



(A State Govt. undertaking)

SYSTEM RESTORATION PROCEDURE FOR PUNJAB

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FLOW CHART – SYSTEM RESTORATION





PUNJAB STATE TRANSMISSION CORPORATION LIMITED
STATE LOAD DISPATCH CENTRE

Operational Instructions for Restoration of Grid

PART - 1

General

- PSEB - BBMB System restoration begins from Bhakra Right Bank or Left Bank.
- In the initial stage, supply is given from Bhakra to Ganguwal.

Procedure - 1

- a) From 220KV Ganguwal, energise 220KV Ganguwal - Mohali line.
- b) From Mohali, energise 220KV Mohali - Ropar ckt.

(Alternately Ganguwal - Gobindgarh 2 - Gobindgarh 1 – RTP)

Procedure - 2

- a) From 220KV Ganguwal, energise 2x90MVA 220/132KV auto T/F.
- b) From 132KV Ganguwal extend 132KV supply to Kotla to Ropar.
- c) From 132KV Ropar extend 132KV supply to RTP.
- d) RTP to energise 100 MVA 220/132KV T/F from 132KV side and energise 220KV bus.

PART - 2

INSTRUCTIONS FOR 220 KV S/S MOHALI

In the event of Grid failure, following steps be taken:-

1. Open 220KV breaker of following:

- a) Rajpura Ckt 1
 - b) Rajpura Ckt 2
 - c) Dera Bassi & Sec-80 Ckt.
 - d) RTP Ckt 2
 - e) 100 MVA 220/66 T/fs T-2, T-3
- } If not already opened

2. Following breakers are to be kept ON:

- a) 220KV Mohali - Ganguwal
- b) Mohali-RTP Ckt 1
- c) 100MVA T/Fs T-1

3. Change Tap of T-1 (in de-energised condition due to grid failure) to Tap No.2.

4. As soon as 220KV supply is received from Ganguwal following steps are to be taken.
 - a) Inform RTP that 220KV ckt. No.1 has been energised.
 - b) Put about 50 MW load on T-1 T/F keeping in view the system voltage & frequency.
 - c) Energise Rajpurackt-1 & instruct Rajpura to extend 220KV supply to Railways.
 - d) Rajpura be allowed to energise 1x100MVA 220/66KV T/F & put 10 to 20 MW load on it.
 - e) Energise 220KV Lalru/ Dera Bassi line.
 - f) Inform Dera Bassi to give 220KV supply to Railways.
 - g) Dera Bassi be allowed to energise one 220/66KV T/F & put 10 to 20 MW load on it.
 - h) Energise 220KV Sec. 80 line.

PART - 2(A)

INSTRUCTIONS FOR RAJPURA

1. OPEN Patiala(PG) Ckts 1, and Bahadurgarh ckt.
2. OPEN Mohali Ckt 2
3. OPEN T-1, T-2, 100 MVA T/F breakers.
4. Keep following breakers ON
 - a) Mohali Ckt-1
 - b) Railway's line on confirmation from P.C. Patiala.
5. On getting 220KV supply from Mohali, put 10 to 20 MW load on 66KV side.

PART - 2(B)

INSTRUCTIONS FOR DERABASSI

1. OPEN 220KV breakers of 220KV T/Fs
2. KEEP following breakers ON
 - a) Lalru line
 - b) Railway's ckt
3. On getting 220KV supply, energise 220/66KV T/F & put 10 to 20 MW load.

PART - 3

INSTRUCTIONS FOR 132KV S/S ROPAR

In the event of grid failure:-

1. Open All 132KV breakers except
 - a) Kotla - Ropar ckts 1,2,3
 - b) Ropar - RTP
 - c) Ropar – Asron - RTP
 - d) Ropar - Nakkian
 - e) One T/F 132/11 KV
(For giving station Aux. Supply).

2. Instruct Nakkian to open Nawanshar ckts 1&2
3. Instruct Nakkian to keep following breakers ON
 - a) Nakkian - Ropar
 - b) Nakkian – Ganguwal ckt 1,2
4. Instruct Asron to keep Ropar & RTP line breakers ON.
5. As soon as 132KV supply is received from Kotla, inform RTP to take the supply from 132KV system. Also inform Nakkian & Ganguwal(PSEB) to synchronise their units.

PART - 3 (A)

INSTRUCTIONS FOR NAKKIAN

1. In case of grid failure:-
 - a) Open Nawanshahar ckts 1 & 2
 - b) Keep following breakers ON
 - i) 132KV Ropar
 - ii) 132KV Ganguwal ckts 1 & 2
3. For giving 132KV supply to Railways & also to Ganguwal(PSEB) PHs.
As soon as 132KV supply is received from Ropar.
 - a) Inform Railways to take traction supply.
 - b) Start & synchronise Nakkian units.

PART - 4

INSTRUCTIONS FOR ROPAR THERMAL

In even of grid failure, open all the 220KV&132KV breakers except following which are to be kept ON.

1. RTP-Mohali Ckt-1
2. 220/6.6KV Station T/Fs (keep highest voltage tap on 220KV side)
3. 132KV line breaker RTP - Ropar
4. 132KV line breaker RTP - Asron.

Sequence of restoration:

Start up supply can come either through 132KV system or through 220KV system.

- a) In case supply is received from 220KV Mohali, the Station T/Fs will get energised & 6.6 KV Aux. supply will be available.
- b) In case supply is received first from 132KV system then
 - i) Open 220KV Mohali-1
 - ii) Energise 100 MVA 220/132KV Auto transformer from 132KV side.
 - iii) Energise 220KV bus through 132/220KV Auto T/F.
 - iv) When 220KV supply is received from Mohali ckt-1, the same be paralleled.
 - v) When 220KV supply is received from 220KV Gobindgarh ckt. No.1, the same be paralleled.

- vi) Extend supply to 220KV S/S Sahnewal through RTP – Sahnewal ckt-1 & instruct Sahnewal to give 220KV supply to Railways S/Stn.
- c) In case supply is received first from Gobindgarh Ckt-1 then
 - i) OPEN Mohali-1
 - ii) Close Gobindgarh-1 & extend supply to Sahnewal.
When 220KV supply is received on Mohali-1, same be paralleled.
 - iii) When supply is received from 132KV system the same be paralleled.
- d) In case supply is received from 400KV P.G.Ludhiana through 220KV Sahnewal then:
 - i) Open Mohali-1 and Gobindgarh-1
 - ii) Close Sahnewal ckt.
 - iii) When supply is received from Mohali-1, same be paralleled.
 - iv) When supply is received from 132KV system, the same be paralleled.

PART - 5

INSTRUCTIONS FOR GOBINDGARH-2 & GOBINDGARH-1

Gobindgarh-2:

In case of grid failure, keep the following breakers ON:

1. Ganguwal 1 & 2
2. Gobindgarh-1 ckts 1 & 2

All other breakers be kept off.

When Power supply is received from Ganguwal, inform Gobindgarh-1.

Gobindgarh-1:

In case of grid failure:

1. Open 220KV Patiala 1 & 2
2. Open 220KV Amloh.
3. Open 220KV RTP Ckt.2
4. Open 66 KV side breakers of 100 MVA, 220/55KV T/Fs T-1, T-2.
5. Bring 100 MVA T/Fs on Tap No. 2.
 - a) When 220KV supply from Ganguwal & Gobindgarh-2 is received, inform RTP to take supply on Gobindgarh ckt-1.
 - b) Put about 50 MW load on 100 MVA T/Fs.
 - c) Close 220KV Amloh line.
 - d) Close 220KV Ekolaha - Malerkotla line.

PART - 5 (A)

INSTRUCTIONS FOR 220KV SAHNEWAL

1. In case of grid failure:
 - a) Open Lalton Kalan Ckts 1&2
 - b) Open RTP Ckt 2
2.
 - a) Keep RTP-1 ON
 - b) Keep Railway supply breaker ON.

- c) Keep P.G. Ludhinana breaker ON.
- 3. Inform Railways to take supply. When 220KV supply is received from RTP.
- 4. When 220KV supply is received, Energise 100 MVA T/F & put upto 20 MW load.

PART - 6

INSTRUCTIONS FOR AMLOH

In case of grid failure keep following breakers ON:

1. 220KV Gobindgarh-1
2. 220KV Malerkotla.

All other breakers be kept OFF.

PART - 7

INSTRUCTIONS FOR MALERKOTLA

In case of grid failure keep following breakers ON

1. 220KV Amloh.
2. 220KV Barnala.
3. 220KV breaker of 100 MVA T-1 (with 66 KV breaker off).
4. Bring T-1 to Tap position 2
5. Ensure that incoming 220KV breakers from PGCIL S/S are OFF.
6. When power supply is received from Amloh, put about 20 MW load on T-1 & inform Barnala (PSEB).

PART - 8 (A)

INSTRUCTIONS FOR BARNALA, PSEB

On grid failure, following operations be done:

1. Open inter-connector breaker/isolator with BBMB S/Stn.
2. Open Lehra Mohabat Ckt.
3. Open breaker of 100 MVA T/F T-1
4. Keep following breakers ON :
 - a) Malerkotla line
 - b) 1x100MVA T/F T-2, Bring T/F tap to No.2
5. As soon as supply is received from Malerkotla, put about 20 MW load on 100 MVA T/F T-2.
6. Extend supply to LehraMohabat by closing breaker of Barnala-Lehra Mohabat (PSEB) line & inform G.H.T.P.

PART - 8(B)

INSTRUCTIONS FOR BARNALA (BBMB)

1. In case of grid failure:
 - a) Keep 220KV Sangrur ckt breaker ON

- b) Open inter-connector breaker to PSEB S/S
- c) Open Lehra Mohabat ckt.
- 2. On getting supply from 220KV Sangrur
 - a) Energise Lehra Mohabat ckt.
 - b) Inform PC Patiala & GHTP Lehra Mohabat.
- 3. When PSEB Barnala gets 220KV supply from Malerkotla, close the inter-connector breaker, paralleling the supply of Sangrur with Malerkotla.

PART - 9

LEHRAMOHA BAT

- 1. Keep following 220KV Breakers ON:
 - a) 220KV Barnala (PSEB)
 - b) 220KV GNDTP Ckt-1
 - c) 220/6.6KV Station T/Fs (Keep on highest voltage tap on 220KV side)
 - d) 100 MVA 220/66KV T/F (keep the T/F on Tap No.2).
- 2. Keep all the other 220KV breakers off.
- 3. When supply is received from PSEB Barnala S/S, inform GNDTP that Lehra Mohabat Ckt-1 is energised.
- 4. Put about 20 MW load on 220/66 KV T/F.
- 5. In case the BBMB Barnala to Lehra Mohabat ckt is energised first then:
 - a) Open Lehra Mohabat - Barnala(PSEB) line breaker.
 - b) Close Lehra Mohabat - Barnala(BBMB)line breaker.

PART - 10

GNDTP, BHATINDA

In case of grid failure, keep all 220KV & 132KV breakers off, except the following which may be kept ON:

- 1. Lehra Mohabatckt-1.
- 2. 220/6.6 KV S/Station T/F (to be kept on higher voltage tap).
- 3. On getting supply from LehraMohabat ckt-1, energise 100 MVA Auto T/F & energise 132KV GNDTP bus.
- 4. Put 20 to 30 MW load on 132KV bus.

PART - 11

GENERAL INSTRUCTIONS

- 1) During grid restoration, initially the supply is extended through one ckt of double ckt line (so as to reduce line charging current and prevent over voltage. However as the grid stabilises & voltage is reduced, the second ckt. of the lines be restored such as :
Mohali – RTP ckt-2 and Lehra Mohabat – Bathinda ckt -2
- 2) During grid restoration of 11 KV & 66 KV capacitor banks be kept OFF.

- 3) Before switching on power T/Fs ensure that the tap position is raised to No. 2 (to prevent over-fluxing).
- 4) Obtain instructions from Power Controller Patiala at each step.
- 5) Ensure that air pressure in compressed air system is preserved so as to maintain the operational availability of breakers.

RESTORATION OF SARNA-RSD SYSTEM & UBDC/ SHANAN/ MHP

1. BBMB will give supply from Bhakra(R) to Jamalpur to Jalandhar.
2. BBMB will energise Jalandhar - Dasuya ckts.
3. From Dasuya, energise ckts to Pong and Sarna
4. Sarna will extend supply to RSD for starting the unit.

PART - A

INSTRUCTIONS FOR 220KV S/S DASUYA

1. In case of grid failure, keep following breakrs ON:
 - a) Jalandhar ckts 1,2
 - b) Pong ckts 1,2
 - c) Sarnackts 1,2
 Keep other breakers OFF.
2. Dasuya will get supply either from BBMB Jalandhar or Pong side (depending on BBMB). As soon as 220KV supply is received, Dasuya will inform 220KVSarna.

PART-B

INSTRUCTIONS FOR 220KV SARNA

1. In case of grid failure, keep following breakrs ON:
 - a) 220KV Dasuya-1 & 2.
 - b) 220KV RSD 1 & 2.
 Keep all other breakers off. Keep 100 MVA 220/132KV T/F on Tap 2.
 As soon as power supply is received from Dasuya, inform RSD.
- c) Energise 100 MVA 220/132KV T/F & give 132KV supply to Sarna for UBDC & extending to Shanana & giving 66 KV supply to RSD.

PART-C

INSTRUCTIONS FOR RSD

On grid failure:

1. Keep all 220KV breakers off.
2. Start DG set & run up units 1, 2, 3 on no load.
3. As soon as 220KV supply is received from Sarna, energise RSD bus from Sarna..

4. Synchronise unit 1. In case bus voltage is 220KV or above, put unit 1 on synchronous inductor mode & draw upto 80 MVAR from system, thereby reducing the 220KV bus voltage to less than 200KV.
5. Synchronise unit 2. In case bus voltage is still above 200 KV, put unit 2 on synchronous inductor mode & bring down voltage to less than 200 KV.
6. Synchronise unit 3 & put it on generation mode. Load the unit to 100 MW. In case frequency is less than 50, load it upto 150 MW.
7. In case frequency is still below 50 HZ then start & synchronise unit 4 & put it on generation mode to bring frequency to 50.

PART-D

1. Instructions for 220KV SARNA (after RSD units have come on bars).
Instructions will be issued by NRLDC through PC Patiala to extend the supply to J&K and Kishanpur.
2. Energise Sarna - Wadala Granthian ckt No.1 & inform Wadala Granthian.

PART-E

INSTRUCTIONS FOR WADALAGRANTHIAN

- 1.. On Grid failure, keep all breaker off except 220KV SARNA-1.
2. On receipt of 220KV supply from Sarna, energise 2x100MVA 220/132KV Auto T/Fs.
3. Extend 132KV supply to Sri Hargobindpur for MHP units.
4. Extend 132KV supply to 132KV Sarna for UBDC units.
5. Energise 220KV Verpal ckt-1 & inform Verpal to take 220KV supply.

PART-F

INSTRUCTIONS FOR 132KVSARNA

1. On getting 132KV supply, energise 40/50 MVA 132/66KV T/F & give 66KV supply to Thein Dam on 66KV RSD-1 ckt.
2. As soon as 132KV supply is received from 220KVSarna(through 220/132KV T/F) or from 132KV Wadala Granthian, extend 132KV supply to UBDC PHs 2,1.
3. Extend 132KV supply to Shanan through Pathankot, Kangra ckts.

PART-G

INSTRUCTIONS FOR 132KV SRI HARGOBINDPUR

1. On grid failure, open all 132KV breakers, except following breakers that should be kept ON:
2. Wadala Granthian ckts 1,2
3. MHP ckts 1, 2

PART-H**INSTRUCTIONS FOR MHP**

On grid failure

1. Open MPH-2, Bhogpur & Tanda ckts.
2. Keep 132KV Sri Hargobindpur line breakrs ON.
3. Keep all tie lines between MPH 4-3-2-1 ON.
4. As soon as supply is received from Shri Hargobindpur, Energise 132/66 KV T/Fs at MPH-4 for giving Auxiliary start up power to MPH 4,3.
5. 66KV Pong – Talwara ckt be energised from BBMB Pong for giving start up power to MPH 1,2 in advance.