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No.07-05/RPC-14A/SLRSG/1703 Jabalpur, dated:11/06/2018

To

As per distribution list

Sub: Minutes of 2nd meeting of State Level Relay Setting Group for Review & Coordination of Relay settings of M.P.

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The Minutes of 2nd meeting of the Operation State Level Relay Setting Group for Review & Coordination of Relay settings of M.P held on 10th May 2018 at Conference Hall, SLDC, MPPTCL, Nayagaon, Jabalpur has been uploaded on the website of SLDC 'www.sldcmpindia.com' and can be downloaded.

(R.A. Sharma)
Addl. Chief Engineer,
SLDC, MPPTCL, Jabalpur

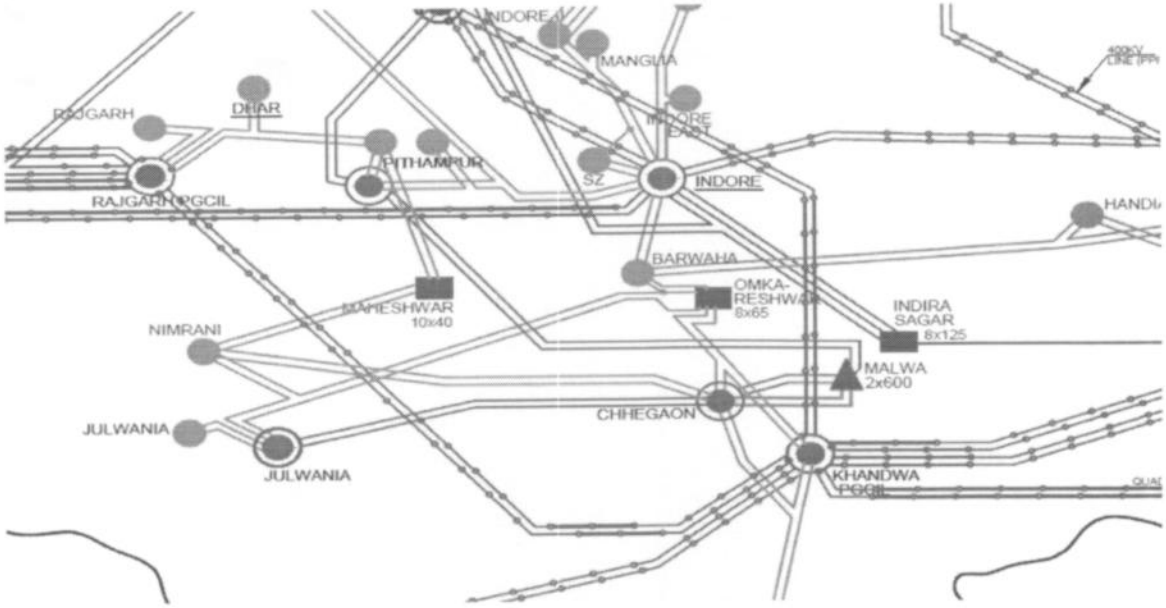
MINUTES OF 2nd MEETING OF STATE LEVEL RELAY SETTING GROUP FOR REVIEW & COORDINATION OF RELAY SETTING OF M.P, HELD ON 10th MAY 2018 AT 11:00 AM AT CONFERENCE HALL, SLDC, MPPTCL, NAYAGAON, JABALPUR.

Shri. R. A. Sharma, Addl. Chief Engineer SLDC welcomed all the members & guests in the 2nd meeting of State Level Relay Setting group for Review & Coordination of Relay setting in the State of M.P. He requested all the participants for formal introduction. Thereafter, the Addl.Chief Engineer, SLDC has also made deliberation and briefed about objective of formation of State Level Relay Setting Group and its functioning. Thereafter brief agenda for deliberation in the meeting was presented.

The committee was apprised that the State Level Relay Setting Group has been constituted in compliance to the decision taken in 128th Protection Committee Meeting of WRPC. It is also stated that protection group at state level has been formed to review the existing relay setting of state network incidental to ISTS & critical state network in a co-ordinated manner and validate the same. The state protection group comprised of representative each from SLDC, STU, Testing circle, Power Grid, Major Generating Companies and WRLDC/WRPC, SLDC is convenor member of group. This group shall review the existing relay settings of critical State network & State Network incidental to ISTS & shall provide necessary interphase between utilities/entities.

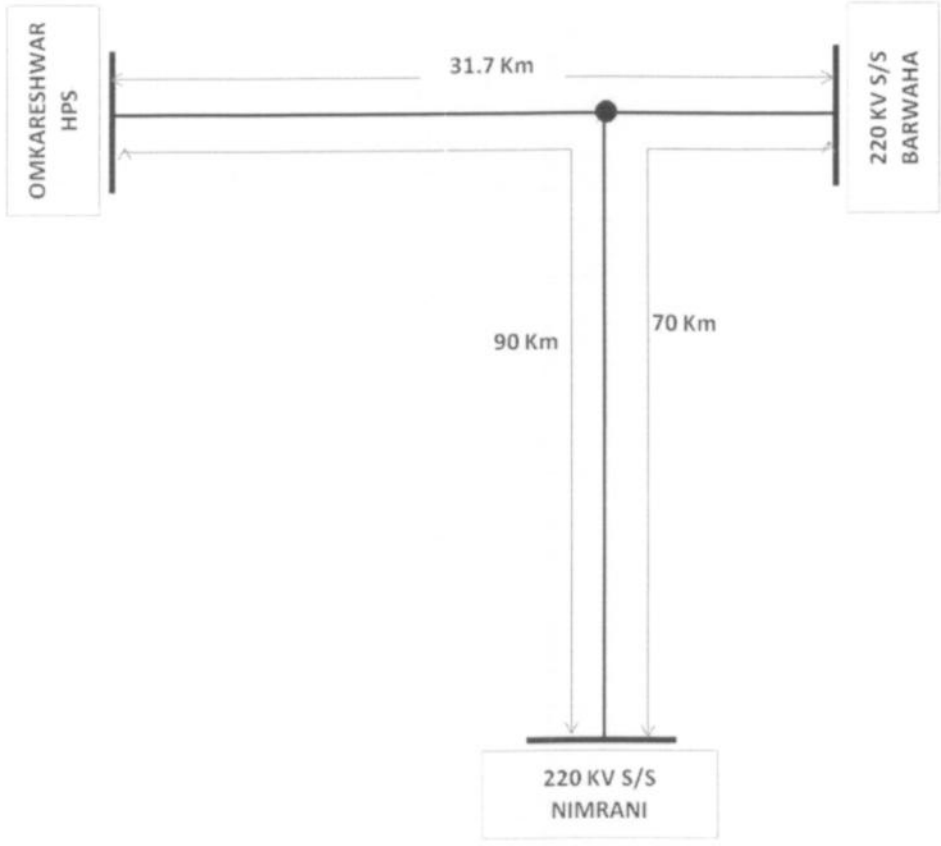
This forum shall strengthen the communication between entities of MP for ensuring relay coordination issues & shall ensure optimal coordination as per system requirement, so that reliability and security of Grid shall be ensured. The node wise validated relay co-ordination shall be appraised to WRPC as per mandate of 128th PCM of WRPC.

After formal discussion the committee was apprised that during first meeting of the State Level Relay Setting Group, it was envisaged that relay setting of OSP nodes required to be examined first, as in recent past, frequent undesirable trappings were observed due to probable mismatch of relay coordination issue. Accordingly, OSP/MPPTCL/PGCIL representatives were requested to provide relay setting of OSP nodes so that same could be validated by the committee in the next meeting the Omkareshwar HPS node .The SE Protection WRPC Mumbai vide letter no.570 dtd – 16.04.18. has also emphasized to validate OSP node first. Thereafter the presentation containing the details of the existing relay settings of Omkareshwar HPS and its adjoining substations (i.e., 220 KV Nimrani, Barwaha, Julwaniya, Chhegaon & 400 KV Khandwa (PGCIL.) were briefed for discussion and needed remedial measures. The committee has felt that after revisiting existing settings , the settings of 220kv OSP- Barwaha tap Nimrani required to be examined besides overvoltage relay settings , backup protection and Bus Bar protection at OSP end.



1. **The DPR settings decided in the meeting is as follows:-**

The settings provided in DPR protection of 220 KV Barwaha .Nimrani -Omkareswar Line was discussed & Reviewed. Following settings were emerged after discussion and committee has recommended for revising the settings as detailed below:



ZONE	END 1- OMKARESHWAR		END 2 - BARWAHA		END 3 - NIMRANI	
	REACH IN %	TIME DELAY IN msec		TIME DELAY IN msec	REACH IN %	TIME DELAY IN msec
ZONE 1	100 % of 220 KV OSP - BARWAHA.	0 sec	100 % of 220 KV BARWAHA - OSP.	0	78% of 220 KV Nimrani - OSP.	0
ZONE 2	100 % of 220 KV OSP - NIMRANI.	0.3 sec	100 % of 220 KV BARWAHA - NIMRANI.	0.3	120 % of 220 KV NIMRANI - OSP.	0.3 sec

It is also decided that relay setting provided for Zone II for OSP-Chhaigaon ckt shall be 250msec . The Zone III settings are as per order, however time setting at OSP end shall be 700 msec.The DPR settings for other lines from OSP were discussed and were found as per requirement. It was also informed by the representative from OSP that for Zone-2 carrier aided tripping is also in service/operational for 220 KV OSP-Barwaha tap Nimrani Ckt. It is also decided that time setting for Zone IV shall be reduced to 1 sec in place of 1.2 sec. Thereafter members of the committee agreed and recommended that its shall be kept in service in future also.

2. **Thereafter the over voltage relay settings were discussed and following recommendation were made.:-**

Sr. No.	Name of Feeder from Omkareshwar HPS	Present setting	Proposed Setting In the meeting
1.	220 KV Nimrani (Tap Barwaha)	108%- 6 Sec.	110%- 6 Sec.
2.	220 KV Julwaniya	108% - 5 Sec.	110% - 5 Sec.
3.	220 KV PGCIL Khandwa	110% - 5 Sec.	112% - 5 Sec.
4.	220 KV Chhegaon	110% - 5 Sec.	112% - 5 Sec.
5.	220 KV Barwaha	110% - 6 Sec.	112% - 6 Sec.

During the discussion it was also found that the Over voltage tripping feature is enabled in DPR only at OSP end. Seeing to the importance of Omkareshwar as a generating station the committee members recommended OSP that separate Over Voltage relay shall be provided for Over Voltage Protection at OSP. Representative from OSP agreed with the recommendation of the committee and ensured that matter shall be taken with management for needful.

3. Bus Bar Protection: - At present 220 KV Bus Bar Protection is of at OSP HPS is of static type. The committee recommended Omkareshwar HPS to replace the static Bus Bar Protection with Numerical Bus Bar Protection at the earliest.
4. Backup protection- At OSP representative has informed that backup protection is used with instantaneous settings. The members of the committee felt for backup protection instantaneous setting is not correct. It is decided that needed change in setting shall be recommended based on joint testing of MPPTCL and NHDC officers at OSP.
5. Conclusion: - After discussing the complete protection settings of Omkareshwar HPS it was decided that a Joint meter testing exercise between T&C_Khnadwa, MPPTCL & OSP shall be performed at Omkareshwar HPS prior to implementation of the recommended settings and the outcome shall be incorporated in the MoM.
6. As decided in the meeting joint testing has been carried out on 16.05.2018 accordingly a shutdown was availed on 220kv OSP-Barwaha line and testing has been carried out on voltage elements and DPRs . Presently 2 no DPR (REL 511 & REL 670) are connected as Main 1 & 2 protection on 220kv OSP – Barwaha line at OSP end.

   It was found that during testing, after unbalancing voltage the REL 511 relay issues tripping command even after voltage becomes stable and within permissible limits. It was tested by injecting unbalanced voltage and current, which were taken out from fault record.

   The overcurrent and earth fault settings were checked and found that the definite time curve has BEEN adopted for overcurrent and earth fault settings. The OSP were advised to IDMT 3 sec curve and accordingly settings have been suggested. The OSP representative has ensured that they will take up this matter with their management for further needful. The MoM of joint testing at OSP node by MPPTCL and NHDC Engineers is appended herewith duly recommended for implementation.

   In the above context CE (T&C) , MPPTCL has recommended that OSP authorities may consider, either to replace REL-511 relay or disable the over voltage features of this relay and provide separate over voltage relay for tripping which could ensure correct over voltage trappings at set value.

7 . The committee has also decided that in the next meeting relay settings at VSTPS-Waidhan nodes shall be examined as frequent cascade tripping are being observed in the area. In the context WRLDC representatives were requested to arrange to ensure participation of NTPC representative to attend the next Relay Setting Review Meeting. Further WRLDC representatives to be requested to be present in the meeting at SLDC Jabalpur considering importance of the issue, since last two meetings WRLDC representative were attended the meeting through VC. The presence of their participation directly in the meeting shall contribute in fruitful manner.

The meeting was ended with vote of thanks.

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Minutes of Meeting held between MPPTCL & NHDC Omkareshwar on date 16.05.2018 at Omkareshwar Power Station.

Shutdown on 220KV OSP Barwaha line was taken on date 16.05.2018 and at OSP end & joint testing has been carried out. Presently 2 nos. DPRs (REL 511 & REL 670) are connected as main 1&2 protection on 220KV OSP Barwaha line at OSP end. The details of testing are as below:

1. The Over Voltages Element tested in REL 511 & REL 670 Distance Protection Relays.

S/n	Particulars	REL 511	REL 670	Remark
1	Pick up Setting	112% (71.1V)	110% (69.8V)	Service setting
2	Time Delay	6 sec	5 sec	Service setting
3	Pickup observed	111% (70.8V)	110% (69.8V)	
4	Drop out voltage	67.33 V	69.5 V	

2. During testing it is observed that in REL511, when pick up balanced 3 phase voltage 70.9V given to relay and if just after 2 sec if voltage has dropped down to:
   (i) 3.56V(i.e. 67.34V) Relay over voltage operated.
   (ii) 3.57V(i.e. 67.33V) Relay over voltage not operated.

   But in REL670, when pick up balanced 3 phase voltage 69.9V given to relay and if just after 2 sec if voltage has dropped down to:

   (i) 0.3V(i.e.69.6V) Relay over voltage operated.
   (ii) 0.4V(i.e.69.5V) Relay over voltage not operated.

3. During analysis of the event and oscillography of the tripping held on date 24-09-17 it is observed that trip command on over voltage is given by REL511, but the relay REL 670 was picked up and not operated.
   The pick up unbalanced voltages (R-69∠148.44, Y-74∠40.60, B-44∠283.22) of REL670 are noted from the above event and these voltages are injected to REL511 by 3 phase relay testing kit and it is observed that relay operated even when the voltage has been dropped down after 2 sec.
   Also relay operated when voltage dropped down to
   (iii) 6.6V Relay over voltage operated.
   (iv) 6.7V Relay over voltage not operated.

   It seems that when unbalancing voltage has been given then the relay drop out voltage increased from 3.56 to 6.6V. It may increase or decrease according to the nature of the fault.

4. Also from oscillography (copy attached) of REL 511of the tripping held on date 24-09-17, it is clear that at the time of tripping (on over voltage) the voltages were below over voltage setting i.e. (R-130.5V, Y-132.3V, B-131.2V) therefore it seems that the relay REL511 is malfunctioning.

5. At OSP end settings of over current and earth fault in main 1&2 (backup settings) are viewed and found as below

REL511 (TOC Element settings)	
Ip	110% of I1b
Tp	60sec
Characteristic	Definate time(non directional)
In	50% of I4b
tn	60sec

REL511 (TEF Element settings)	
In	20% of 1b
Imin	100% of In
t1	1 sec
k	0.05
tmin	0.05 sec
Direction	Directional
U measured	U1+U2+U3
Characteristic	DEF

REL670 (IOC Element settings)	
Ip	125%
Characteristic	INVERSE TIME
tp	Instantaneous

It has been discussed that time setting of over current and earth fault is to be reviewed and also characteristic in REL511 should be IDMT normal inverse. OSP engineers has agreed for considering the review of settings on consultation with higher authorities.

For M.P.P.T.C.L.

① A. K. Dubey E.E(T) Barwaha A.Dubey 16-05-18

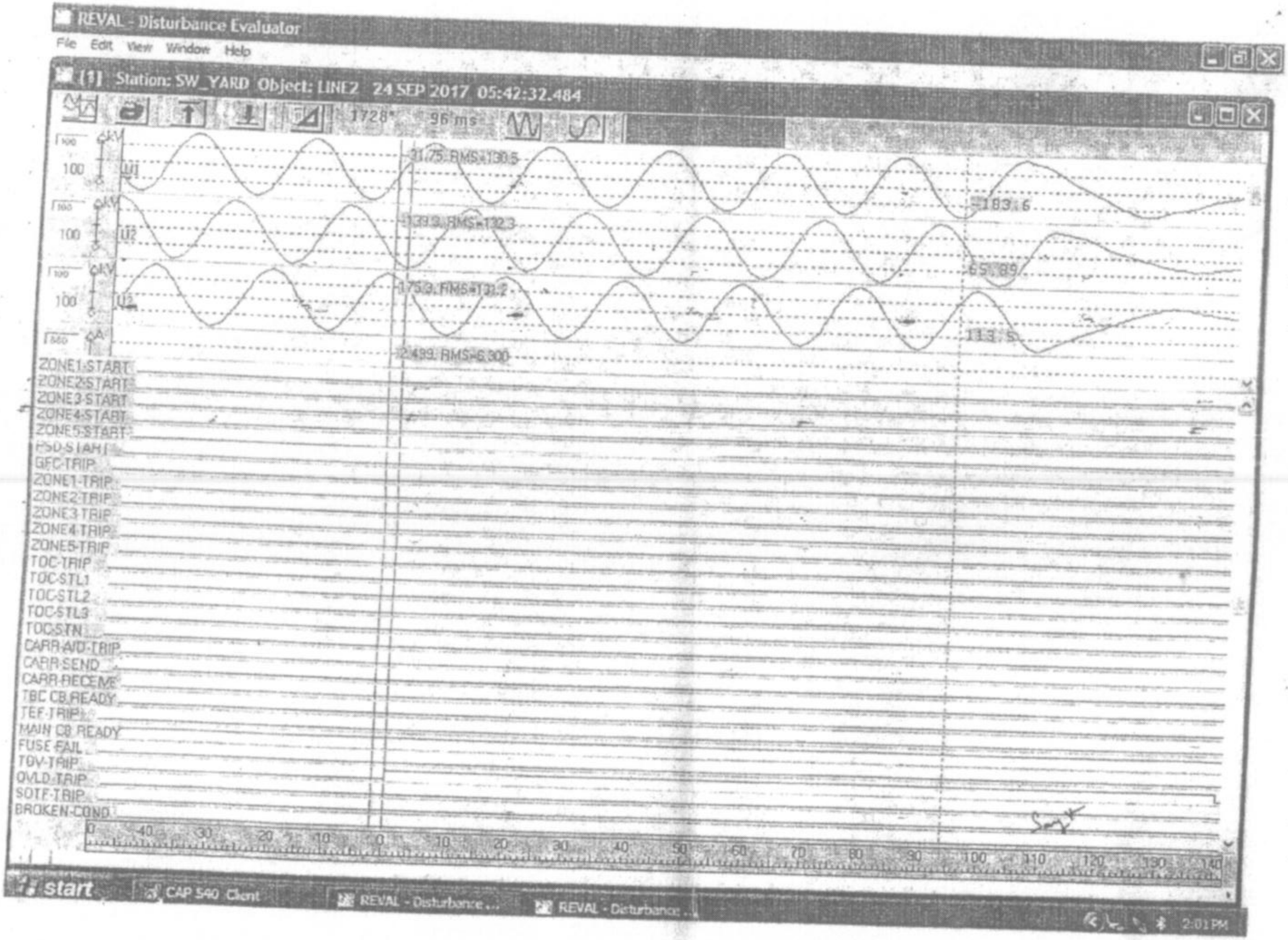
② N.S. Patel EE(T) Khandwa

③ Mukesh kumar yadav 16.05.18

④ Gonesh. Mansare A.E(T) Barwaha

For NHDC (OSP)

SM-E


REVAL - Disturbance Evaluator
File Edit View Window Help
[1] Station: SW_YARD Object: LINE2 24 SEP 2017 05:42:32.484
1728* 96 ms
U1
U2
U3
31.75, RMS=130.5
139.3, RMS=132.3
175.3, RMS=131.2
2.499, RMS=6.300
183.6
65.89
113.5
ZONE1-START
ZONE2-START
ZONE3-START
ZONE4-START
ZONE5-START
PSD-START
GFC-TRIP
ZONE1-TRIP
ZONE2-TRIP
ZONE3-TRIP
ZONE4-TRIP
ZONE5-TRIP
TOC-TRIP
TOC-STL1
TOC-STL2
TOC-STL3
TOC-STN
CARR-A/D-TRIP
CARR-SEND
CARR-RECEIVE
TBC CB READY
TEF-TRIP
MAIN CB READY
FUSE FAIL
TOV-TRIP
OVLD-TRIP
SOTF-TRIP
BROKEN-COND
start
CAP 540 Client
REVAL - Disturbance ...
REVAL - Disturbance ...
2:01 PM

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