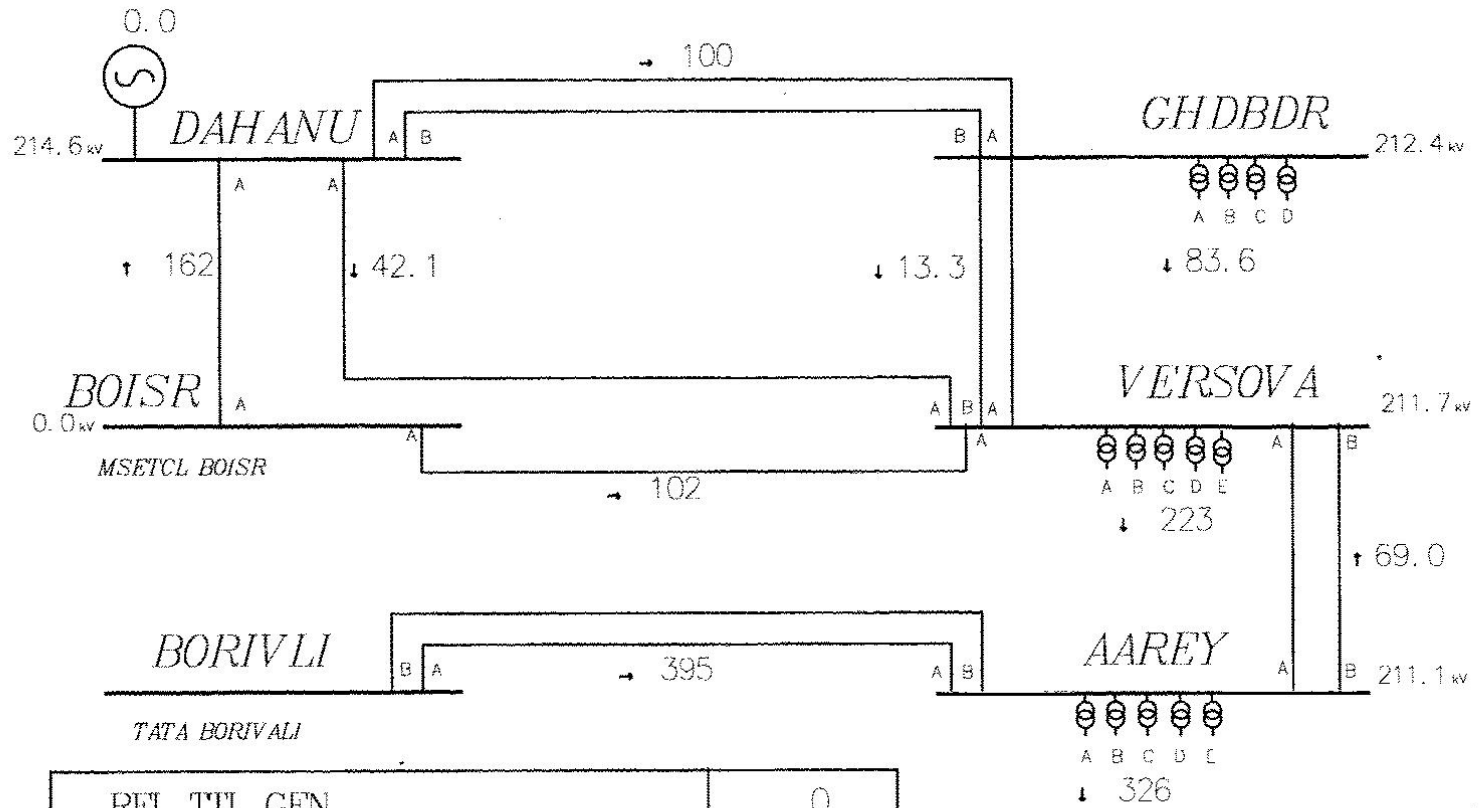
7]220/100 KV Borivali(M) 125 MVA ICT-II at 18:10 hrs

*At 19:04 hrs 664 MW load was restored in R-infra system.*

*(400 MW from TPCL and 264 MW from Boiser).*

*DTPS U-2 syn.at 20:14 hrs.*

*DTPS U-1 syn.at 21:18 hrs.*



REL TTL GEN.	0
REL-TPCL NET-EXCH ( 220 KV )	374
REL-MSETCL NET-EXCH ( 220 KV )	263
REL TTL EXCH ( 220 KV )	637
REL-TPCL TTL EXCH (22KV)	549
REL NET EXCH	1186
REL TOTAL DEMAND	1186

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# Maharashtra State Load Despatch Centre

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**Partial Grid Disturbance  
in**

**Mumbai system**

**on**

**21<sup>st</sup> Nov. 2010 at 17:10 hrs**

# Maharashtra System Conditions

## *(Prior to Disturbance)*

■ State Generation	:	<b>9093</b> MW
■ State Catered Demand	:	<b>10675</b> MW
■ System Frequency	:	<b>50.08</b> Hz
■ <u>Mumbai System</u>		
TPC Hydro	:	<b>0</b> MW
TPC Thermal	:	<b>936</b> MW
R-Infra Thermal	:	<b>496</b> MW
Exchange with MSETCL	:	<b>360</b> MW
Mumbai Demand	:	<b>1792</b> MW

TROMBAY FREQ.

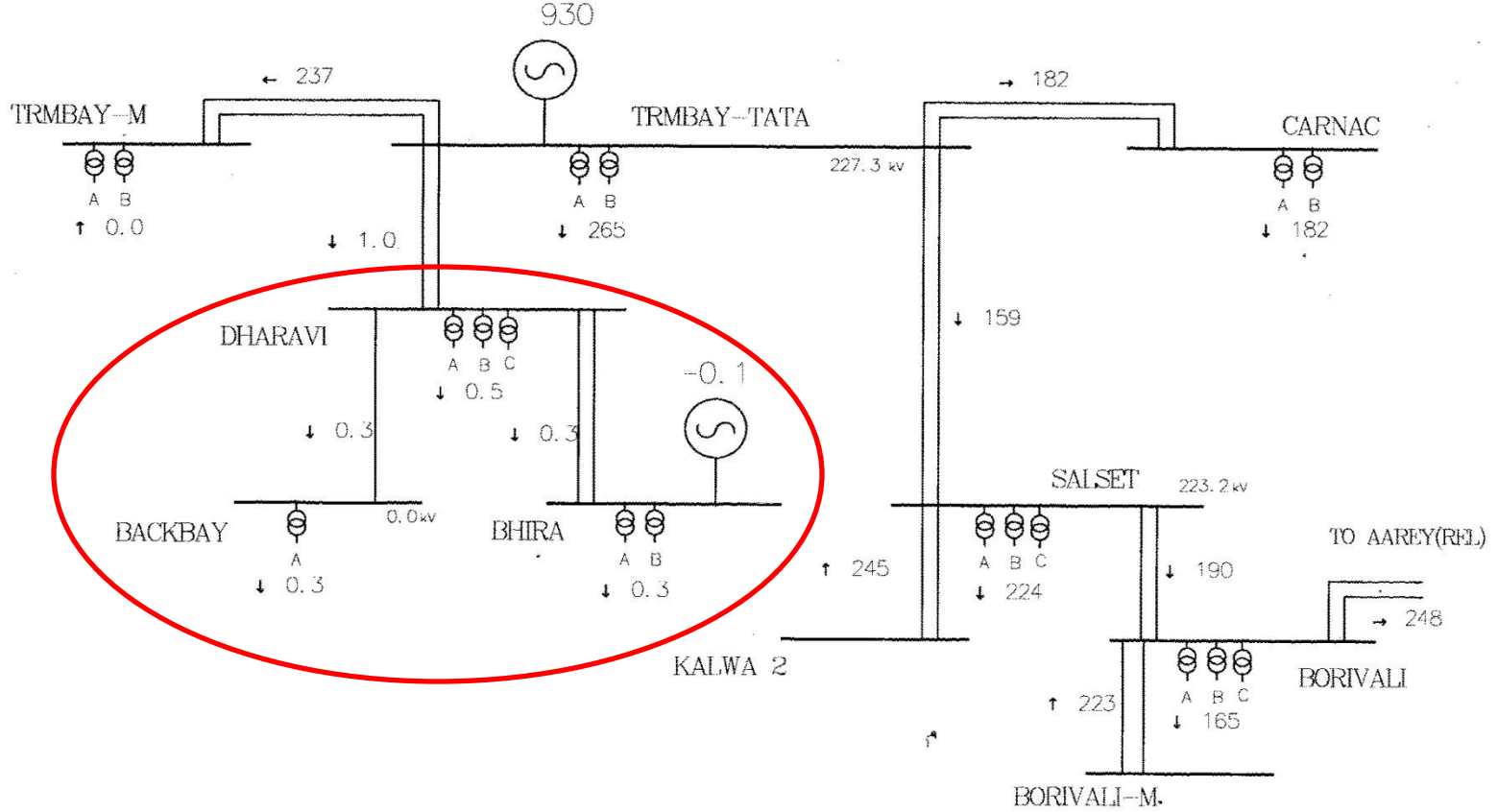
49.99 Hz

# TATA 220KV OVERVIEW

21.11.10 17:34:07

VIKROLI FREQ.

49.98 Hz



# **Disturbance on 21<sup>st</sup> Nov. 2010**

## **Following lines tripped**

- **220 KV Trombay-Dharavi-V & 220 KV Trombay-Salsett-II tripped on fault at 1705 Hrs.**
- **220 KV Trombay-Dharavi VI tripped at 1710 Hrs.**  
**This has resulted in failure of 220 KV supply to Dharavi S/s and tripping of other 110 KV lines on over load causing shut down to Dharavi S/s**
- **Bhira plant not working due to work in tailrace by irrigation department.**
- **No source to Dharavi on 220 KV Bhira-Dharavi D/C**
- **220 KV Dharavi – Backbay supply failed at Backbay.**

# **Disturbance on 21<sup>st</sup> Nov. 2010**

## **Conti ...**

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- **Area affected**

**Load at Dharavi – 299 MW**

**Load fed from Dharavi at Vikhroli -- 67 MW**

**Load fed from Dharavi at Mahalaxmi -- 30 MW**

**Load fed from Dharavi at Backbay -- 29 MW**

**Total Load affected -- 425 MW**

- **Supply affected in full or partial in the part of**

**Marin Drive, Mantralaya, Backbay, Nariman point, Cuff parade, Colaba,**

**lower Parel Mahalaxmi, Chinchpokali, Bomaby central**

**Lalabag, Dadar, Mahim, Matunga, Sion, Dharavi,**

**Bandra, Kurla, Ghatkopar, Vikroli, Chunabhatti, Mankhurd, Chembur**

# **Disturbance on 21<sup>st</sup> Nov. 2010**

## **Conti ...**

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- **17:14 Hrs supply extended to Mahalaxmi from 110 KV Parel and about 30-35 MW load restored**
- **17:23 110 KV Trombay-Dharavi – II taken in service**
- **17:27 220 KV Trombay-Dharavi – VI taken in service**
- **17:28 110 KV Dharavi-Vikroli taken in service**
- **17:30 Hrs supply extended to Backbay from 220/110 KV Crnac S/s about 35 MW load restored including Mantralaya**

# **Disturbance on 21<sup>st</sup> Nov. 2010**

## **Conti ...**

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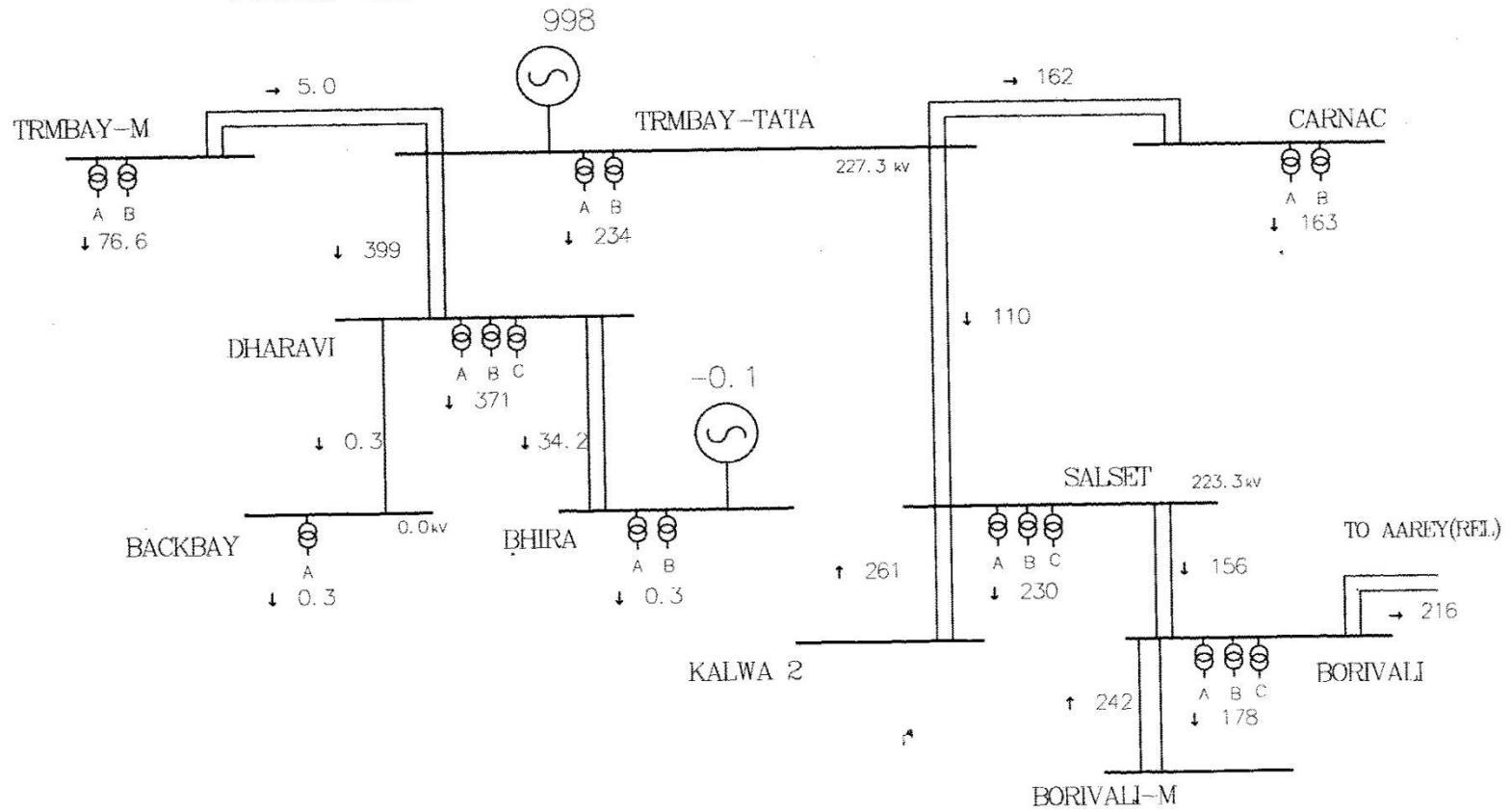
- **17:32 Railway feeders at Dharavi & Vikroli charged Central Railway section from Chinchpokali to Mulund & Western Railway section from Dadar to Vileparle affected during 17:10 to 17:32 Hrs for about 22 min.**
- **17:52 Hrs 220 KV Trombay-Dharavi – V taken in service**
- **18:01 Entire load at Dharavi & Vikhroli restored**
- **18:02 220 KV Trombay-Salsett taken in service**
- **19:49 110 KV Dharavi – Mahalaxmi taken in service**

TROMBAY FREQ  
50.05 Hz

# TATA 220KV OVERVIEW

21. 11. 10 20: 11: 59

VIKROLI FREQ  
50.03 Hz





**Thank You**

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