



**Facility Study
For
Generation Interconnection
Request
GEN-2012-017**

***SPP Generation
Interconnection Studies***

(#GEN-2012-017)

July 2013

Revision History

Date	Author	Change Description
07/03/2013	SPP	Facility Study Report Issued

Summary

Nebraska Public Power District (NPPD) performed a detailed Facility Study at the request of Southwest Power Pool (SPP) for Generation Interconnection request GEN-2012-017 (115MW Net uprate/Nuclear) located in Nemaha County, Nebraska. The originally proposed in-service date for GEN-2012-017 is September 1, 2018. The request for interconnection was placed with SPP in accordance with SPP's Open Access Transmission Tariff, which covers new generation interconnections on SPP's transmission system.

Phases of Interconnection Service

It is not expected that interconnection service will require phases however, interconnection service will not be available until all interconnection facilities and network upgrades can be placed in service.

Interconnection Customer Interconnection Facilities

The Interconnection Customer will be responsible for all of the transmission facilities connecting the customer owned substation to the Point of Interconnection (POI), at Nebraska Public Power District owned 345kV bus at Cooper substation. GEN-2012-017 will utilize the existing 345/22kV transformer at the Cooper to interconnect to the Point of Interconnection (POI). The Interconnection Customer will also be responsible for any equipment located at the Customer substation necessary to maintain a power factor of 0.95 lagging to 0.95 leading at the POI.

Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades

To allow interconnection the Transmission Owner has determined that the associated terminal equipment for acceptance of the Interconnection Customer's Interconnection Facilities will need to be upgraded to at least 2000 amps. At this time GEN-2012-017 is responsible for \$720,000.00 of Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades.

Shared Network Upgrades

The Interconnection Customer was studied within the DISIS-2012-002 Impact Study. At this time, the Interconnection Customer is allocated \$0.00 for Shared Network Upgrades. If higher or equally queued interconnection customers withdraw from the queue, suspend or terminate their GIA, restudies will have to be conducted to determine the Interconnection Customers' allocation of Shared Network Upgrades. All studies have been conducted on the basis of higher queued interconnection requests and the upgrades associated with those higher queued interconnection requests being placed in service. At this time, the Interconnection Customer is allocated the following cost for Shared Network Upgrade:

Share Network Upgrade Description	Allocated Cost	Total Cost
None	\$0.00	\$0.00
Total	\$0.00	

Conclusion

The Interconnection Customer is responsible for \$720,000.00 of Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades. At this time, the Interconnection Customer is allocated \$0.00 for Shared Network Upgrades. At this time, the total allocation of costs assigned to GEN-2012-017 for Interconnection Service is estimated at \$720,000.00.

**DISIS-2012-002
GENERATION INTERCONNECTION
FACILITY STUDY**

SPP GEN-2012-017 +115 MW Uprate (965 MW NET) at Cooper 345 kV

JUNE 2013

**PREPARED FOR:
SOUTHWEST POWER POOL**

**PREPARED BY:
NEBRASKA PUBLIC POWER DISTRICT OPERATIONS
TRANSMISSION ASSET PLANNING
T&D ASSET MANAGEMENT
T&D ENGINEERING**



Nebraska Public Power District
"Always there when you need us"

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Executive Summary

The *NPPD DISIS-2012-002 Facility Study* was performed to document the reliability impacts of a generation project that is interconnected to the NPPD transmission system. This project has developed through the SPP Definitive Interconnection System Impact Study process and has advanced to the facility study stage. SPP has requested that NPPD perform the Facility Study associated with the generation interconnection project listed below:

<u>Project</u>	<u>MW</u>	<u>Point-of-Interconnection</u>
GEN-2012-017	+115.0 (965 MW total)	Cooper 345 kV

SPP entered into a Facility Study agreement with the generation interconnection customer and subsequently requested that NPPD perform the Facility Study for the GI request. In response to the SPP request, NPPD has performed a Facility Study for the generation interconnection request which included a detailed loadflow analysis, short circuit analysis and stability analysis. The Facility Study also includes detailed cost estimates and estimated project schedules for the interconnection and network upgrades identified in the Facility Study. The System Impact Study did not identify any interconnection or network upgrades required for the generation interconnection request. The Facility Study identified the need to upgrade equipment in the Cooper 345 kV substation to at least 2000 Amp capability (1195 MVA) to accommodate the generation increase.

The DISIS-2012-002 Facility Study includes a loadflow analysis, short circuit analysis, and stability analysis.

The Loadflow Analysis documents the steady-state performance of the network following the generation uprate project. The loadflow analysis was split into four phases.

Phase 1 of the loadflow analysis was a system intact and N-1 contingency analysis of the Nebraska transmission system in accordance with NERC Standards TPL-001 and TPL-002. The results of the Phase 1 portion of the loadflow analysis revealed no additional facility overloads or voltage violations that would require mitigation due to TPL-001 and TPL-002 contingencies.

Phase 2 of the loadflow analysis involved a comprehensive multiple element contingency analysis of the Nebraska transmission system. The results of the Phase 2 contingency analysis revealed no additional facility overloads or voltage violations that would require mitigation due to TPL-003 and TPL-004 contingencies.

Phase 3 of the loadflow analysis evaluated the local area transmission capacity with respect to delivering the fully accredited generating capability out of the area at off-peak load levels. The Phase 3 loadflow analysis was performed to evaluate the system state for the worst-case N-1, stuck breaker, and N-2 contingencies in the area of the generation project. The results of the Phase 3 portion of the loadflow analysis revealed no

additional facility overloads or voltage violations that would require mitigation due to TPL-001, TPL-002, TPL-003, and TPL-004 contingencies.

Phase 4 of the loadflow analysis evaluated the transmission system with respect to worst-case north-to-south transfer conditions across Nebraska. The Phase 4 analysis was performed to evaluate worst-case N-1 contingencies under these highly stressed transfer conditions. Overall, there was one N-1 transmission facility overloads discovered in the Phase 4 screening that were associated with north-south transfer limitations in eastern Nebraska. Loading on the line south of the GEN-2010-056 wind project interconnection on the Cooper – St. Joe 345 kV line was discovered for loss of the Cooper – Fairport 345 kV line. If the GEN-2010-056 wind project is developed, then the COOPER_S interface definition may need to be modified to address congestion at this new interconnection substation. The Nebraska City – Maryville – Sibley 345 kV line projects are expected to help relieve flowgate congestion through the transmission corridor south of Cooper.

The Short Circuit Analysis was performed to evaluate the fault interrupting capability of existing devices in the area and protection coordination issues following the generation uprate. The results of this analysis showed that there were no protective devices subject to replacement.

The Stability Analysis did not reveal any instances of transient voltage violations or rotor angle instability. The system was found to be stable following each of the system disturbances that were evaluated under both system intact and prior outage conditions. Rotor angles were found to be well damped and system voltages were found to recover in an adequate matter. There were no violations of stability criteria discovered for any of the system disturbances that were evaluated in this study. A SPPR analysis was performed on each of the disturbances to validate adequate rotor angle damping in accordance with NPPD criteria.

The Interconnection Facility was reviewed with the proposed uprate at Cooper Nuclear Station with the requirement that the 345 kV substation equipment was to have at least 2000 Amp capability. The Generator Step-Up (GSU) Transformer was replaced in 2012 from a 1008 MVA unit (3-336 MVA single-phase units) to a 1230 MVA unit (3-410 MVA single-phase units). This necessitated a detailed review of the 345 kV substation equipment from the high-side of the Generator Step-Up (GSU) transformer to the substation. As a result of this detailed engineering review, T&D Engineering has identified seven disconnect switches that would need upgraded to support the uprate requirements. The capability of the iso-phase bus would also need increased as part of the uprate project. The scope of the iso-phase bus work is still being developed and assessed by the generation facility.

Overall, the *NPPD DISIS-2012-002 Facility Study* documents the performance of the network following the addition of the generation uprate project at Cooper Nuclear Station. The Facility Study has documented the transmission plan required for interconnection to the NPPD transmission system and the details are listed on the following page.

DISIS-2012-002 Interconnection Plan

- Uprate Cooper 345 kV substation terminal facilities to at least 2000 Amp – Upgrade seven disconnect switches in the Cooper 345 kV substation.
\$ 720,000

Total Interconnection & Network Upgrades: \$720,000

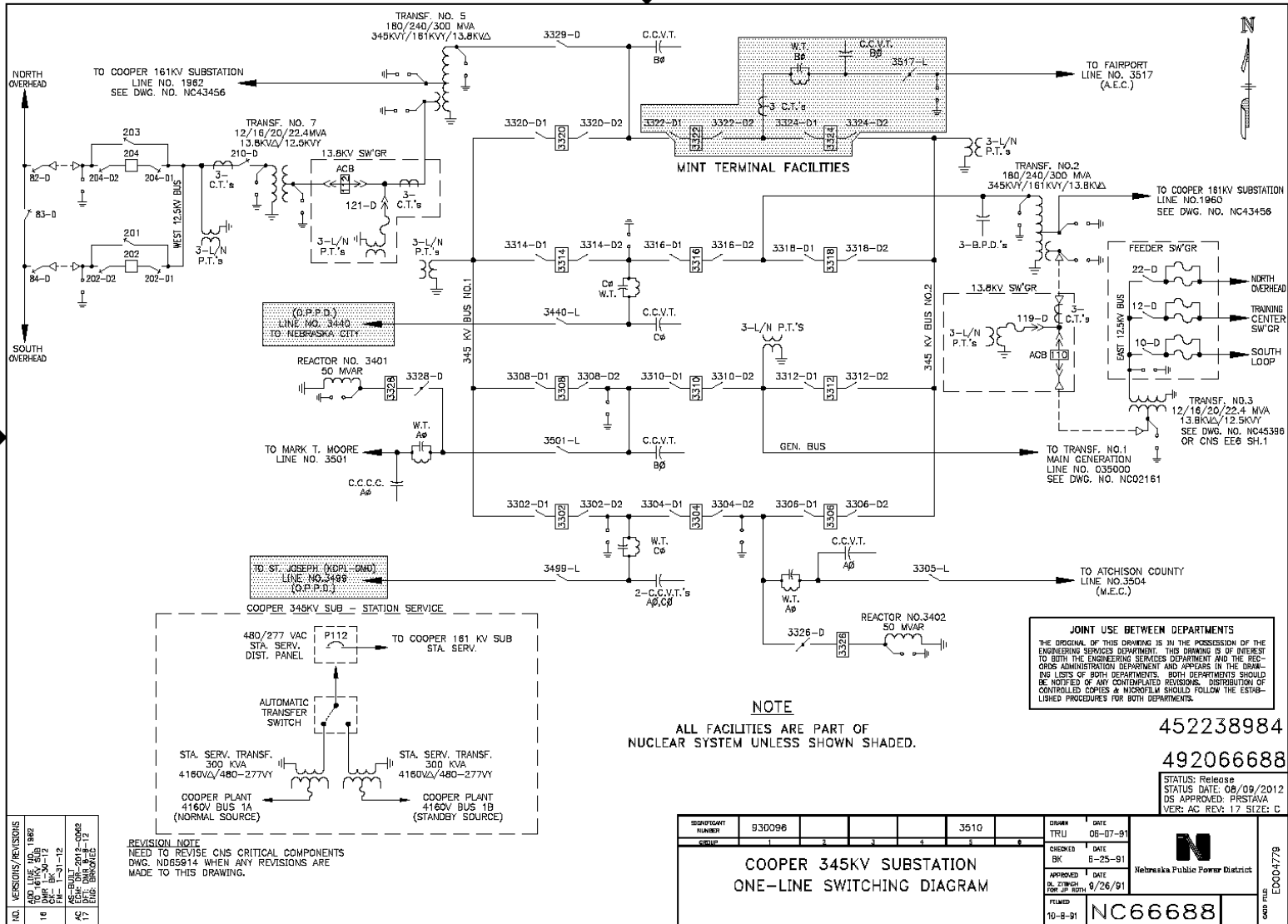
1.0 Introduction

In March 2013, NPPD was notified that a generation interconnection request in the SPP generation interconnection queue had advanced to the facility study stage. The generation interconnection request was evaluated by SPP in the Definitive Interconnection System Impact Study (DISIS-2012-002). The generation interconnection request is listed below:

<u>Project</u>	<u>MW</u>	<u>Point-of-Interconnection</u>
GEN-2012-017	+115.0 (965 MW total)	Cooper 345 kV

SPP entered into a Facility Study agreement with the generation interconnection customer and subsequently requested that NPPD perform the Facility Study for the GI request. In response to the SPP request, NPPD has performed a Facility Study for the generation interconnection request which included a detailed loadflow analysis, short circuit analysis and stability analysis. The Facility Study also includes detailed cost estimates and estimated project schedules for the interconnection and network upgrades identified in the Facility Study. The System Impact Study did not identify any interconnection or network upgrades required for the generation interconnection request. The Facility Study identified the need to upgrade equipment in the Cooper 345 kV substation to 2000 Amp capability (1195 MVA) to accommodate the generation increase.

Cooper 345 kV Substation One-Line Diagram



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NOTE
 ALL FACILITIES ARE PART OF NUCLEAR SYSTEM UNLESS SHOWN SHADED.

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STATUS: Release
 STATUS DATE: 08/09/2012
 DS APPROVED: PRISTAVIA
 VERR. AC. REV. 17 SIZE: C

REVISION NOTE
 NEED TO REVISE CNS CRITICAL COMPONENTS DWG. NDB5914 WHEN ANY REVISIONS ARE MADE TO THIS DRAWING.

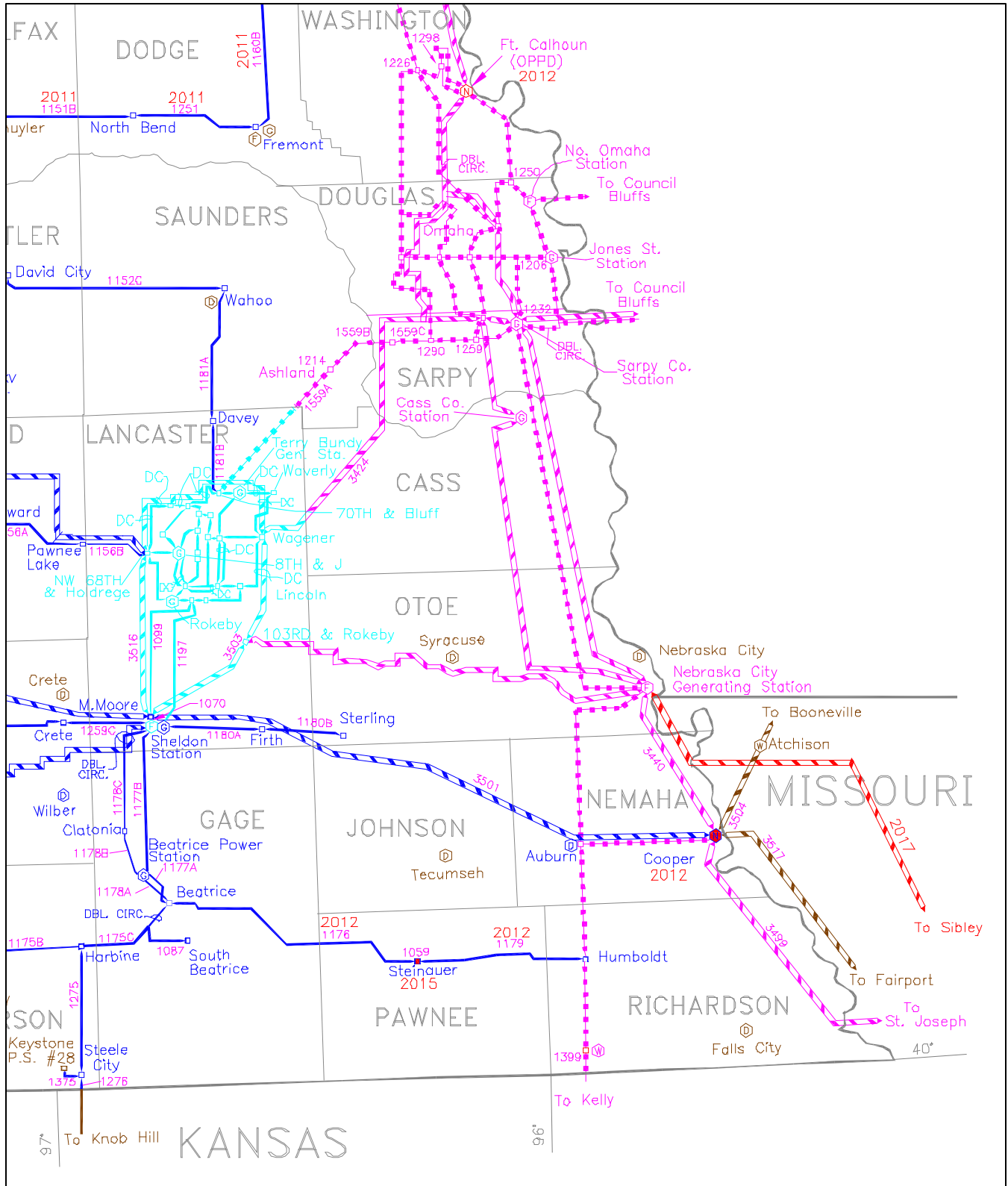
NO.	REVISIONS/REVISIONS
16	ADD LINE NO. 1982 DWP: [unclear] DATE: 11-31-12
15	AS-BUILT: 2014-09-02 DATE: 09-02-12 EIP: BRINKLEY

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			FILED	
			10-8-91	

**COOPER 345KV SUBSTATION
 ONE-LINE SWITCHING DIAGRAM**

Nebraska Public Power District
 EOOD-0779
NC66688

CNS Area Transmission System Map



2.0 Study Scope

2.1 Overview

This Facility Study will evaluate the impact of the requested Cooper Nuclear Station (CNS) Extended Power Uprate (EPU) on the NPPD transmission system. This study will evaluate the generator interconnection request in the SPP Generator Interconnection Queue which was studied in the SPP Definitive Interconnection System Impact Study, SPP DISIS-2012-002, and progressed to the facilities study stage. The GI project on the NPPD transmission system included in the DISIS-2012-002 study is as follows:

<u>Project</u>	<u>MW</u>	<u>Point-of-Interconnection</u>
GEN-2012-017	+115.0 (965 MW total)	Cooper 345 kV

This Facility Study will focus on the uprate project requesting interconnection to the NPPD transmission system. The SPP DISIS-2012-002 system impact study did not identify any network transmission upgrades due to the proposed generation facility uprate.

The results of the SPP DISIS indicated that there is one external network upgrade required to accommodate the new 965 MW EPU at CNS. The previously allocated network upgrade is the new Nashua 345/161 kV autotransformer addition in northern Kansas City. This project is an approved Balanced Portfolio project which is slated for a Summer 2015 in-service date. Since it is an existing approved project, the project costs were previously allocated and will not be a cost responsibility for CNS EPU. There are no other external network upgrades required for CNS EPU according to the SPP DISIS-2012-002.

At the time of this facility study, there were several active generation interconnection requests in the SPP GI queue in the southeast Nebraska area. Due to time constraints, this facility study must proceed assuming the following generation interconnection projects and associated network upgrades remain active projects in the SPP GI process. If any of these GI projects or network upgrades withdraw from the SPP GI queue, then a re-study of this DISIS-2012-002 facility study will be required. The previously queued GI projects and network upgrades in the southeast Nebraska area are as follows:

<u>Previously queued GI projects</u>		
GEN-2011-055 (Johnson County)	=	52.8 MW (facility study)
GEN-2011-018 (Steele City)	=	73.6 MW (on schedule 2013)
GEN-2010-056 (Cooper-StJoe)	=	151.0 MW (on suspension)
GEN-2010-044 (Harbine)	=	99.0 MW (ia pending)
GEN-2010-041 (S1399)	=	10.5 MW (facility study)
GEN-2008-123N (Rosemont)	=	<u>89.7 MW (on suspension)</u>
		476.6 MW

Previously allocated interconnection facilities & network upgrades

- Rosemont 115 kV substation (for GEN-2008-123N)
- Cooper-St. Joseph 345 kV substation (for GEN-2010-056)
- Harbine – Crete 115 kV line (for GEN-2010-044)

This facility study will assess the new system state with the EPU at CNS. The facility study will also identify any additional transmission issues that would require mitigation to meet mandatory NERC reliability standards following the EPU. The Facility Study will include the following study phases:

1. Loadflow Analysis
2. Short Circuit Analysis
3. Stability Analysis
4. Interconnection Facility Review

The loadflow analysis will be an assessment of the transmission system following the addition of the EPU. The loadflow analysis will evaluate the transmission system for compliance with NERC Reliability Standards and identify any thermal and voltage issues that would require mitigation. The short circuit analysis will evaluate the impacts of the EPU on existing fault currents in the area and determine if the capability of existing fault interrupting devices are adequate. A stability analysis will also be included to verify system stability and generator outlet capability following implementation of the EPU. The interconnection point for the CNS unit will need to be reviewed to ensure the equipment ratings from the substation to the generator terminals can accommodate the EPU. A minimum rating of 2000 Amp is required on the high-side 345 kV equipment.

The intent of the facility study is to perform a detailed assessment of the proposed generation interconnection facility and associated transmission and validate adherence to system reliability criteria. This study will be performed in accordance with NERC Reliability Standards and the criteria set forth under those standards. This facility study will document the required transmission facility interconnection plan for the proposed uprate and will be performed in accordance with the methodologies described in NPPD's Facility Connection Requirements Document.

2.2 Loadflow Analysis

NPPD Transmission Planning will perform a loadflow analysis to screen the steady state performance of the network following the EPU at CNS. The powerflow models used for the loadflow analysis will be 2012 Series SPP MDWG models. These models will represent system conditions close to the expected in-service date of the proposed uprate

project and will adequately represent a variety of worst-case seasonal conditions. The powerflow models utilized for the analysis will be:

2018 Spring Light Load Case
2018 Summer 100% Peak Load Case
2018 Winter 100% Peak Load Case

The base SPP MDWG powerflow models will be updated with planned transmission facility additions in the 2018 timeframe and other system changes consistent with the latest SPP Integrated Transmission Plan.

The loadflow study will be split into four phases:

Phase 1 : System-wide Single Contingency N-1 Analysis

Phase 2 : System-wide Multiple Element Contingency N-2 Analysis

Phase 3 : Local Area Full Accredited Generation Capacity N-1 & N-2 Contingency Analysis

Phase 4 : System-wide Single Contingency N-1 Analysis under heavy transfer conditions

PHASE 1: This Phase is considered a comprehensive single contingency analysis of the entire Nebraska subregion. Every single element rated from 115 kV – 345 kV in the NPPD, OPPD, and LES areas plus ties will be outaged and monitored through activity ACCC. The results of the contingency screening will be assessed and documented. Phase 1 will also further investigate all critical contingencies identified from the ACCC contingency screening. Phase 1 will be utilized to document the performance characteristics of the system in accordance with NERC Reliability Standards, TPL-001 and TPL-002.

PHASE 2: This Phase is considered a comprehensive multiple element contingency analysis of the entire Nebraska region. Multiple element contingencies rated from 115 kV – 345 kV will be outaged and monitored through activity ACCC. The multiple element contingencies consist of stuck breaker contingencies and double circuit tower contingencies identified by Nebraska transmission owners and utilized during MRO and SPP screening processes. The results of the contingency screening will be assessed and documented. Phase 2 will also further investigate all critical contingencies identified from the ACCC contingency screening comparison. Phase 2 will be utilized to document the performance characteristics of the system in accordance with NERC Reliability Standards, TPL-003 and TPL-004.

PHASE 3: This Phase will evaluate the impacts of worst case N-1 single contingency and independent N-2 double contingency conditions for the local area transmission outlet paths associated with the uprate project. The 2012 Series 2018 Winter Peak Load case will be utilized to show the impacts of the worst case local area contingencies. All of the local area generation included in the study will be redispatched off-system. The purpose of this Phase will be to document sufficient generator outlet transmission capacity for the EPU concurrent with the existing approved accredited generation in the area.

This Phase will be used to evaluate the Nebraska area transmission capacity with respect to delivering the fully accredited generating capability out of the local area resources for load levels at and above 70% of peak. The Winter Peak Load case is approximately 70% of summer peak for the Nebraska region. To stress the generation outlet capacity, the maximum accredited generation is modeled in the southeast portion of Nebraska and exported into the surrounding MAPP & SPP regions. The following maximum accredited net generation levels will be modeled in this phase:

GEN-2012-017 (CNS EPU)	=	965.0 MW
GEN-2011-018 (Steele City)	=	73.6 MW
GEN-2008-123N (Rosemont)	=	89.7 MW
GEN-2010-056 (Cooper-StJoe)	=	151.0 MW
GEN-2010-044 (Harbine)	=	99.0 MW
Hebron #1	=	52.0 MW
Deshler Units #1-4	=	2.3 MW
Belleville Units #4-8	=	13.9 MW
Fairbury Units #2-3	=	15.3 MW
Red Cloud Units #1-5	=	4.0 MW
Sheldon #1	=	105.0 MW
Sheldon #2	=	120.0 MW
Hallam #1	=	52.0 MW
Beatrice Power Station #1	=	80.0 MW
Beatrice Power Station #2	=	80.0 MW
Beatrice Power Station #3	=	90.0 MW
Nebraska City #1	=	652.0 MW
Nebraska City #2	=	682.0 MW
Cass County #1	=	161.5 MW
Cass County #2	=	161.5 MW
Flat Water Wind	=	60.0 MW
GEN-2010-041 (Flat Water exp.)	=	10.5 MW
GEN-2011-055 (Johnson County)	=	52.8 MW
Atchison County Wind	=	144.0 MW

All of the incremental generation adjustments were made to external Nebraska resources to effect these schedules. Additional non-firm schedules into the MAPP and SPP regions made up the transfers. This type of operational mode is highly unlikely, but was utilized

to demonstrate the transmission capacity available to deliver the fully accredited generation out of the southeast Nebraska area under emergency conditions.

PHASE 4: This Phase is considered a comprehensive single contingency analysis of the entire Nebraska subregion under transfer conditions. This Phase will assess the performance of the NPPD transmission system under heavy north-to-south transfer conditions. Transfer cases will be established to evaluate north-to-south transfer limits with EPU. Every single element rated from 115 kV – 345 kV in the NPPD, OPPD, and LES areas plus ties will be outaged and monitored through activity ACCC. The results of the contingency screening will be assessed and documented. Phase 4 will also further investigate all critical contingencies identified from the ACCC contingency screening. Phase 4 will be utilized to document the performance characteristics of the system in accordance with NERC Reliability Standards, TPL-001 and TPL-002.

2.3 Short Circuit Analysis

The purpose of the Short Circuit Analysis will be to evaluate the impacts of the proposed uprate project on the existing substation equipment fault duty ratings in the area. The substations to be evaluated are those electrically close to the interconnection point (Cooper 345 kV Sub) of the uprate.

The Short Circuit Analysis will include short circuit calculations, an evaluation of the adequacy of existing circuit breaker interrupting ratings and an evaluation of the adequacy of the fault withstand capability of other substation equipment located at the monitored substations. The Short Circuit Analysis will be performed by NPPD Engineering Protection & Control personnel.

2.4 Stability Analysis

The intent of the stability portion of this study will be to evaluate CNS generation with the EPU and to assess the generation outlet capability of the local area transmission system. The benchmark stability system studies for the CNS area are the “*Cooper Nuclear Station USAR Grid Stability Study 850 MW NET*” performed in 2012 and the “*815 MW Cooper Nuclear Station Stability Sensitivity Study*” performed in 2007 and the “*Cooper Nuclear Station 22 MW Power Uprate Generation Accreditation Study*” performed in 2005. These studies are considered the dynamic benchmarks for the CNS area.

From the base case, a locally stressed, heavy transfer case will be developed utilizing the following generation patterns:

Cooper Nuclear Station	=	965 MW
Nebraska City Unit # 1	=	652 MW
Nebraska City Unit # 2	=	682 MW
Cass County Gas Turbines	=	323 MW
Council Bluffs Unit # 1	=	46 MW
Council Bluffs Unit # 2	=	88 MW
Council Bluffs Unit # 3	=	720 MW
Council Bluffs Unit # 4	=	790 MW
Beatrice Power Station	=	250 MW
Sheldon Unit # 1	=	105 MW
Sheldon Unit # 2	=	120 MW
Hallam GT Peaker	=	52 MW
Flat Water Wind	=	60 MW
Atchison County Wind	=	144 MW
Iatan Unit #1	=	706 MW
Iatan Unit #2	=	850 MW

To evaluate the impacts of the EPU at CNS, the worst case local area disturbances will be simulated to evaluate the response characteristics of CNS and nearby units to faults in the immediate area.

Post Disturbance powerflow analysis will be performed to evaluate the system state following the worst case fault conditions and resultant transmission outages. The post-disturbance loadflow study will be performed for each of the critical disturbances analyzed in the stability study phase.

The overall goal of the stability analysis is to assess the new system state and verify that compliance with all NERC Planning and Operating standards is maintained.

2.5 Interconnection Facility Review

NPPD T&D Engineering and CNS Engineering departments will review the electrical equipment ratings associated with the CNS generation facility to ensure adequate capacity to accommodate the EPU. This will include a review of all 345 kV substation equipment at this location to verify a minimum rating of 2000 Amps (1195 MVA). This will also include a full review of all generation interconnection equipment from the generator terminals to the 345 kV substation (i.e. Iso-Phase Bus, GSU, Line #3500 (gen tie line), Metering CT's, etc.) to ensure adequate capacity to accommodate the EPU. Any electrical equipment that is scheduled to be or identified to be upgraded should be documented as necessary.

2.6 Detailed Cost Estimates & Project Schedule

NPPD Engineering, Asset Management, and Project Management departments will review the transmission upgrades identified in the SPP DISIS-2012-002 study. Detailed cost estimates and project schedules will be developed by these groups to implement the proposed transmission upgrades using standard NPPD construction and procurement practices. If any additional transmission upgrades are identified in this facility study, a detailed cost estimate and project schedule for these additional upgrades will also be developed and provided as required.

3.0 Model Development

3.1 Overview

This study was conducted using Rev 32.2.1 and Rev 30.3.3 of Power Technology Inc.'s (PTI's) Power System Simulator (PSS/E) software package and the following SPP 2012 Series MDWG powerflow models:

2018 Spring Light Load Load Case
2018 Winter Peak Load Case
2018 Summer 100% Peak Load Case

The powerflow models were updated to include the new generator step-up transformers and updated generator at CNS with the EPU.

3.2 CNS Generator Models

Loadflow:

The loadflow generator model for CNS was reviewed and compared to the latest information provided by the generation facility. As such, the reactive capability of the CNS generator was adjusted to + 610 MVAR / - 350 MVAR to be evaluated in this study. The unsaturated sub-synchronous reactance, X''d, was adjusted to 0.3300 and the MBASE was modified to 1160 MVA per the latest generator constant data sheet. The impedance and facility rating for the generator step-up transformer was also adjusted to the values of the new units replaced during the Fall 2012 outage. The station service load was also adjusted to 20 MW/8.5 MVAR per the direction of the generation facility. The loadflow generator PSS/E data for CNS is listed below:

```
DATA FOR BUS 640009 [COOPER1G      22.000] RESIDING IN AREA 640, ZONE 686, OWNER 640:

CODE P Q - L O A D      I - L O A D      Y - L O A D G-SHUNT B-SHUNT VOLTAGE  ANGLE
  2   20.0   8.5   0.0   0.0   0.0   0.0   0.0   0.0 1.00000 -33.07

ID ST  PGEN  QGEN  QMAX  QMIN  MBASE  Z S O R C E  X T R A N  GENTAP  PMAX  PMIN
1  1  985.0  129.5  610.0 -350.0 1160.0 0.0000 0.3300 0.0000 0.0000 1.0000 985.0 247.0

X----- TO BUS -----X          XFRMER   S W M C C          SPECIFIED
BUS# X-- NAME --X BASKV CKT X-- NAME --X T 1 T Z M   R 1-2   X 1-2  SBAS1-2
640139 COOPER 3      345.00  1  COOPER T1      1 T F 1 1   0.00020  0.01040  100.0

X----- TO BUS -----X          C
BUS# X-- NAME --X BASKV CKT W  WINDV1  NOMV1  ANGLE  WINDV2  NOMV2  RATEA  RATEB  RATEC
640139 COOPER 3      345.00  1  1  1.05263  345.00   30.0  1.00000  20.900  1195.0  1195.0  1195.0
```

Stability:

The existing dynamics models for CNS were reviewed and compared to the latest information provided by the generation facility. As such, the generator (GENROU) and governor (IEESGO) models were modified. The governor model is not active ($K1 = 0$) and the unit will not respond to changes in grid frequency. The governor model is included to retain the time constants and modeling data for potential future use. The exciter model (IEEET1) was not modified. The power system stabilizer model (STAB1) was included. The exciter and power system stabilizer models are preliminary estimations and will need updated following the EPU upgrades. The stability PSS/E data for CNS is listed below:

PLANT MODELS

REPORT FOR PLANT MODELS

BUS 640009 [COOPER1G 22.000] MODELS

```
** GENROU ** BUS X-- NAME --X BASEKV MC C O N S S T A T E S
640009 COOPER1G 22.000 1 294633-294646 110503-110508

MBASE Z S O R C E X T R A N GENTAP
1160.0 0.00000+J 0.33000 0.00000+J 0.00000 1.00000

T'D0 T''D0 T'Q0 T''Q0 H DAMP XD XQ X'D X'Q X''D XL
6.65 0.054 0.74 0.070 4.90 0.00 2.1127 2.0522 0.4965 0.6290 0.3300 0.2714

S(1.0) S(1.2)
0.1190 0.4690

** STAB1 ** BUS X-- NAME --X BASEKV MC C O N S S T A T E S
640009 COOPER1G 22.000 1 294647-294653 110509-110511

K/T T T1/T3 T3 T2/T4 T4 LIMIT
2.650 30.000 2.500 0.100 5.000 0.050 0.050

** IEEET1 ** BUS X-- NAME --X BASEKV MC C O N S S T A T E S VAR
640009 COOPER1G 22.000 1 294654-294667 110512-110515 42927

TR KA TA VRMAX VRMIN KE TE KF TF SWITCH
0.000 400.00 0.030 7.100 -7.100 1.000 0.910 0.060 1.000 0.0

E1 S(E1) E2 S(E2) KE VAR
3.0825 0.2960 4.1100 0.7290 0.0000

** IEESGO ** BUS X-- NAME --X BASEKV MC C O N S S T A T E S VAR
640009 COOPER1G 22.000 1 294668-294678 110516-110520 42928

T1 T2 T3 T4 T5 T6 K1 K2 K3 PMAX PMIN
0.180 0.030 0.150 0.250 6.00 0.30 0.0 0.65 1.00 0.89 0.20
```

3.3 Relaying Considerations

For the disturbances analyzed with normal clearing, normal piloted relaying schemes are used on all lines with near and far ends cleared simultaneously. Simultaneous normal clearing assumed the worst-case far end clearing time. For the disturbances analyzed with delayed clearing, the near and far ends were cleared separately depending on the

disturbance conditions that were evaluated. High speed reclosing was not considered for the CNS area disturbances due to breaker clearing times and reclosing schemes not being critical to maintaining stability in the eastern Nebraska area. Reclosing is not considered for three phase faults or when a failed breaker condition exists. All faults applied in this study were three phase faults or single-line-to-ground faults with delayed clearing (stuck breaker conditions).

A breakdown of fault clearing times in cycles is shown below for each system voltage level.

Line Relay Operation Timing

	345 kV Close End (cycles)	345 kV Far End (cycles)	230 kV Close End (cycles)	230 kV Far End (cycles)	115 kV Close End (cycles)	115 kV Far End (cycles)
Relay Time	0.5	1.5	1.5	2.0	1.5	2.5
Breaker Time	2.0	2.0	3.0	3.0	3.0	3.0
Misc.	1.0	1.0	1.0	1.0	1.0	1.0
Total	3.5	4.5	5.5	6.0	5.5	6.5

Transformer Differential Relay Timing

	345 kV (cycles)	230 kV (cycles)	115 kV (cycles)
Relay Time	1.0	1.0	1.0
Lockout Relay	0.5	0.5	0.5
Breaker Time	2.0	3.0	3.0
Misc.	1.0	1.0	1.0
Total	4.5	5.5	5.5

Breaker Failure Relay Operations Timing

	345 kV Close End (cycles)	345 kV Far End (cycles)	230 kV Close End (cycles)	230 kV Far End (cycles)	115 kV Close End (cycles)	115 kV Far End (cycles)
Fault Det. Init.	1.0	1.5	1.0	2.0	1.5	2.5
Timer Relay	8.5	8.5	9.0	9.0	12.0	12.0
Lockout Relay	0.5	0.5	0.5	0.5	0.5	0.5
Breaker Time	2.0	2.0	3.0	3.0	3.0	3.0
Misc.	1.0	1.0	1.0	1.0	1.0	1.0
Total	13.0	13.5	14.5	15.5	18.0	19.0

3.4 Case Naming Convention

The naming convention used throughout the stability analysis portion of this study is outlined in the following table. The file type description is contained in the first two letters of the case name. Simulation channel output files begin with the prefix “CH”. The next letter “C” differentiates these files as being associated with the CNS stability study. The first two digits following the C contain the loadflow prior outage information. The three numbers between the next decimal points depict the net generation level information for the Cooper Nuclear Station. The disturbance information is contained in the last two digits of the case name. A “00” in the disturbance information was used to represent base case loadflows for system intact and prior outage conditions. A complete detailed listing of the prior outages and disturbances is included in the following table.

Table 1. Case Naming Convention

<u>CH</u>	.	<u>C00</u>	.	<u>XXX</u>	.	<u>01</u>
File Type Description		Study Description Prior Outage Code		CNS Gen Code		Disturbance Code
<u>File Type Description</u>						
CH: Channel Output						
<u>Study Description</u>						
C : Cooper Nuclear Station USAR Grid Stability Study						
<u>Prior Outage Code</u>						
00 : System Intact						
01 : Prior Outage of Cooper – S3458 345 kV line (L-3440)						
02 : Prior Outage of Cooper – Moore 345 kV line (L-3501)						
03 : Prior Outage of Cooper – Atchison 345 kV line (L-3504)						
04 : Prior Outage of Cooper – Fairport 345 kV line (L-3517)						
05 : Prior Outage of Cooper – St. Joe 345 kV line (L-3499)						
06 : Prior Outage of Cooper 345/161 kV Transformer, T2						
07 : Prior Outage of Cooper 345/161 kV Transformer, T5						
<u>Cooper Nuclear Station Generation Code</u>						
XXX : net MW output of Cooper Nuclear Station generation						
<u>Disturbance Code</u>						
00 : No disturbance (base case representation for loadflows)						
01 : 3PH fault at Cooper end of Cooper – S3458 345 kV line						
02 : 3PH fault at Cooper end of Cooper – Moore 345 kV line						
03 : 3PH fault at Cooper end of Cooper – Atchison 345 kV line						
04 : 3PH fault at Cooper end of Atchison - Booneville 345 kV line						
05 : 3PH fault at S3458 end of S3458 – S3456 345 kV line						
06 : 3PH fault at Cooper end of Cooper – Fairport 345 kV line						
07 : 3PH fault at Cooper end of Cooper – St. Joe 345 kV line						
08 : 3PH fault on high side of Cooper 345/161 kV Transformer, T2						
09 : 3PH fault on low side of Cooper 345/161 kV Transformer, T5						
10 : 3PH fault on Cooper end of Cooper – S1280 161 kV line						
11 : Loss of CNS Generation (Load Rejection)						
12 : Loss of Council Bluffs Unit #4 Generation (Load Rejection)						
13 : Loss of Iatan Unit #2 Generation (Load Rejection)						
14 : SLG fault at Cooper end of Cooper – S3458 345 kV line, Stuck 3316 at Cooper, Clear Cooper 345/161 kV T2						
15 : SLG fault at Cooper end of Cooper – Fairport 345 kV line, Stuck 3322 at Cooper, Clear Cooper 345/161 kV T5						
16 : SLG fault at Cooper end of Cooper – Atchison 345 kV line, Stuck 3304 at Cooper, Clear Cooper – St. Joe line						
17 : SLG fault on low side of Cooper 345/161 kV Transformer, Stuck 1602 at Cooper, Clear Cooper 161kV, Auto-Reclose, Re-clear						

4.0 Study Criteria

4.1 Loadflow Analysis Criteria

Facility Loading Criteria

Overloads of equipment are defined as greater than 100% of the normal continuous rating (Rate A).

Voltage Criteria

Normal steady-state voltage levels are defined as 0.95 to 1.05 pu. Emergency steady-state voltage levels are defined as 0.90 – 1.10 pu and may be utilized for less than 30 minutes.

4.2 Stability Analysis Criteria

Transient Voltage Criteria :

Bus voltage excursions outside the band of 0.80 to 1.2 PU for a time period greater than 30 cycles or below 0.70 PU anytime after the fault was cleared were considered unacceptable.

Damping Criteria:

All machine rotor angle oscillations must be positively damped and meet the criteria below. The criterion does not apply to bus voltages. The Damping Factor will be calculated from the "Successive Positive Peak Ratio" (SPPR) of the peak-to-peak amplitude of the rotor oscillation. SPPR and the associated Damping Factor will be calculated as:

$$\text{SPPR} = \text{Successive swing amplitude} / \text{Previous swing amplitude}$$

$$\text{Damping Factor} = (1 - \text{SPPR}) * 100 \text{ (in \%)}$$

The Damping Criteria are as follows (with increased damping required for higher probability events):

$$\begin{aligned} \text{For Disturbances with faults: SPPR (maximum)} &= 0.95 \\ \text{Damping Factor (minimum)} &= 5\% \end{aligned}$$

$$\begin{aligned} \text{For Line Trips: SPPR (maximum)} &= 0.90 \\ \text{Damping Factor (minimum)} &= 10\% \end{aligned}$$

Post-Disturbance Criteria Definitions:

(same as Loadflow Analysis Criteria above in Section 4.1)

5.0 Loadflow Analysis

5.1 Phase 1 Results (System-wide N-1 Screening)

PSS/E activity ACCC was used as a screening tool on each of the base cases to identify those contingencies which deserve closer study. ACCC analyzed the system by sequentially taking each transmission element greater than 100kV in the NPPD, OPPD, and LES areas out of service. Transmission facilities in the NPPD, OPPD, and LES areas were then monitored for violations of loading or bus voltage criteria. Contingencies which resulted in facility loadings or bus voltages outside of acceptable limits will be discussed in the summary of each case. The Phase 1 ACCC analysis is performed to assess the performance of the transmission system following the addition of the generation interconnection project according to TPL-001 and TPL-002 standards.

Phase 1 analysis further addressed contingencies flagged in the screened ACCC run with additional AC powerflow analysis as required. In the NPPD area, there are loadflow solution issues associated with voltage regulation bandwidths. Consequently, most of the capacitors and reactors are modeled as fixed mode switched shunts, which must be manually switched to achieve optimal voltage profiles.

Powerflow activities VCHK and RATE were used to identify voltage and loading issues in the NPPD, OPPD, and LES areas for the full AC solution contingency runs. Activity VCHK produced a listing of those buses whose voltage magnitude was greater than 1.10 PU, followed by a listing of buses whose voltage was less than 0.90 PU. Activity RATE reported any branch whose current loading, including line charging and line connected shunt components, exceeded the specified percentage of RATE A.

Phase 1 – 2018 Spring Light Load

System Intact Results (TPL-001):

There were no impacted transmission facility overloads or bus voltages outside of limits under system intact or base case conditions for the 2018 Spring Light Load model.

N-1 Contingency Results (TPL-002):

There were no impacted transmission facility overloads or bus voltages discovered outside of limits under N-1 conditions for the 2018 Spring Light Load model.

Phase 1 – 2018 Summer Peak

System Intact Results (TPL-001):

There were no impacted transmission facility overloads or bus voltages outside of limits under system intact or base case conditions for the 2018 Summer Peak model.

N-1 Contingency Results (TPL-002):

There were no impacted transmission facility overloads or bus voltages discovered outside of limits under N-1 conditions for the 2018 Summer Peak model.

Phase 1 – 2018 Winter Peak

System Intact Results (TPL-001):

There were no impacted transmission facility overloads or bus voltages outside of limits under system intact or base case conditions for the 2018 Winter Peak model.

N-1 Contingency Results (TPL-002):

There were no impacted transmission facility overloads or bus voltages discovered outside of limits under N-1 conditions for the 2018 Winter Peak model.

Phase 1 Results Summary

The Phase 1 screening did not discover any impacted transmission facility overloads or bus voltages outside of limits for system intact or N-1 conditions.

5.2 Phase 2 Results (System-wide Multiple Element Screening)

PSS/E activity ACCC was used as a screening tool on each of the base cases to identify those multiple element contingencies which deserve closer study. ACCC analyzed the system by sequentially taking select multiple element contingencies in the Nebraska area out-of-service. Transmission facilities in the NPPD, OPPD, and LES areas were then monitored for violations of loading or bus voltage criteria. The Phase 2 ACCC analysis is performed to assess the performance of the transmission system following the addition of the generation project according to TPL-003 and TPL-004 standards.

Phase 2 – 2018 Spring Light Load

Category C Results (TPL-003):

There were no impacted transmission facility overloads or bus voltages discovered outside of limits under Category C contingency conditions for the 2018 Spring Light Load model.

Category D Results (TPL-004):

There were no impacted transmission facility overloads or bus voltages discovered outside of limits under Category D contingency conditions for the 2018 Spring Light Load model.

Phase 2 – 2018 Summer Peak

Category C Results (TPL-003):

There were no impacted transmission facility overloads or bus voltages discovered outside of limits under Category C contingency conditions for the 2018 Summer Peak model.

Category D Results (TPL-004):

There were no impacted transmission facility overloads or bus voltages discovered outside of limits under Category D contingency conditions for the 2018 Summer Peak model.

Phase 2 – 2018 Winter Peak

Category C Results (TPL-003):

There were no impacted transmission facility overloads or bus voltages discovered outside of limits under Category C contingency conditions for the 2018 Winter Peak model.

Category D Results (TPL-004):

There were no impacted transmission facility overloads or bus voltages discovered outside of limits under Category D contingency conditions for the 2018 Winter Peak model.

Phase 2 Results Summary

Overall, there were no impacted transmission facility overloads or bus voltages outside of limits discovered in the Phase 2 screening for NERC category C and D contingencies.

5.3 Phase 3 Results (Local Area Full Accredited Generation Capacity N-1 & N-2 Contingency Analysis)

5.3.1 Phase 3 – N-1 Contingency Screening Analysis Results

PSS/E activity ACCC was used as a screening tool on the maximum generation powerflow model to identify those contingencies which deserve closer study. It should be noted that the powerflow models utilized in this phase of the loadflow study represent extreme worst-case generation outlet conditions. The powerflow models represent a highly unlikely maximum simultaneous generation dispatch scenario of generation facilities in the area. In order to evaluate new generation interconnection requests, a southeast NE cluster was established to evaluate the new request in this study. ACCC was utilized to analyze the system by sequentially taking contingencies in the NPPD, LES, and OPPD area out-of-service and monitoring facilities in the NPPD, LES, and OPPD area for violations of loading or bus voltage criteria.

Phase 3 – 2018 Winter Peak – Maximum Generation (N-1)

System Intact Results (TPL-001):

There were no transmission facility overloads or bus voltages outside of limits under system intact or base case conditions for the 2018 Winter Peak – Maximum Generation model.

N-1 Contingency Results (TPL-002):

There were no impacted transmission facility overloads or bus voltages discovered outside of limits under N-1 conditions for the 2018 Winter Peak – Maximum Generation model.

5.3.2 Phase 3 – Multiple Element Contingency Analysis Results

This phase of the analysis evaluated all worst-case stuck breaker and double circuit contingencies in the Nebraska area. PSS/E activity ACCC was used as a screening tool on the maximum generation base case with the additions to identify those contingencies which deserve closer study. ACCC analyzed the system by sequentially taking stuck breaker and double circuit contingencies in the Nebraska area and monitoring facilities in the NPPD, OPPD, and LES areas for violations of loading or bus voltage criteria.

Phase 3 – 2018 Winter Peak – Maximum Generation (Stuck PCB / Double Circuit)

There were no transmission facility overloads or bus voltages outside of limits for the multiple element contingencies evaluated using the 2018 Winter Peak – Maximum Generation model.

5.3.3 Phase 3 – Independent N-2 Contingency Analysis Results

This phase of the analysis evaluated select set of independent N-2 contingencies in the local area. PSS/E activity ACCC was used as a screening tool on the 2018 Winter Peak Maximum Generation powerflow model with the EPU to identify those contingencies which deserve closer study. ACCC analyzed the system by sequentially taking out all independent N-2 contingencies in the local area and monitoring facilities in the NPPD, OPPD, and LES areas for violations of loading or bus voltage criteria. A total of 528 independent N-2 contingencies were included in this contingency analysis.

Phase 3 – 2018 Winter Peak – Maximum Generation (Independent N-2)

There were no transmission facility overloads or bus voltages outside of limits for the independent N-2 contingencies evaluated using the 2018 Winter Peak – Maximum Generation model.

5.4 Phase 4 Results (System-wide N-1 Screening w/ transfer conditions)

The Phase 4 ACCC analysis is performed to assess the performance of the transmission system under stressed heavy transfer conditions following the addition of the EPU according to TPL-001 and TPL-002 standards. This phase utilized the 2018 Winter Peak case as the base system topology. Generation in western Nebraska and Iowa were then increased to stress the existing north-south flowgates (WNE_WKS & COOPER_S) in Nebraska to existing transfer limits. The EPU at CNS was then added to the case. The generation uprate was exported off-system to other modeling areas in SPP on a pro rata basis. PSS/E activity ACCC was then used as a screening tool on the base case to identify those contingencies which deserve closer study. ACCC analyzed the system by sequentially taking each transmission element greater than 100kV in the NPPD, OPPD, and LES areas out of service. Transmission facilities in the NPPD, OPPD, and LES areas were then monitored for violations of loading or bus voltage criteria. Contingencies which resulted in facility loadings or bus voltages outside of acceptable limits will be discussed in the summary of each case.

System Intact Results (TPL-001):

There were no transmission facility overloads or bus voltages outside of limits under system intact or base case conditions for the 2018 Winter Peak case with transfers.

N-1 Contingency Results (TPL-002):

A single overloaded transmission facility was discovered in the monitored study areas in the N-1 ACCC analysis of the 2018 Winter Peak case with transfers and the EPU at CNS.

The GEN-2010-056 Wind – St. Joe 345 kV line was overloaded above the 1073 MVA rating for loss of the Cooper – Fairport 345 kV line. This line was loaded to 102.2% of the 1073 MVA rating. The GEN-2010-056 Wind is a possible new substation on the Cooper – St. Joe 345 kV line to interconnect the GEN-2010-056 wind project that is currently under suspension. If this wind project is developed, the COOPER_S interface definition may need to be modified to address the potential constraint south of this new substation. The Axtell – Post Rock 345 kV and Nebraska City – Maryville – Sibley 345 kV line projects are expected to help relieve flowgate congestion through the transmission corridor south of Cooper.

Phase 4 Results Summary

Overall, there was a single transmission facility overload discovered in the Phase 4 screening that was associated with north-south transfer limitations in eastern Nebraska. The north-south transfer limitations in this area are expected to be relieved with the addition of the Axtell – Post Rock 345 kV line and the future addition of the Nebraska City – Maryville – Sibley 345 kV line. Transfer limitations in this area will continue to be monitored if new substations are interconnected to existing lines which could impact the existing COOPER_S interface definition.

6.0 Short Circuit Analysis

The NPPD Protection and Controls Department has reviewed the impact of the Cooper Nuclear Station Extended Power Uprate (965 MW NET) and has concluded there would be no significant impacts to the transmission system from a short circuit perspective. When the rotor and stator of the generator were replaced at Cooper in 2008 (1160 MVA) and the generator step-up transformer was replaced in 2012 (1230 MVA), the Cooper area transmission system was assessed from a short circuit capability perspective and no issues were identified. Increasing the real power output from 850 MW net to 965 MW net would not change the impacts on the system from a short circuit capability perspective so no additional short circuit analysis was required at this time.

7.0 Stability Analysis

7.1 Model Development

The stability loadflow base case utilized in the stability analysis was developed from a 2010 Series MRO 2011/12 Winter Peak model that was updated based on NPPD's 2011 Series dynamics data submittal update. The dynamics data for existing Nebraska area resources used in this study was derived from the 2010 Series MRO model dynamics data with any updates related to NPPD's 2011 Series dynamics data submittal update. All machine, excitation, governor, stabilizer, DC controller and special user models that resided in the 2010 Series database were used as the base model for this study.

The loadflow generator model for CNS was reviewed and compared to the latest information provided by the generation facility. As such, the reactive capability of the CNS generator was adjusted to +610 MVAR / -350 MVAR to be evaluated in this study. The unsaturated sub-synchronous reactance, X''d, was adjusted to 0.3300 and the MBASE was modified to 1160 MVA per the latest generator constant data sheet. The impedance and facility rating for the generator step-up transformer was also adjusted to the values of the new units replaced during the Fall 2012 outage. The station service load was also adjusted to 20 MW/8.5 MVAR per the direction of the generation facility.

The existing dynamics models for CNS were reviewed and compared to the latest information provided by the generation facility. As such, the generator (GENROU) and governor (IEESGO) models were modified. The governor model is not active (K1 = 0) and the unit will not respond to changes in grid frequency. The governor model is included to retain the time constants and modeling data for potential future use. The exciter model (IEEET1) was not modified. The power system stabilizer model (STAB1) was included. The exciter and power system stabilizer models are preliminary estimations and will need updated following the EPU upgrades.

A detailed snapshot of the loadflow / dynamics models utilized for the stability analysis is below.

PSS/E LOADFLOW DATA

DATA FOR BUS 640009 [COOPER1G 22.000] RESIDING IN AREA 640, ZONE 686, OWNER 640:

CODE	P	Q	-	L	O	A	D	I	-	L	O	A	D	Y	-	L	O	A	D	G-SHUNT	B-SHUNT	VOLTAGE	ANGLE
2		20.0		8.5				0.0		0.0				0.0		0.0		0.0		0.0	1.00000	-33.07	

ID	ST	PGEN	QGEN	QMAX	QMIN	MBASE	Z	S	O	R	C	E	X	T	R	A	N	GENTAP	P	M	A	X	P	M	I	N	
1	1	985.0	129.5	610.0	-350.0	1160.0	0.0000	0.3300	0.0000	0.0000	0.0000	1.0000	985.0	247.0													

X	TO	BUS	X	XFRMER	S	W	M	C	C	SPECIFIED												
BUS#	X--	NAME	--X	BASKV	CKT	X--	NAME	--X	T	1	T	Z	M	R	1-2	X	1-2	S	B	A	S	1-2
640139	COOPER	3		345.00	1	COOPER	T1		1	T	F	1	1	0.00020	0.01040	100.0						

```

X----- TO BUS -----X      C
BUS# X-- NAME --X BASKV CKT W WINDV1 NOMV1 ANGLE WINDV2 NOMV2 RATEA RATEB RATEC
640139 COOPER 3      345.00 1 1 1.05263 345.00 30.0 1.00000 20.900 1195.0 1195.0 1195.0

```

PSS/E DYNAMICS DATA

PLANT MODELS

REPORT FOR PLANT MODELS BUS 640009 [COOPER1G 22.000] MODELS

```

** GENROU ** BUS X-- NAME --X BASEKV MC C O N S S T A T E S
        640009 COOPER1G      22.000 1 294633-294646 110503-110508

        MBASE      Z S O R C E      X T R A N      GENTAP
        1160.0    0.00000+J 0.33000    0.00000+J 0.00000    1.00000

T'D0 T''D0 T'Q0 T''Q0 H DAMP XD XQ X'D X'Q X''D XL
6.65 0.054 0.74 0.070 4.90 0.00 2.1127 2.0522 0.4965 0.6290 0.3300 0.2714

                S(1.0) S(1.2)
                0.1190 0.4690

```

```

** STAB1 ** BUS X-- NAME --X BASEKV MC C O N S S T A T E S
        640009 COOPER1G      22.000 1 294647-294653 110509-110511

        K/T      T      T1/T3      T3      T2/T4      T4      LIMIT
        2.650    30.000    2.500    0.100    5.000    0.050    0.050

** IEEE11 ** BUS X-- NAME --X BASEKV MC C O N S S T A T E S VAR
        640009 COOPER1G      22.000 1 294654-294667 110512-110515 42927

        TR      KA      TA      VRMAX      VRMIN      KE      TE      KF      TF      SWITCH
        0.000    400.00 0.030 7.100 -7.100 1.000 0.910 0.060 1.000 0.0

                E1      S(E1)      E2      S(E2)      KE VAR
                3.0825 0.2960 4.1100 0.7290 0.0000

```

```

** IEESGO ** BUS X-- NAME --X BASEKV MC C O N S S T A T E S VAR
        640009 COOPER1G      22.000 1 294668-294678 110516-110520 42928

        T1      T2      T3      T4      T5      T6      K1      K2      K3      PMAX      PMIN
        0.180 0.030 0.150 0.250 6.00 0.30 0.0 0.65 1.00 0.89 0.20

```

7.2 Disturbance Summary

A comprehensive set of disturbances was developed to evaluate the system response and stability performance in the CNS area. CNS local area disturbances were simulated to evaluate the CNS generation unit response to faults electrically close to the interconnection of the facility. The set of disturbances included NERC Category B, C and D events. Disturbances with three-phase fault conditions on each local area transmission facility were evaluated. Single-line-to-ground faults with a stuck breaker on each local area transmission facility were also evaluated. The three-phase fault and single-line-to-ground fault with stuck breaker conditions were also evaluated under prior outage of each local area transmission facility. Losses of the largest generation units in

the area were also evaluated to verify acceptable grid performance under these conditions. A complete list of disturbances is included in the Disturbance Analysis Results Summary table.

Dynamic simulation output plots were developed and include the response characteristics of machine rotor angle plots for local area (CNS, Nebraska City #1, Sheldon #1, Cass #1, BPS #3) and regional generation facilities (TBGS #2, Louisa #1, Ft Calhoun, CBEC #3, GGS #2).

Bus voltage plots were developed for local area and regional substation. The local area buses include: Cooper 345 kV, Cooper 161 kV, Cooper 69 kV, Nebraska City 345 kV, Moore 345 kV. Regional bus voltages include: Grand Island 345 kV, S1211 161 kV, Rokeby 115 kV, Ft Calhoun 345 kV, Council Bluffs 345 kV.

All dynamic simulations were run for 5 seconds.

7.3 Stability Analysis Results

The results of the stability analysis did not reveal any instances of transient voltage violations or rotor angle instability. The system was found to be stable following each of the system disturbances that were evaluated under both system intact and prior outage conditions. Rotor angles were found to be well damped and system voltages were found to recover in an adequate matter. There were no violations of stability criteria discovered for any of the system disturbances that were evaluated in this study. A SPPR analysis was performed on each of the disturbances to validate adequate rotor angle damping in accordance with NPPD criteria. The detailed disturbance descriptions and stability output plots are contained in Section 7.4. The post-disturbance powerflow analysis one-lines are contained in Section 7.5.

Disturbance Analysis Results Summary

PRIOR OUTAGE	FAULTED ELEMENT END A - END B	DISTURBANCE	STUCK PCB	RECLOSE ATTEMPTS	OTHER ELEMENT AFFECTED	NERC CATEGORY	RESULT	CHANNEL FILE	ROTOR ANGLE		
									1st SWING PEAK	2nd SWING PEAK	SPPR (1st - 2nd)
NONE	COOPER - S3458 345 KV	3PH FAULT END A	NONE	NONE	NONE	B	STABLE	CH.C00.965.C01	92.28	65.29	0.71
NONE	COOPER - MOORE 345 KV	3PH FAULT END A	NONE	NONE	NONE	B	STABLE	CH.C00.965.C02	95.05	67.82	0.71
NONE	COOPER - ATCHISON 345 KV	3PH FAULT END A	NONE	NONE	NONE	B	STABLE	CH.C00.965.C03	95.73	67.21	0.70
NONE	ATCHISON - BOONEVILLE 345 KV	3PH FAULT END A	NONE	NONE	NONE	B	STABLE	CH.C00.965.C04	85.79	71.21	0.83
NONE	S3458 - S3456 345 KV	3PH FAULT END A	NONE	NONE	NONE	B	STABLE	CH.C00.965.C05	91.00	67.73	0.74
NONE	COOPER - FAIRPORT 345 KV	3PH FAULT END A	NONE	NONE	NONE	B	STABLE	CH.C00.965.C06	95.89	68.57	0.72
NONE	COOPER - ST. JOE 345 KV	3PH FAULT END A	NONE	NONE	NONE	B	STABLE	CH.C00.965.C07	96.24	68.10	0.71
NONE	COOPER 345/161 KV T2	3PH FAULT END A	NONE	NONE	NONE	B	STABLE	CH.C00.965.C08	100.40	66.83	0.67
NONE	COOPER 345/161 KV T5	3PH FAULT END B	NONE	NONE	NONE	B	STABLE	CH.C00.965.C09	78.09	67.46	0.86
NONE	COOPER - S1280 161 KV	3PH FAULT END A	NONE	NONE	NONE	B	STABLE	CH.C00.965.C10	80.51	68.33	0.85
NONE	COOPER GENERATION	CNS LOAD REJECTION	NONE	NONE	NONE	B	STABLE	CH.C00.965.C11	-	-	-
NONE	COUNCIL BLUFFS #4 GENERATION	LOSS OF COUNCIL BLUFFS #4	NONE	NONE	NONE	B	STABLE	CH.C00.965.C12	67.20	55.30	0.82
NONE	IATAN #2 GENERATION	LOSS OF IATAN #2	NONE	NONE	NONE	B	STABLE	CH.C00.965.C13	67.28	57.11	0.85
NONE	COOPER - S3458 345 KV	SLG FAULT END A	3316	NONE	COOPER 345/161 KV T2	C	STABLE	CH.C00.965.C14	81.14	66.90	0.82
NONE	COOPER - FAIRPORT 345 KV	SLG FAULT END A	3322	NONE	COOPER 345/161 KV T5	C	STABLE	CH.C00.965.C15	83.26	69.87	0.84
NONE	COOPER - ATCHISON 345 KV	SLG FAULT END A	3304	NONE	COOPER - ST. JOE 345 KV	C	STABLE	CH.C00.965.C16	85.02	70.79	0.83
NONE	COOPER 345/161 KV T2	SLG FAULT END B	1602	SINGLE	COOPER - S1280 161 KV	C	STABLE	CH.C00.965.C17	73.46	66.53	0.91
COOPER - S3458 345 KV	COOPER - ATCHISON 345 KV	3PH FAULT END A	NONE	NONE	NONE	C	STABLE	CH.C01.965.C03	92.68	68.70	0.74
COOPER - S3458 345 KV	COOPER - FAIRPORT 345 KV	3PH FAULT END A	NONE	NONE	NONE	C	STABLE	CH.C01.965.C06	92.29	70.42	0.76
COOPER - S3458 345 KV	COOPER - ATCHISON 345 KV	SLG FAULT END A	3304	NONE	COOPER - ST. JOE 345 KV	D	STABLE	CH.C01.965.C16	89.12	73.12	0.82
COOPER - S3458 345 KV	COOPER - FAIRPORT 345 KV	SLG FAULT END A	3322	NONE	COOPER 345/161 KV T5	D	STABLE	CH.C01.965.C15	85.37	70.35	0.82
COOPER - S3458 345 KV	COOPER GENERATION	CNS LOAD REJECTION	NONE	NONE	NONE	C	STABLE	CH.C01.965.C11	-	-	-
COOPER - MOORE 345 KV	COOPER - S3458 345 KV	3PH FAULT END A	NONE	NONE	NONE	C	STABLE	CH.C02.965.C01	93.49	67.83	0.73
COOPER - MOORE 345 KV	COOPER - ST. JOE 345 KV	3PH FAULT END A	NONE	NONE	NONE	C	STABLE	CH.C02.965.C07	96.19	70.74	0.74
COOPER - MOORE 345 KV	COOPER - S3458 345 KV	SLG FAULT END A	3316	NONE	COOPER 345/161 KV T2	D	STABLE	CH.C02.965.C14	85.56	69.30	0.81
COOPER - MOORE 345 KV	COOPER - ATCHISON 345 KV	SLG FAULT END A	3304	NONE	COOPER - ST. JOE 345 KV	D	STABLE	CH.C02.965.C16	87.70	72.91	0.83
COOPER - MOORE 345 KV	COOPER GENERATION	CNS LOAD REJECTION	NONE	NONE	NONE	C	STABLE	CH.C02.965.C11	-	-	-

Disturbance Analysis Results Summary

PRIOR OUTAGE	FAULTED ELEMENT END A - END B	DISTURBANCE	STUCK PCB	RECLOSE ATTEMPTS	OTHER ELEMENT AFFECTED	NERC CATEGORY	RESULT	CHANNEL FILE	ROTOR ANGLE		
									1st SWING PEAK	2nd SWING PEAK	SPPR (1st - 2nd)
COOPER - ATCHISON 345 KV	COOPER - MOORE 345 KV	3PH FAULT END A	NONE	NONE	NONE	C	STABLE	CH.C03.965.C02	98.11	71.48	0.73
COOPER - ATCHISON 345 KV	COOPER - FAIRPORT 345 KV	3PH FAULT END A	NONE	NONE	NONE	C	STABLE	CH.C03.965.C06	98.69	72.26	0.73
COOPER - ATCHISON 345 KV	COOPER - S3458 345 KV	SLG FAULT END A	3316	NONE	COOPER 345/161 KV T2	D	STABLE	CH.C03.965.C14	86.53	70.71	0.82
COOPER - ATCHISON 345 KV	COOPER GENERATION	CNS LOAD REJECTION	NONE	NONE	NONE	C	STABLE	CH.C03.965.C11	-	-	-
COOPER - FAIRPORT 345 KV	COOPER - MOORE 345 KV	3PH FAULT END A	NONE	NONE	NONE	C	STABLE	CH.C04.965.C02	97.22	69.59	0.72
COOPER - FAIRPORT 345 KV	COOPER - ST. JOE 345 KV	3PH FAULT END A	NONE	NONE	NONE	C	STABLE	CH.C04.965.C07	102.20	72.62	0.71
COOPER - FAIRPORT 345 KV	COOPER - S3458 345 KV	SLG FAULT END A	3316	NONE	COOPER 345/161 KV T2	D	STABLE	CH.C04.965.C14	84.36	69.01	0.82
COOPER - FAIRPORT 345 KV	COOPER - ATCHISON 345 KV	SLG FAULT END A	3304	NONE	COOPER - ST. JOE 345 KV	D	STABLE	CH.C04.965.C16	91.72	79.28	0.86
COOPER - FAIRPORT 345 KV	COOPER GENERATION	CNS LOAD REJECTION	NONE	NONE	NONE	C	STABLE	CH.C04.965.C11	-	-	-
COOPER - ST. JOE 345 KV	COOPER - S3458 345 KV	3PH FAULT END A	NONE	NONE	NONE	C	STABLE	CH.C05.965.C01	96.51	68.51	0.71
COOPER - ST. JOE 345 KV	COOPER - ATCHISON 345 KV	3PH FAULT END A	NONE	NONE	NONE	C	STABLE	CH.C05.965.C03	100.30	69.98	0.70
COOPER - ST. JOE 345 KV	COOPER 345/161 KV T5	SLG FAULT END A	3322	NONE	COOPER - FAIRPORT 345 KV	D	STABLE	CH.C05.965.C15	92.66	75.86	0.82
COOPER - ST. JOE 345 KV	COOPER GENERATION	CNS LOAD REJECTION	NONE	NONE	NONE	C	STABLE	CH.C05.965.C11	-	-	-
COOPER 345/161 KV T2	COOPER - MOORE 345 KV	3PH FAULT END A	NONE	NONE	NONE	C	STABLE	CH.C06.965.C02	95.14	67.96	0.71
COOPER 345/161 KV T2	COOPER 345/161 KV T5	3PH FAULT END B	NONE	NONE	NONE	C	STABLE	CH.C06.965.C09	74.45	68.36	0.92
COOPER 345/161 KV T2	COOPER - FAIRPORT 345 KV	SLG FAULT END A	3322	NONE	COOPER 345/161 KV T5	D	STABLE	CH.C06.965.C15	83.74	70.90	0.85
COOPER 345/161 KV T2	COOPER GENERATION	CNS LOAD REJECTION	NONE	NONE	NONE	C	STABLE	CH.C06.965.C11	-	-	-
COOPER 345/161 KV T5	COOPER - S3458 345 KV	3PH FAULT END A	NONE	NONE	NONE	C	STABLE	CH.C07.965.C01	92.36	65.42	0.71
COOPER 345/161 KV T5	COOPER - ST. JOE 345 KV	3PH FAULT END A	NONE	NONE	NONE	C	STABLE	CH.C07.965.C07	96.32	68.22	0.71
COOPER 345/161 KV T5	COOPER - S3458 345 KV	SLG FAULT END A	3316	NONE	COOPER 345/161 KV T2	D	STABLE	CH.C07.965.C14	81.52	67.93	0.83
COOPER 345/161 KV T5	COOPER GENERATION	CNS LOAD REJECTION	NONE	NONE	NONE	C	STABLE	CH.C07.965.C11	-	-	-

Section 7.4

Disturbance Descriptions and Stability Output Plots

Disturbance Description

STABILITY CASE NAME: C00.965.C01

PRIOR OUTAGE: SYSTEM INTACT

POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - S3458 345 KV LINE. CLEAR COOPER - S3458 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - S3458 345 KV LINE

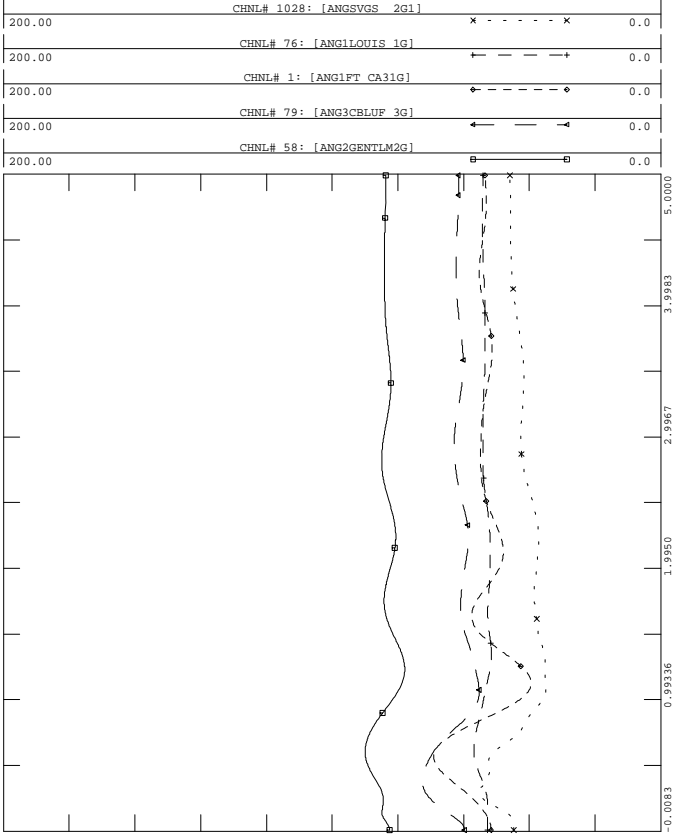
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



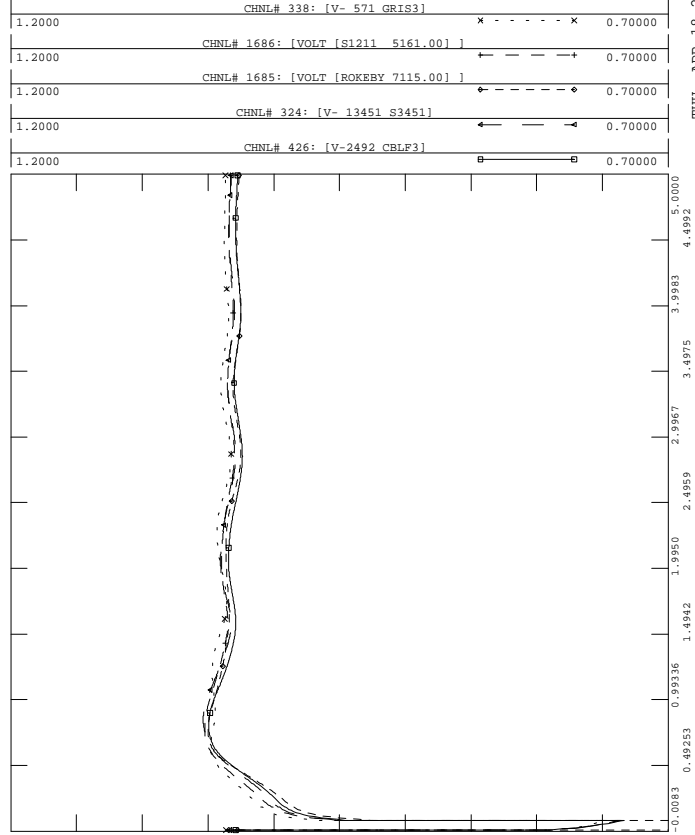
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - S3458 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C01

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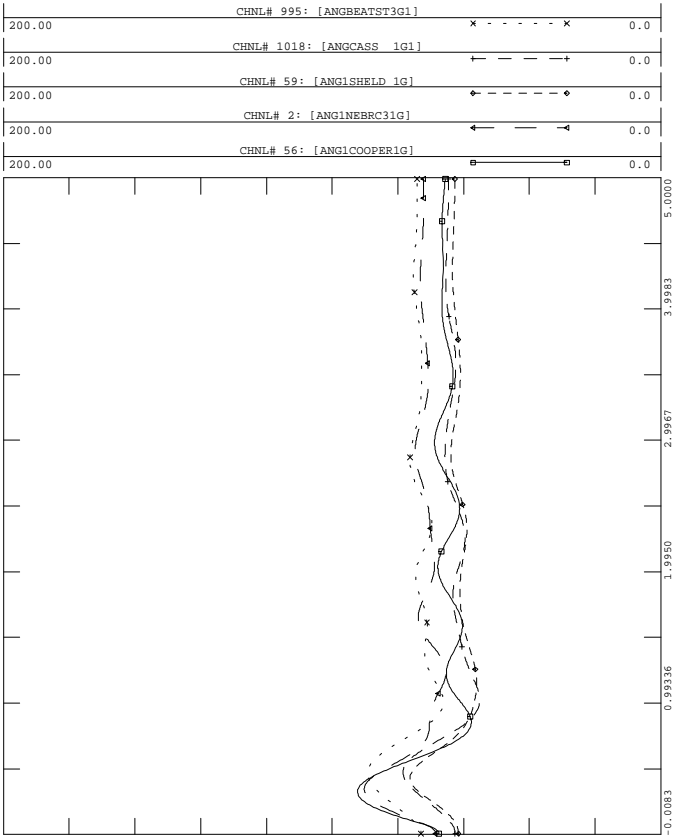
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - S3458 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C01

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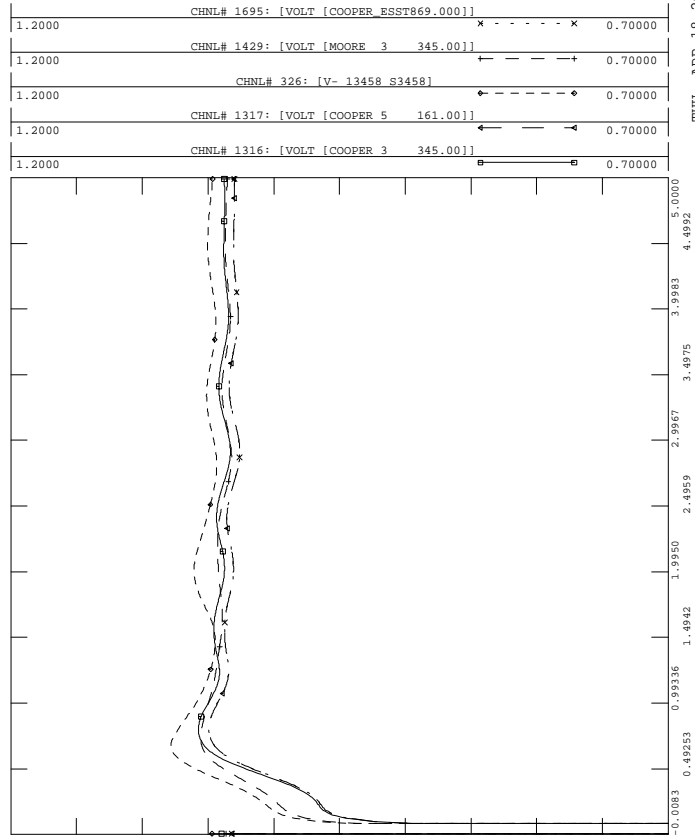
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - S3458 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C01

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - S3458 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C01

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Disturbance Description

STABILITY CASE NAME: C00.965.C02

PRIOR OUTAGE: SYSTEM INTACT

POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - MOORE 345 KV LINE. CLEAR COOPER - MOORE 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - MOORE 345 KV LINE

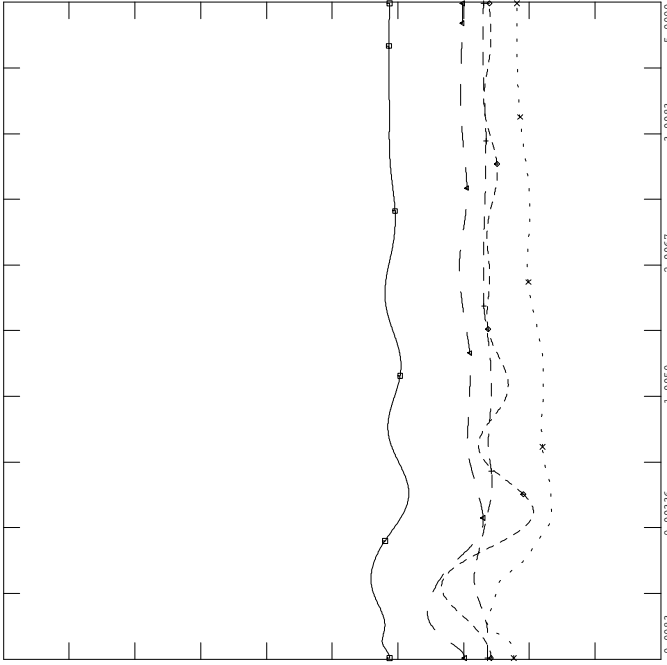
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - MOORE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C02

200.00	CHNL# 1028: [ANGSVGS 2G1]	x - - - - x	0.0
200.00	CHNL# 76: [ANGLLOUIS 1G]	↑ - - - - ↓	0.0
200.00	CHNL# 1: [ANGLFT CA31G]	◆ - - - - ◆	0.0
200.00	CHNL# 79: [ANG3CBLUF 3G]	← - - - - →	0.0
200.00	CHNL# 58: [ANG2GENTLM2G]	□ - - - - □	0.0

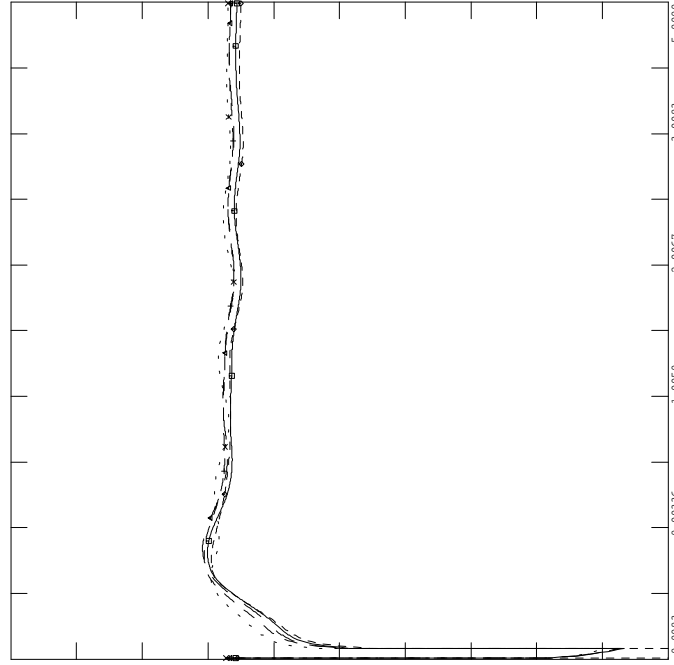


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - MOORE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C02

1.2000	CHNL# 338: [V- 571 GRIS3]	x - - - - x	0.70000
1.2000	CHNL# 1686: [VOLT [S1211 5161.00]]	↑ - - - - ↓	0.70000
1.2000	CHNL# 1685: [VOLT [ROKEYB 7115.00]]	◆ - - - - ◆	0.70000
1.2000	CHNL# 324: [V- 13451 S3451]	← - - - - →	0.70000
1.2000	CHNL# 426: [V-2492 CBLF3]	□ - - - - □	0.70000

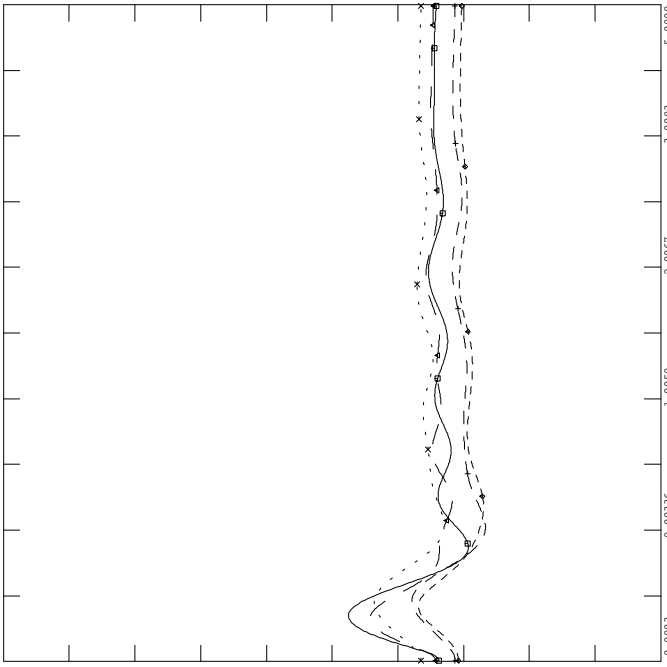


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - MOORE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C02

200.00	CHNL# 995: [ANGBEATST3G1]	x - - - - x	0.0
200.00	CHNL# 1018: [ANGCASS 1G1]	↑ - - - - ↓	0.0
200.00	CHNL# 59: [ANGISHELD 1G]	◆ - - - - ◆	0.0
200.00	CHNL# 2: [ANGINEBRC31G]	← - - - - →	0.0
200.00	CHNL# 56: [ANGLCOOPER1G]	□ - - - - □	0.0

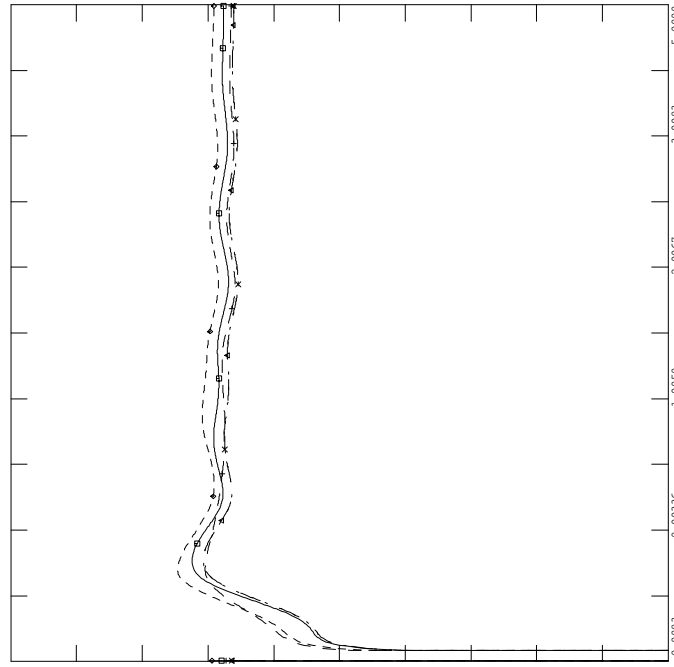


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - MOORE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C02

1.2000	CHNL# 1695: [VOLT [COOPER_ESST869.000]]	x - - - - x	0.70000
1.2000	CHNL# 1429: [VOLT [MOORE 3 345.00]]	↑ - - - - ↓	0.70000
1.2000	CHNL# 326: [V- 13458 S3458]	◆ - - - - ◆	0.70000
1.2000	CHNL# 1317: [VOLT [COOPER 5 161.00]]	← - - - - →	0.70000
1.2000	CHNL# 1316: [VOLT [COOPER 3 345.00]]	□ - - - - □	0.70000



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Disturbance Description

STABILITY CASE NAME: C00.965.C03

PRIOR OUTAGE: SYSTEM INTACT

POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1	= 105	Council Bluffs #1	= 46
Nebraska City #1	= 652	Sheldon #2	= 120	Council Bluffs #2	= 88
Nebraska City #2	= 682	Hallam CT	= 52	Council Bluffs #3	= 720
Cass County #1	= 161	BPS	= 250	Council Bluffs #4	= 790
Cass County #2	= 161	Iatan #1	= 706	Atchison Co Wind	= 144
Flat Water Wind	= 60	Iatan #2	= 965		

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - ATCHISON 345 KV LINE. CLEAR COOPER - BOONEVILLE 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - ATCHISON 345 KV LINE

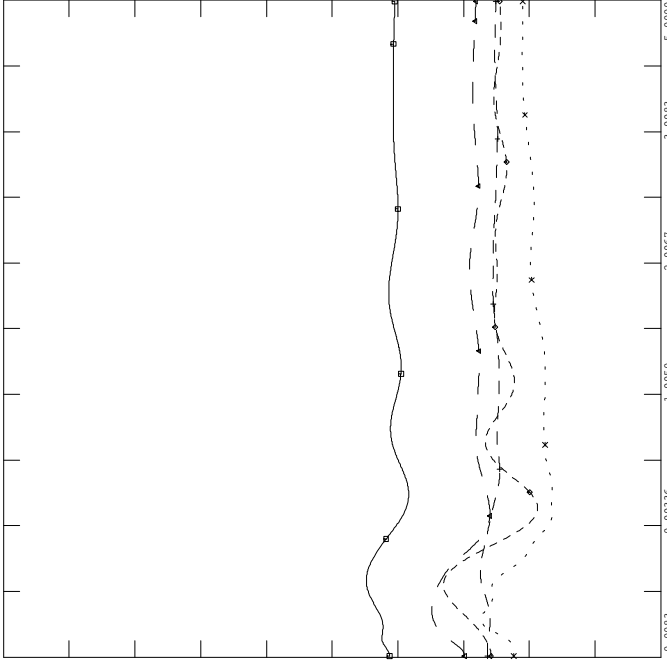
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C03

200.00	CHNL# 1028: [ANGSVGS 2G1]	x - - - - x	0.0
200.00	CHNL# 76: [ANGLLOUIS 1G]	↑ - - - - ↓	0.0
200.00	CHNL# 1: [ANGLFT CA31G]	◆ - - - - ◆	0.0
200.00	CHNL# 79: [ANG3CBLUF 3G]	← - - - - →	0.0
200.00	CHNL# 58: [ANG2GENTLM2G]	□ - - - - □	0.0

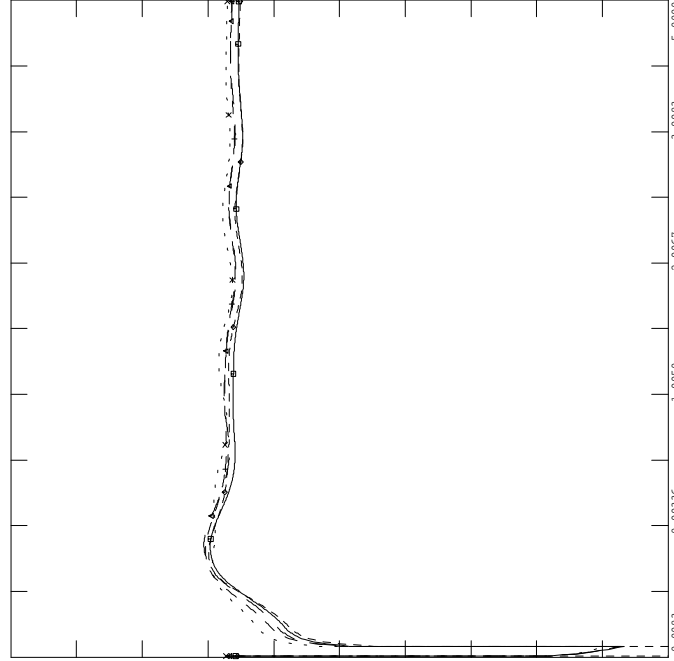


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C03

1.2000	CHNL# 338: [V- 571 GRIS3]	x - - - - x	0.70000
1.2000	CHNL# 1686: [VOLT [S1211 5161.00]]	↑ - - - - ↓	0.70000
1.2000	CHNL# 1685: [VOLT [ROKEBY 7115.00]]	◆ - - - - ◆	0.70000
1.2000	CHNL# 324: [V- 13451 S3451]	← - - - - →	0.70000
1.2000	CHNL# 426: [V-2492 CBLF3]	□ - - - - □	0.70000

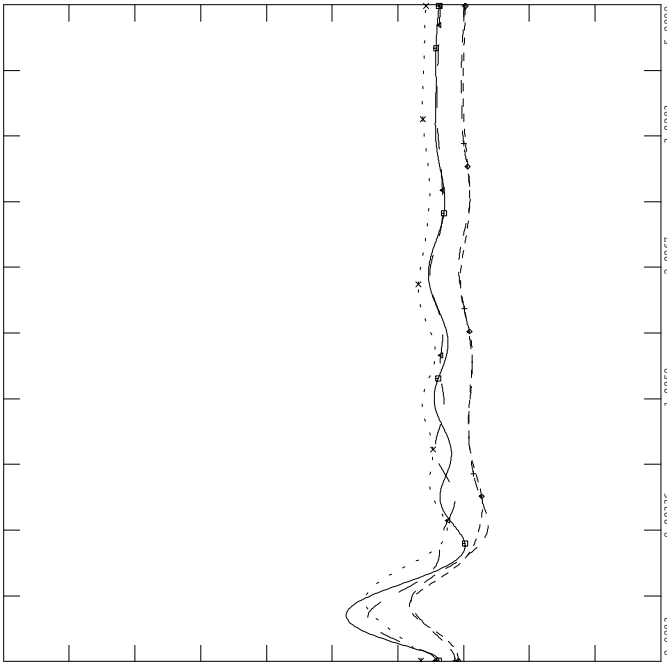


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C03

200.00	CHNL# 995: [ANGBEATST3G1]	x - - - - x	0.0
200.00	CHNL# 1018: [ANGCASS 1G1]	↑ - - - - ↓	0.0
200.00	CHNL# 59: [ANGSHELD 1G]	◆ - - - - ◆	0.0
200.00	CHNL# 2: [ANGINEBRC31G]	← - - - - →	0.0
200.00	CHNL# 56: [ANGLCOOPER1G]	□ - - - - □	0.0

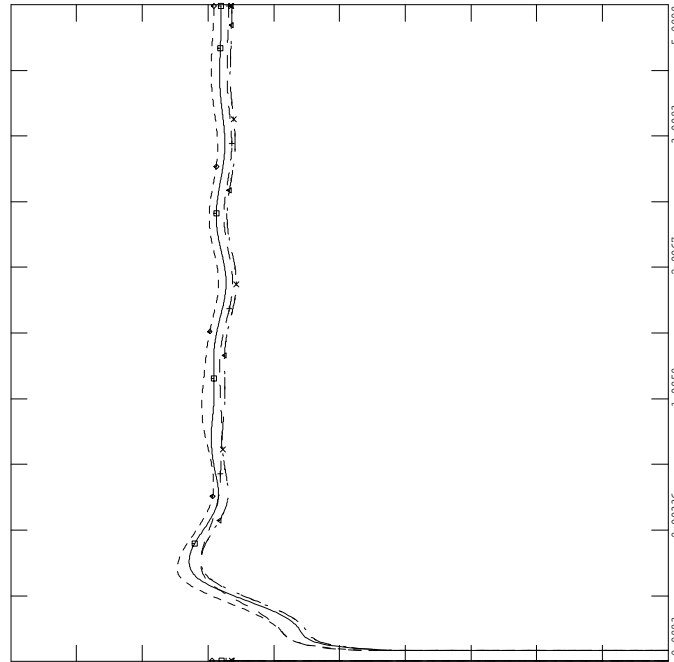


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C03

1.2000	CHNL# 1695: [VOLT [COOPER_ESST869.000]]	x - - - - x	0.70000
1.2000	CHNL# 1429: [VOLT [MOORE 3 345.00]]	↑ - - - - ↓	0.70000
1.2000	CHNL# 326: [V- 13458 S3458]	◆ - - - - ◆	0.70000
1.2000	CHNL# 1317: [VOLT [COOPER 5 161.00]]	← - - - - →	0.70000
1.2000	CHNL# 1316: [VOLT [COOPER 3 345.00]]	□ - - - - □	0.70000



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Disturbance Description

STABILITY CASE NAME: C00.965.C04

PRIOR OUTAGE: SYSTEM INTACT

POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1	= 105	Council Bluffs #1	= 46
Nebraska City #1	= 652	Sheldon #2	= 120	Council Bluffs #2	= 88
Nebraska City #2	= 682	Hallam CT	= 52	Council Bluffs #3	= 720
Cass County #1	= 161	BPS	= 250	Council Bluffs #4	= 790
Cass County #2	= 161	Iatan #1	= 706	Atchison Co Wind	= 144
Flat Water Wind	= 60	Iatan #2	= 965		

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON ATCHISON - BOONEVILLE 345 KV LINE. CLEAR BOONEVILLE - ATCHISON 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT ATCHISON 345 KV
0.0750	4.5	CLEAR ATCHISON - BOONEVILLE 345 KV LINE

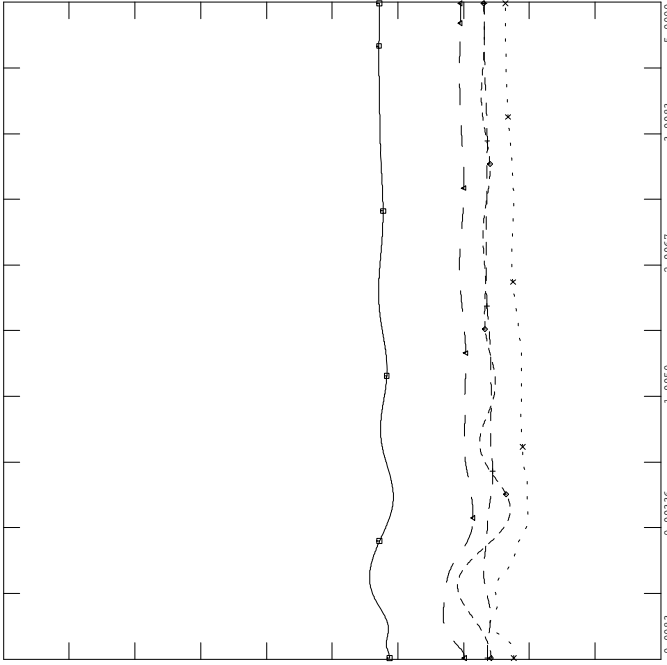
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT ATCHSON ON ATCHISON-BOONEVILLE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C04

200.00	CHNL# 1028: [ANGSVGS 2G1]	x - - - - x	0.0
200.00	CHNL# 76: [ANGLLOUIS 1G]	↑ - - - - ↓	0.0
200.00	CHNL# 1: [ANGLFT CA31G]	◆ - - - - ◆	0.0
200.00	CHNL# 79: [ANG3CBLUF 3G]	← - - - - →	0.0
200.00	CHNL# 58: [ANG2GENTLM2G]	□ - - - - □	0.0

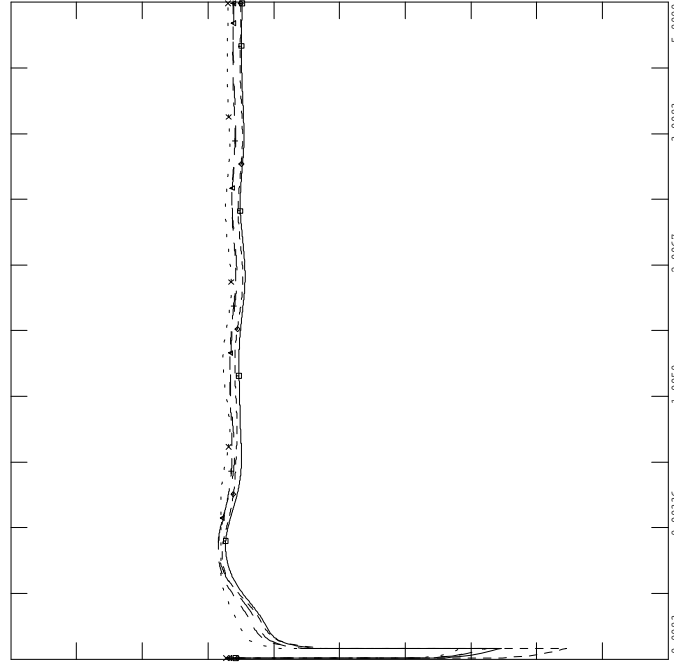


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 REGIONAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT ATCHSON ON ATCHISON-BOONEVILLE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C04

1.2000	CHNL# 338: [V- 571 GRIS3]	x - - - - x	0.70000
1.2000	CHNL# 1686: [VOLT [S1211 5161.00]]	↑ - - - - ↓	0.70000
1.2000	CHNL# 1685: [VOLT [ROKEYB 7115.00]]	◆ - - - - ◆	0.70000
1.2000	CHNL# 324: [V- 13451 S3451]	← - - - - →	0.70000
1.2000	CHNL# 426: [V-2492 CBLF3]	□ - - - - □	0.70000

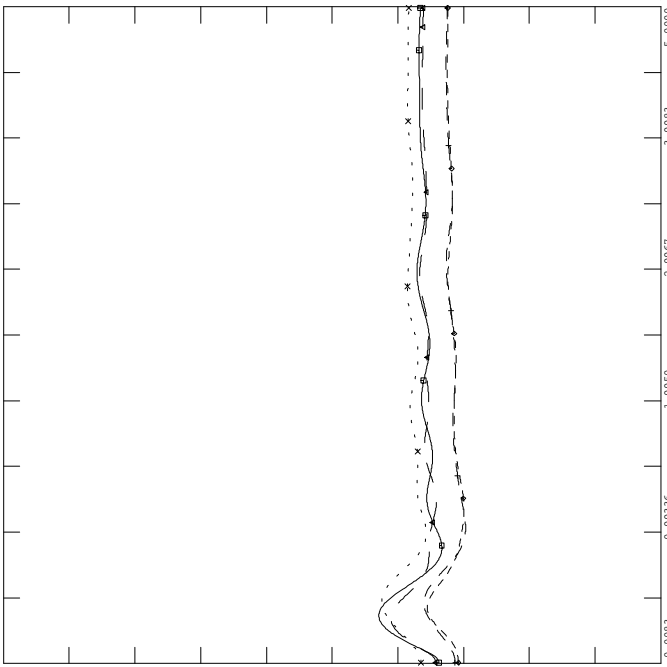


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 REGIONAL VOLTAGES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT ATCHSON ON ATCHISON-BOONEVILLE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C04

200.00	CHNL# 995: [ANGBEATST3G1]	x - - - - x	0.0
200.00	CHNL# 1018: [ANGCASS 1G1]	↑ - - - - ↓	0.0
200.00	CHNL# 59: [ANGISHELD 1G]	◆ - - - - ◆	0.0
200.00	CHNL# 2: [ANG1NEBRC31G]	← - - - - →	0.0
200.00	CHNL# 56: [ANG1COOPER1G]	□ - - - - □	0.0

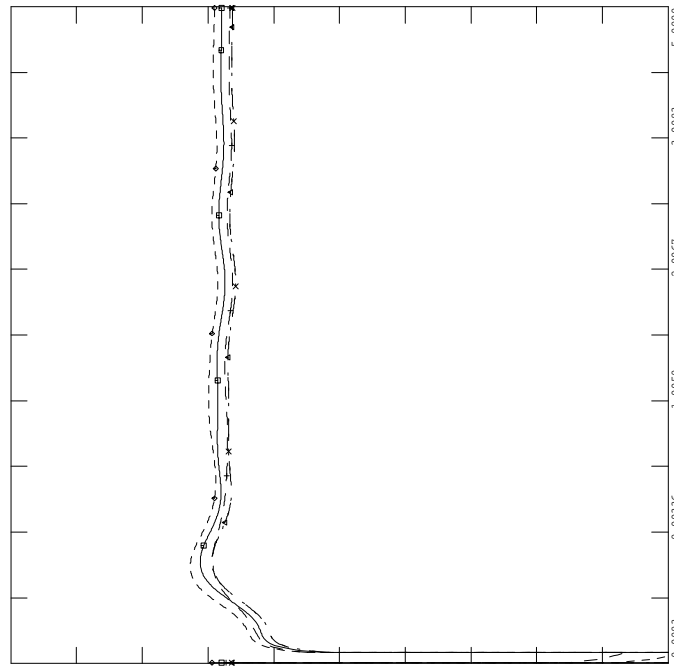


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT ATCHSON ON ATCHISON-BOONEVILLE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C04

1.2000	CHNL# 1695: [VOLT [COOPER ESST869.000]]	x - - - - x	0.70000
1.2000	CHNL# 1429: [VOLT [MOORE 3 345.00]]	↑ - - - - ↓	0.70000
1.2000	CHNL# 326: [V- 13458 S3458]	◆ - - - - ◆	0.70000
1.2000	CHNL# 1317: [VOLT [COOPER 5 161.00]]	← - - - - →	0.70000
1.2000	CHNL# 1316: [VOLT [COOPER 3 345.00]]	□ - - - - □	0.70000



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Disturbance Description

STABILITY CASE NAME: C00.965.C05
PRIOR OUTAGE: SYSTEM INTACT
POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1	= 105	Council Bluffs #1	= 46
Nebraska City #1	= 652	Sheldon #2	= 120	Council Bluffs #2	= 88
Nebraska City #2	= 682	Hallam CT	= 52	Council Bluffs #3	= 720
Cass County #1	= 161	BPS	= 250	Council Bluffs #4	= 790
Cass County #2	= 161	Iatan #1	= 706	Atchison Co Wind	= 144
Flat Water Wind	= 60	Iatan #2	= 965		

DISTURBANCE DESCRIPTION: 3PH FAULT AT S3458 345 KV ON S3458 - S3456 345 KV LINE. CLEAR S3458 - S3456 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT S3458 345 KV
0.0750	4.5	CLEAR S3458 - S3456 345 KV

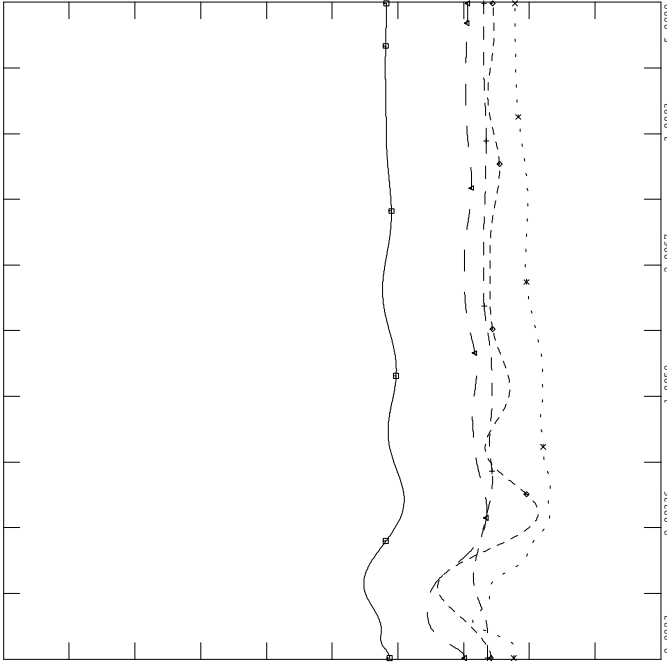
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT S3458 ON S3458 - S3456 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C05

200.00	CHNL# 1028: [ANGSVGS 2G1]	x - - - - x	0.0
200.00	CHNL# 76: [ANGLLOUIS 1G]	↑ - - - - ↓	0.0
200.00	CHNL# 1: [ANGLFT CA31G]	◆ - - - - ◆	0.0
200.00	CHNL# 79: [ANG3CBLUF 3G]	← - - - - →	0.0
200.00	CHNL# 58: [ANG2GENTLM2G]	□ - - - - □	0.0

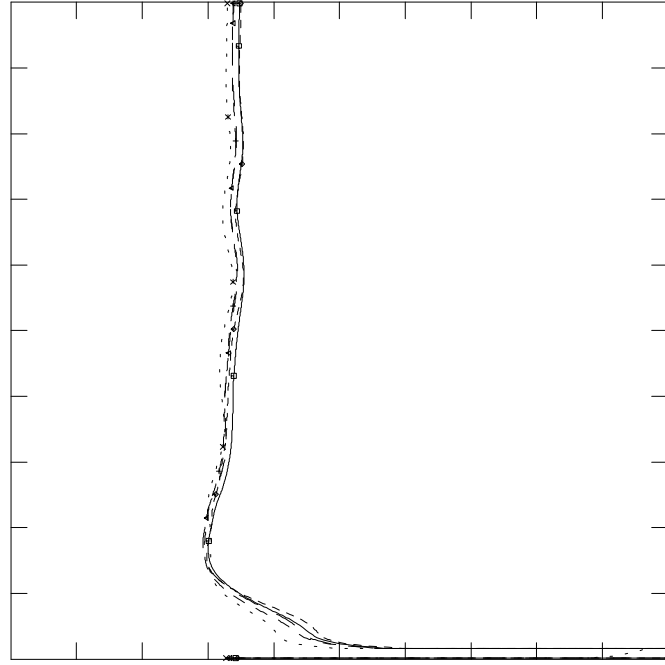


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT S3458 ON S3458 - S3456 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C05

1.2000	CHNL# 338: [V- 571 GRIS3]	x - - - - x	0.70000
1.2000	CHNL# 1686: [VOLT [S1211 5161.00]]	↑ - - - - ↓	0.70000
1.2000	CHNL# 1685: [VOLT [ROKEYBY 7115.00]]	◆ - - - - ◆	0.70000
1.2000	CHNL# 324: [V- 13451 S3451]	← - - - - →	0.70000
1.2000	CHNL# 426: [V-2492 CBLF3]	□ - - - - □	0.70000

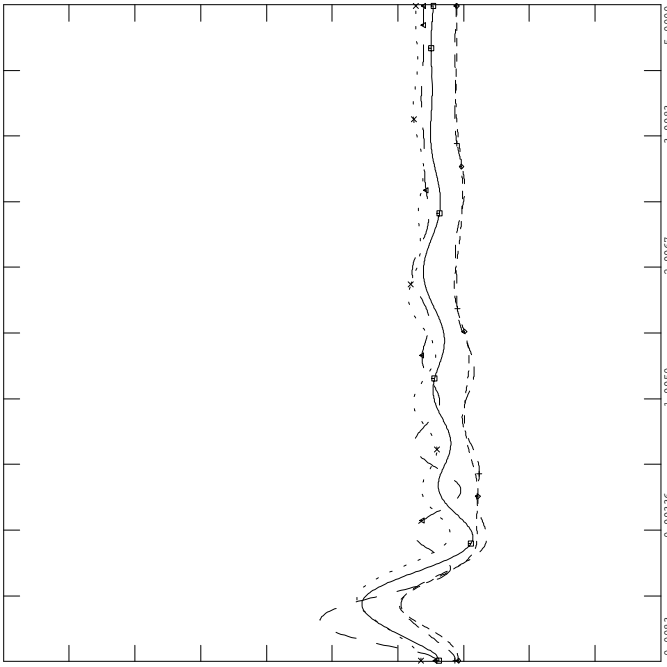


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT S3458 ON S3458 - S3456 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C05

200.00	CHNL# 995: [ANGBEATST3G1]	x - - - - x	0.0
200.00	CHNL# 1018: [ANGCASS 1G1]	↑ - - - - ↓	0.0
200.00	CHNL# 59: [ANGISHELD 1G]	◆ - - - - ◆	0.0
200.00	CHNL# 2: [ANGINEBRC31G]	← - - - - →	0.0
200.00	CHNL# 56: [ANGICOOPER1G]	□ - - - - □	0.0

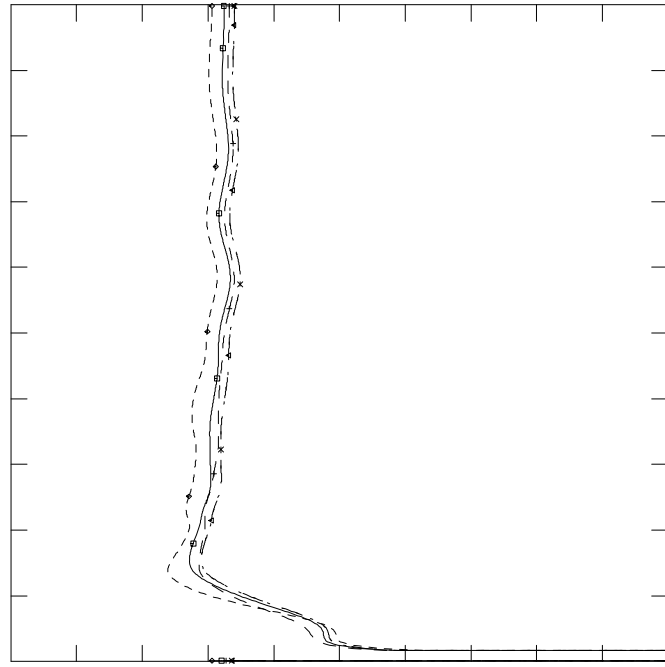


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT S3458 ON S3458 - S3456 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C05

1.2000	CHNL# 1695: [VOLT [COOPER ESST869.000]]	x - - - - x	0.70000
1.2000	CHNL# 1429: [VOLT [MOORE 3 345.00]]	↑ - - - - ↓	0.70000
1.2000	CHNL# 326: [V- 13458 S3458]	◆ - - - - ◆	0.70000
1.2000	CHNL# 1317: [VOLT [COOPER 5 161.00]]	← - - - - →	0.70000
1.2000	CHNL# 1316: [VOLT [COOPER 3 345.00]]	□ - - - - □	0.70000



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Disturbance Description

STABILITY CASE NAME: C00.965.C06
PRIOR OUTAGE: SYSTEM INTACT
POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - FAIRPORT 345 KV LINE. CLEAR COOPER - FAIRPORT 345 KV LINE, FAIRPORT - ST. JOE 345 KV LINE, AND FAIRPORT 345/161 KV TRANSFORMER. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - FAIRPORT 345 KV LINE, FAIRPORT - ST. JOE 345 KV LINE, AND FAIRPORT 345/161 KV TRANSFORMER

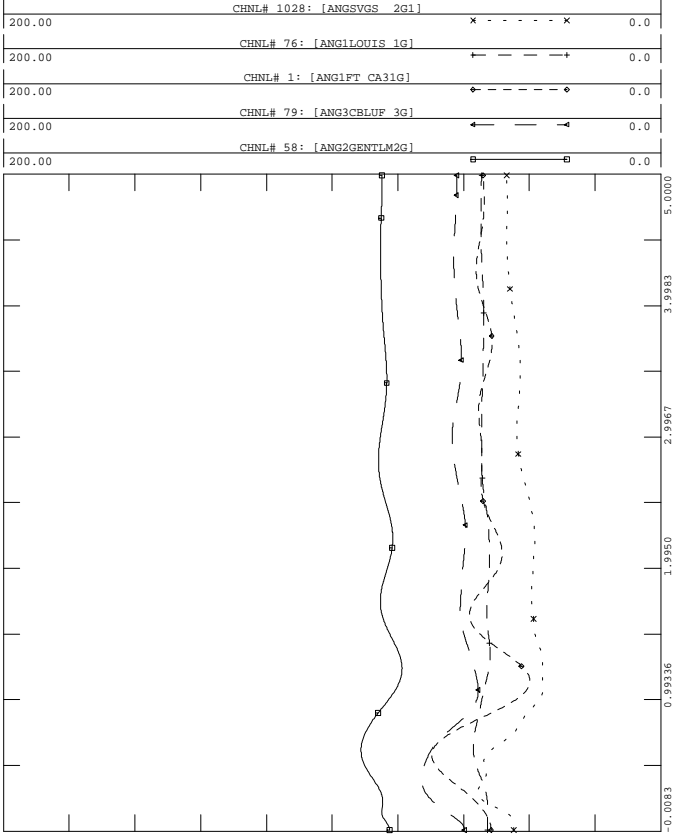
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



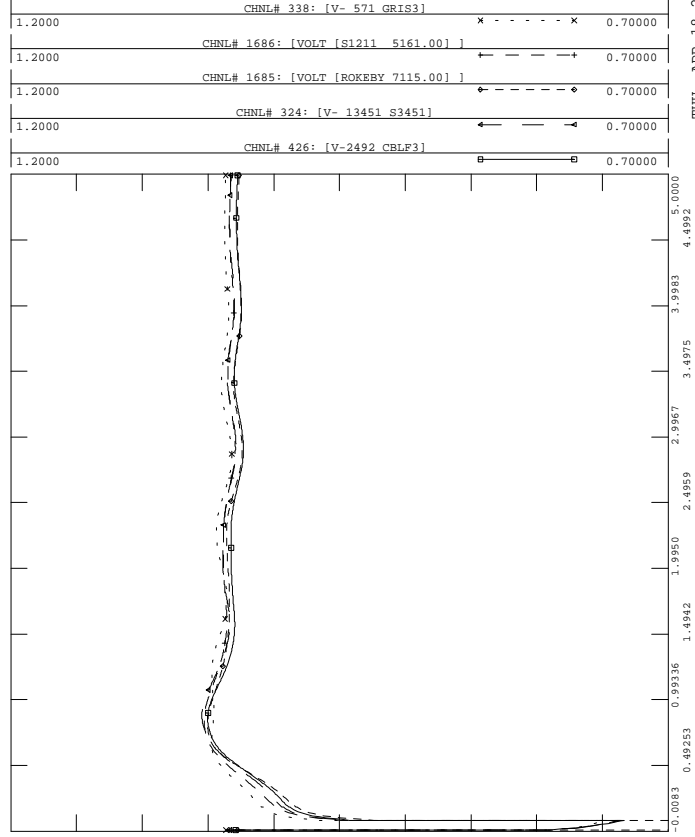
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C06

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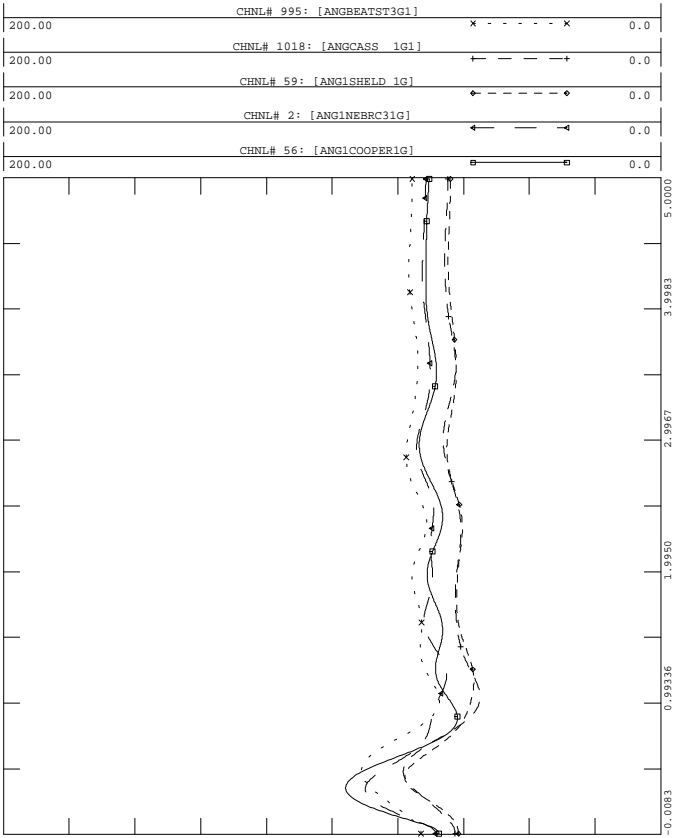
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C06

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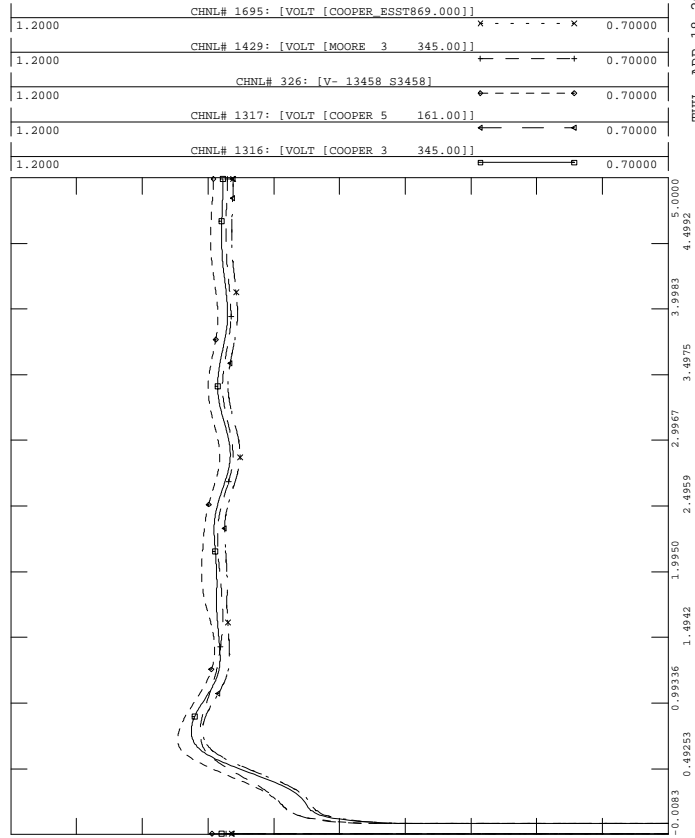
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C06

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C06

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Disturbance Description

STABILITY CASE NAME: C00.965.C07

PRIOR OUTAGE: SYSTEM INTACT

POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1	= 105	Council Bluffs #1	= 46
Nebraska City #1	= 652	Sheldon #2	= 120	Council Bluffs #2	= 88
Nebraska City #2	= 682	Hallam CT	= 52	Council Bluffs #3	= 720
Cass County #1	= 161	BPS	= 250	Council Bluffs #4	= 790
Cass County #2	= 161	Iatan #1	= 706	Atchison Co Wind	= 144
Flat Water Wind	= 60	Iatan #2	= 965		

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - ST. JOE 345 KV LINE. CLEAR COOPER - ST. JOE 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - ST. JOE 345 KV LINE

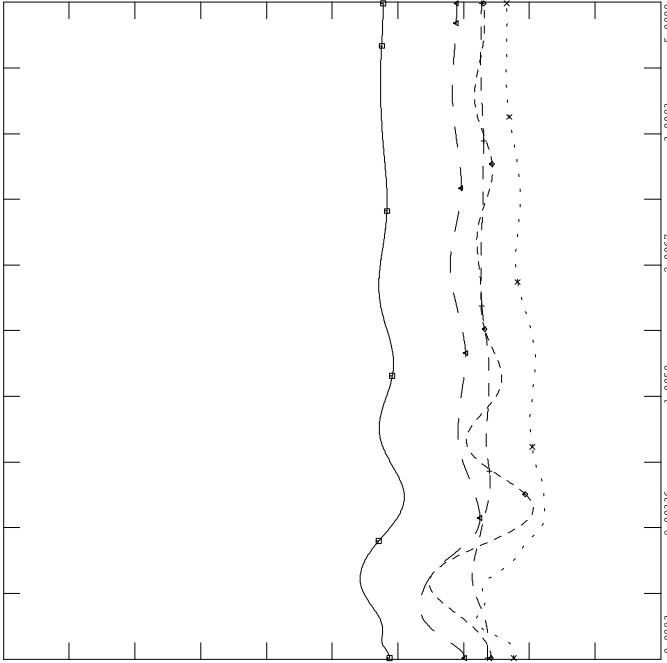
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - ST.JOE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C07

200.00	CHNL# 1028: [ANGSVGS 2G1]	x - - - - x	0.0
200.00	CHNL# 76: [ANGLLOUIS 1G]	↑ - - - - ↓	0.0
200.00	CHNL# 1: [ANGLFT CA31G]	◆ - - - - ◆	0.0
200.00	CHNL# 79: [ANG3CBLUF 3G]	← - - - - →	0.0
200.00	CHNL# 58: [ANG2GENTLM2G]	□ - - - - □	0.0

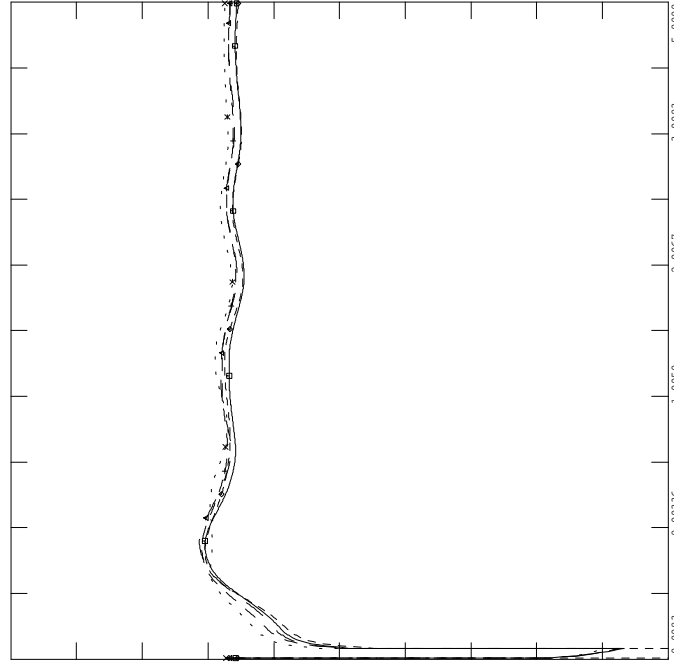


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - ST.JOE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C07

1.2000	CHNL# 338: [V- 571 GRIS3]	x - - - - x	0.70000
1.2000	CHNL# 1686: [VOLT [S1211 5161.00]]	↑ - - - - ↓	0.70000
1.2000	CHNL# 1685: [VOLT [ROKEYB 7115.00]]	◆ - - - - ◆	0.70000
1.2000	CHNL# 324: [V- 13451 S3451]	← - - - - →	0.70000
1.2000	CHNL# 426: [V-2492 CBLF3]	□ - - - - □	0.70000

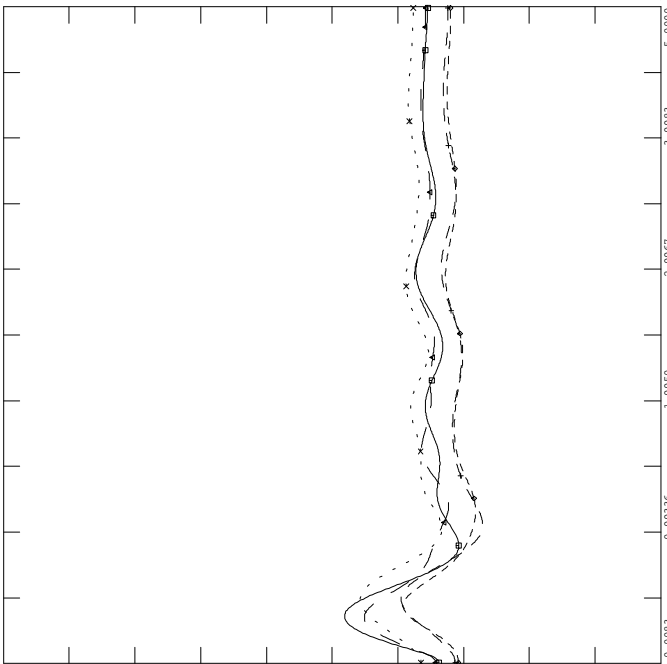


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - ST.JOE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C07

200.00	CHNL# 995: [ANGBEATST3G1]	x - - - - x	0.0
200.00	CHNL# 1018: [ANGCASS 1G1]	↑ - - - - ↓	0.0
200.00	CHNL# 59: [ANGISHELD 1G]	◆ - - - - ◆	0.0
200.00	CHNL# 2: [ANG1NEBRC31G]	← - - - - →	0.0
200.00	CHNL# 56: [ANGLCOOPER1G]	□ - - - - □	0.0

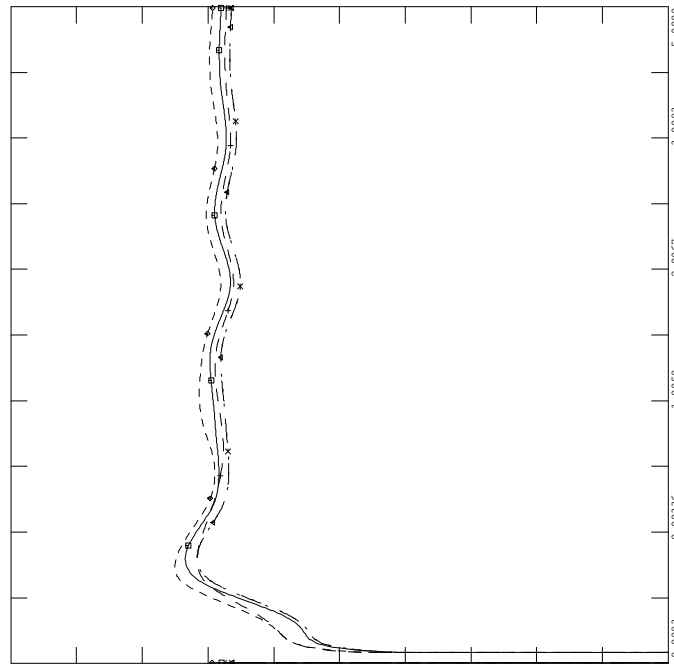


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - ST.JOE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C07

1.2000	CHNL# 1695: [VOLT [COOPER ESST869.000]]	x - - - - x	0.70000
1.2000	CHNL# 1429: [VOLT [MOORE 3 345.00]]	↑ - - - - ↓	0.70000
1.2000	CHNL# 326: [V- 13458 S3458]	◆ - - - - ◆	0.70000
1.2000	CHNL# 1317: [VOLT [COOPER 5 161.00]]	← - - - - →	0.70000
1.2000	CHNL# 1316: [VOLT [COOPER 3 345.00]]	□ - - - - □	0.70000



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Disturbance Description

STABILITY CASE NAME: C00.965.C08
PRIOR OUTAGE: SYSTEM INTACT
POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV END OF COOPER 345 / 161 KV TRANSFORMER, T2. CLEAR COOPER 345 / 161 KV TRANSFORMER, T2. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0917	5.5	CLEAR COOPER 345 / 161 KV TRANSFORMER, T2

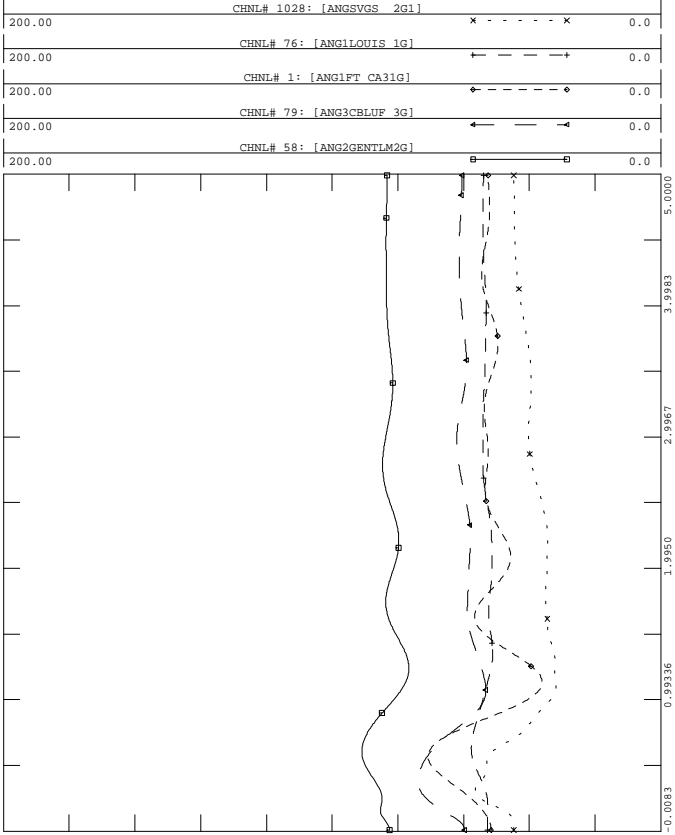
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



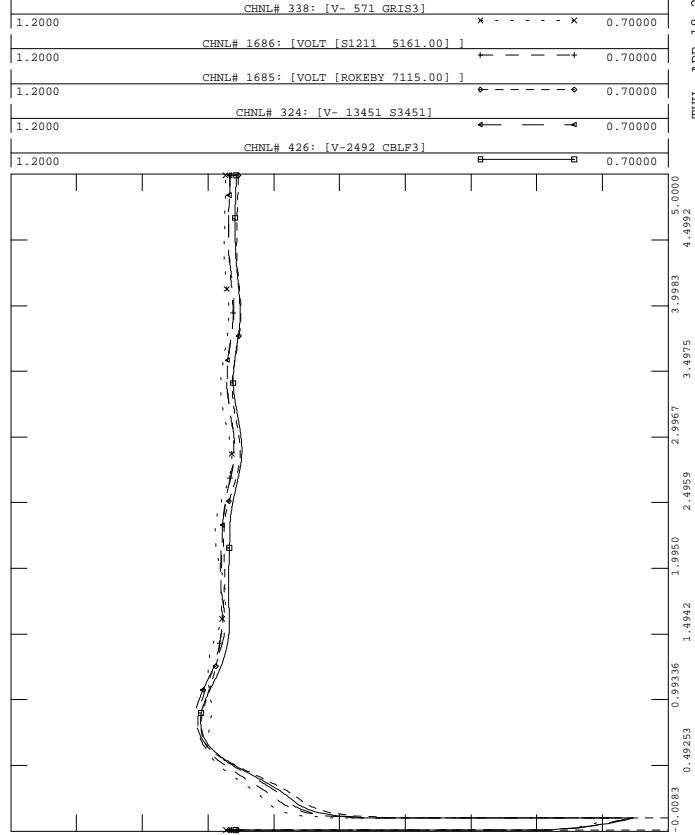
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT ON HIGH-SIDE OF COOPER T2
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C08

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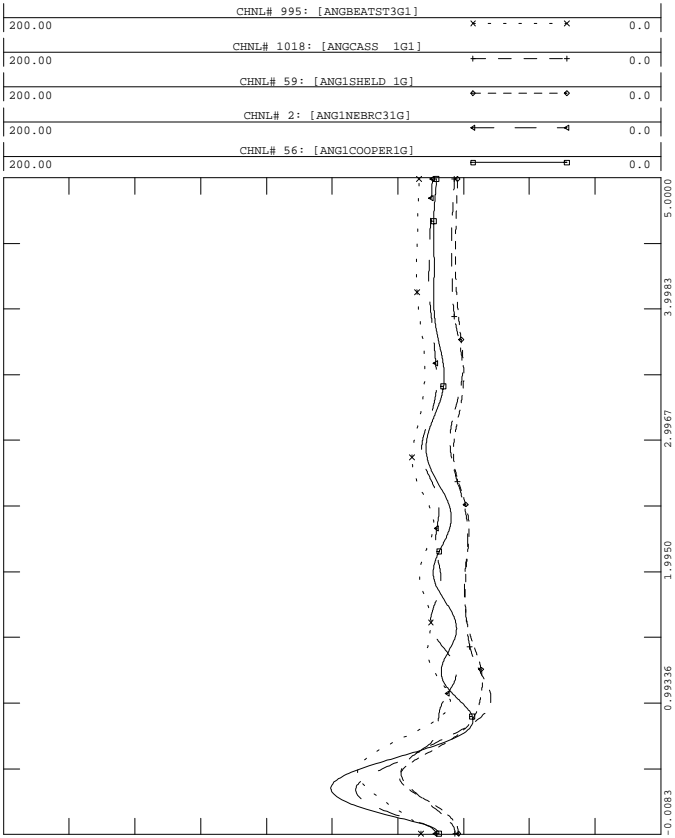
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT ON HIGH-SIDE OF COOPER T2
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C08

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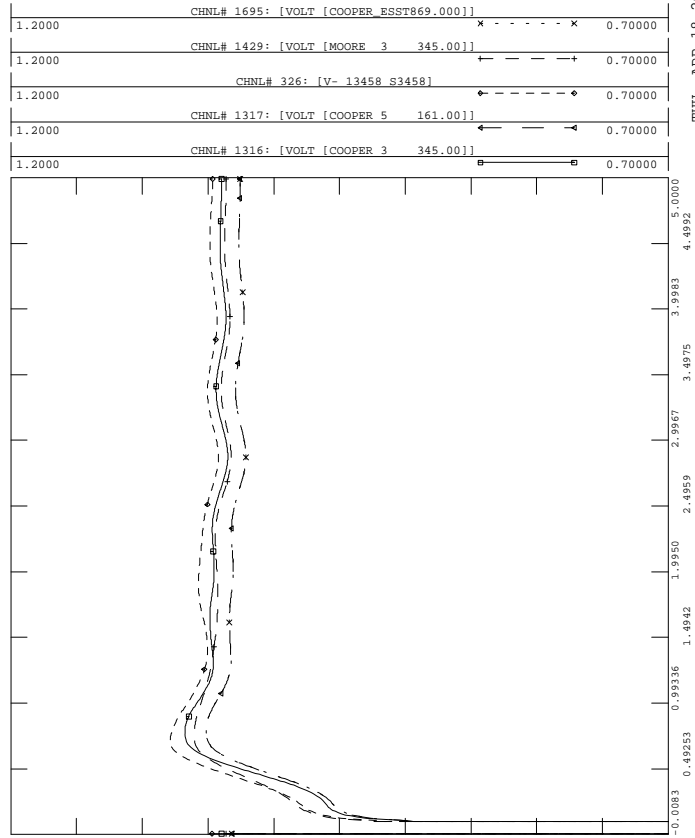
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT ON HIGH-SIDE OF COOPER T2
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C08

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT ON HIGH-SIDE OF COOPER T2
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C08

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C00.965.C09
PRIOR OUTAGE: SYSTEM INTACT
POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1	= 105	Council Bluffs #1	= 46
Nebraska City #1	= 652	Sheldon #2	= 120	Council Bluffs #2	= 88
Nebraska City #2	= 682	Hallam CT	= 52	Council Bluffs #3	= 720
Cass County #1	= 161	BPS	= 250	Council Bluffs #4	= 790
Cass County #2	= 161	Iatan #1	= 706	Atchison Co Wind	= 144
Flat Water Wind	= 60	Iatan #2	= 965		

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 161 KV END OF COOPER 345 / 161 KV TRANSFORMER, T5. CLEAR COOPER 345 / 161 KV TRANSFORMER, T5. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 161 KV
0.0917	5.5	CLEAR COOPER 345 / 161 KV TRANSFORMER, T5

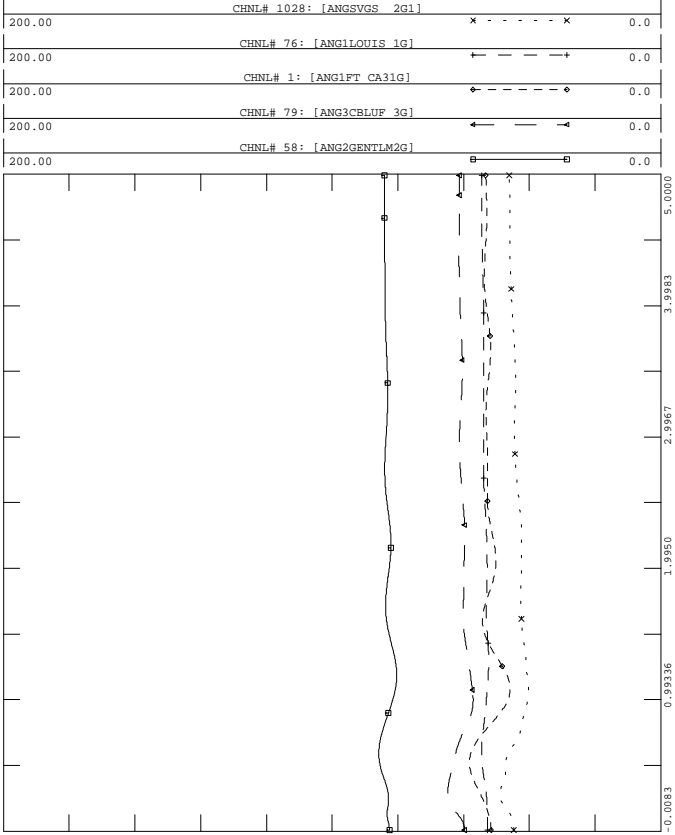
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



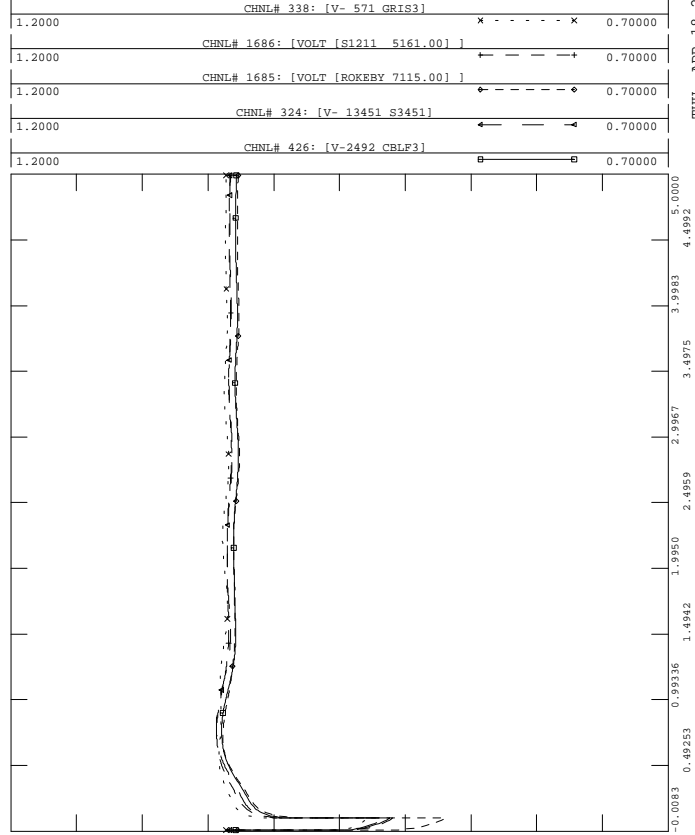
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT ON LOW-SIDE OF COOPER T5
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C09

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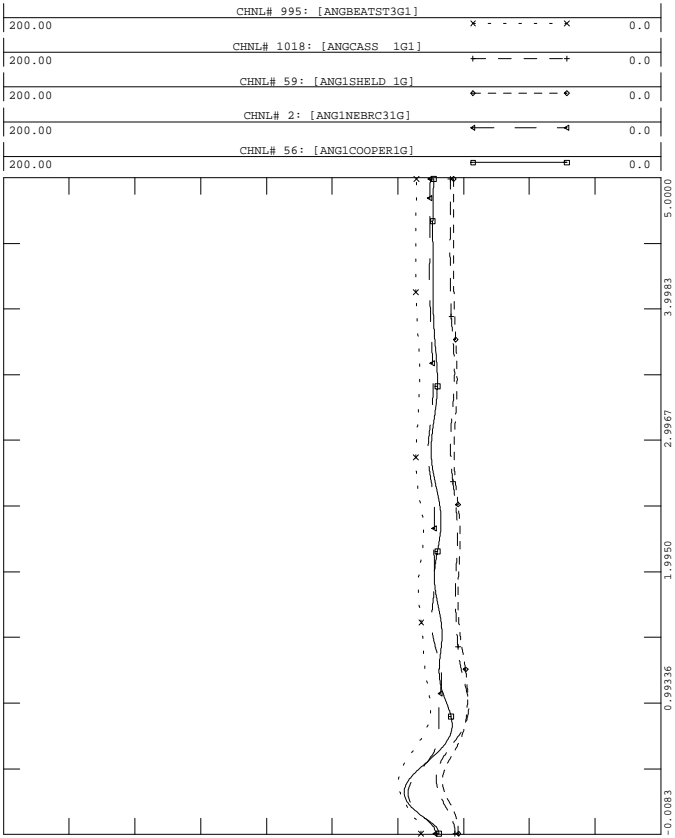
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT ON LOW-SIDE OF COOPER T5
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C09

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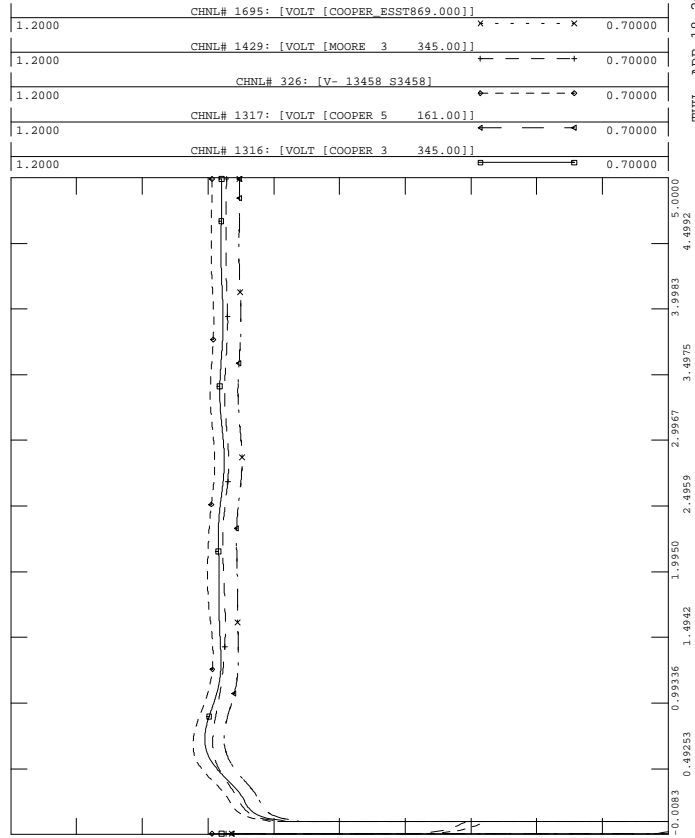
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT ON LOW-SIDE OF COOPER T5
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C09

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT ON LOW-SIDE OF COOPER T5
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C09

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C00.965.C10
PRIOR OUTAGE: SYSTEM INTACT
POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 161 KV END OF COOPER - S1280 161 KV LINE. CLEAR COOPER - S1280 161 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 161 KV
0.1083	6.5	CLEAR COOPER - S1280 161 KV LINE

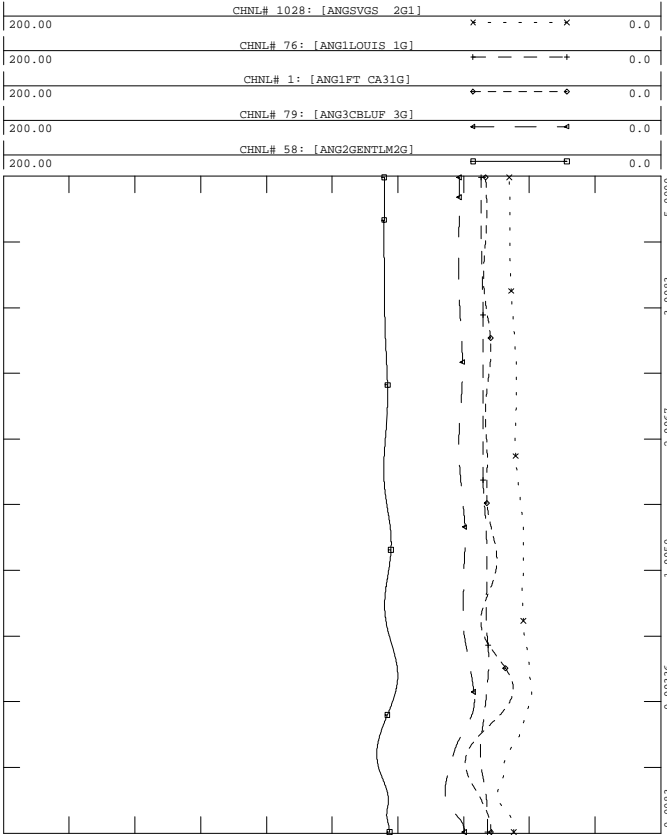
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



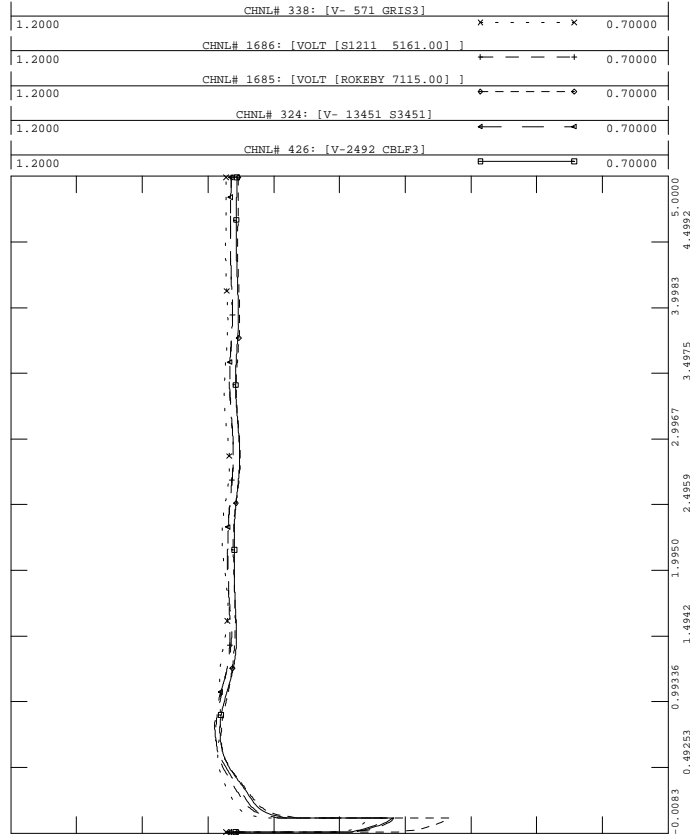
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - S1280 161KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C10

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 REGIONAL ROTOR ANGLES



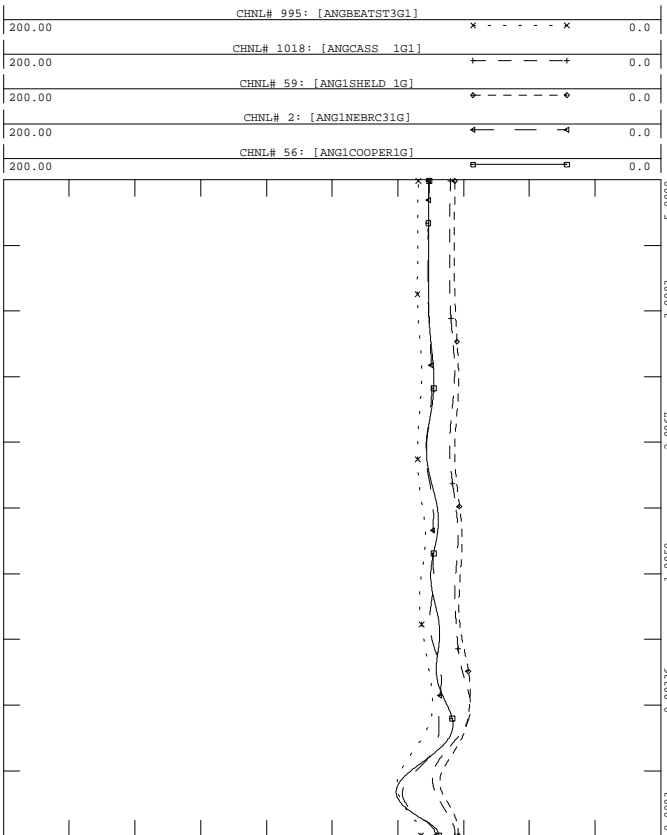
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - S1280 161KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C10

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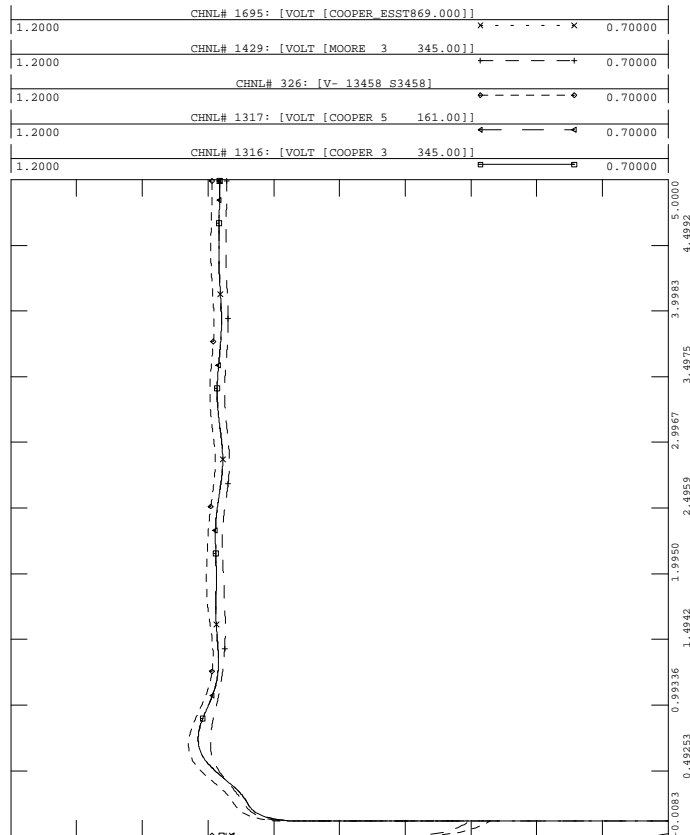
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - S1280 161KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C10

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 3PH FAULT AT COOPER ON COOPER - S1280 161KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C10

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C00.965.C11

PRIOR OUTAGE: SYSTEM INTACT

POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: NO FAULT. LOSS OF COOPER GENERATION.
LOAD REJECTION. NO RECLOSE. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	LOSS OF COOPER GENERATION

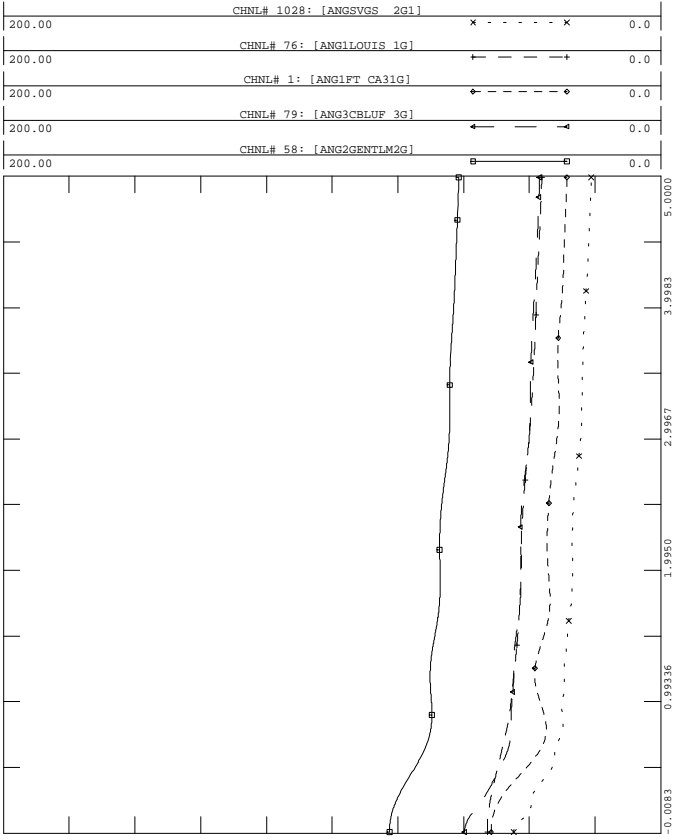
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



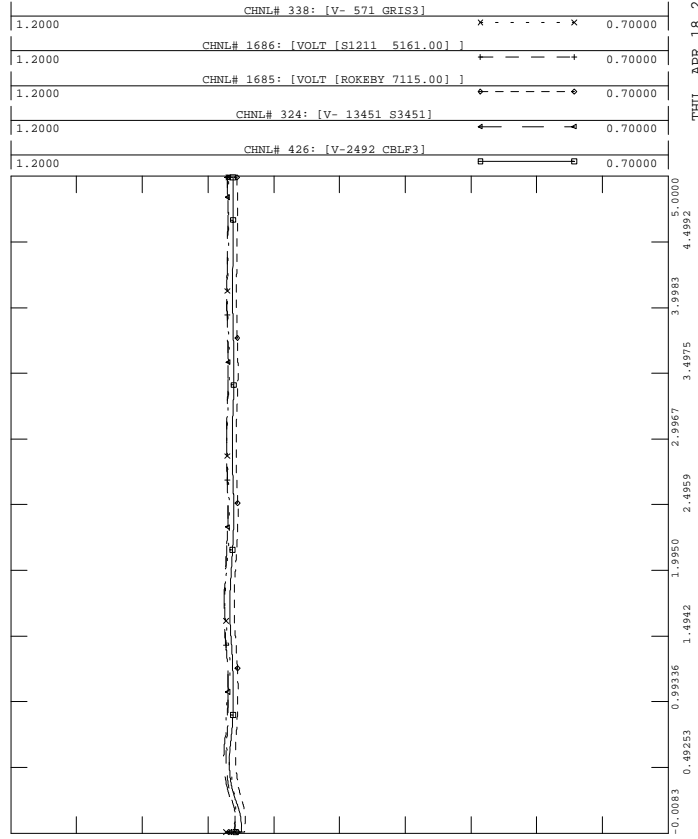
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C11

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 REGIONAL ROTOR ANGLES



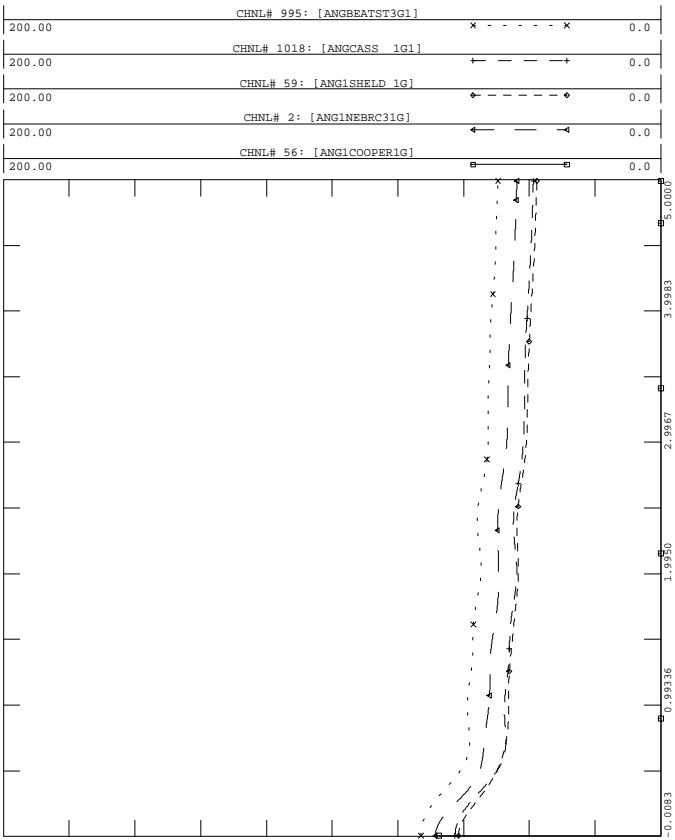
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C11

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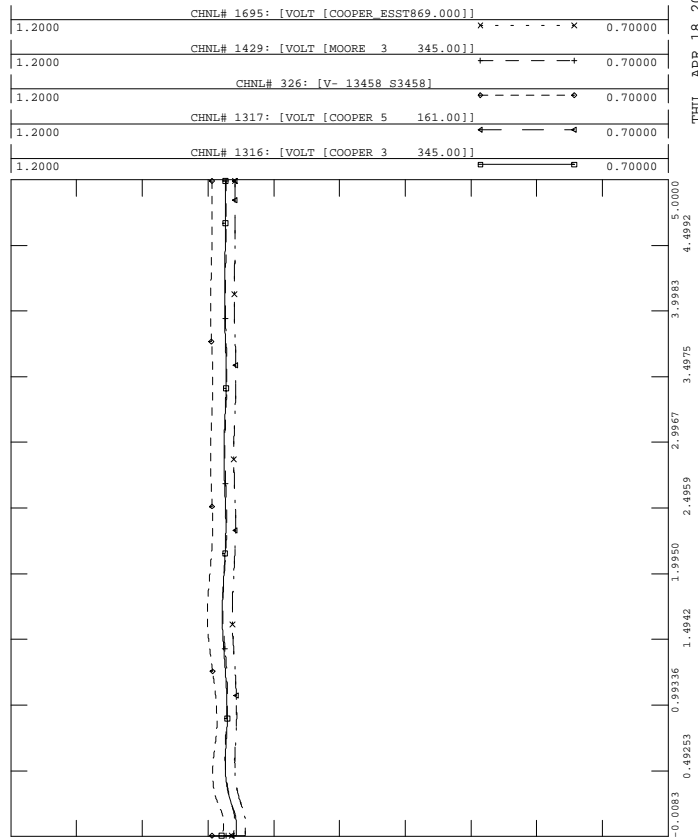
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C11

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C11

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C00.965.C12
PRIOR OUTAGE: SYSTEM INTACT
POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1	= 105	Council Bluffs #1	= 46
Nebraska City #1	= 652	Sheldon #2	= 120	Council Bluffs #2	= 88
Nebraska City #2	= 682	Hallam CT	= 52	Council Bluffs #3	= 720
Cass County #1	= 161	BPS	= 250	Council Bluffs #4	= 790
Cass County #2	= 161	Iatan #1	= 706	Atchison Co Wind	= 144
Flat Water Wind	= 60	Iatan #2	= 965		

DISTURBANCE DESCRIPTION: NO FAULT. LOSS OF COUNCIL BLUFFS #4 GENERATION.
LOAD REJECTION. NO RECLOSE. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	LOSS OF COUNCIL BLUFFS #4 GENERATION

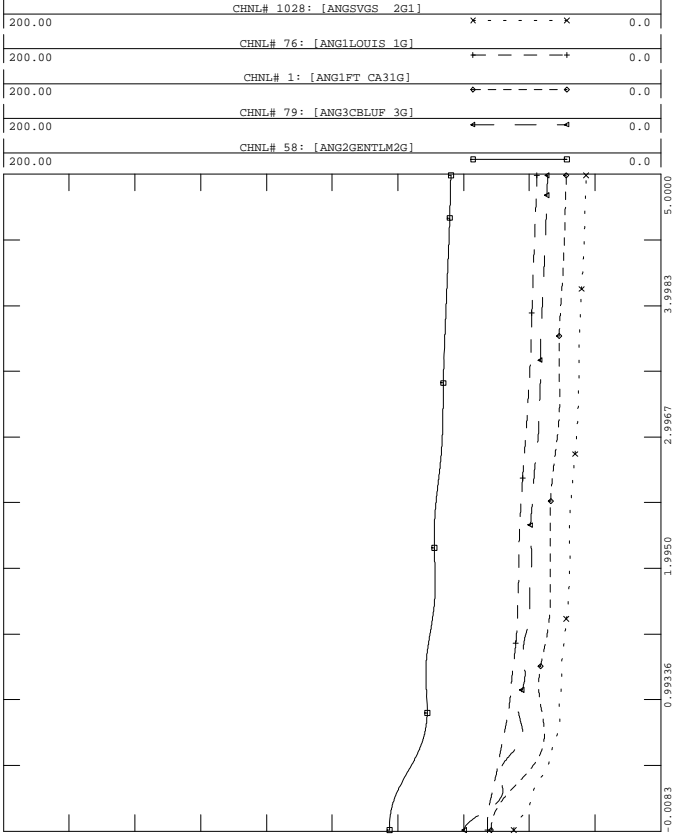
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



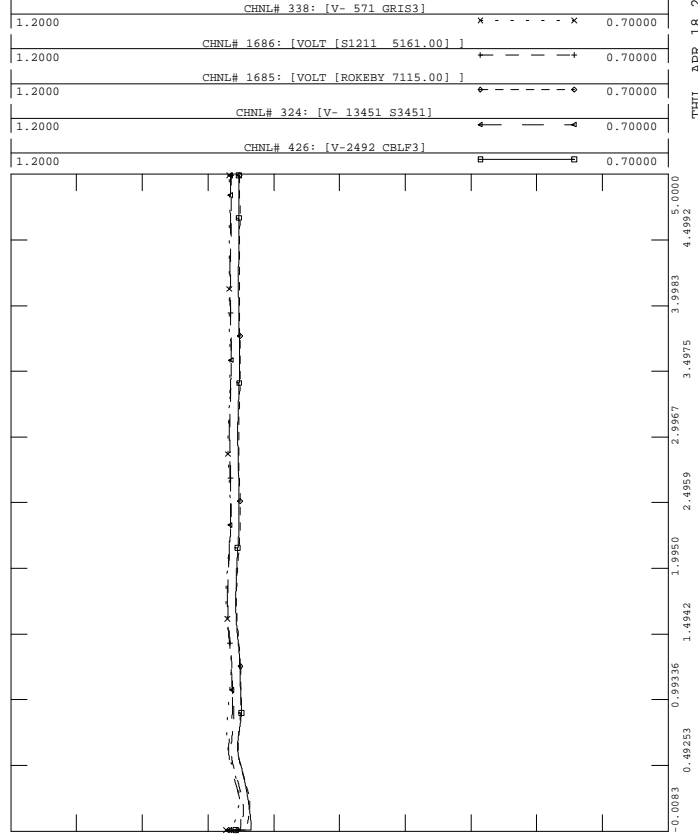
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 COUNCIL BLUFFS UNIT #4 LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C12

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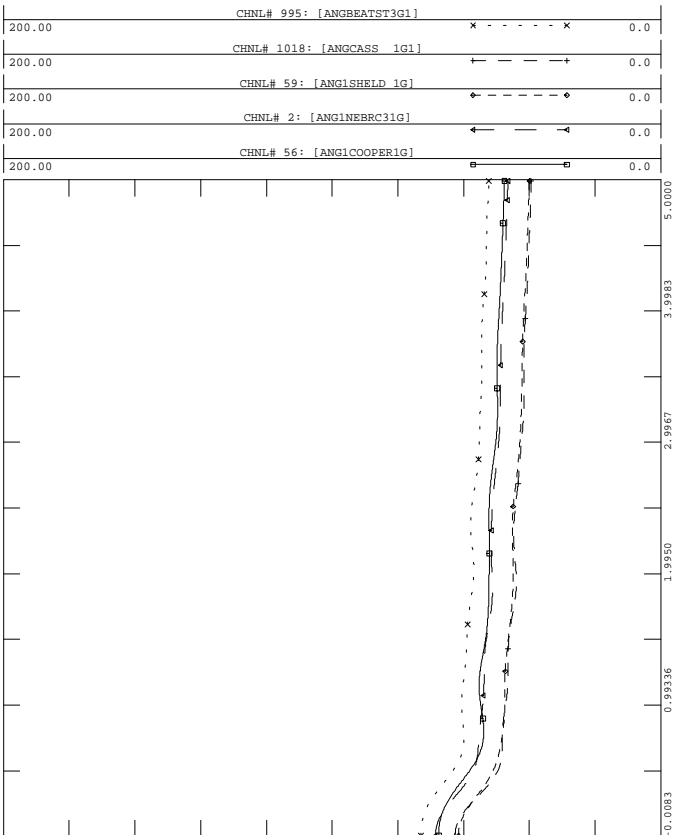
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 COUNCIL BLUFFS UNIT #4 LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C12

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 REGIONAL VOLTAGES



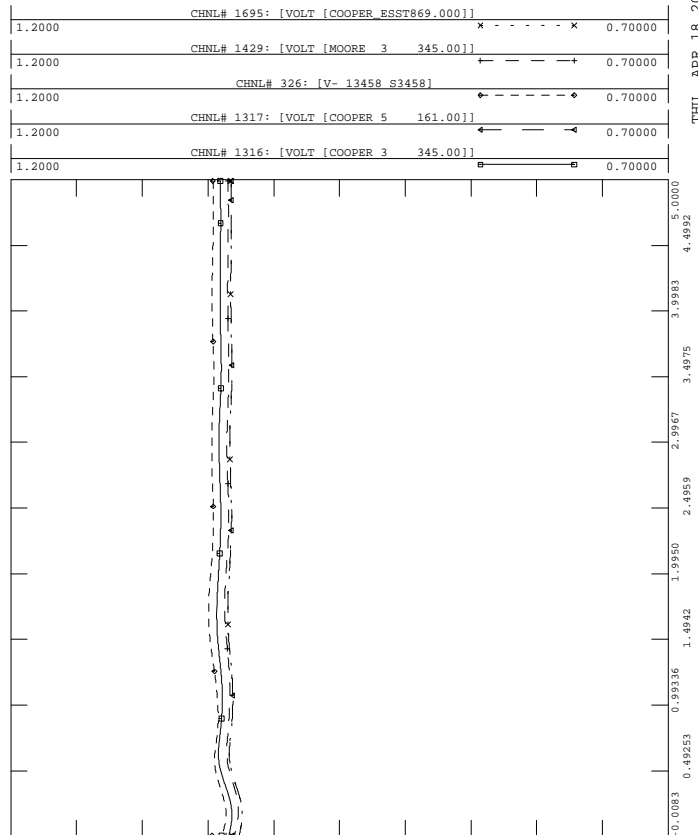
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 COUNCIL BLUFFS UNIT #4 LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C12

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 COUNCIL BLUFFS UNIT #4 LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C12

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C00.965.C13
PRIOR OUTAGE: SYSTEM INTACT
POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1	= 105	Council Bluffs #1	= 46
Nebraska City #1	= 652	Sheldon #2	= 120	Council Bluffs #2	= 88
Nebraska City #2	= 682	Hallam CT	= 52	Council Bluffs #3	= 720
Cass County #1	= 161	BPS	= 250	Council Bluffs #4	= 790
Cass County #2	= 161	Iatan #1	= 706	Atchison Co Wind	= 144
Flat Water Wind	= 60	Iatan #2	= 965		

DISTURBANCE DESCRIPTION: NO FAULT. LOSS OF IATAN #2 GENERATION.
LOAD REJECTION. NO RECLOSE. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	LOSS OF IATAN #2 GENERATION

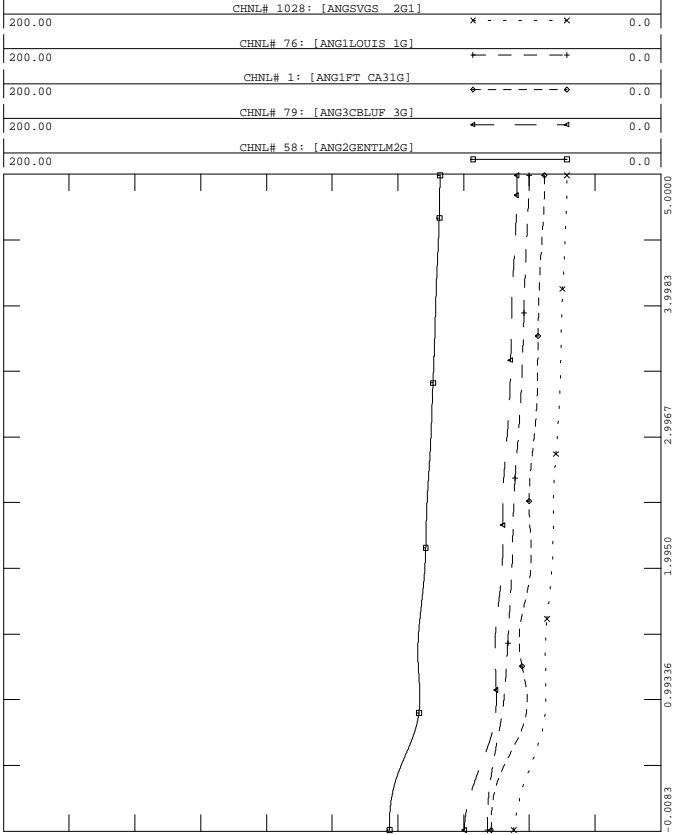
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



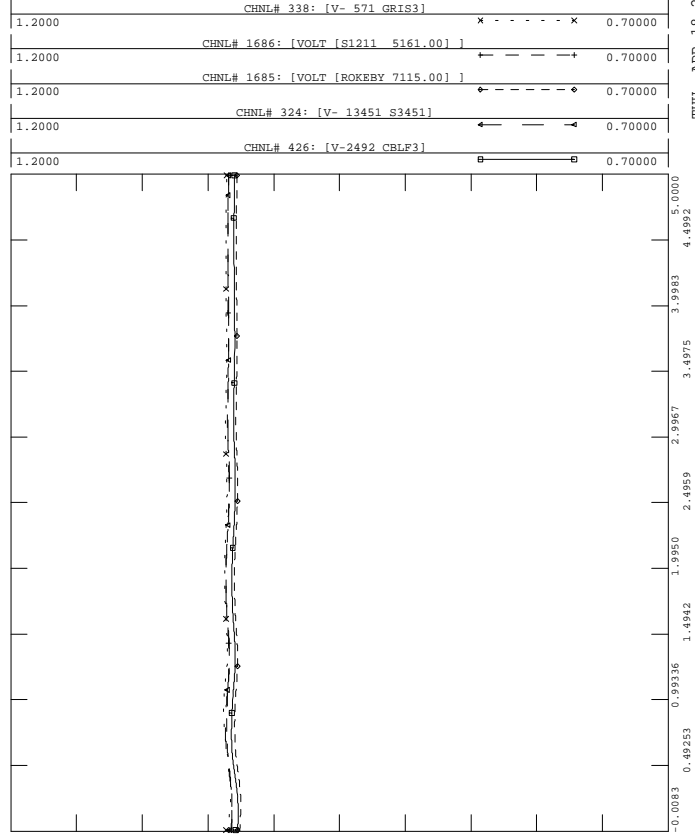
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 IATAN UNIT #2 LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C13

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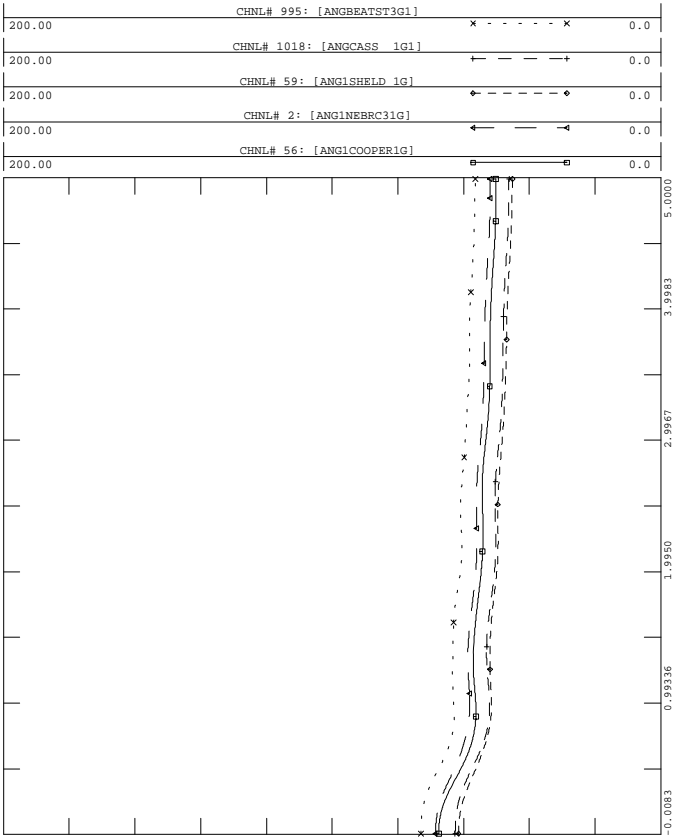
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 IATAN UNIT #2 LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C13

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 REGIONAL VOLTAGES



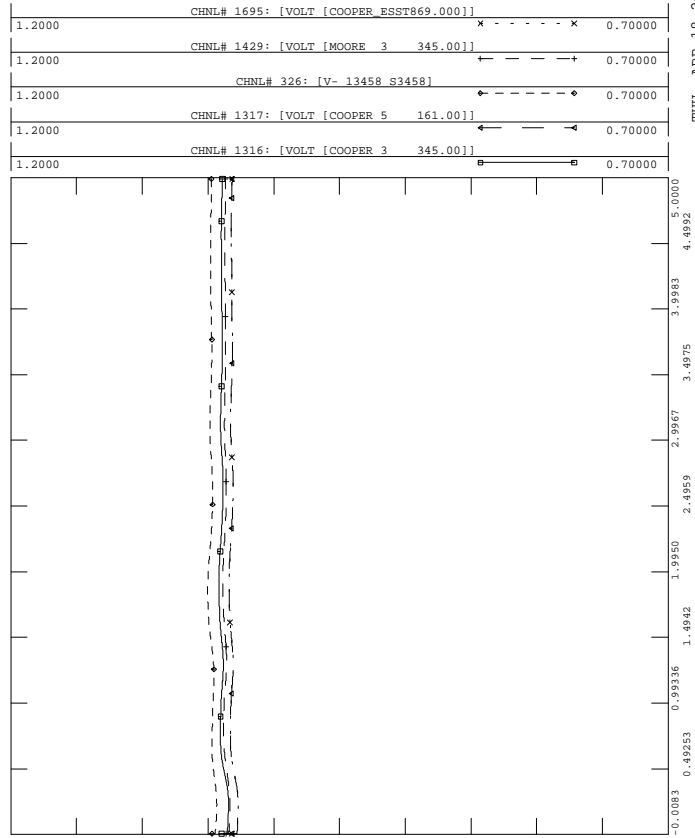
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 IATAN UNIT #2 LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C13

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 IATAN UNIT #2 LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C00.965.C13

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C00.965.C14
PRIOR OUTAGE: SYSTEM INTACT
POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: SLG FAULT AT COOPER 345 KV ON COOPER - S3458 345 KV LINE. OPEN S3458 END OF COOPER - S3458 345 KV LINE. STUCK PCB 3316 AT COOPER. DELAYED CLEAR OF FAULT, COOPER - S3458 345 KV LINE, AND COOPER 345/161 KV T2. NO RECLOSING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	SLG FAULT (Y=620-j3470) AT COOPER 345 KV
0.0750	4.5	CLEAR S3458 END OF COOPER - S3458 345 KV LINE
0.2170	13.0	CLEAR FAULT AND COOPER END OF COOPER - S3458 345 KV LINE AND COOPER 345/161 KV T2

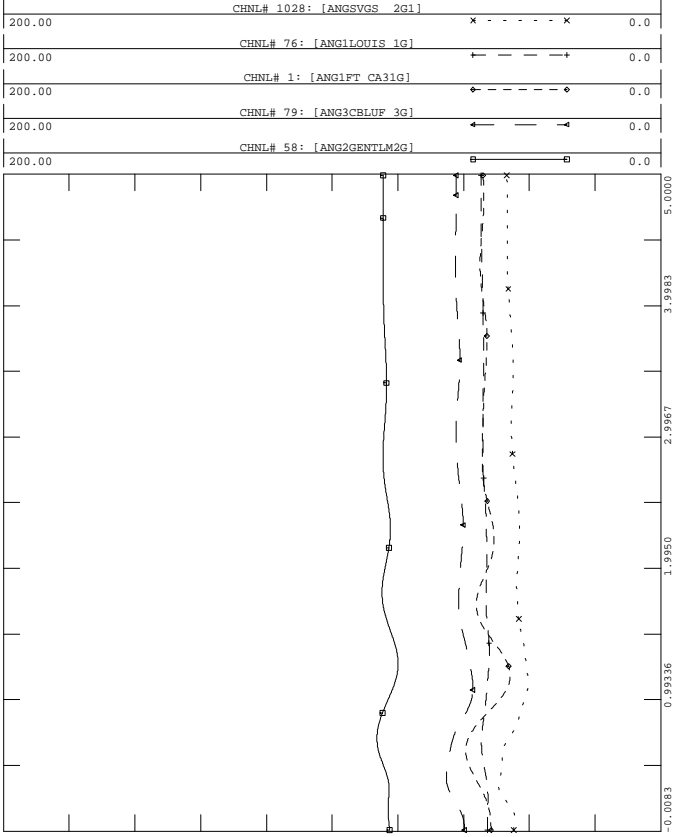
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



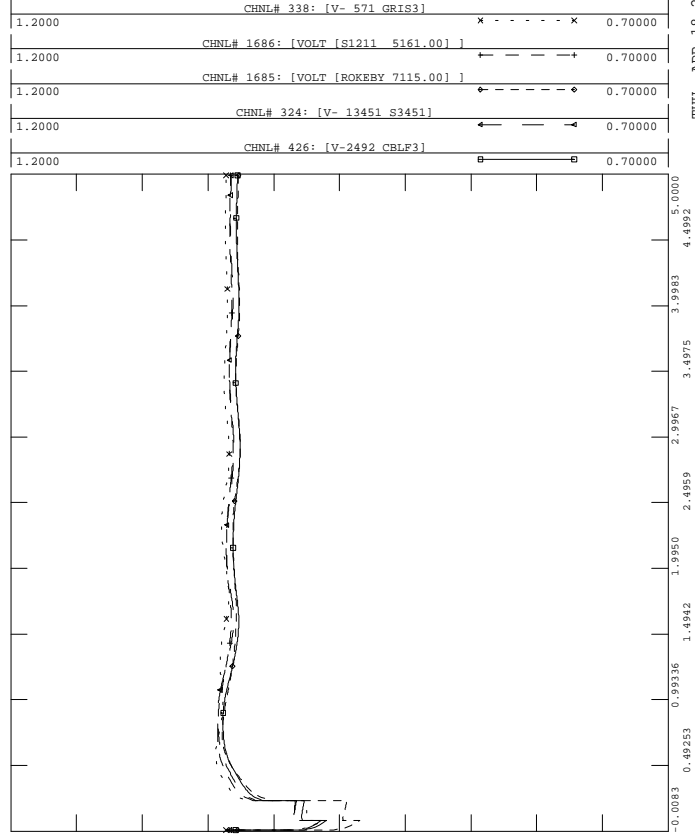
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C00.965.C14

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 REGIONAL ROTOR ANGLES



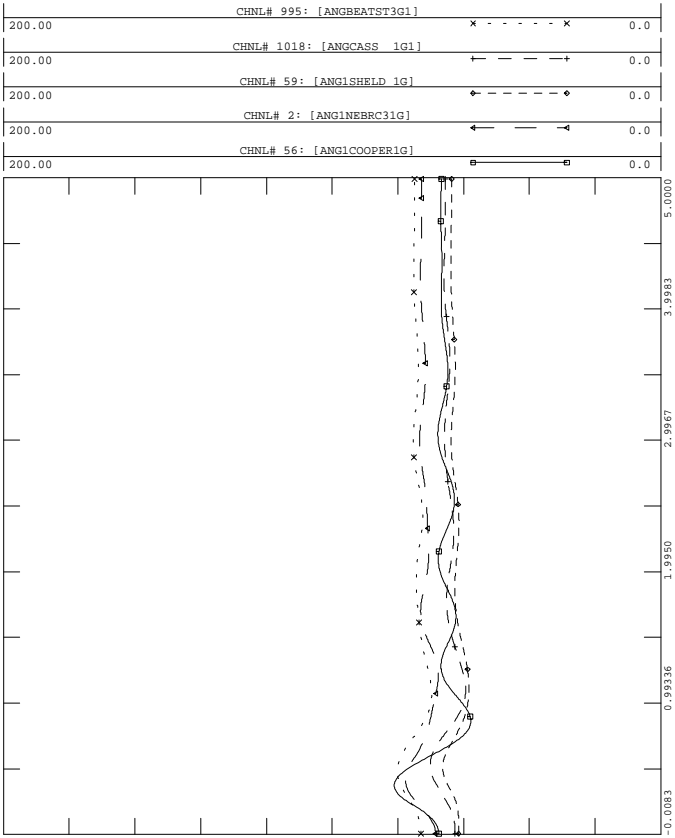
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C00.965.C14

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 REGIONAL VOLTAGES



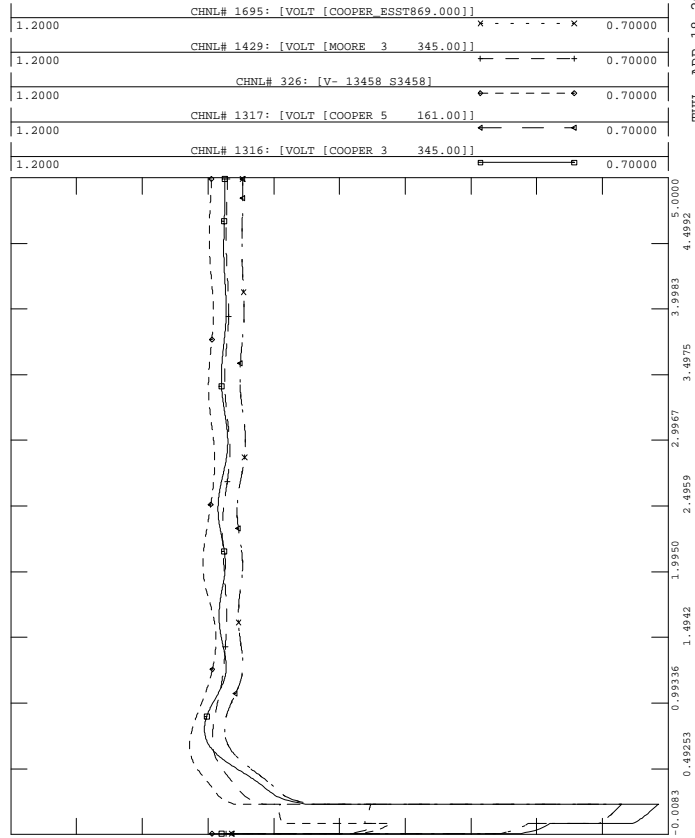
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C00.965.C14

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C00.965.C14

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C00.965.C15
PRIOR OUTAGE: SYSTEM INTACT
POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: SLG FAULT AT COOPER 345 KV ON COOPER - FAIRPORT - ST. JOE 345 KV LINE. OPEN ST JOE END OF COOPER - FAIRPORT - ST JOE 345 KV LINE. STUCK PCB 3322 AT COOPER. DELAYED CLEAR OF FAULT, COOPER - FAIRPORT - ST JOE 345 KV LINE, AND COOPER 345/161 KV T5. NO RECLOSING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	SLG FAULT (Y=620-j3470) AT COOPER 345 KV
0.0750	4.5	CLEAR ST JOE END OF COOPER - FAIRPORT - ST JOE 345 KV
0.2170	13.0	CLEAR FAULT AND COOPER END OF COOPER - FAIRPORT - ST JOE 345 KV LINE AND COOPER 345/161 KV T5

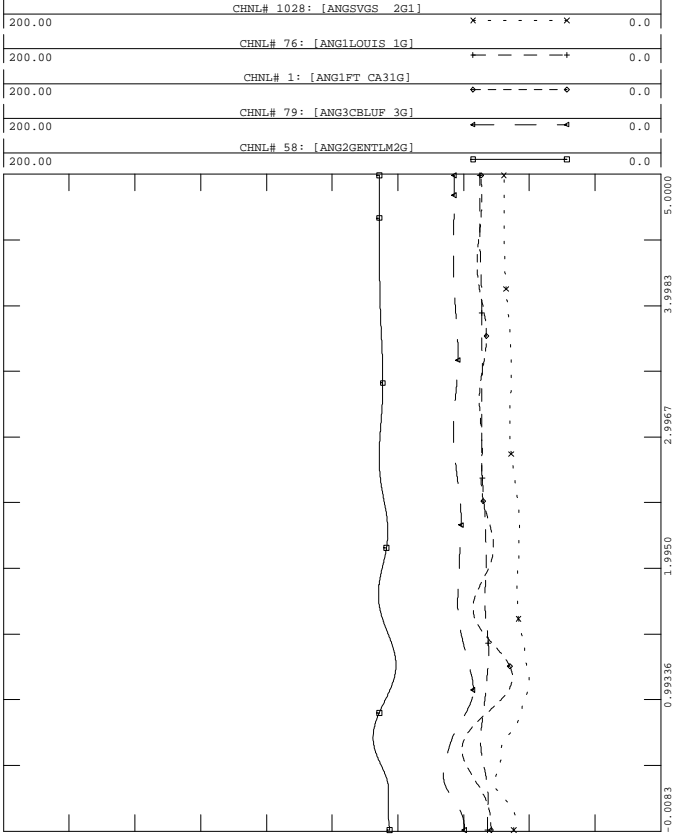
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



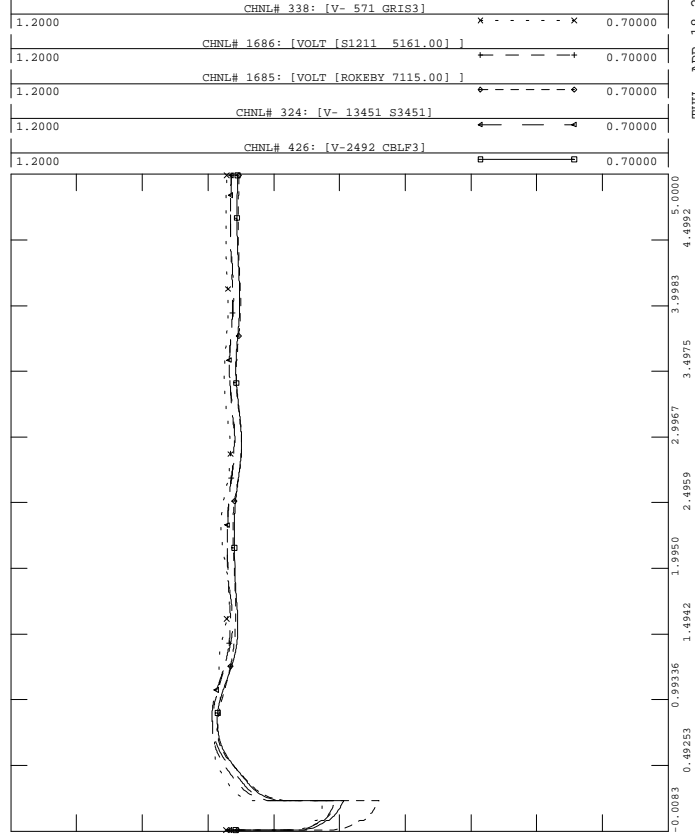
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 SLG FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 STUCK PCB 3322; TRIP COOPER T5; NO RECLOSING
 FILE: chan/CH.C00.965.C15

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 REGIONAL ROTOR ANGLES



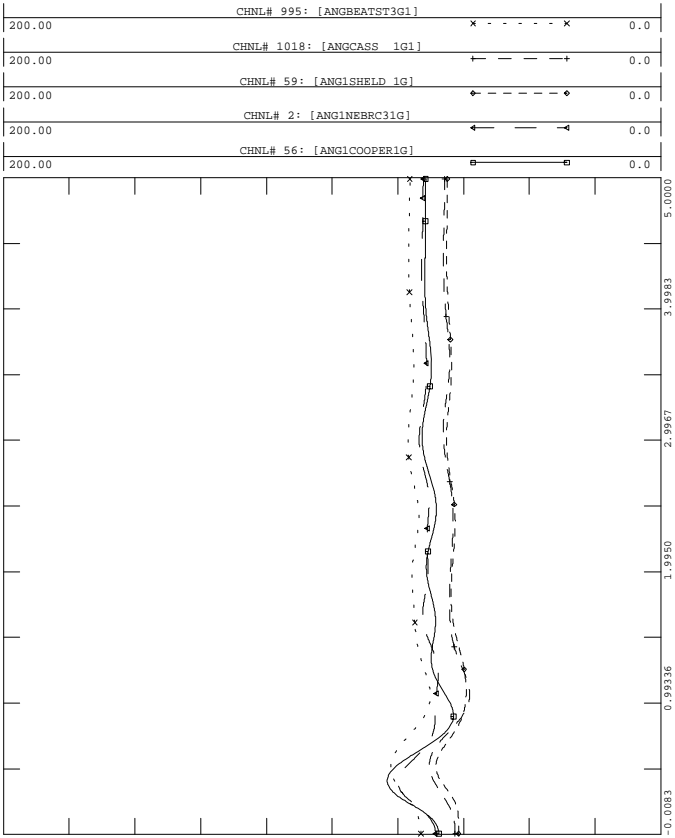
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 SLG FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 STUCK PCB 3322; TRIP COOPER T5; NO RECLOSING
 FILE: chan/CH.C00.965.C15

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 REGIONAL VOLTAGES



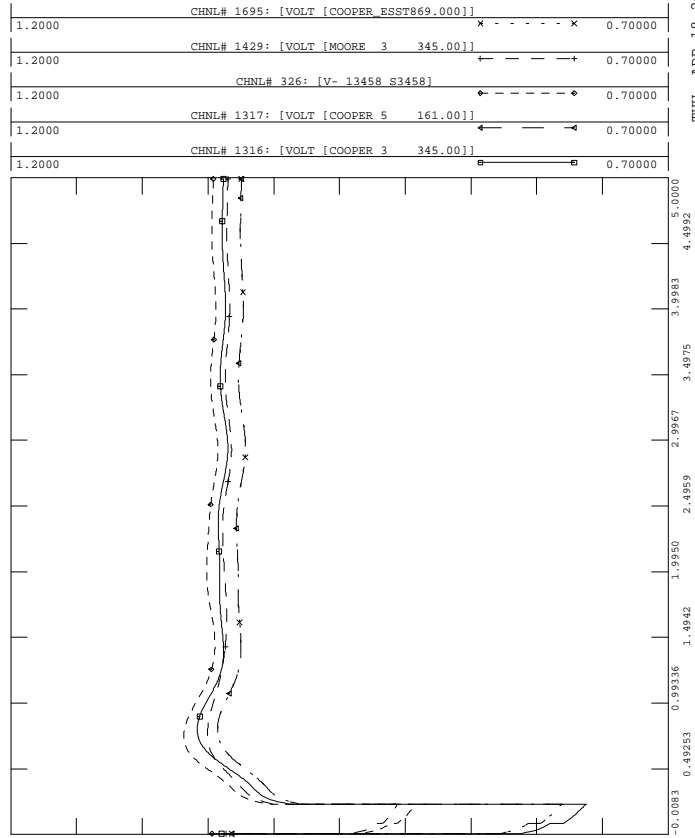
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 SLG FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 STUCK PCB 3322; TRIP COOPER T5; NO RECLOSING
 FILE: chan/CH.C00.965.C15

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 SLG FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 STUCK PCB 3322; TRIP COOPER T5; NO RECLOSING
 FILE: chan/CH.C00.965.C15

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C00.965.C16
PRIOR OUTAGE: SYSTEM INTACT
POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: SLG FAULT AT COOPER 345 KV ON COOPER - ATCHISON 345 KV LINE. OPEN ATCHISON END OF COOPER - ATCHISON 345 KV LINE. STUCK PCB 3304 AT COOPER. DELAYED CLEAR OF FAULT, COOPER - ATCHISON 345 KV LINE, AND COOPER - ST. JOE 345 KV. NO RECLOSING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	SLG FAULT (Y=620-j3470) AT COOPER 345 KV
0.0750	4.5	CLEAR ATCHISON END OF COOPER - ATCHISON 345 KV
0.2250	13.5	CLEAR FAULT AND COOPER END OF COOPER - ATCHISON 345 KV LINE AND COOPER - ST. JOE 345 KV LINE

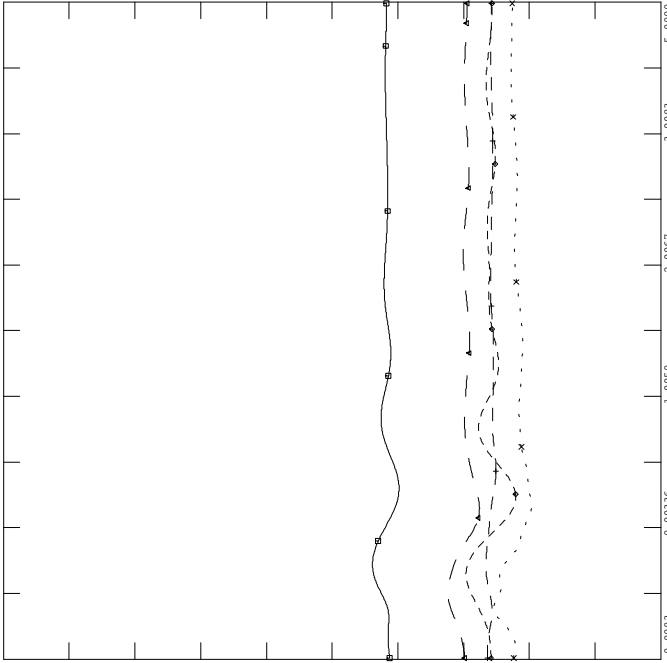
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 SLG FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 STUCK PCB 3304; TRIP COOPER - ST.JOE 345 KV; NO RECLOSING
 FILE: chan/CH.C00.965.C16

200.00	CHNL# 1028: [ANGSVGS 2G1]	x - - - - x	0.0
200.00	CHNL# 76: [ANGLLOUIS 1G]	↑ - - - - ↑	0.0
200.00	CHNL# 1: [ANGLFT CA31G]	◆ - - - - ◆	0.0
200.00	CHNL# 79: [ANG3CBLUF 3G]	← - - - - ←	0.0
200.00	CHNL# 58: [ANG2GENTLM2G]	□ - - - - □	0.0

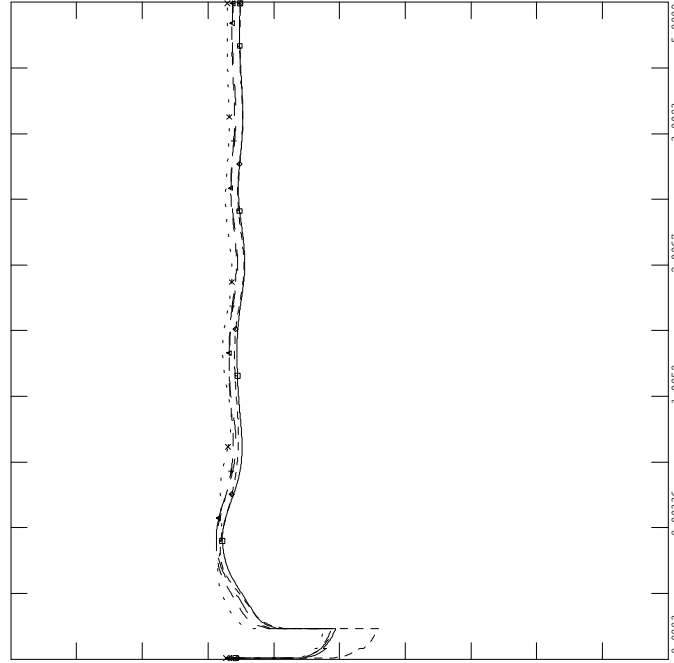


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 SLG FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 STUCK PCB 3304; TRIP COOPER - ST.JOE 345 KV; NO RECLOSING
 FILE: chan/CH.C00.965.C16

1.2000	CHNL# 338: [V- 571 GRIS3]	x - - - - x	0.70000
1.2000	CHNL# 1686: [VOLT [S1211 5161.00]]	↑ - - - - ↑	0.70000
1.2000	CHNL# 1685: [VOLT [ROKEYBY 7115.00]]	◆ - - - - ◆	0.70000
1.2000	CHNL# 324: [V- 13451 S3451]	← - - - - ←	0.70000
1.2000	CHNL# 426: [V-2492 CBLF3]	□ - - - - □	0.70000

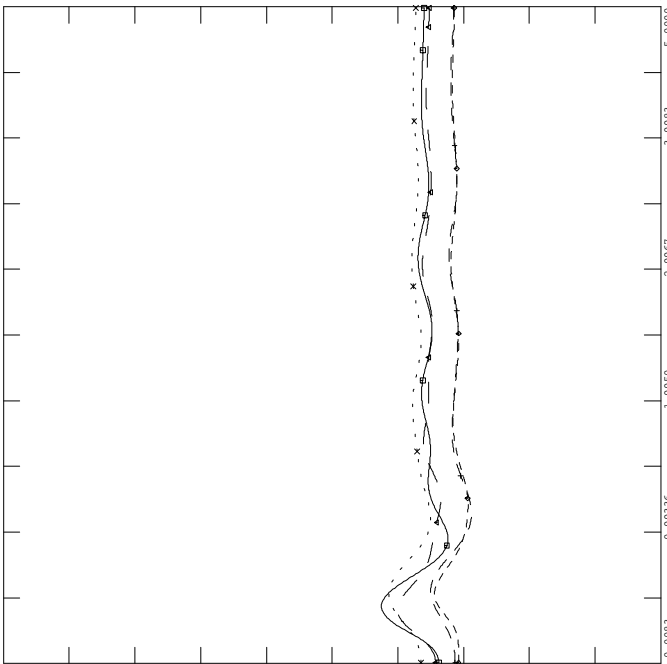


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 REGIONAL VOLTAGES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 SLG FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 STUCK PCB 3304; TRIP COOPER - ST.JOE 345 KV; NO RECLOSING
 FILE: chan/CH.C00.965.C16

200.00	CHNL# 995: [ANGBEATST3G1]	x - - - - x	0.0
200.00	CHNL# 1018: [ANGCASS 1G1]	↑ - - - - ↑	0.0
200.00	CHNL# 59: [ANGSHELD 1G]	◆ - - - - ◆	0.0
200.00	CHNL# 2: [ANGINEBRC31G]	← - - - - ←	0.0
200.00	CHNL# 56: [ANGLCOOPER1G]	□ - - - - □	0.0

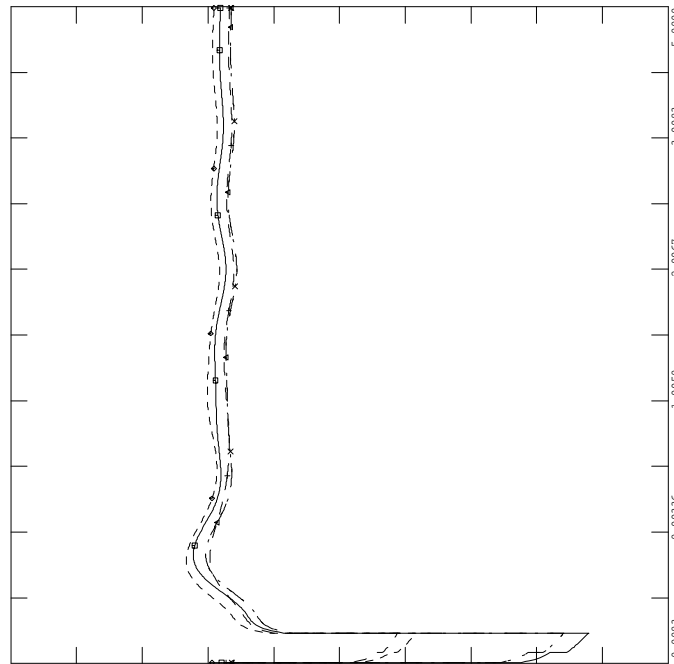


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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 SLG FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 STUCK PCB 3304; TRIP COOPER - ST.JOE 345 KV; NO RECLOSING
 FILE: chan/CH.C00.965.C16

1.2000	CHNL# 1695: [VOLT [COOPER ESST869.000]]	x - - - - x	0.70000
1.2000	CHNL# 1429: [VOLT [MOORE 3 345.00]]	↑ - - - - ↑	0.70000
1.2000	CHNL# 326: [V- 13458 S3458]	◆ - - - - ◆	0.70000
1.2000	CHNL# 1317: [VOLT [COOPER 5 161.00]]	← - - - - ←	0.70000
1.2000	CHNL# 1316: [VOLT [COOPER 3 345.00]]	□ - - - - □	0.70000



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Disturbance Description

STABILITY CASE NAME: C00.965.C17
PRIOR OUTAGE: SYSTEM INTACT
POWERFLOW CASE NAME: C00.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: SLG FAULT AT COOPER 161 KV ON COOPER 345 / 161 KV T2.
OPEN HIGH SIDE OF COOPER 345 /161 KV T2. STUCK PCB
1602 AT COOPER. DELAYED CLEAR OF FAULT, COOPER
345/161 KV T2, AND COOPER - S1280 161 KV. NO
RECLOSING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	SLG FAULT (Y=141-j1616) AT COOPER 161 KV
0.0750	4.5	CLEAR HIGH SIDE OF COOPER 345/161 KV T2
0.2667	16.0	CLEAR FAULT AND COOPER 345/161 KV T2 AND COOPER - S1280 161 KV LINE

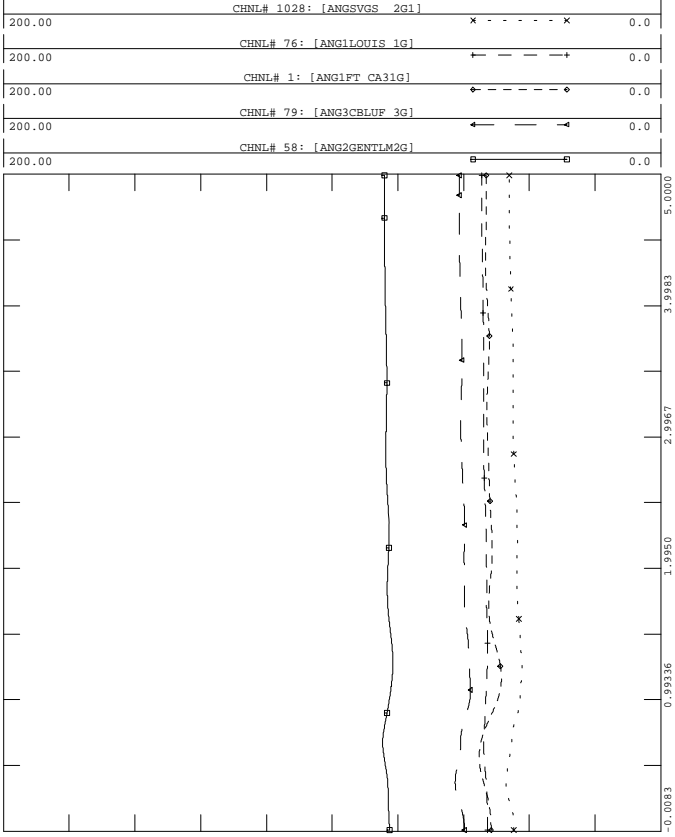
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE
LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



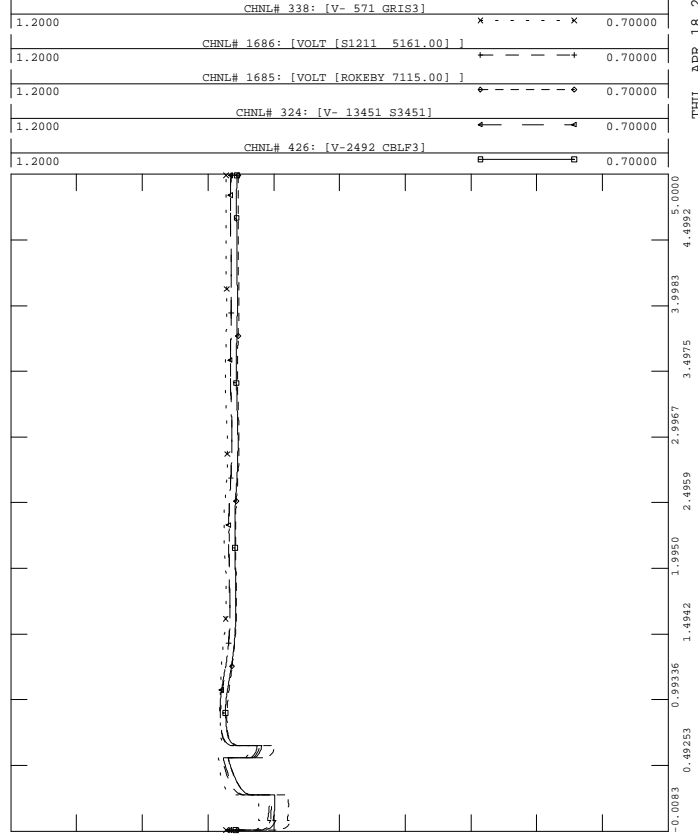
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 SLG FAULT ON LOW-SIDE OF COOPER T2
 STUCK PCB 1602; TRIP COOPER-S1280 161KV; NO RECLOSING
 FILE: chan/CH.C00.965.C17

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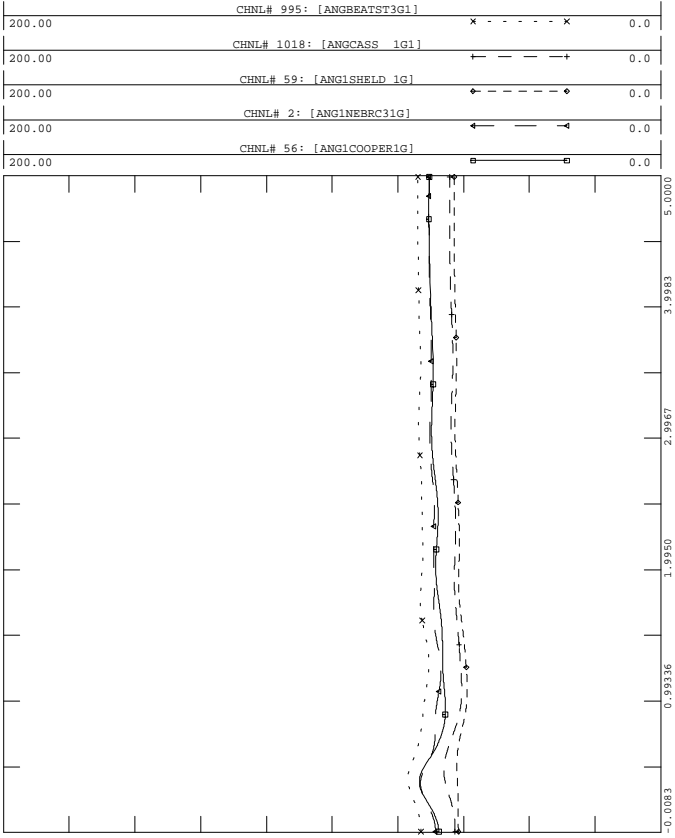
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 SLG FAULT ON LOW-SIDE OF COOPER T2
 STUCK PCB 1602; TRIP COOPER-S1280 161KV; NO RECLOSING
 FILE: chan/CH.C00.965.C17

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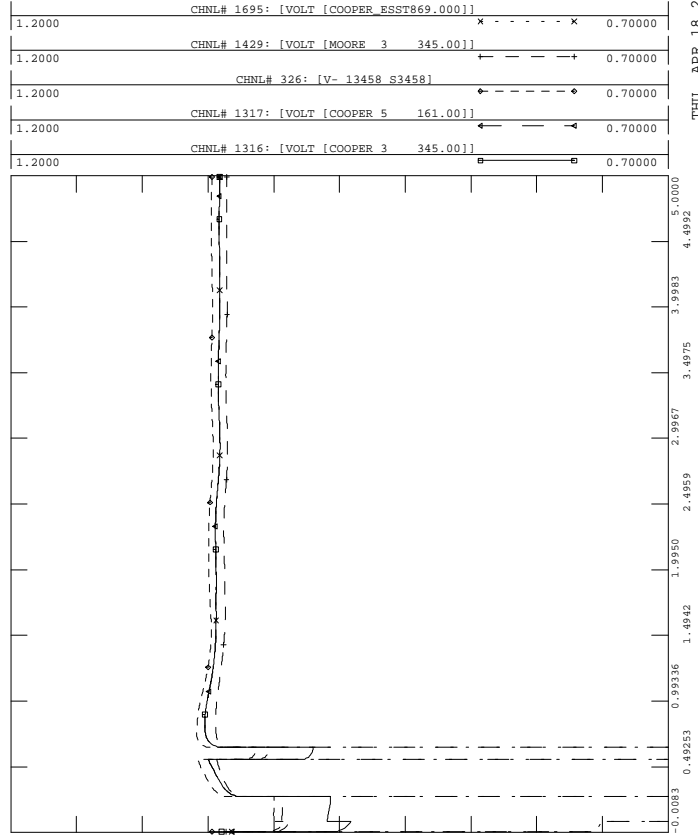
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 SLG FAULT ON LOW-SIDE OF COOPER T2
 STUCK PCB 1602; TRIP COOPER-S1280 161KV; NO RECLOSING
 FILE: chan/CH.C00.965.C17

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 BASE CASE
 SLG FAULT ON LOW-SIDE OF COOPER T2
 STUCK PCB 1602; TRIP COOPER-S1280 161KV; NO RECLOSING
 FILE: chan/CH.C00.965.C17

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Disturbance Description

STABILITY CASE NAME: C01.965.C03
PRIOR OUTAGE: COOPER - S3458 345 KV
POWERFLOW CASE NAME: C01.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - ATCHISON 345 KV LINE. CLEAR COOPER - ATCHISON 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - ATCHISON 345 KV LINE

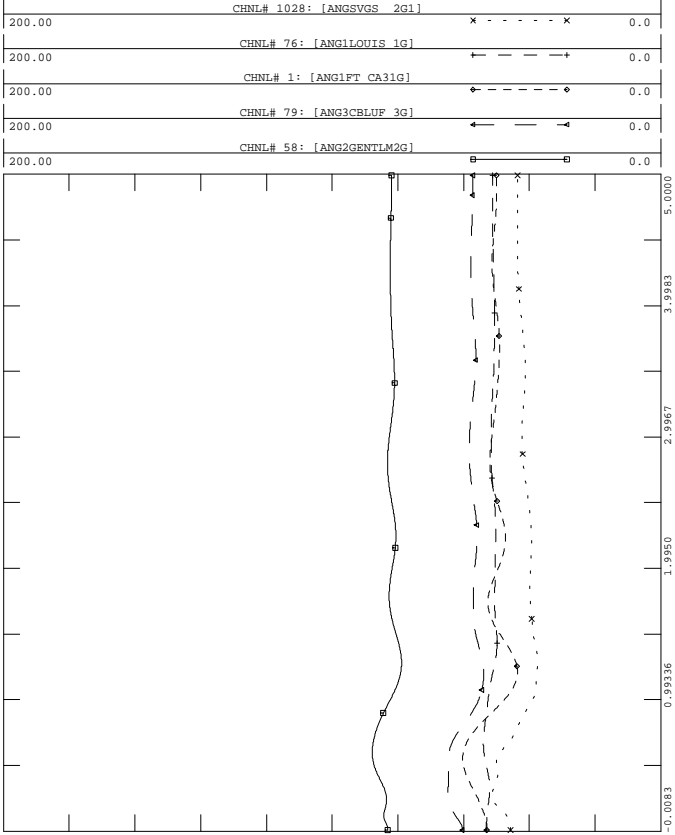
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



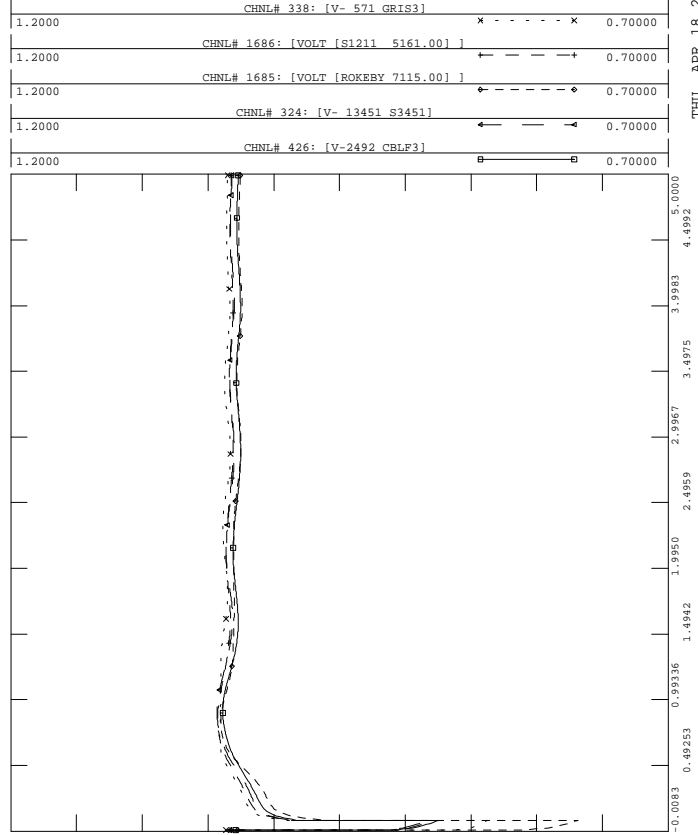
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 3PH FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C01.965.C03

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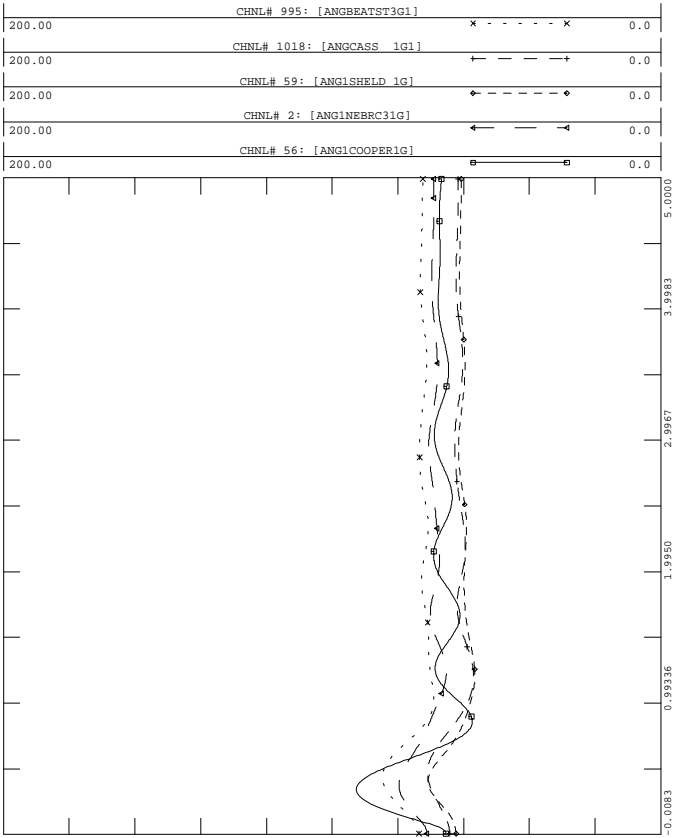
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 3PH FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C01.965.C03

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 REGIONAL VOLTAGES



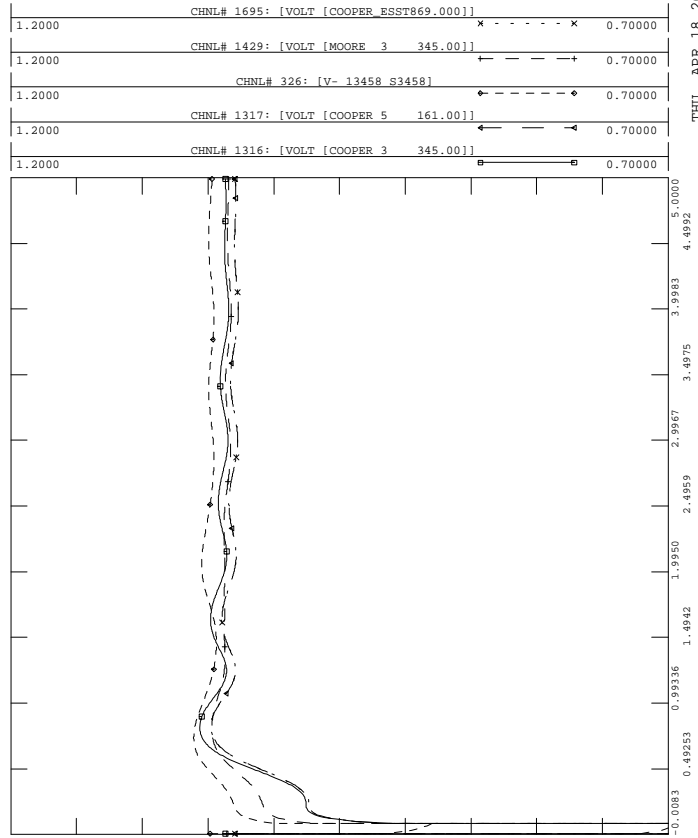
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 3PH FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C01.965.C03

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 3PH FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C01.965.C03

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Disturbance Description

STABILITY CASE NAME: C01.965.C06
PRIOR OUTAGE: COOPER - S3458 345 KV
POWERFLOW CASE NAME: C01.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - FAIRPORT 345 KV LINE. CLEAR COOPER - FAIRPORT 345 KV LINE, FAIRPORT - ST. JOE 345 KV LINE, AND FAIRPORT 345/161 KV TRANSFORMER. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - FAIRPORT 345 KV LINE, FAIRPORT - ST. JOE 345 KV LINE, AND FAIRPORT 345/161 KV TRANSFORMER

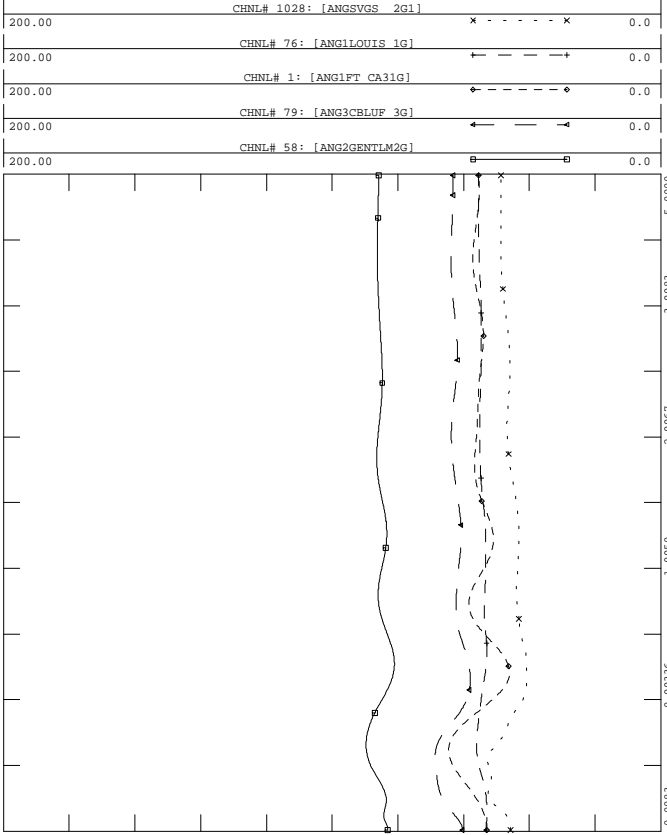
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



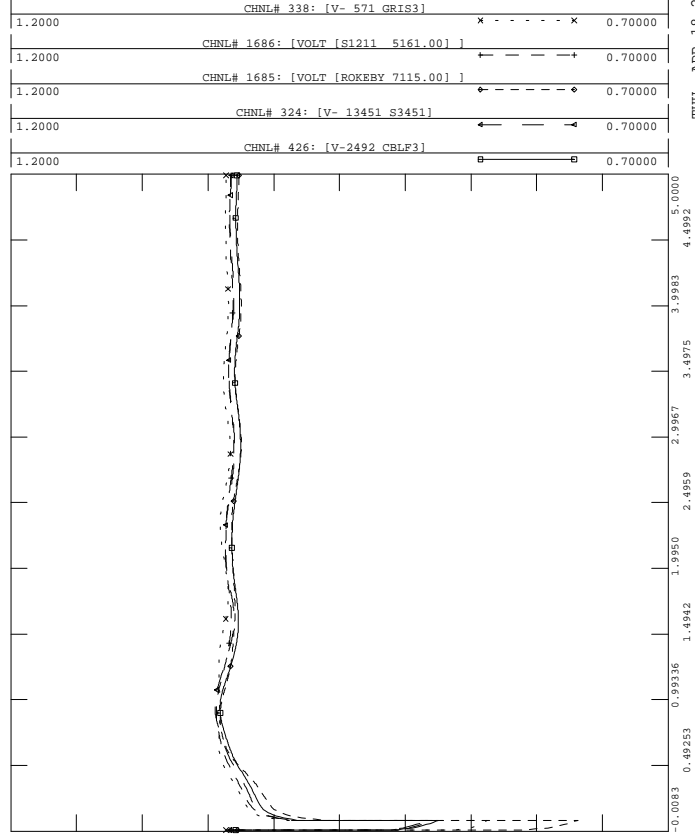
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 3PH FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C01.965.C06

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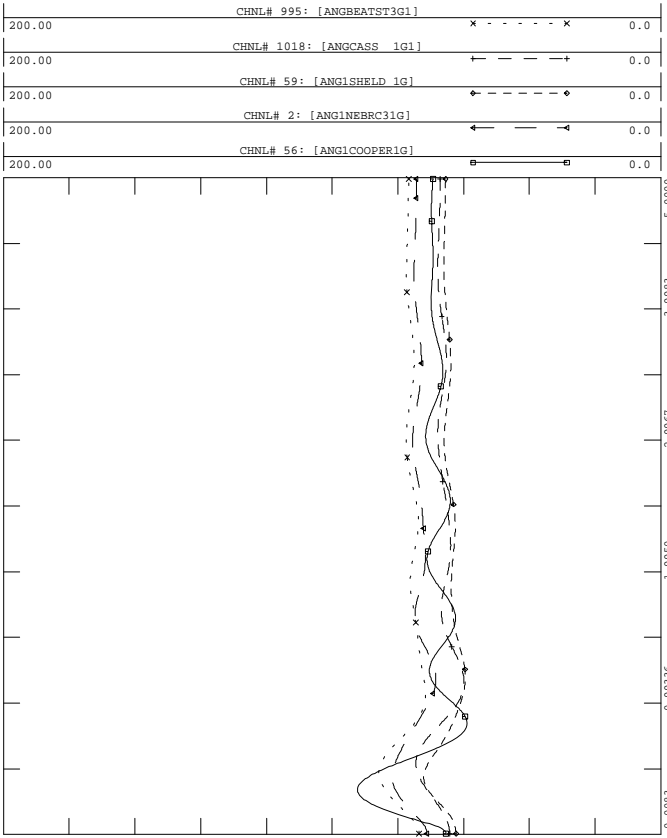
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 3PH FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C01.965.C06

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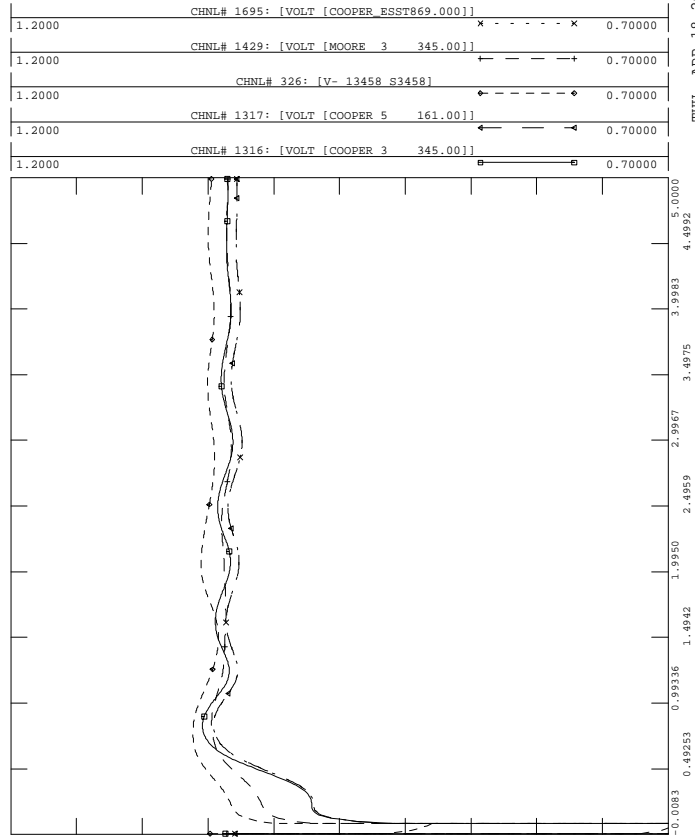
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 3PH FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C01.965.C06

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 3PH FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C01.965.C06

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Disturbance Description

STABILITY CASE NAME: C01.965.C11
PRIOR OUTAGE: COOPER - S3458 345 KV
POWERFLOW CASE NAME: C01.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: NO FAULT. LOSS OF COOPER GENERATION.
LOAD REJECTION. NO RECLOSE. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	LOSS OF COOPER GENERATION

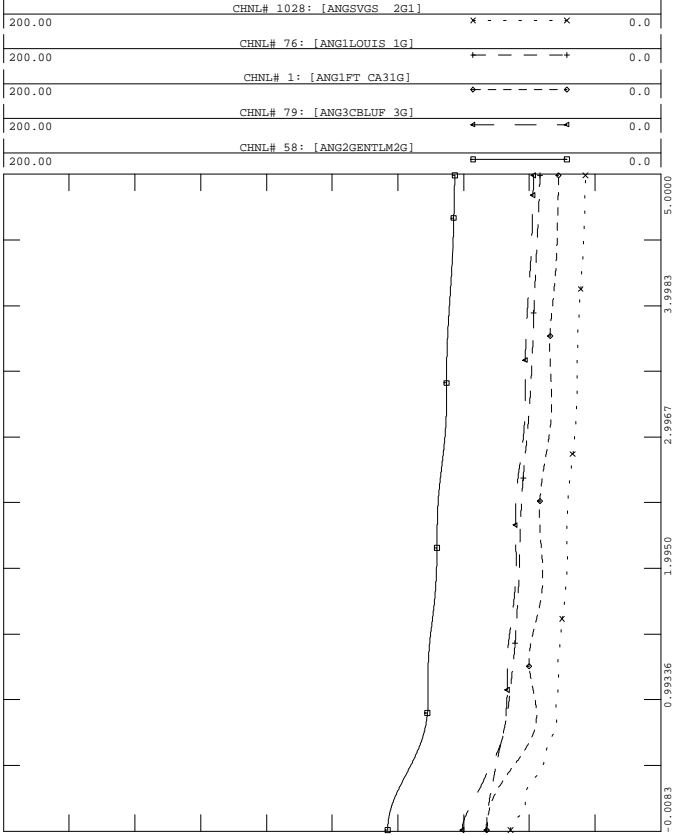
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



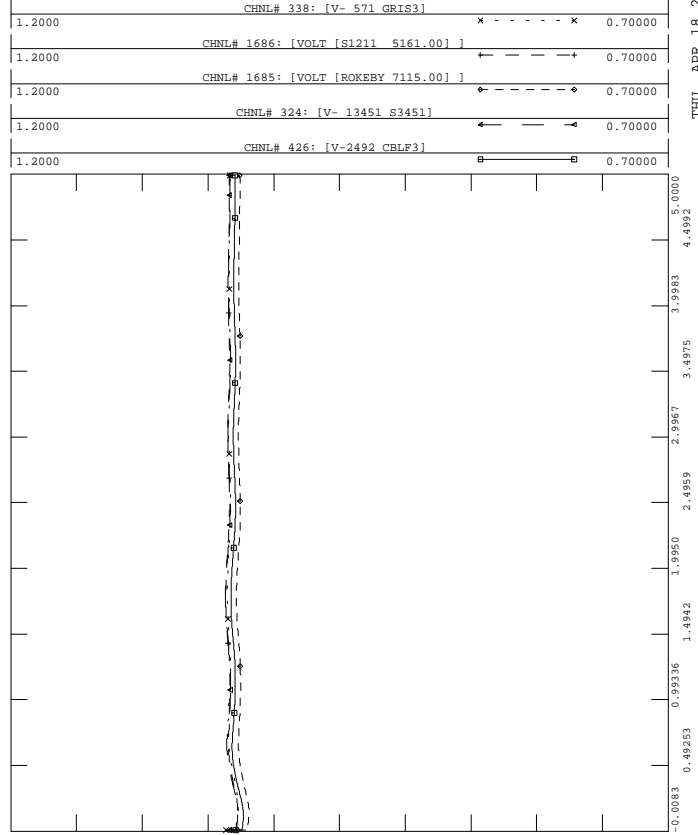
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C01.965.C11

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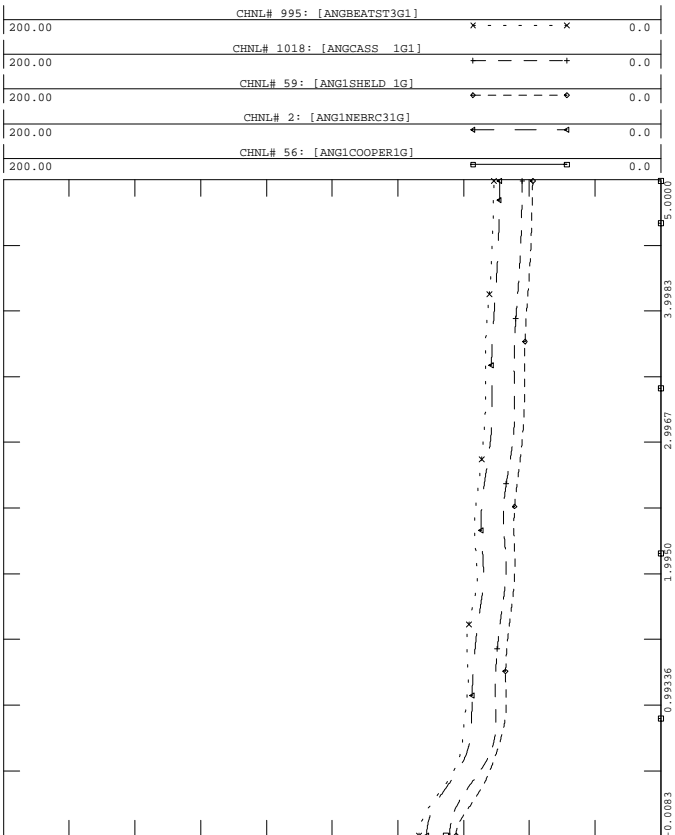
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C01.965.C11

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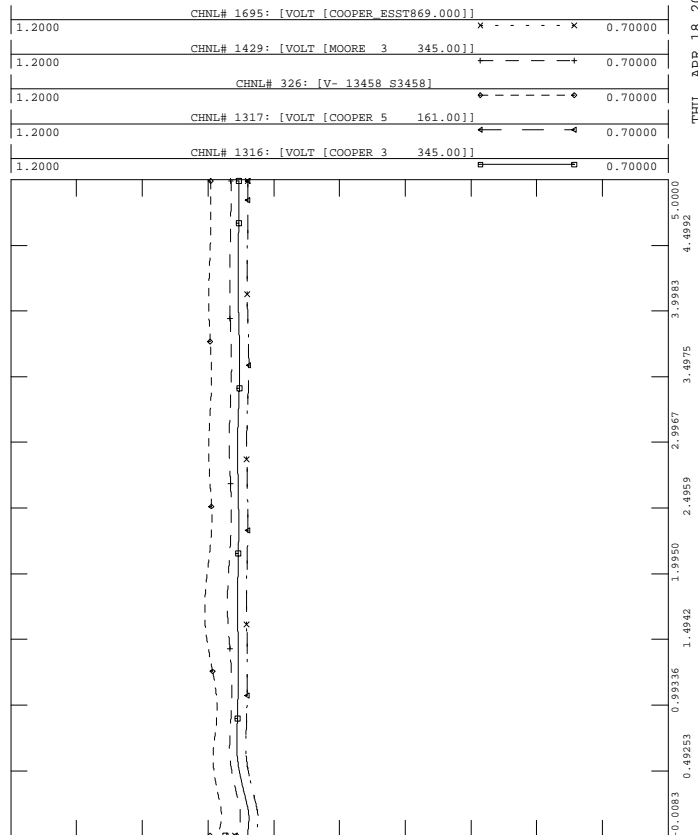
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C01.965.C11

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C01.965.C11

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Disturbance Description

STABILITY CASE NAME: C01.965.C15
PRIOR OUTAGE: COOPER - S3458 345 KV
POWERFLOW CASE NAME: C01.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: SLG FAULT AT COOPER 345 KV ON COOPER - FAIRPORT - ST. JOE 345 KV LINE. OPEN ST JOE END OF COOPER - FAIRPORT - ST JOE 345 KV LINE. STUCK PCB 3322 AT COOPER. DELAYED CLEAR OF FAULT, COOPER - FAIRPORT - ST JOE 345 KV LINE, AND COOPER 345/161 KV T5. NO RECLOSING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	SLG FAULT (Y=620-j3470) AT COOPER 345 KV
0.0750	4.5	CLEAR ST JOE END OF COOPER - FAIRPORT - ST JOE 345 KV
0.2170	13.0	CLEAR FAULT AND COOPER END OF COOPER - FAIRPORT - ST JOE 345 KV LINE AND COOPER 345/161 KV T5

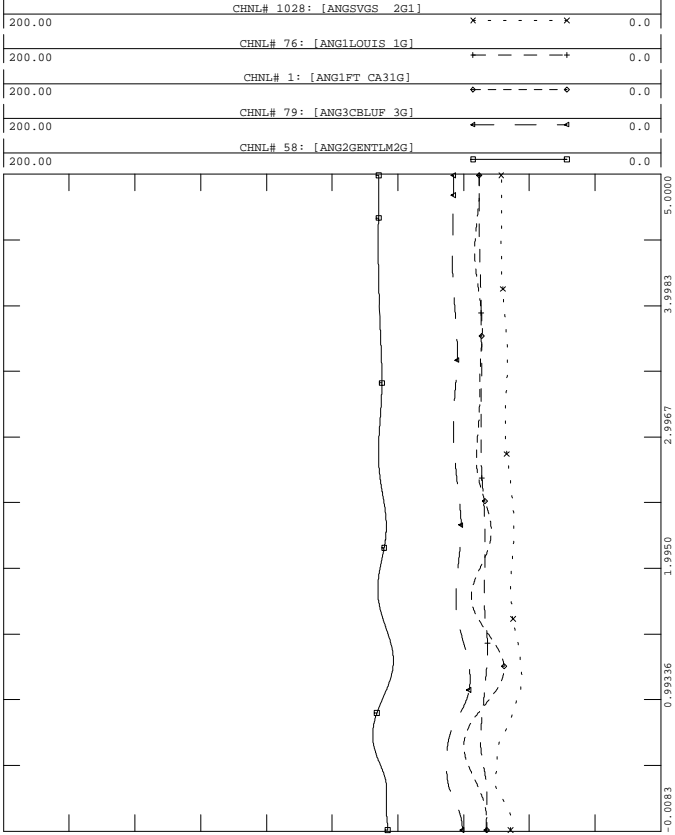
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



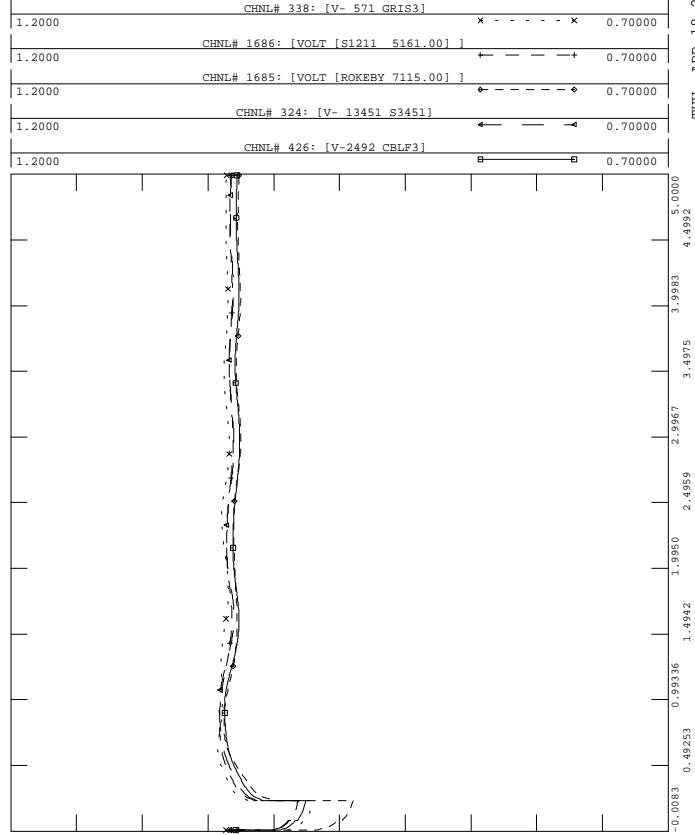
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 SLG FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 STUCK PCB 3322; TRIP COOPER T5; NO RECLOSING
 FILE: chan/CH.C01.965.C15

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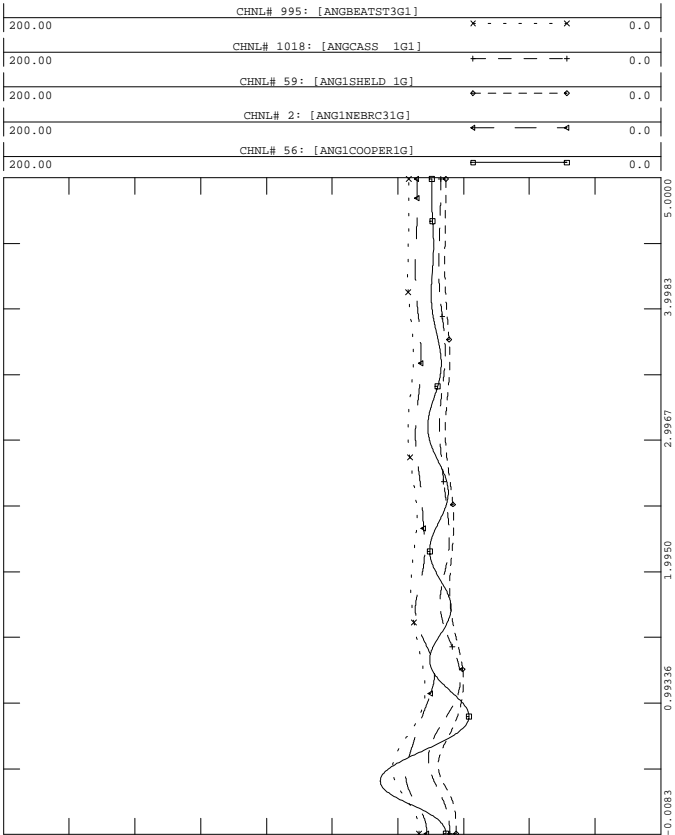
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 SLG FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 STUCK PCB 3322; TRIP COOPER T5; NO RECLOSING
 FILE: chan/CH.C01.965.C15

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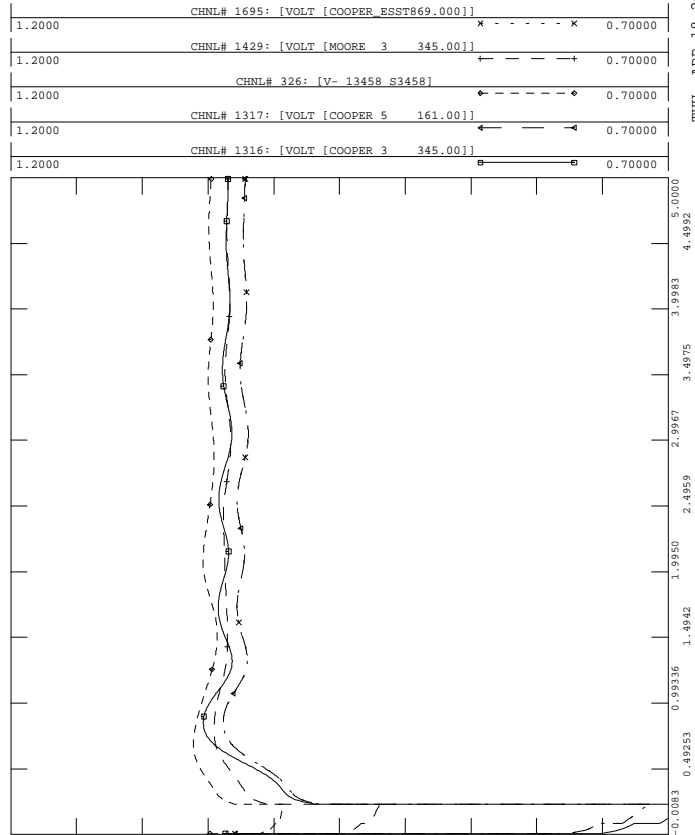
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 SLG FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 STUCK PCB 3322; TRIP COOPER T5; NO RECLOSING
 FILE: chan/CH.C01.965.C15

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 SLG FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 STUCK PCB 3322; TRIP COOPER T5; NO RECLOSING
 FILE: chan/CH.C01.965.C15

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Disturbance Description

STABILITY CASE NAME: C01.965.C16
PRIOR OUTAGE: COOPER - S3458 345 KV
POWERFLOW CASE NAME: C01.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: SLG FAULT AT COOPER 345 KV ON COOPER - ATCHISON 345 KV LINE. OPEN ATCHISON END OF COOPER - ATCHISON 345 KV LINE. STUCK PCB 3304 AT COOPER. DELAYED CLEAR OF FAULT, COOPER - ATCHISON 345 KV LINE, AND COOPER - ST. JOE 345 KV. NO RECLOSING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	SLG FAULT (Y=620-j3470) AT COOPER 345 KV
0.0750	4.5	CLEAR ATCHISON END OF COOPER - ATCHISON 345 KV
0.2250	13.5	CLEAR FAULT AND COOPER END OF COOPER - ATCHISON 345 KV LINE AND COOPER - ST. JOE 345 KV LINE

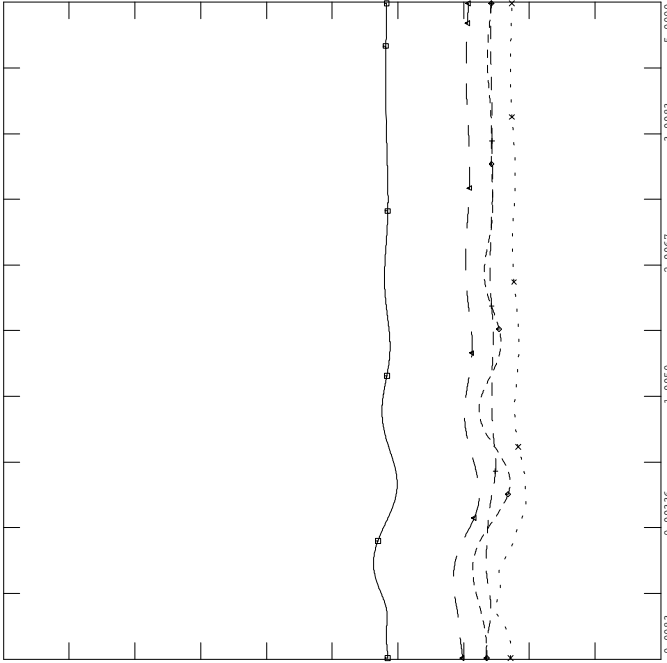
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 SLG FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 STUCK PCB 3304; TRIP COOPER - ST.JOE 345 KV; NO RECLOSING
 FILE: chan/CH.C01.965.C16

200.00	CHNL# 1028: [ANGSVGS 2G1]	x - - - - x	0.0
200.00	CHNL# 76: [ANGLLOUIS 1G]	↑ - - - - ↓	0.0
200.00	CHNL# 1: [ANGLFT CA31G]	◆ - - - - ◆	0.0
200.00	CHNL# 79: [ANG3CBLUF 3G]	← - - - - →	0.0
200.00	CHNL# 58: [ANG2GENTLM2G]	□ - - - - □	0.0

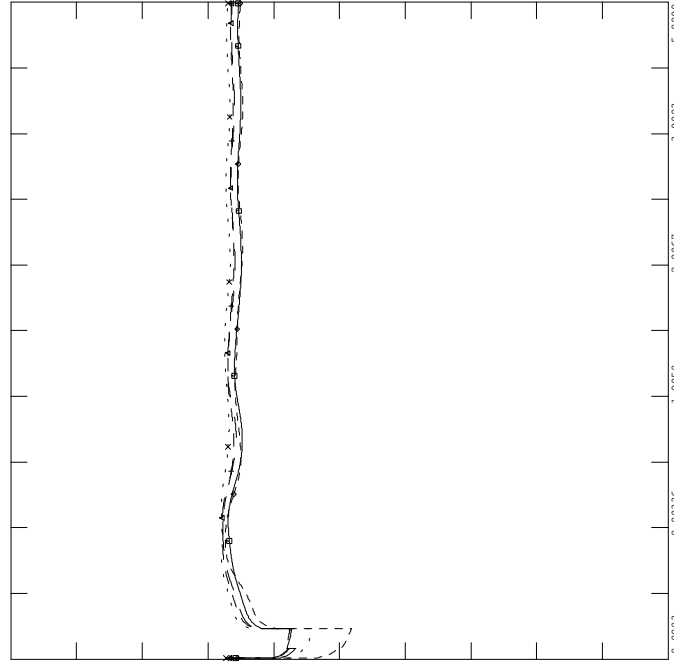


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 SLG FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 STUCK PCB 3304; TRIP COOPER - ST.JOE 345 KV; NO RECLOSING
 FILE: chan/CH.C01.965.C16

1.2000	CHNL# 338: [V- 571 GRIS3]	x - - - - x	0.70000
1.2000	CHNL# 1686: [VOLT [S1211 5161.00]]	↑ - - - - ↓	0.70000
1.2000	CHNL# 1685: [VOLT [ROKEBY 7115.00]]	◆ - - - - ◆	0.70000
1.2000	CHNL# 324: [V- 13451 S3451]	← - - - - →	0.70000
1.2000	CHNL# 426: [V-2492 CBLF3]	□ - - - - □	0.70000

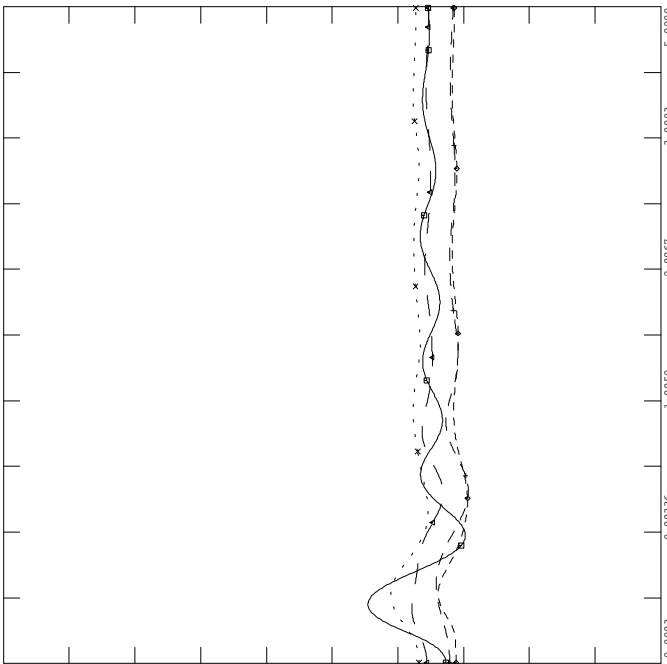


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 SLG FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 STUCK PCB 3304; TRIP COOPER - ST.JOE 345 KV; NO RECLOSING
 FILE: chan/CH.C01.965.C16

200.00	CHNL# 995: [ANGBEATST3G1]	x - - - - x	0.0
200.00	CHNL# 1018: [ANGCASS 1G1]	↑ - - - - ↓	0.0
200.00	CHNL# 59: [ANGSHELD 1G]	◆ - - - - ◆	0.0
200.00	CHNL# 2: [ANG1NEBRC31G]	← - - - - →	0.0
200.00	CHNL# 56: [ANGLCOOPER1G]	□ - - - - □	0.0

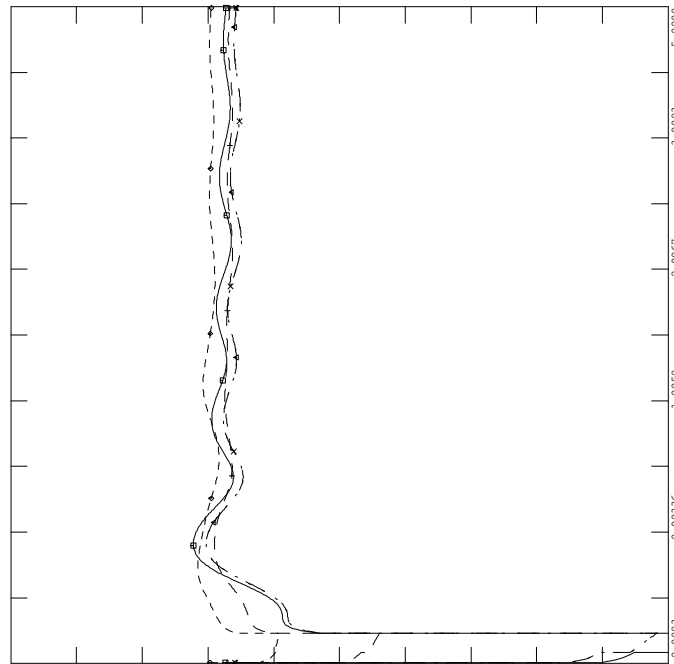


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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - S3458 345 KV
 SLG FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 STUCK PCB 3304; TRIP COOPER - ST.JOE 345 KV; NO RECLOSING
 FILE: chan/CH.C01.965.C16

1.2000	CHNL# 1695: [VOLT [COOPER_ESST869.000]]	x - - - - x	0.70000
1.2000	CHNL# 1429: [VOLT [MOORE 3 345.00]]	↑ - - - - ↓	0.70000
1.2000	CHNL# 326: [V- 13458 S3458]	◆ - - - - ◆	0.70000
1.2000	CHNL# 1317: [VOLT [COOPER 5 161.00]]	← - - - - →	0.70000
1.2000	CHNL# 1316: [VOLT [COOPER 3 345.00]]	□ - - - - □	0.70000



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 LOCAL VOLTAGES

Disturbance Description

STABILITY CASE NAME: C02.965.C01

PRIOR OUTAGE: COOPER - MOORE 345 KV

POWERFLOW CASE NAME: C02.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1	= 105	Council Bluffs #1	= 46
Nebraska City #1	= 652	Sheldon #2	= 120	Council Bluffs #2	= 88
Nebraska City #2	= 682	Hallam CT	= 52	Council Bluffs #3	= 720
Cass County #1	= 161	BPS	= 250	Council Bluffs #4	= 790
Cass County #2	= 161	Iatan #1	= 706	Atchison Co Wind	= 144
Flat Water Wind	= 60	Iatan #2	= 965		

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - S3458 345 KV LINE. CLEAR COOPER - S3458 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - S3458 345 KV LINE

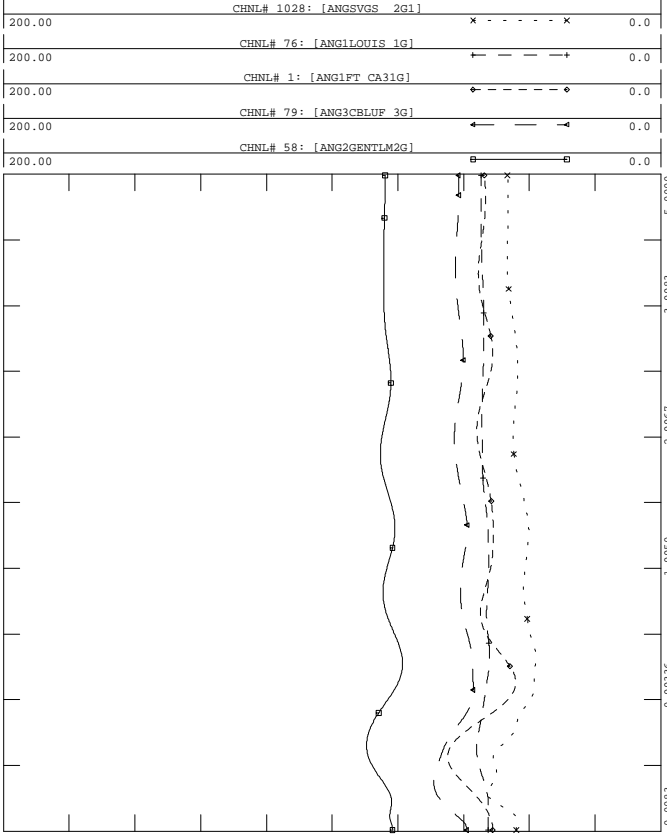
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



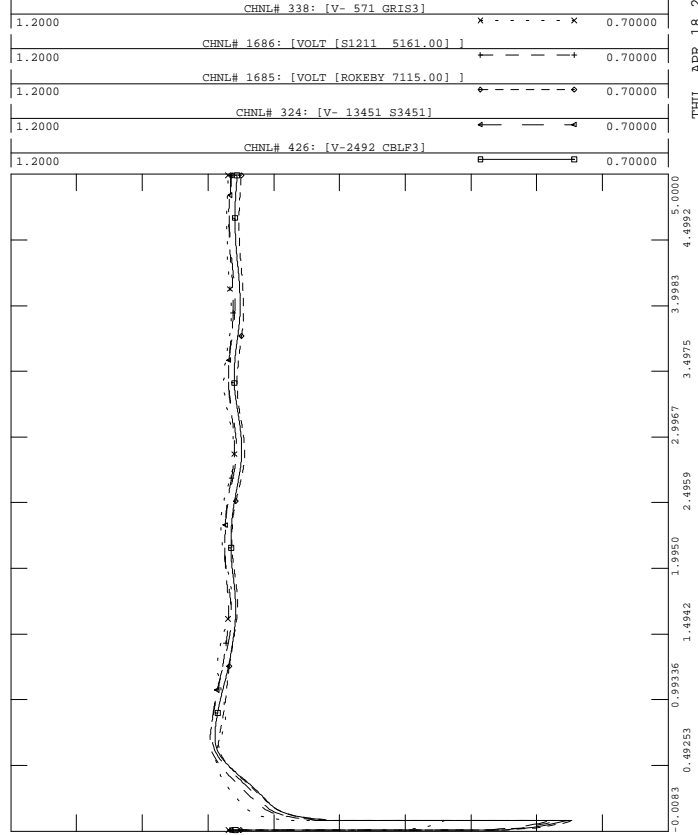
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 3PH FAULT AT COOPER ON COOPER - S3458 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C02.965.C01

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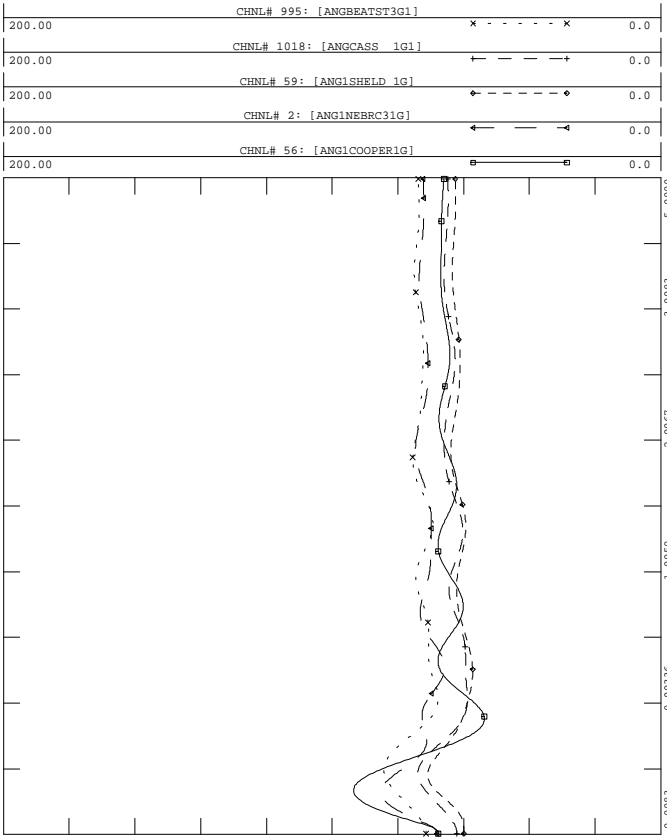
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 3PH FAULT AT COOPER ON COOPER - S3458 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C02.965.C01

THU, APR 18 2013 16:02
 REGIONAL VOLTAGES



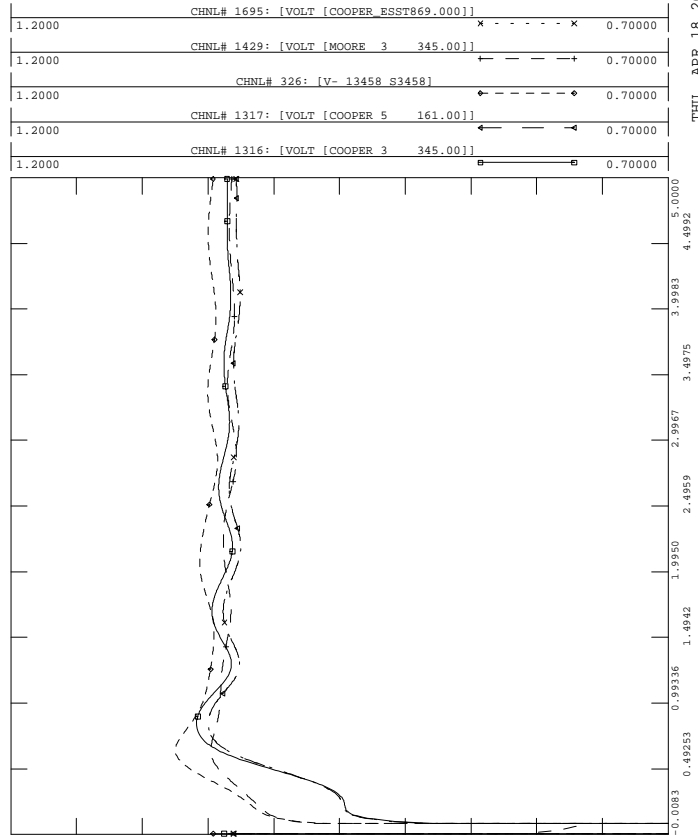
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 3PH FAULT AT COOPER ON COOPER - S3458 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C02.965.C01

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 3PH FAULT AT COOPER ON COOPER - S3458 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C02.965.C01

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C02.965.C07

PRIOR OUTAGE: COOPER - MOORE 345 KV

POWERFLOW CASE NAME: C02.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - ST. JOE 345 KV LINE. CLEAR COOPER - ST. JOE 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - ST. JOE 345 KV LINE

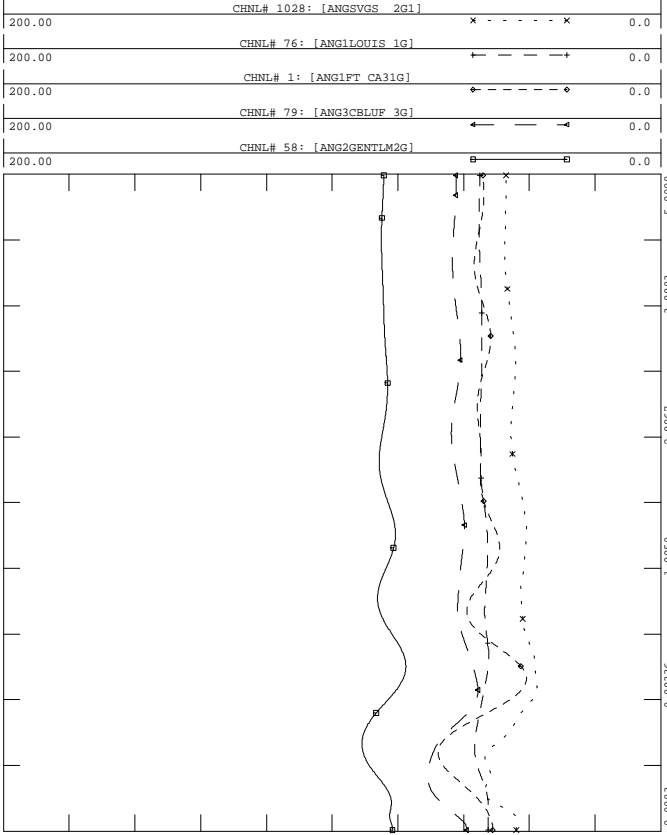
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



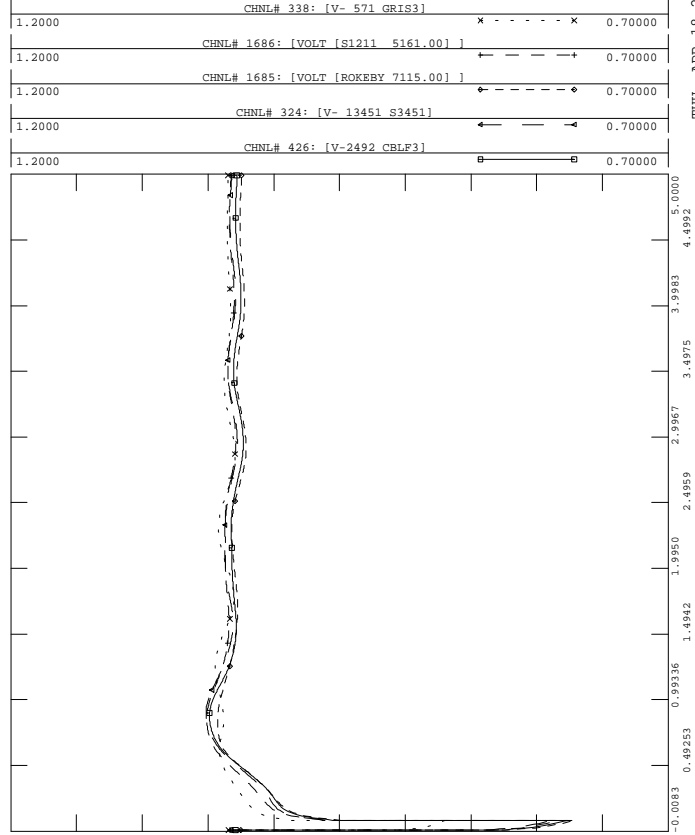
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 3PH FAULT AT COOPER ON COOPER - ST.JOE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C02.965.C07

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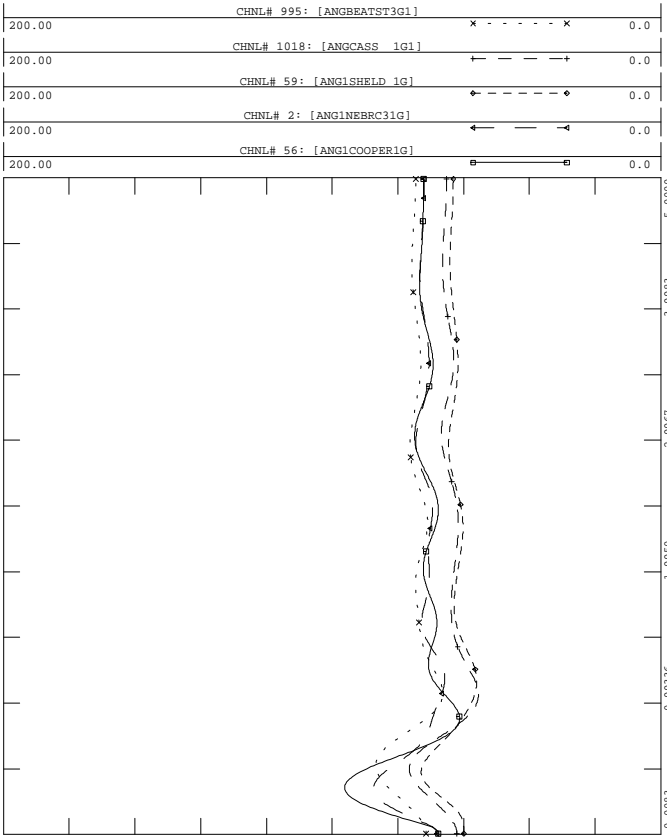
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 3PH FAULT AT COOPER ON COOPER - ST.JOE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C02.965.C07

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 REGIONAL VOLTAGES



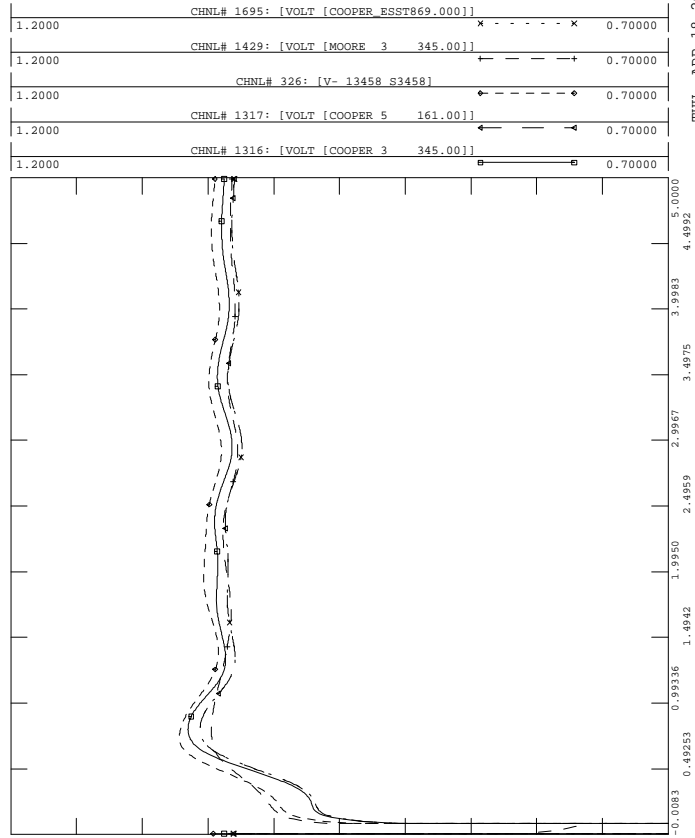
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 3PH FAULT AT COOPER ON COOPER - ST.JOE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C02.965.C07

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 3PH FAULT AT COOPER ON COOPER - ST.JOE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C02.965.C07

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C02.965.C11
PRIOR OUTAGE: COOPER - MOORE 345 KV
POWERFLOW CASE NAME: C02.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: NO FAULT. LOSS OF COOPER GENERATION.
LOAD REJECTION. NO RECLOSE. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	LOSS OF COOPER GENERATION

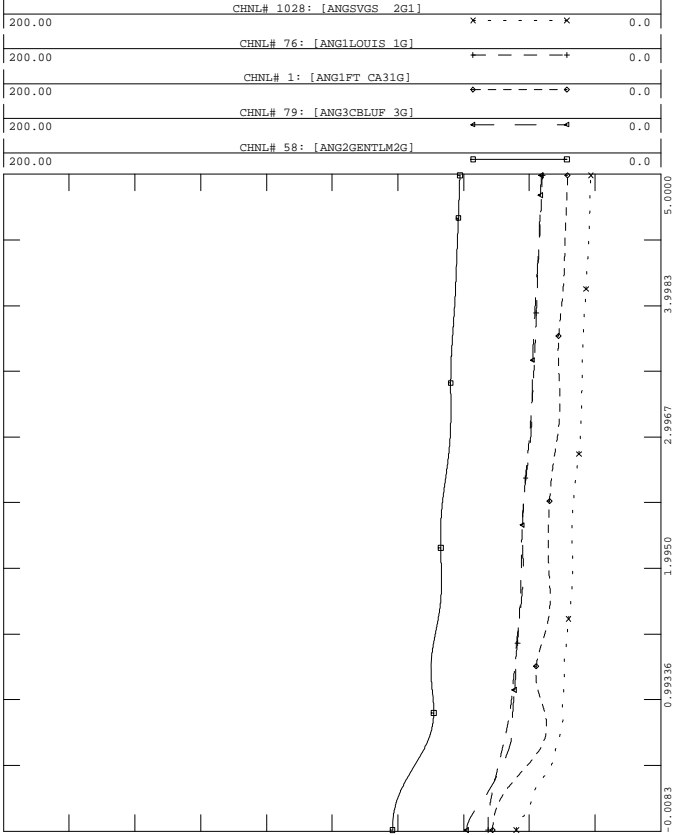
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



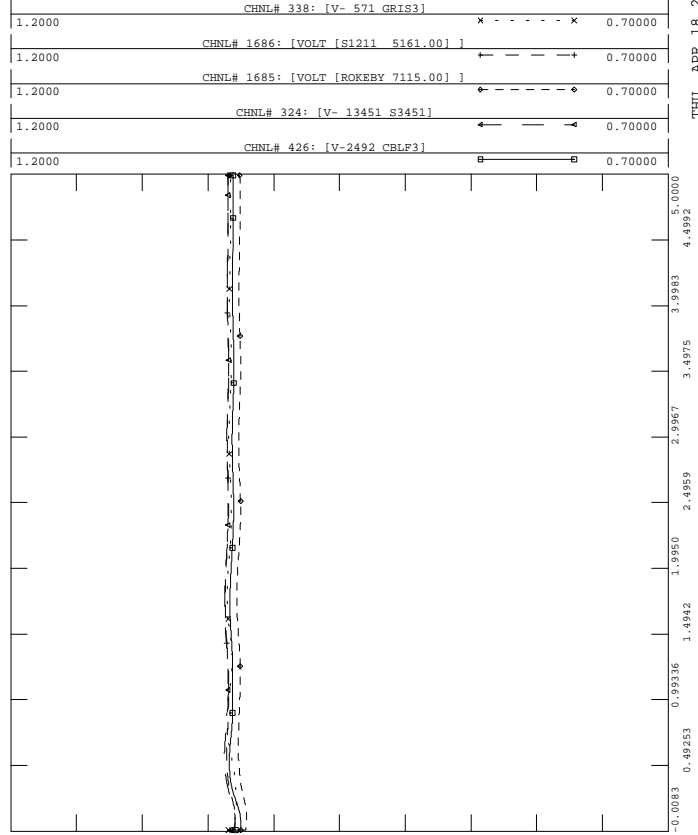
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C02.965.C11

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 REGIONAL ROTOR ANGLES



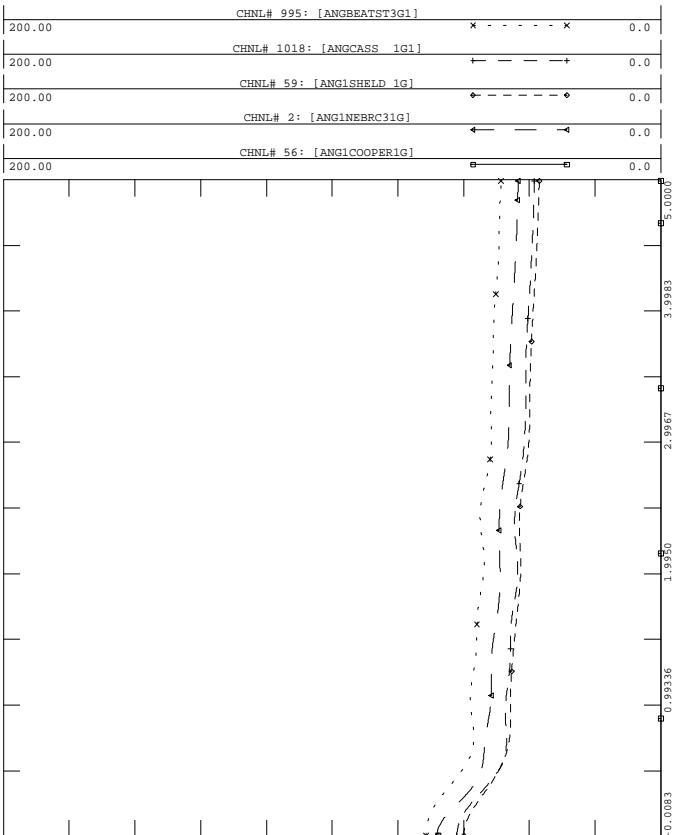
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C02.965.C11

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 REGIONAL VOLTAGES



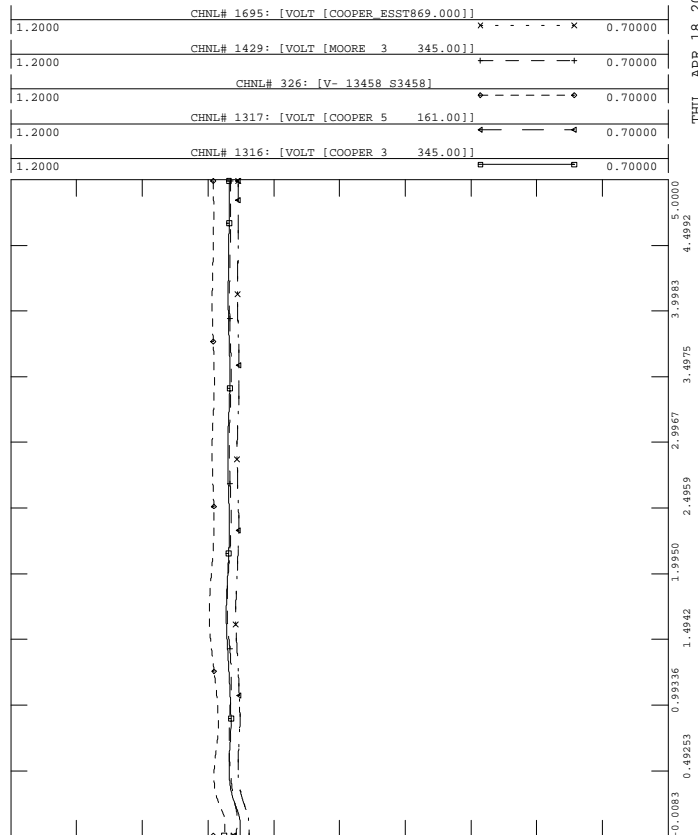
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C02.965.C11

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C02.965.C11

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C02.965.C14
PRIOR OUTAGE: COOPER - MOORE 345 KV
POWERFLOW CASE NAME: C02.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: SLG FAULT AT COOPER 345 KV ON COOPER - S3458 345 KV LINE. OPEN S3458 END OF COOPER - S3458 345 KV LINE. STUCK PCB 3316 AT COOPER. DELAYED CLEAR OF FAULT, COOPER - S3458 345 KV LINE, AND COOPER 345/161 KV T2. NO RECLOSING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	SLG FAULT (Y=620-j3470) AT COOPER 345 KV
0.0750	4.5	CLEAR S3458 END OF COOPER - S3458 345 KV LINE
0.2170	13.0	CLEAR FAULT AND COOPER END OF COOPER - S3458 345 KV LINE AND COOPER 345/161 KV T2

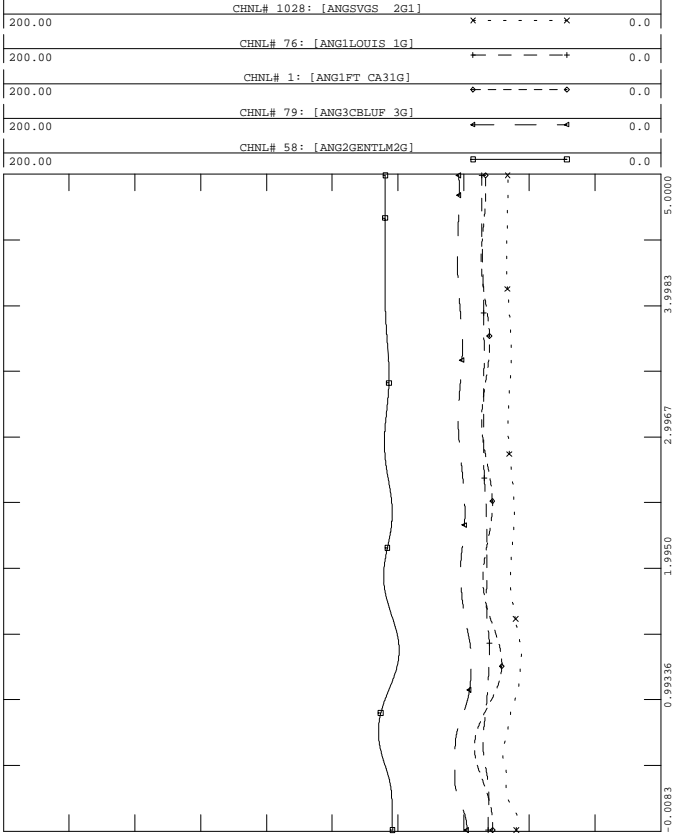
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



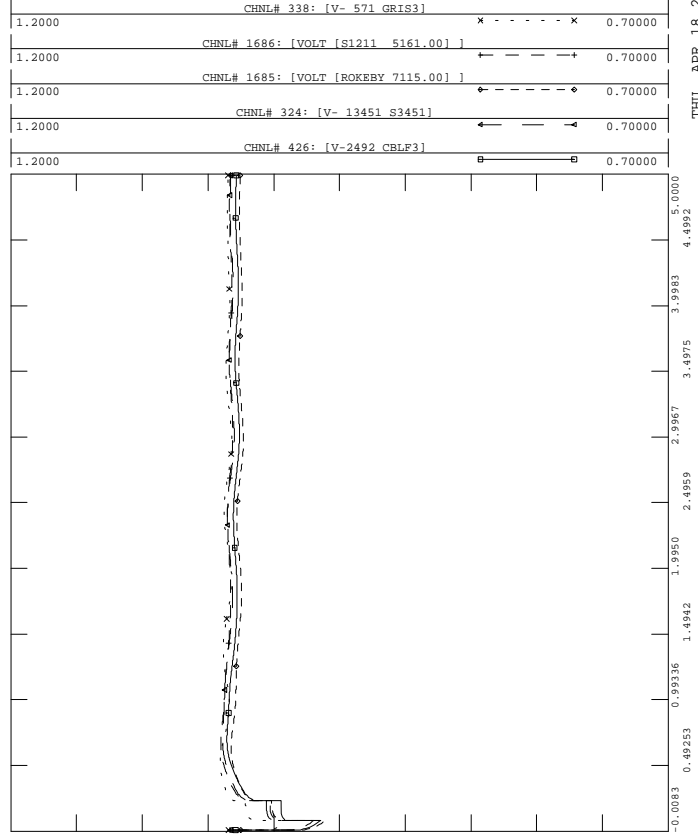
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C02.965.C14

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 REGIONAL ROTOR ANGLES



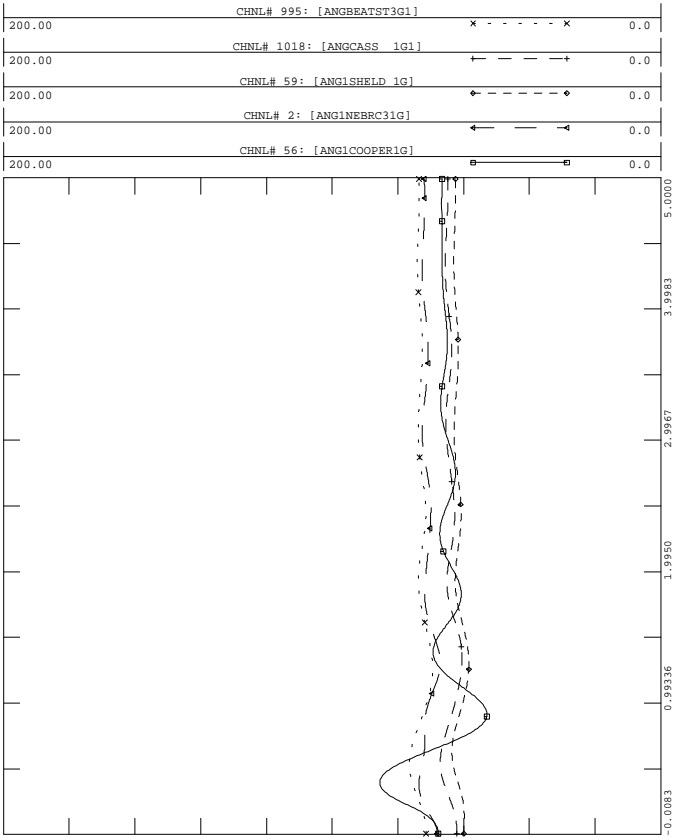
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C02.965.C14

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 REGIONAL VOLTAGES



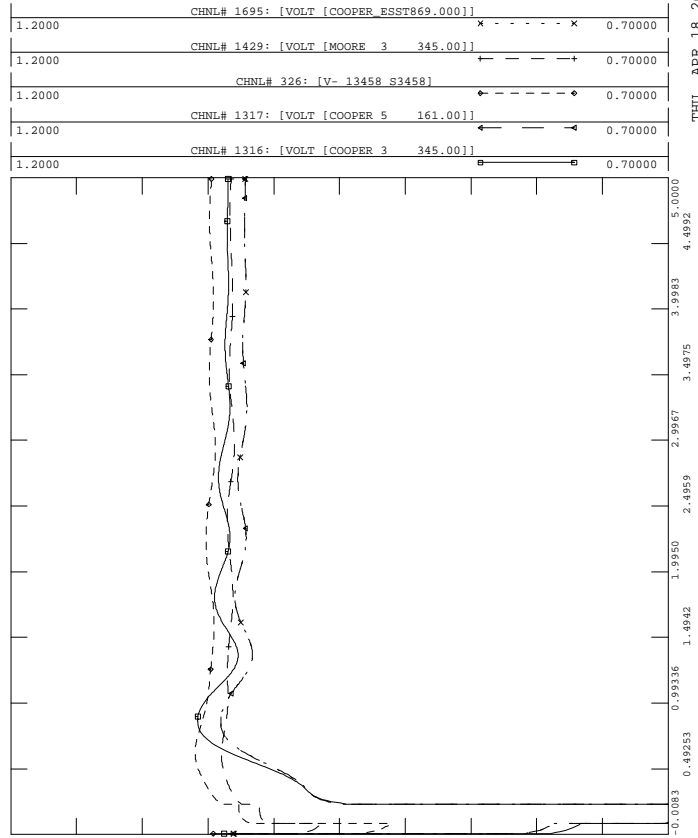
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C02.965.C14

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C02.965.C14

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C02.965.C16
PRIOR OUTAGE: COOPER - MOORE 345 KV
POWERFLOW CASE NAME: C02.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: SLG FAULT AT COOPER 345 KV ON COOPER - ATCHISON 345 KV LINE. OPEN ATCHISON END OF COOPER - ATCHISON 345 KV LINE. STUCK PCB 3304 AT COOPER. DELAYED CLEAR OF FAULT, COOPER - ATCHISON 345 KV LINE, AND COOPER - ST. JOE 345 KV. NO RECLOSING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	SLG FAULT (Y=620-j3470) AT COOPER 345 KV
0.0750	4.5	CLEAR ATCHISON END OF COOPER - ATCHISON 345 KV
0.2250	13.5	CLEAR FAULT AND COOPER END OF COOPER - ATCHISON 345 KV LINE AND COOPER - ST. JOE 345 KV LINE

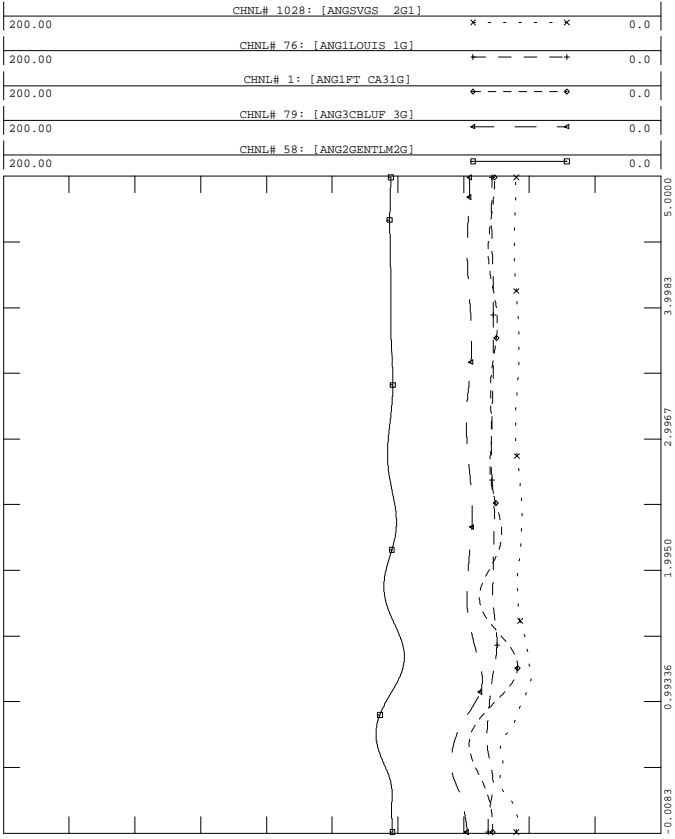
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



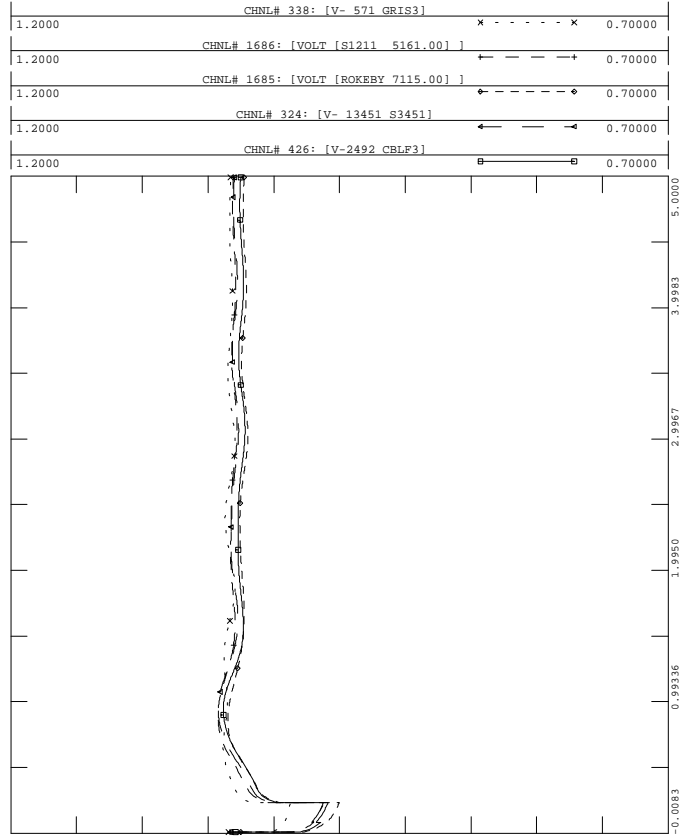
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 SLG FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 STUCK PCB 3304; TRIP COOPER - ST.JOE 345 KV; NO RECLOSING
 FILE: chan/CH.C02.965.C16

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 REGIONAL ROTOR ANGLES



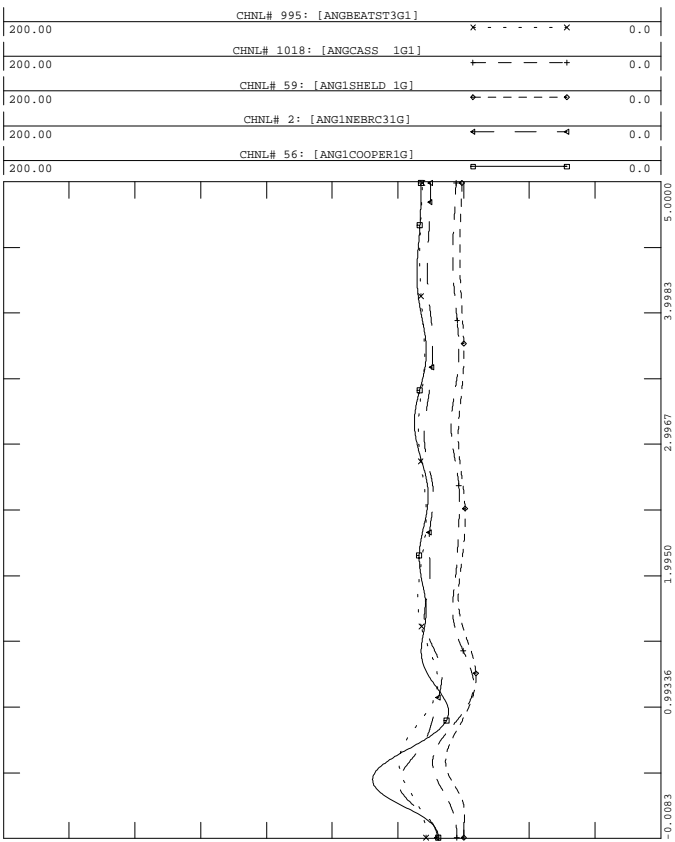
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 SLG FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 STUCK PCB 3304; TRIP COOPER - ST.JOE 345 KV; NO RECLOSING
 FILE: chan/CH.C02.965.C16

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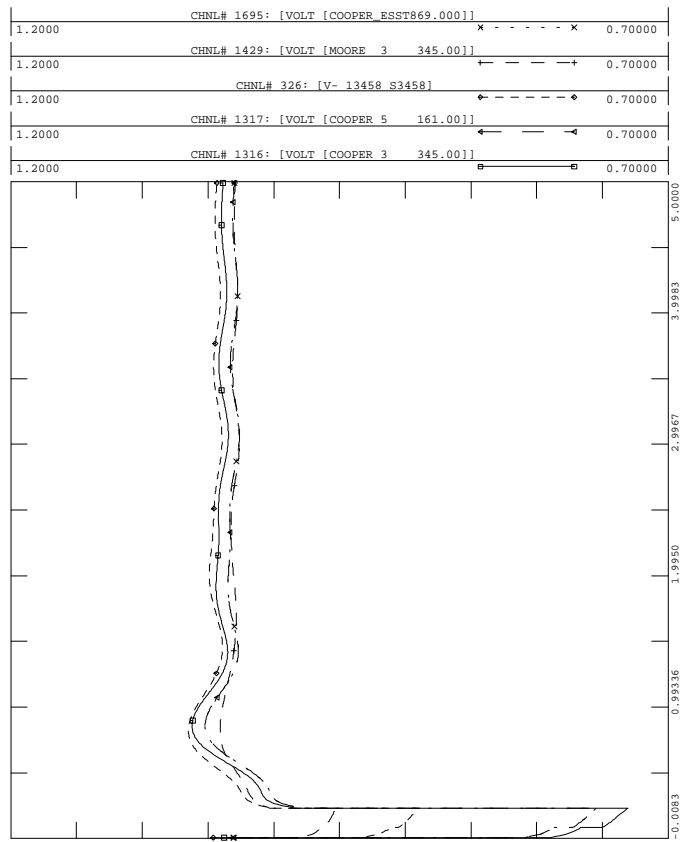
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 SLG FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 STUCK PCB 3304; TRIP COOPER - ST.JOE 345 KV; NO RECLOSING
 FILE: chan/CH.C02.965.C16

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - MOORE 345 KV
 SLG FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 STUCK PCB 3304; TRIP COOPER - ST.JOE 345 KV; NO RECLOSING
 FILE: chan/CH.C02.965.C16

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C03.965.C02

PRIOR OUTAGE: COOPER - ATCHISON 345 KV

POWERFLOW CASE NAME: C03.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1	= 105	Council Bluffs #1	= 46
Nebraska City #1	= 652	Sheldon #2	= 120	Council Bluffs #2	= 88
Nebraska City #2	= 682	Hallam CT	= 52	Council Bluffs #3	= 720
Cass County #1	= 161	BPS	= 250	Council Bluffs #4	= 790
Cass County #2	= 161	Iatan #1	= 706	Atchison Co Wind	= 144
Flat Water Wind	= 60	Iatan #2	= 965		

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - MOORE 345 KV LINE. CLEAR COOPER - MOORE 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - MOORE 345 KV LINE

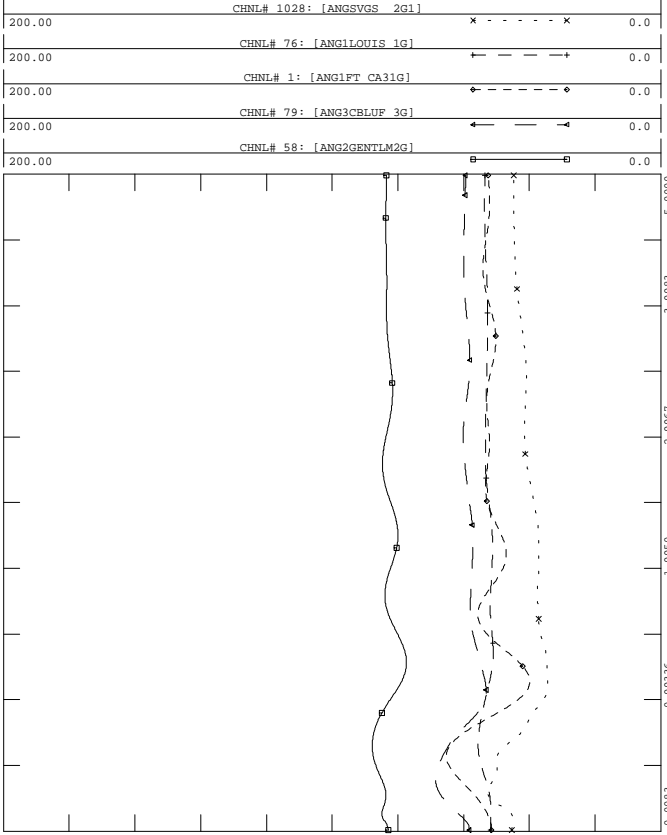
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



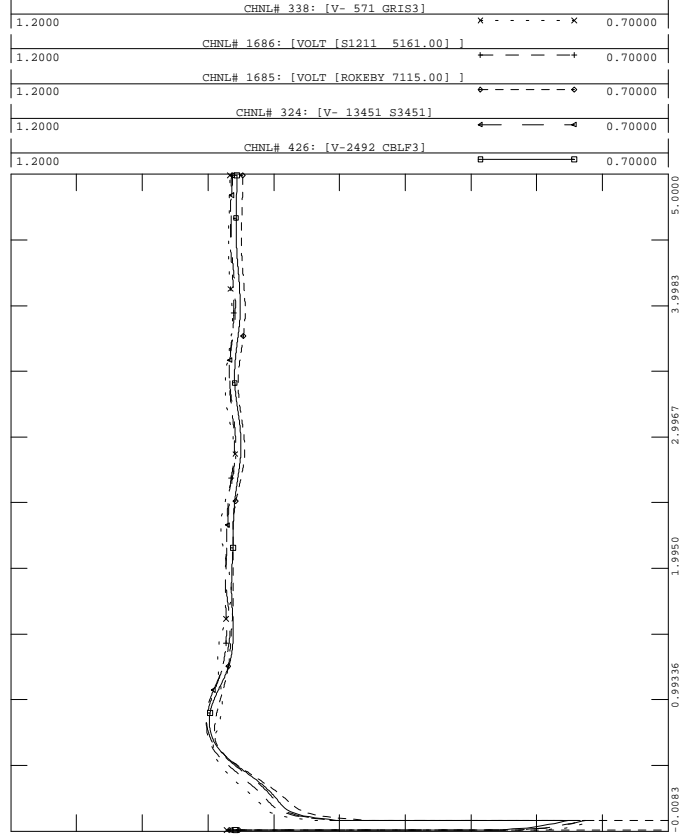
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ATCHISON 345 KV
 3PH FAULT AT COOPER ON COOPER - MOORE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C03.965.C02

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 REGIONAL ROTOR ANGLES



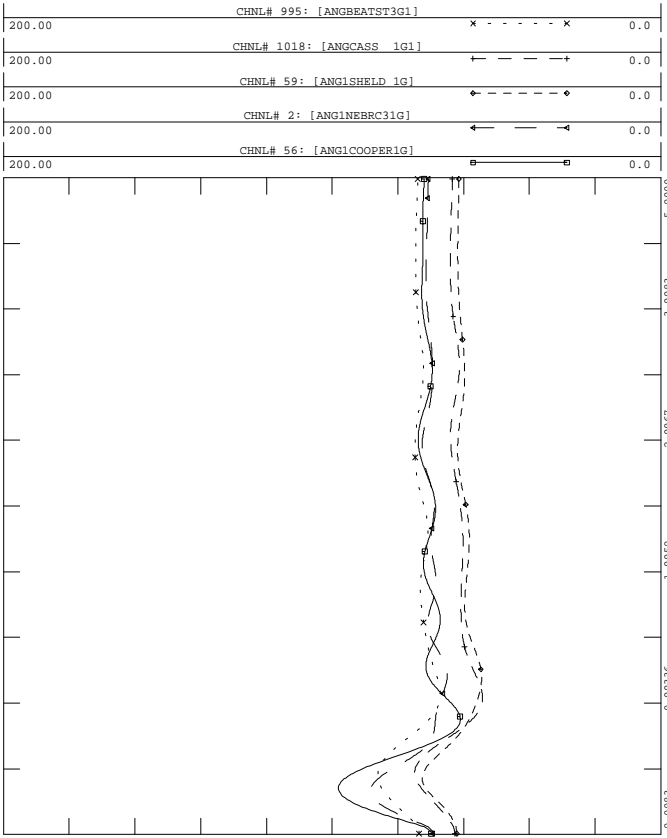
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ATCHISON 345 KV
 3PH FAULT AT COOPER ON COOPER - MOORE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C03.965.C02

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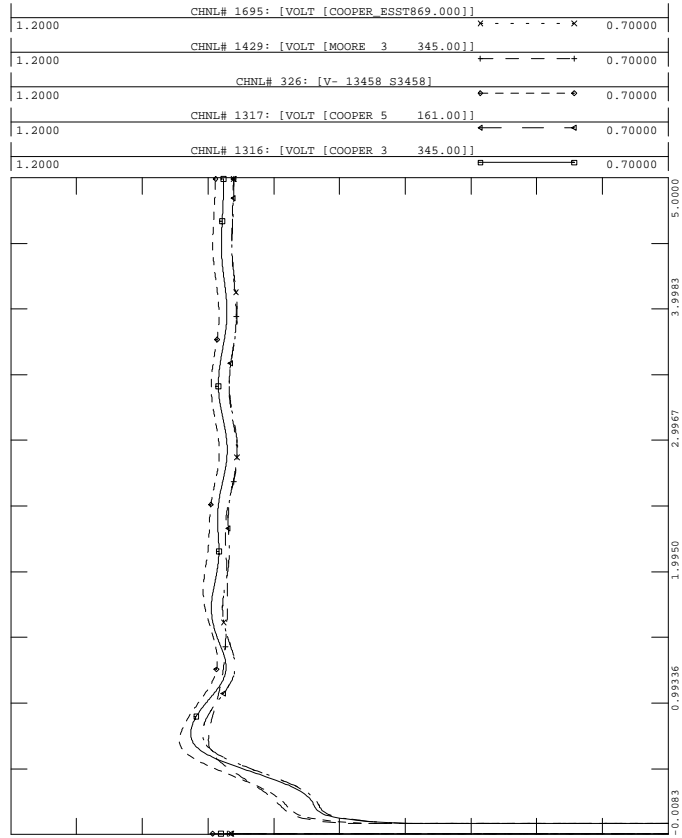
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ATCHISON 345 KV
 3PH FAULT AT COOPER ON COOPER - MOORE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C03.965.C02

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ATCHISON 345 KV
 3PH FAULT AT COOPER ON COOPER - MOORE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C03.965.C02

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C03.965.C06
PRIOR OUTAGE: COOPER - ATCHISON 345 KV
POWERFLOW CASE NAME: C03.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - FAIRPORT 345 KV LINE. CLEAR COOPER - FAIRPORT 345 KV LINE, FAIRPORT - ST. JOE 345 KV LINE, AND FAIRPORT 345/161 KV TRANSFORMER. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - FAIRPORT 345 KV LINE, FAIRPORT - ST. JOE 345 KV LINE, AND FAIRPORT 345/161 KV TRANSFORMER

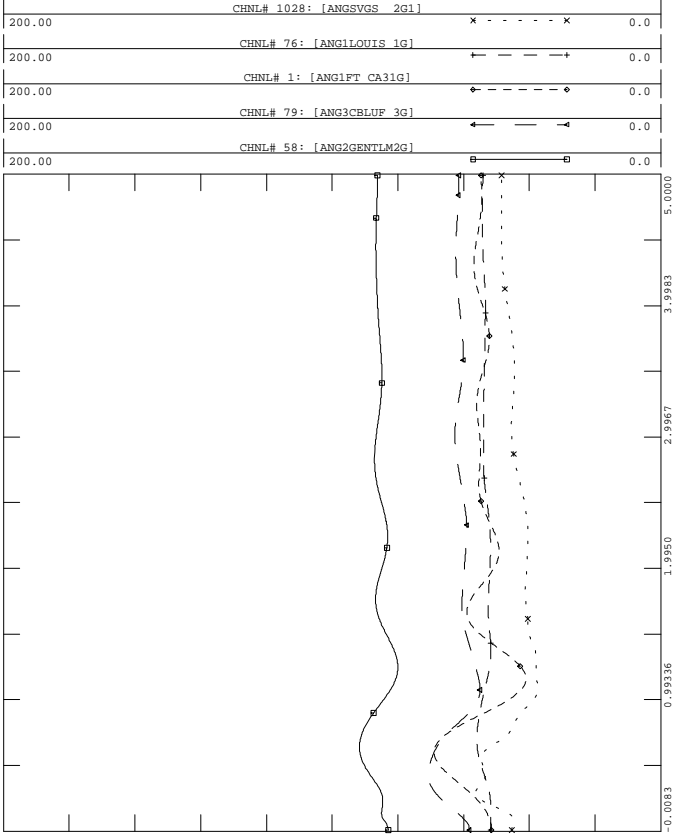
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



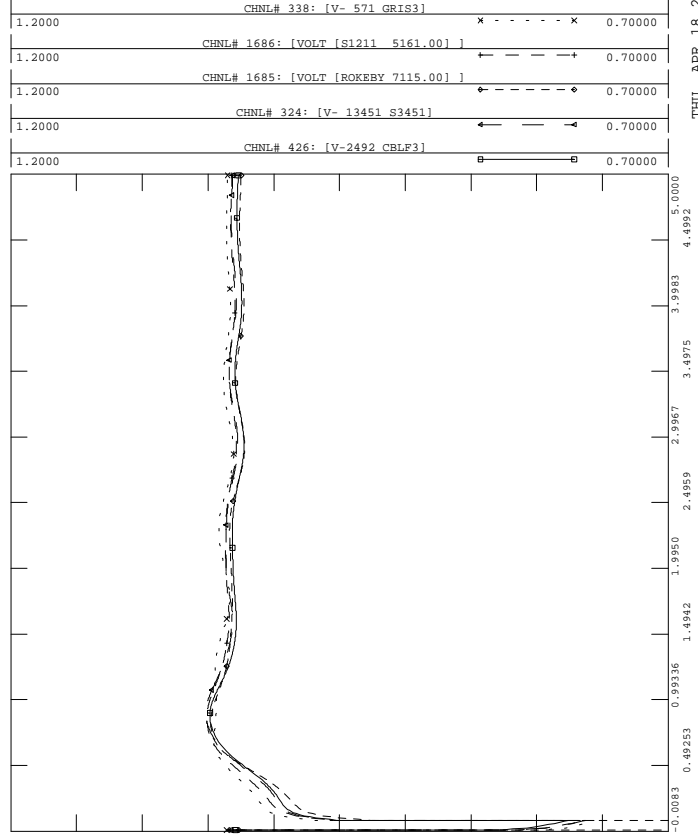
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ATCHISON 345 KV
 3PH FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C03.965.C06

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 REGIONAL ROTOR ANGLES



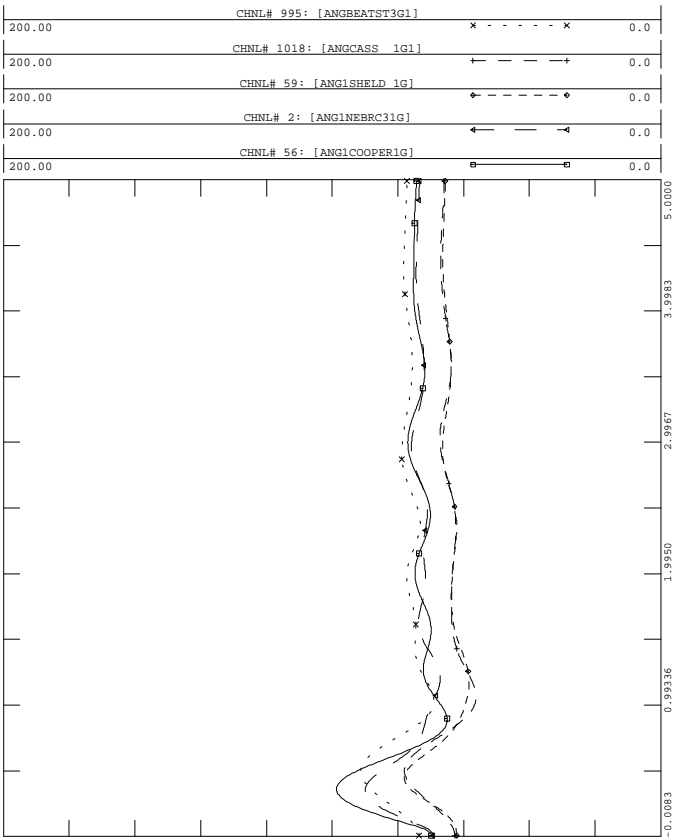
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ATCHISON 345 KV
 3PH FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C03.965.C06

THU, APR 18 2013 16:02
 REGIONAL VOLTAGES



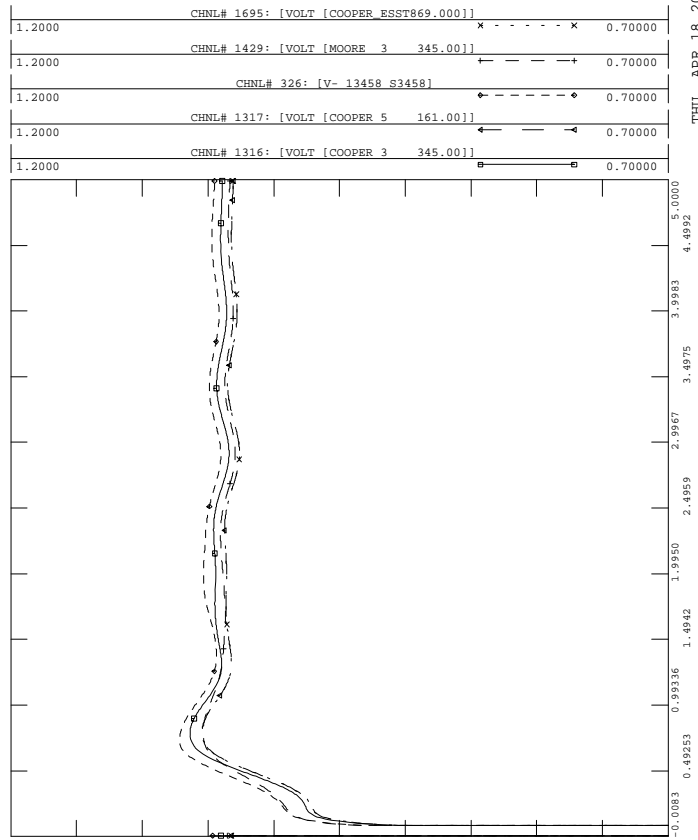
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ATCHISON 345 KV
 3PH FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C03.965.C06

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ATCHISON 345 KV
 3PH FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C03.965.C06

THU, APR 18 2013 16:02
 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C03.965.C11

PRIOR OUTAGE: COOPER - ATCHISON 345 KV

POWERFLOW CASE NAME: C03.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: NO FAULT. LOSS OF COOPER GENERATION.
LOAD REJECTION. NO RECLOSE. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	LOSS OF COOPER GENERATION

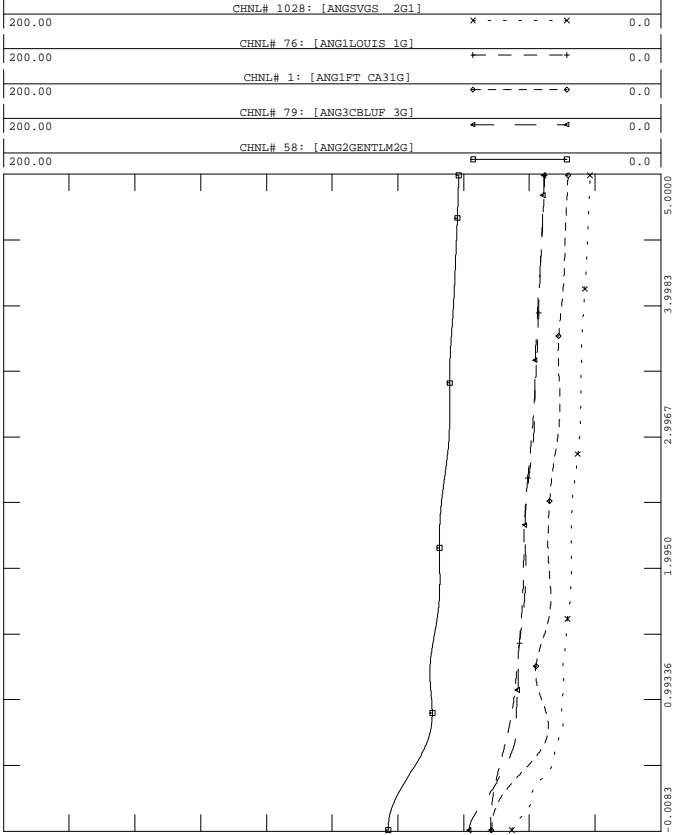
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



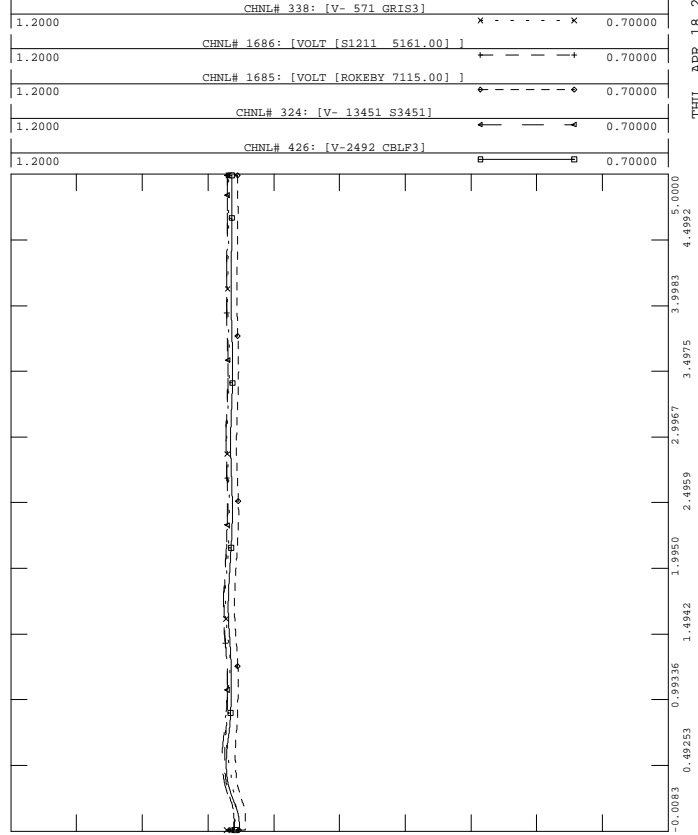
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ATCHISON 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C03.965.C11

THU, APR 18 2013 16:02
 REGIONAL ROTOR ANGLES



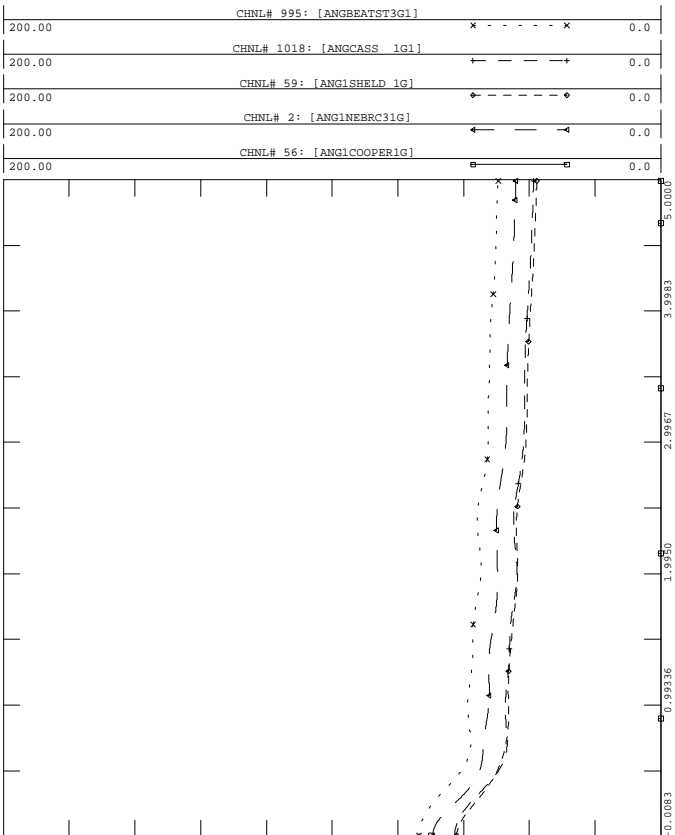
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ATCHISON 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C03.965.C11

THU, APR 18 2013 16:02
 REGIONAL VOLTAGES



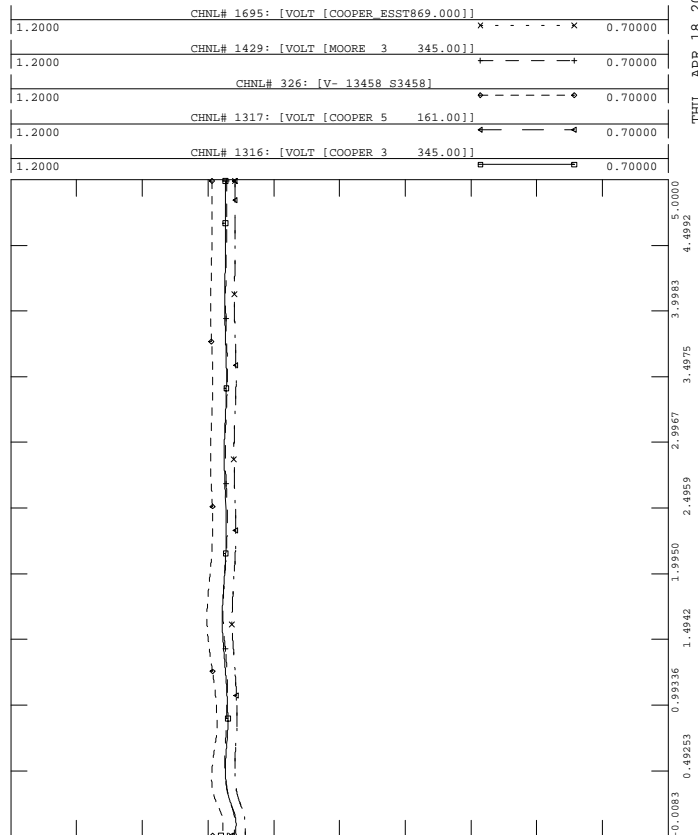
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ATCHISON 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C03.965.C11

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ATCHISON 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C03.965.C11

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C03.965.C14

PRIOR OUTAGE: COOPER - ATCHISON 345 KV

POWERFLOW CASE NAME: C03.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: SLG FAULT AT COOPER 345 KV ON COOPER - S3458 345 KV LINE. OPEN S3458 END OF COOPER - S3458 345 KV LINE. STUCK PCB 3316 AT COOPER. DELAYED CLEAR OF FAULT, COOPER - S3458 345 KV LINE, AND COOPER 345/161 KV T2. NO RECLOSING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	SLG FAULT (Y=620-j3470) AT COOPER 345 KV
0.0750	4.5	CLEAR S3458 END OF COOPER - S3458 345 KV LINE
0.2170	13.0	CLEAR FAULT AND COOPER END OF COOPER - S3458 345 KV LINE AND COOPER 345/161 KV T2

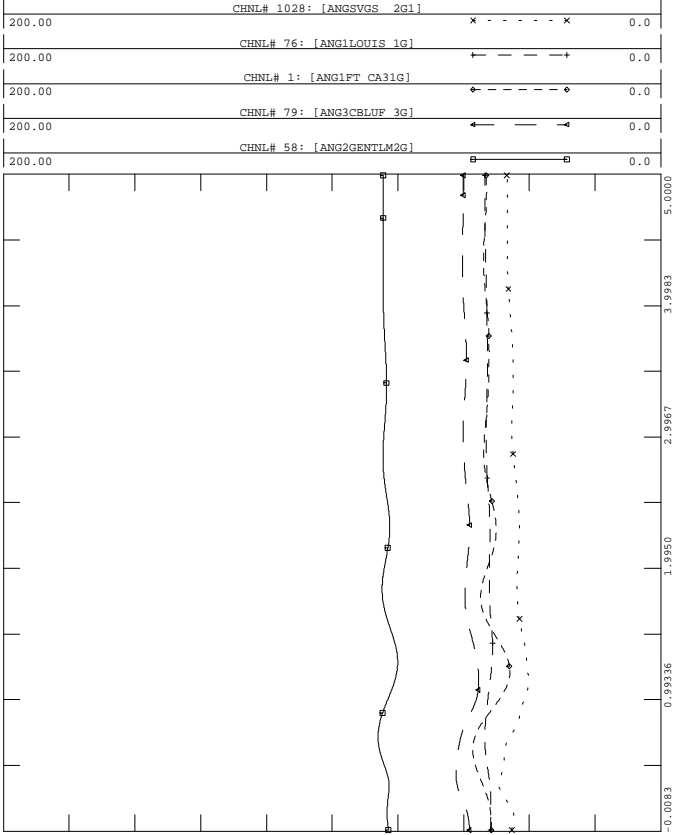
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



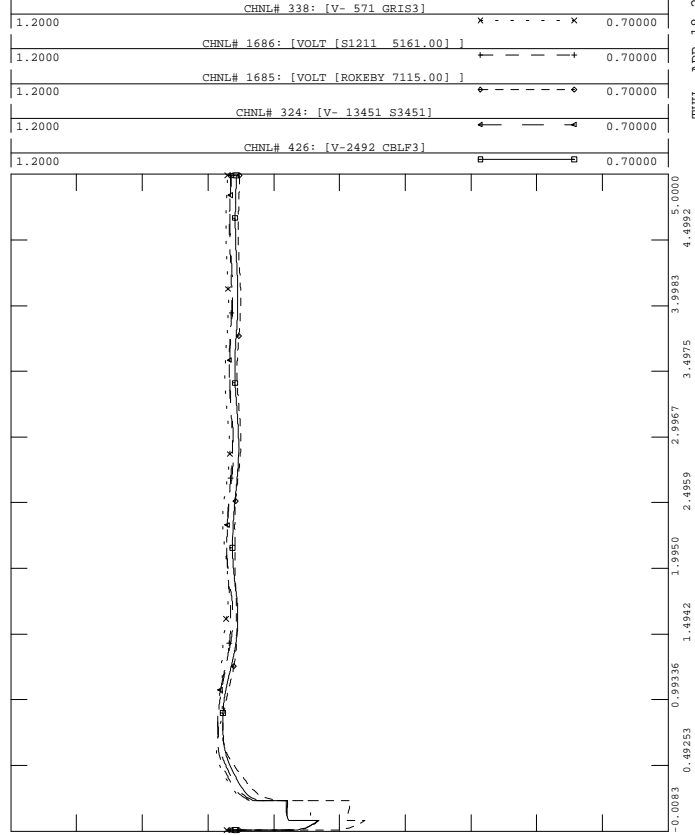
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ATCHISON 345 KV
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C03.965.C14

THU, APR 18 2013 16:02
 REGIONAL ROTOR ANGLES



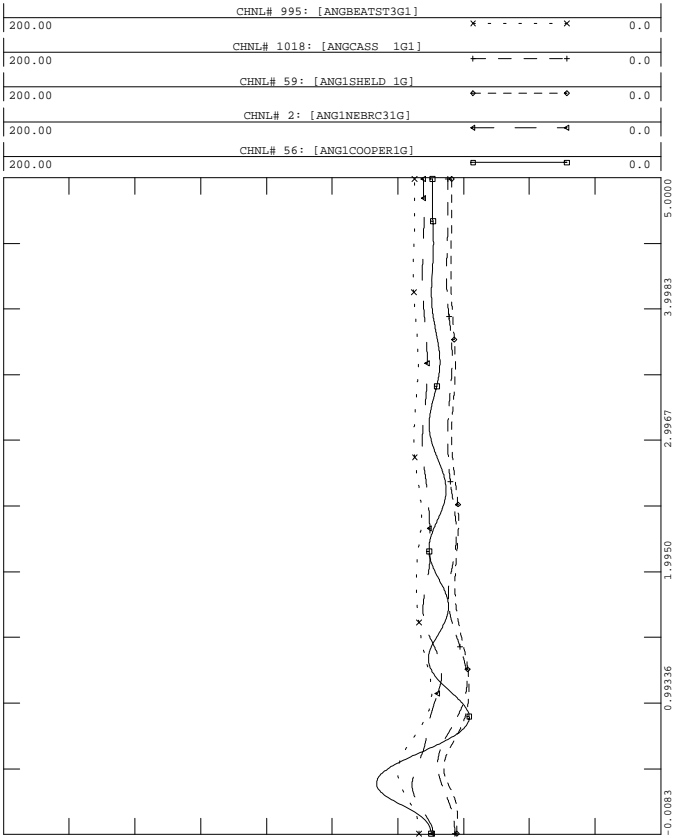
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ATCHISON 345 KV
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C03.965.C14

THU, APR 18 2013 16:02
 REGIONAL VOLTAGES



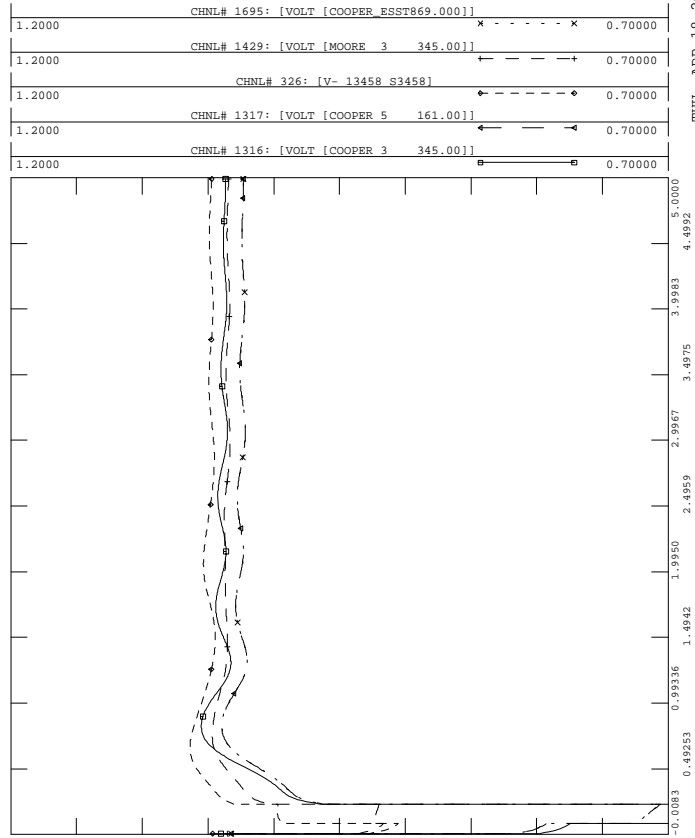
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ATCHISON 345 KV
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C03.965.C14

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ATCHISON 345 KV
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C03.965.C14

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C04.965.C02

PRIOR OUTAGE: COOPER - FAIRPORT 345 KV

POWERFLOW CASE NAME: C04.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1	= 105	Council Bluffs #1	= 46
Nebraska City #1	= 652	Sheldon #2	= 120	Council Bluffs #2	= 88
Nebraska City #2	= 682	Hallam CT	= 52	Council Bluffs #3	= 720
Cass County #1	= 161	BPS	= 250	Council Bluffs #4	= 790
Cass County #2	= 161	Iatan #1	= 706	Atchison Co Wind	= 144
Flat Water Wind	= 60	Iatan #2	= 965		

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - MOORE 345 KV LINE. CLEAR COOPER - MOORE 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - MOORE 345 KV LINE

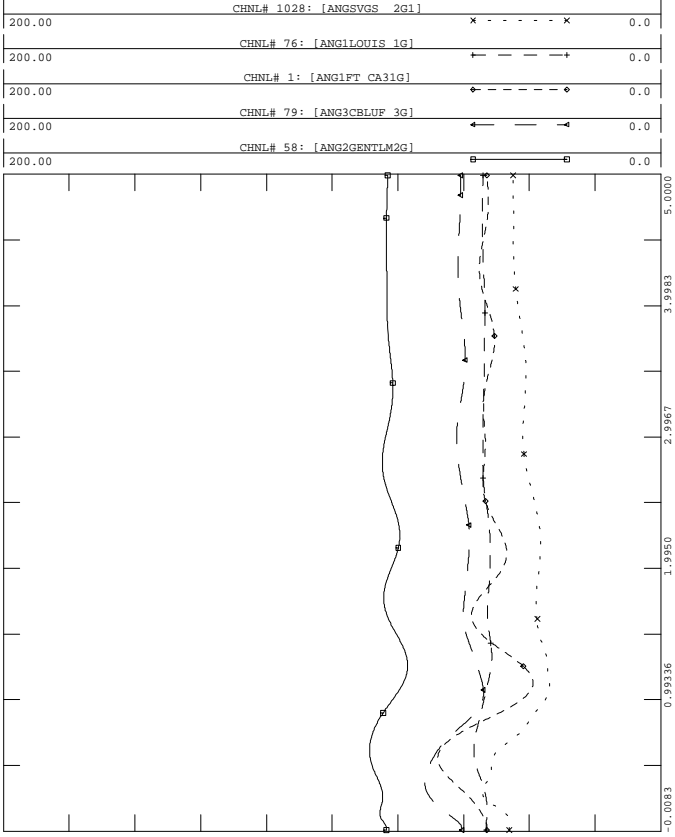
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



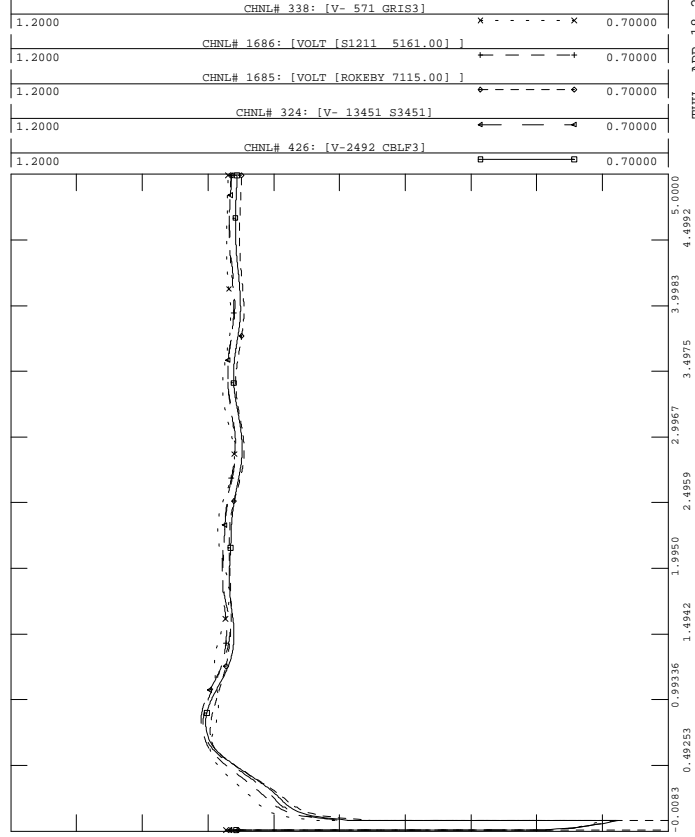
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 3PH FAULT AT COOPER ON COOPER - MOORE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C04.965.C02

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 REGIONAL ROTOR ANGLES



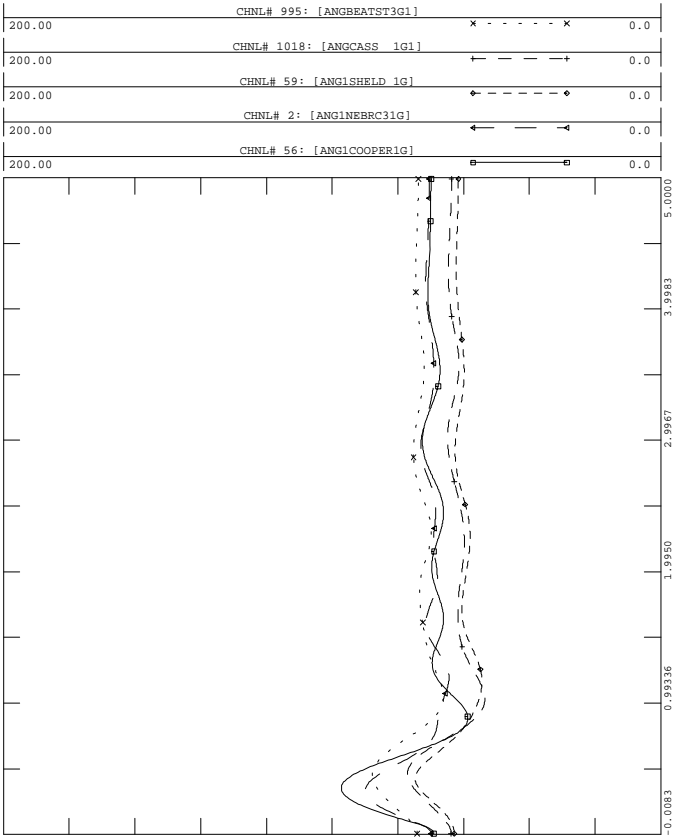
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 3PH FAULT AT COOPER ON COOPER - MOORE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C04.965.C02

THU, APR 18 2013 16:02
 REGIONAL VOLTAGES



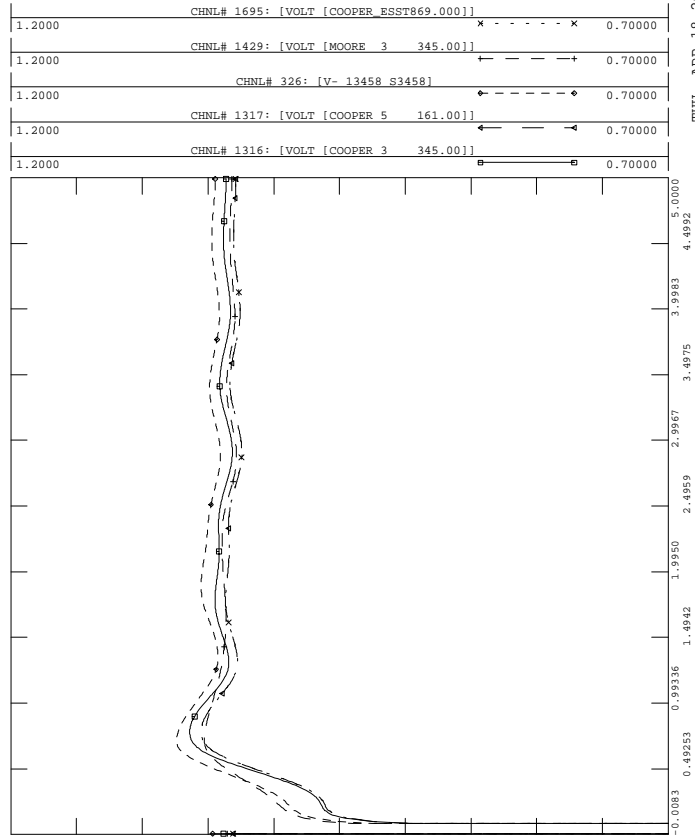
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 3PH FAULT AT COOPER ON COOPER - MOORE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C04.965.C02

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 3PH FAULT AT COOPER ON COOPER - MOORE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C04.965.C02

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C04.965.C07

PRIOR OUTAGE: COOPER - FAIRPORT 345 KV

POWERFLOW CASE NAME: C04.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - ST. JOE 345 KV LINE. CLEAR COOPER - ST. JOE 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - ST. JOE 345 KV LINE

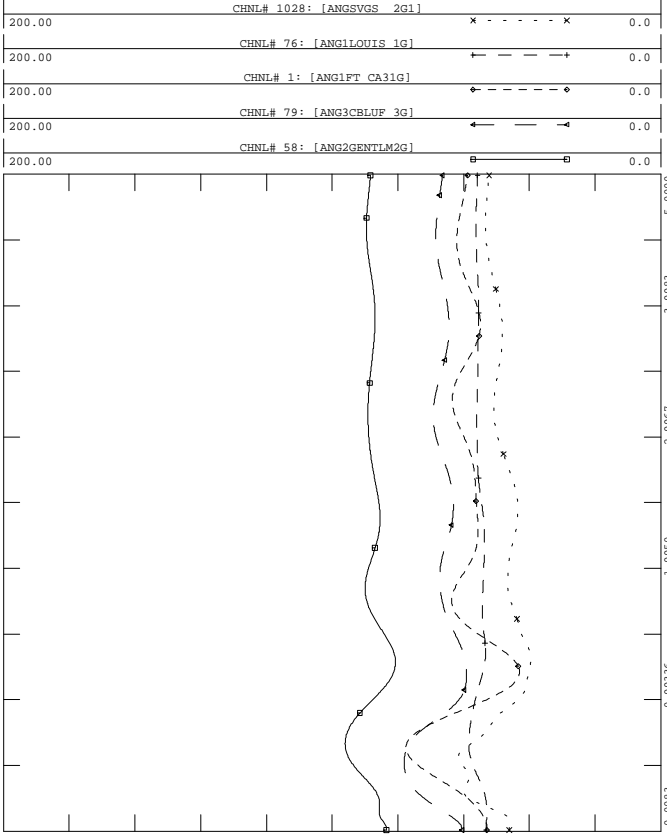
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



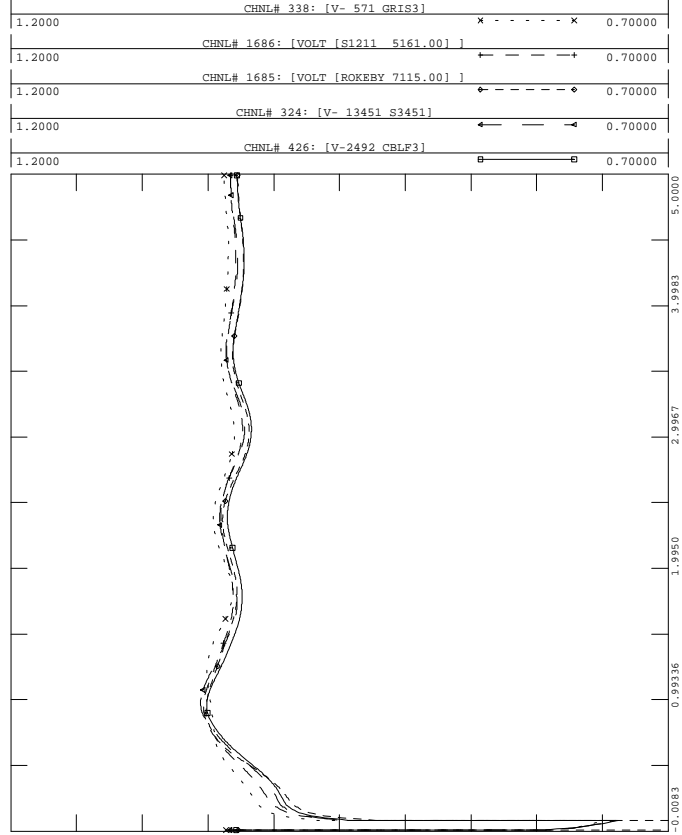
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 3PH FAULT AT COOPER ON COOPER - ST.JOE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C04.965.C07

THU, APR 18 2013 16:02
 REGIONAL ROTOR ANGLES



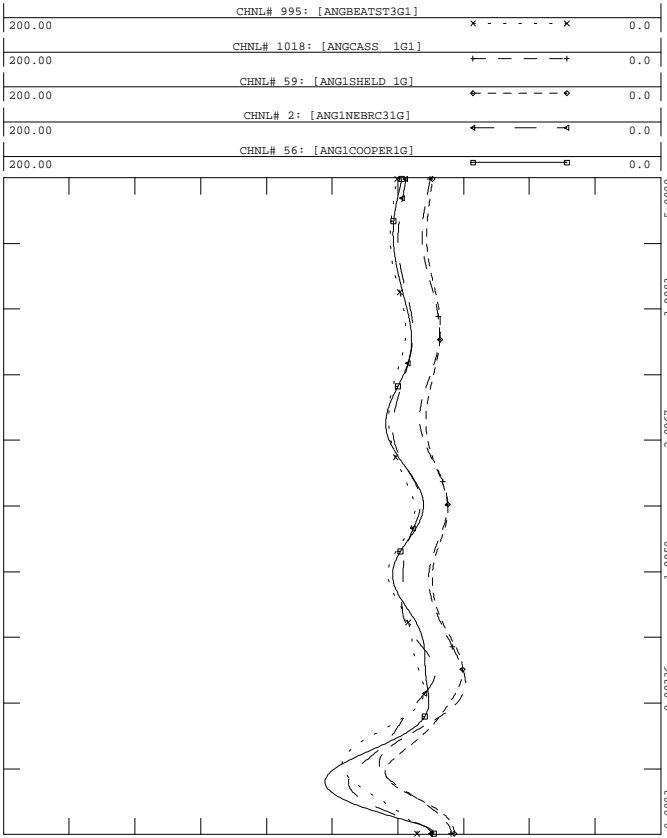
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 3PH FAULT AT COOPER ON COOPER - ST.JOE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C04.965.C07

THU, APR 18 2013 16:02
 REGIONAL VOLTAGES



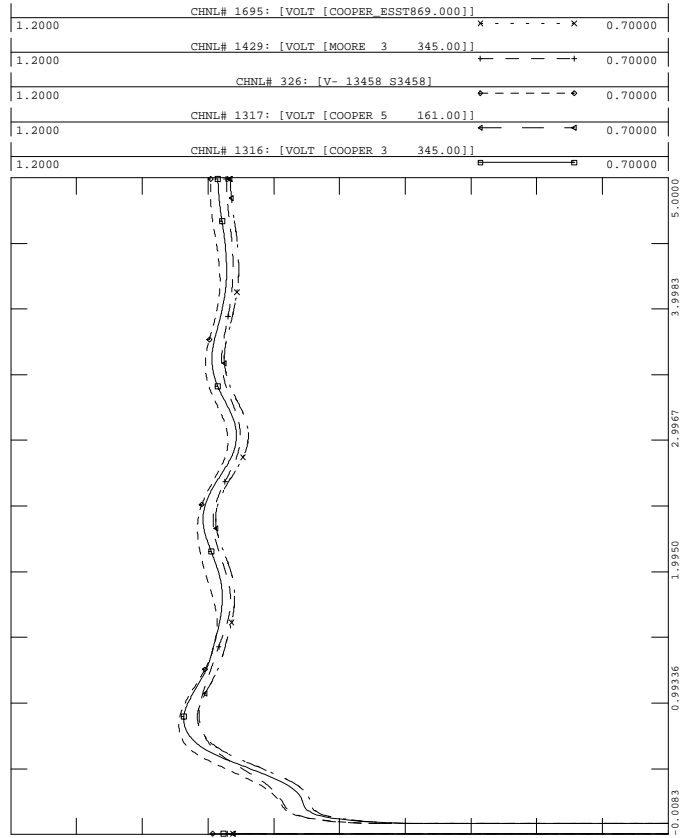
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 3PH FAULT AT COOPER ON COOPER - ST.JOE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C04.965.C07

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 3PH FAULT AT COOPER ON COOPER - ST.JOE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C04.965.C07

THU, APR 18 2013 16:02
 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C04.965.C11

PRIOR OUTAGE: COOPER - FAIRPORT 345 KV

POWERFLOW CASE NAME: C04.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: NO FAULT. LOSS OF COOPER GENERATION.
LOAD REJECTION. NO RECLOSE. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	LOSS OF COOPER GENERATION

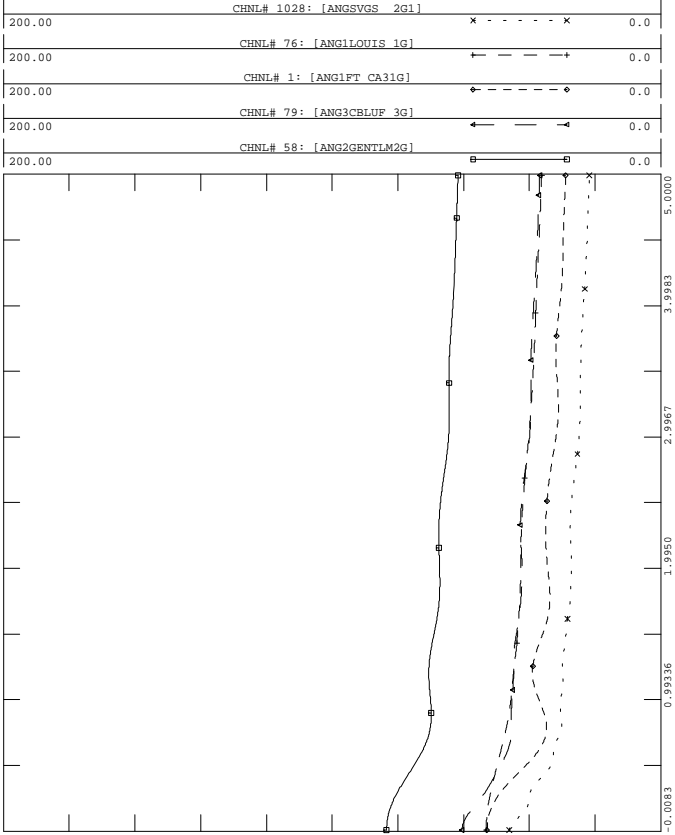
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



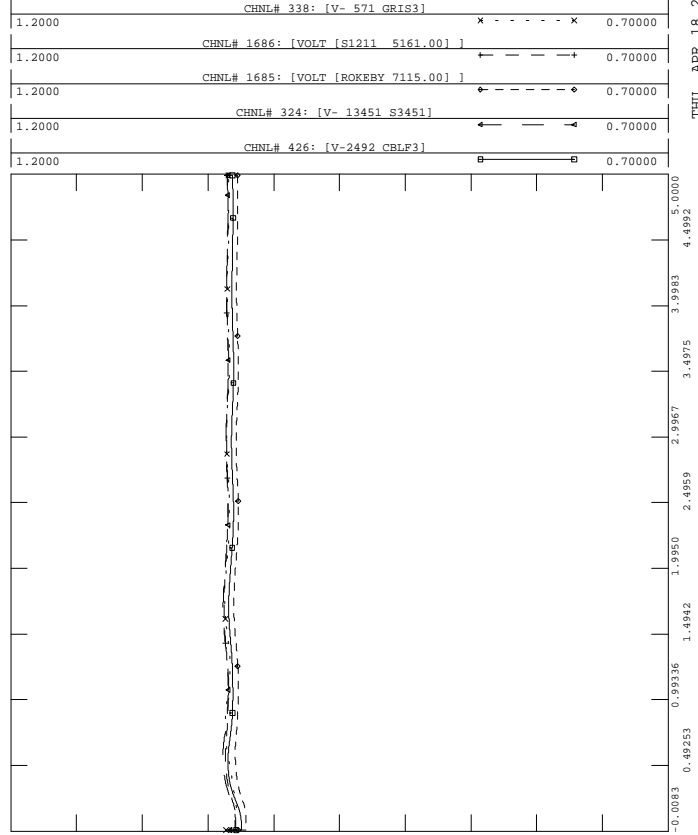
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C04.965.C11

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 REGIONAL ROTOR ANGLES



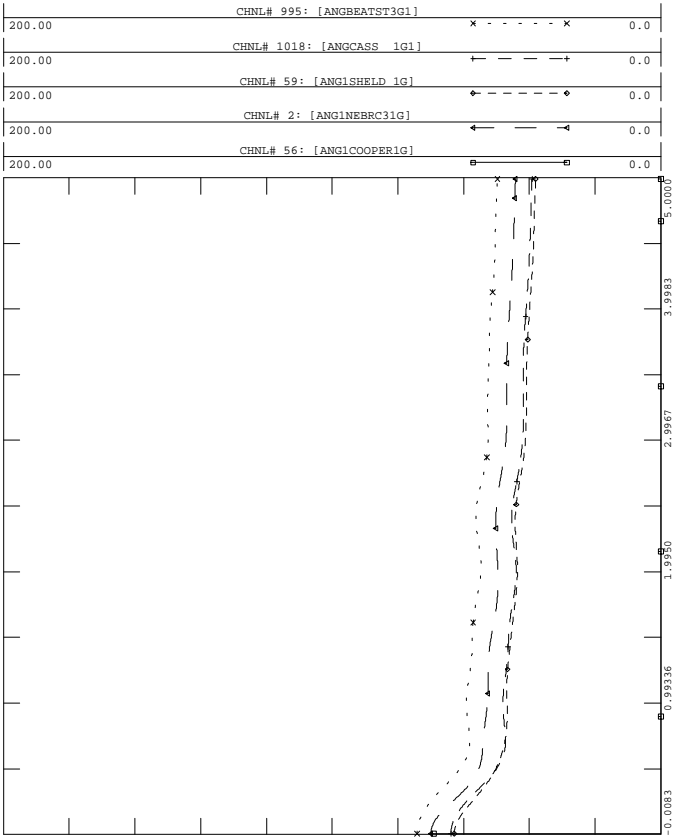
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C04.965.C11

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 REGIONAL VOLTAGES



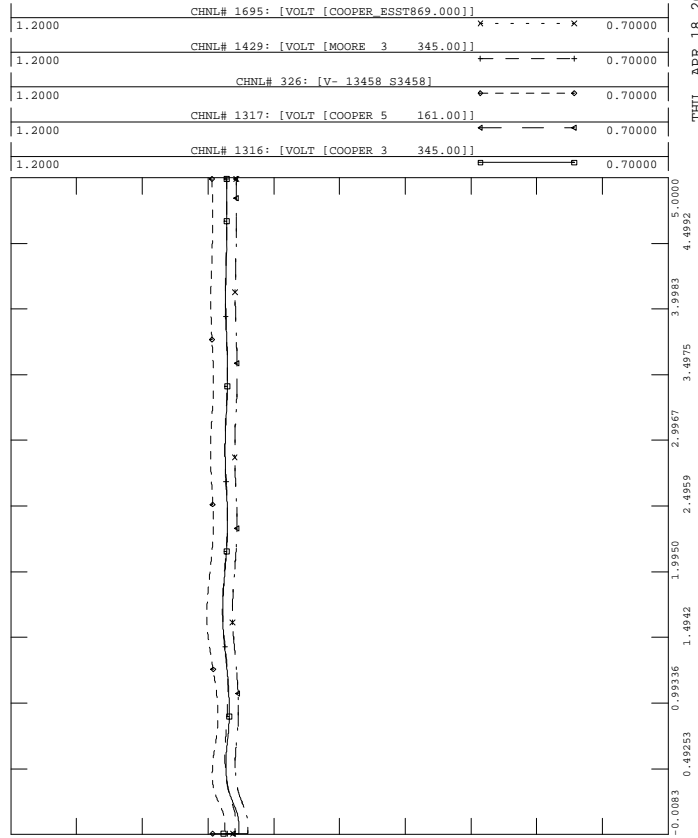
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C04.965.C11

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C04.965.C11

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C04.965.C14

PRIOR OUTAGE: COOPER - FAIRPORT 345 KV

POWERFLOW CASE NAME: C04.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: SLG FAULT AT COOPER 345 KV ON COOPER - S3458 345 KV LINE. OPEN S3458 END OF COOPER - S3458 345 KV LINE. STUCK PCB 3316 AT COOPER. DELAYED CLEAR OF FAULT, COOPER - S3458 345 KV LINE, AND COOPER 345/161 KV T2. NO RECLOSING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	SLG FAULT (Y=620-j3470) AT COOPER 345 KV
0.0750	4.5	CLEAR S3458 END OF COOPER - S3458 345 KV LINE
0.2170	13.0	CLEAR FAULT AND COOPER END OF COOPER - S3458 345 KV LINE AND COOPER 345/161 KV T2

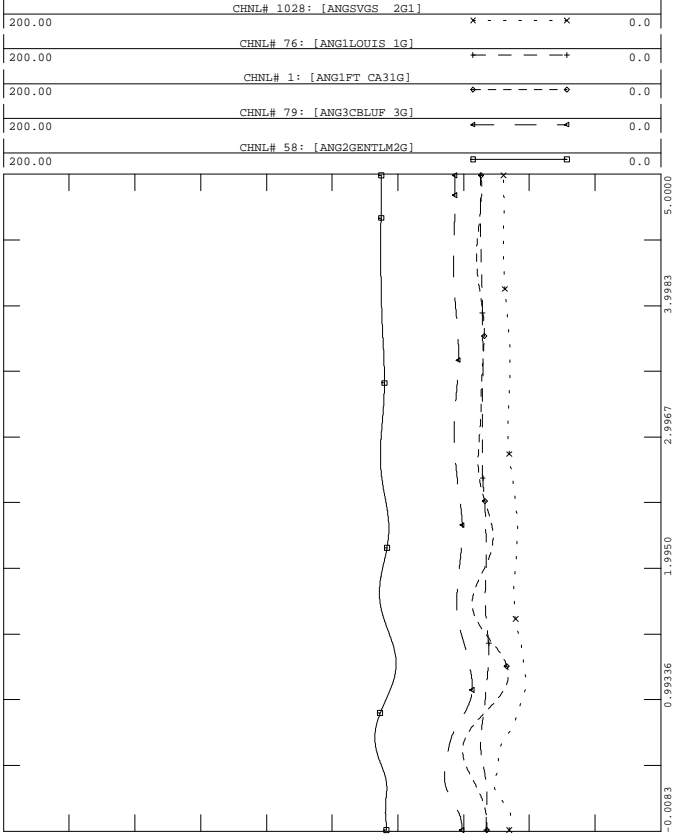
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



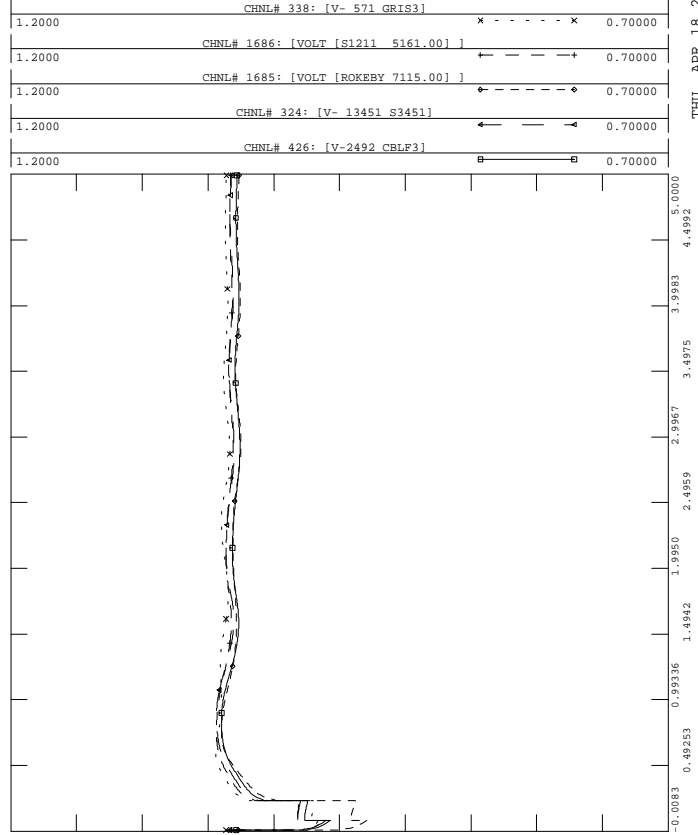
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C04.965.C14

THU, APR 18 2013 16:02
 REGIONAL ROTOR ANGLES



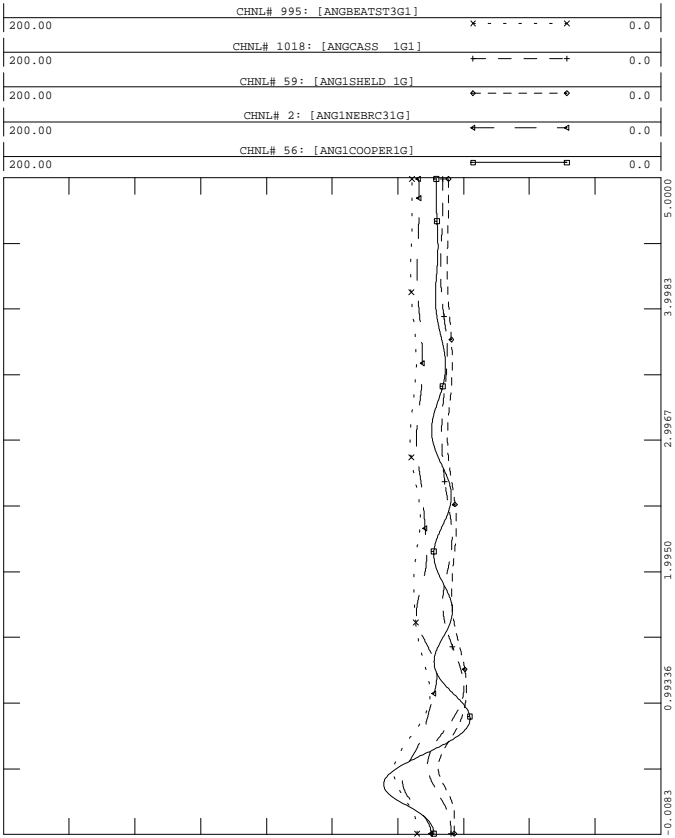
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C04.965.C14

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 REGIONAL VOLTAGES



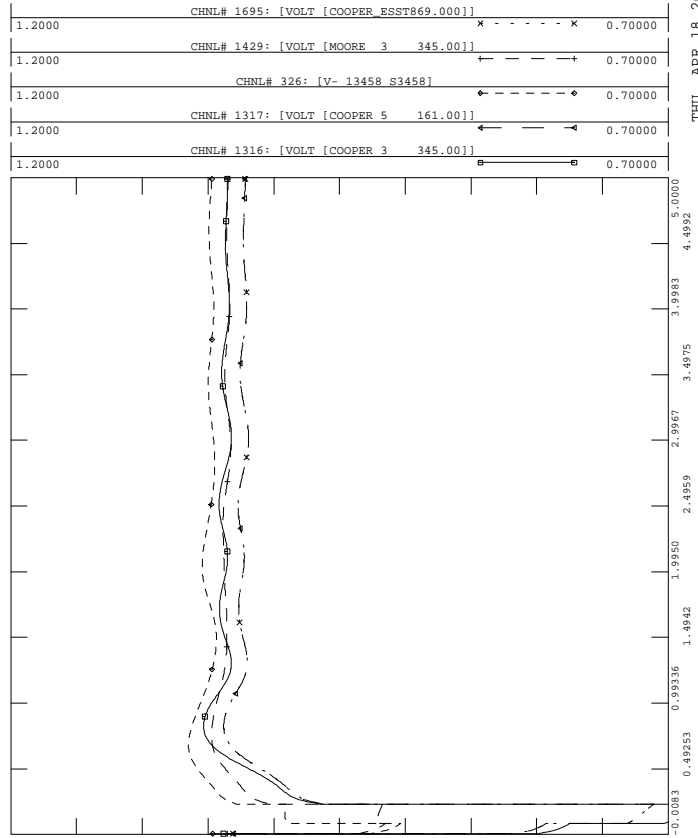
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C04.965.C14

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C04.965.C14

THU, APR 18 2013 16:02
 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C04.965.C16

PRIOR OUTAGE: COOPER - FAIRPORT 345 KV

POWERFLOW CASE NAME: C04.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: SLG FAULT AT COOPER 345 KV ON COOPER - ATCHISON 345 KV LINE. OPEN ATCHISON END OF COOPER - ATCHISON 345 KV LINE. STUCK PCB 3304 AT COOPER. DELAYED CLEAR OF FAULT, COOPER - ATCHISON 345 KV LINE, AND COOPER - ST. JOE 345 KV. NO RECLOSING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	SLG FAULT (Y=620-j3470) AT COOPER 345 KV
0.0750	4.5	CLEAR ATCHISON END OF COOPER - ATCHISON 345 KV
0.2250	13.5	CLEAR FAULT AND COOPER END OF COOPER - ATCHISON 345 KV LINE AND COOPER - ST. JOE 345 KV LINE

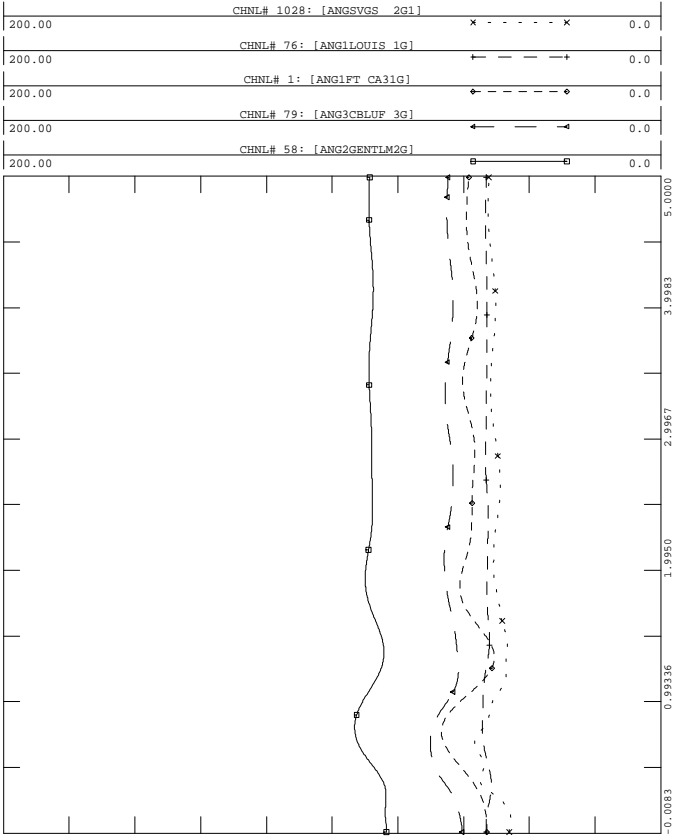
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



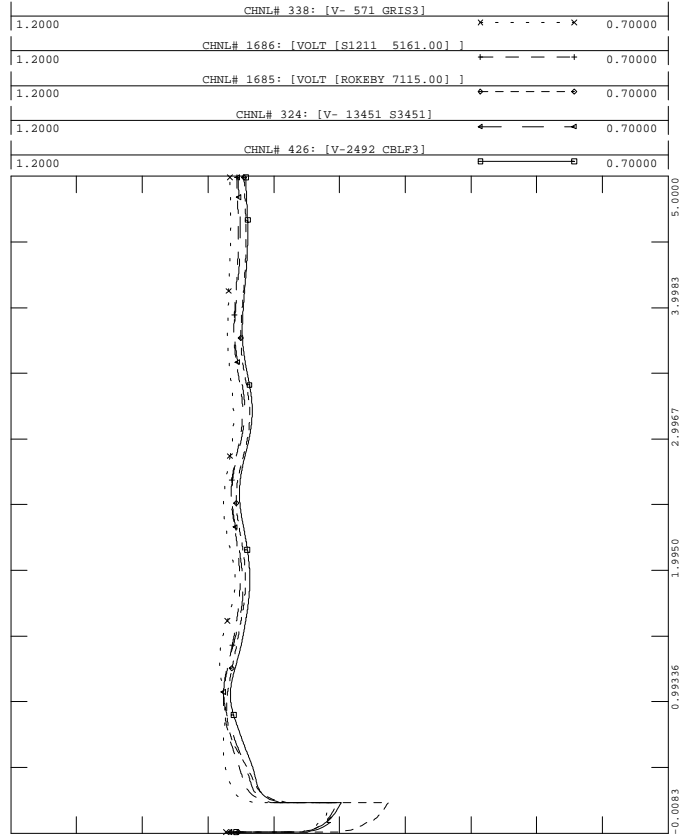
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 SLG FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 STUCK PCB 3304; TRIP COOPER - ST.JOE 345 KV; NO RECLOSING
 FILE: chan/CH.C04.965.C16

THU, APR 25 2013 12:02
 REGIONAL ROTOR ANGLES



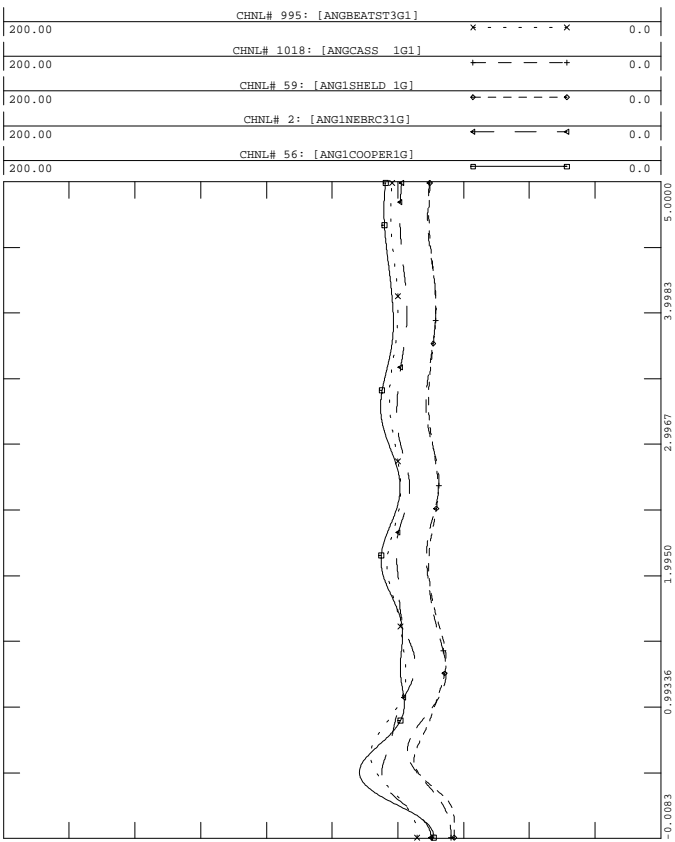
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 SLG FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 STUCK PCB 3304; TRIP COOPER - ST.JOE 345 KV; NO RECLOSING
 FILE: chan/CH.C04.965.C16

THU, APR 25 2013 12:02
 REGIONAL VOLTAGES



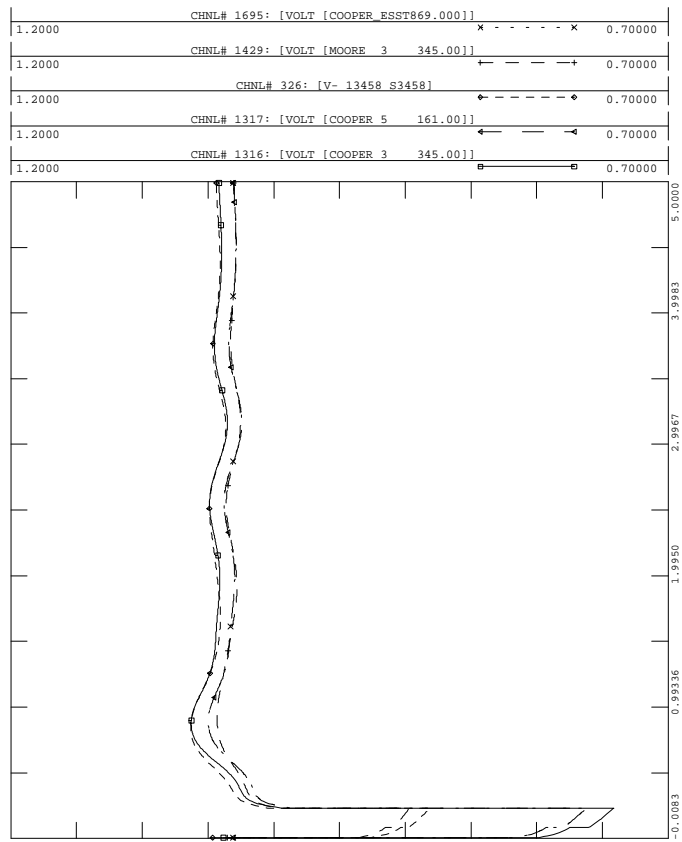
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 SLG FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 STUCK PCB 3304; TRIP COOPER - ST.JOE 345 KV; NO RECLOSING
 FILE: chan/CH.C04.965.C16

THU, APR 25 2013 12:02
 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - FAIRPORT 345 KV
 SLG FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 STUCK PCB 3304; TRIP COOPER - ST.JOE 345 KV; NO RECLOSING
 FILE: chan/CH.C04.965.C16

THU, APR 25 2013 12:02
 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C05.965.C01

PRIOR OUTAGE: COOPER - ST JOE 345 KV

POWERFLOW CASE NAME: C05.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - S3458 345 KV LINE. CLEAR COOPER - S3458 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - S3458 345 KV LINE

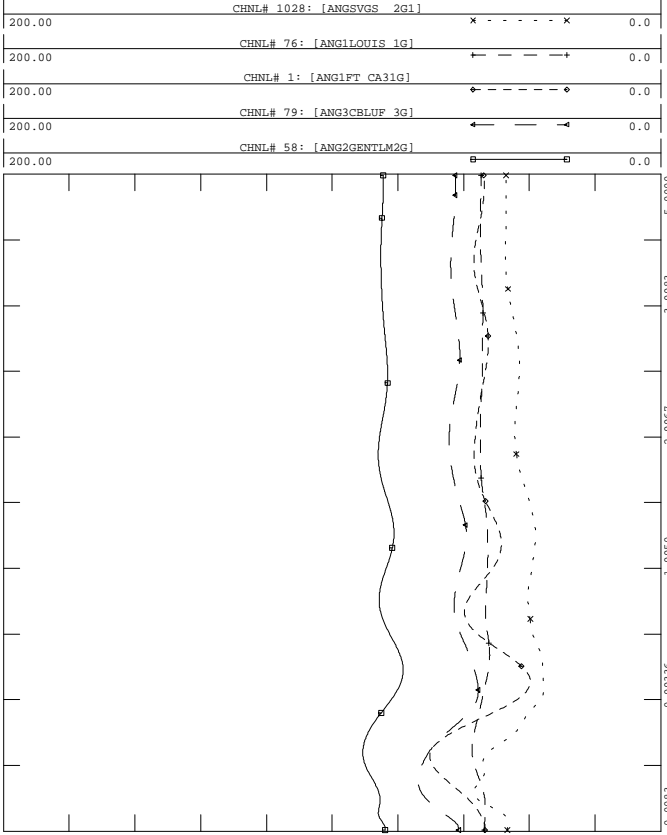
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



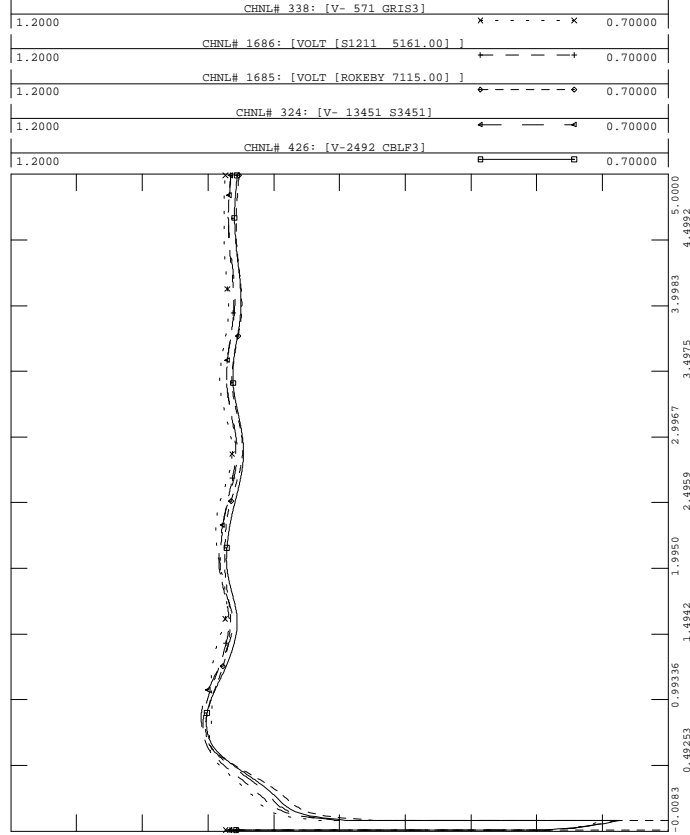
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ST JOE 345 KV
 3PH FAULT AT COOPER ON COOPER - S3458 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C05.965.C01

THU, APR 18 2013 16:02
 REGIONAL ROTOR ANGLES



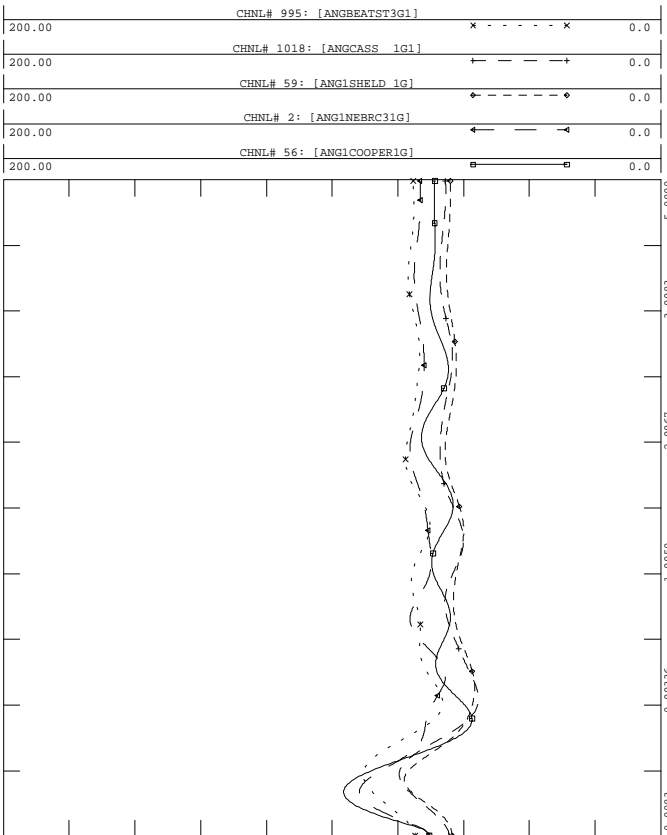
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ST JOE 345 KV
 3PH FAULT AT COOPER ON COOPER - S3458 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C05.965.C01

THU, APR 18 2013 16:02
 REGIONAL VOLTAGES



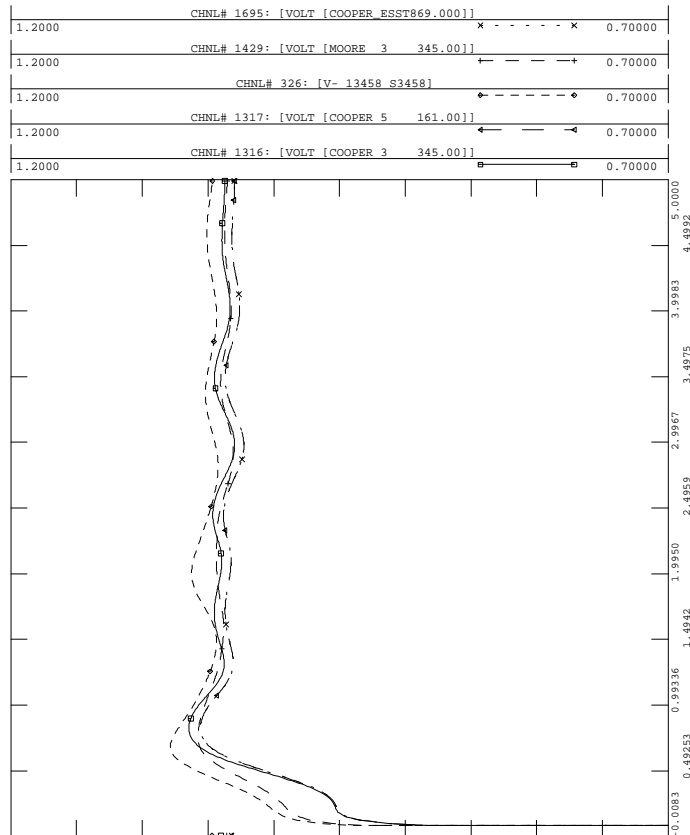
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ST JOE 345 KV
 3PH FAULT AT COOPER ON COOPER - S3458 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C05.965.C01

THU, APR 18 2013 16:02
 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ST JOE 345 KV
 3PH FAULT AT COOPER ON COOPER - S3458 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C05.965.C01

THU, APR 18 2013 16:02
 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C05.965.C03

PRIOR OUTAGE: COOPER - ST JOE 345 KV

POWERFLOW CASE NAME: C05.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - ATCHISON 345 KV LINE. CLEAR COOPER - BOONEVILLE 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - ATCHISON 345 KV LINE

REMARKS:

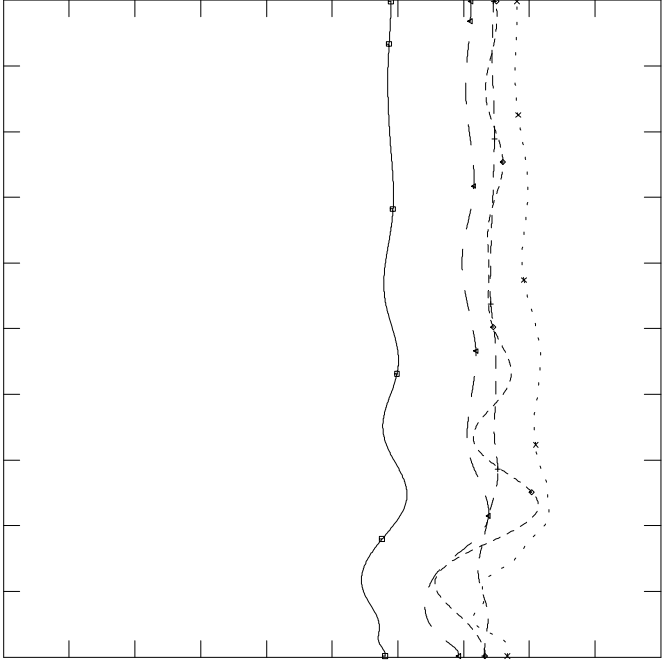
STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ST JOE 345 KV
 3PH FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C05.965.C03

THU, APR 18 2013 16:02
 REGIONAL ROTOR ANGLES

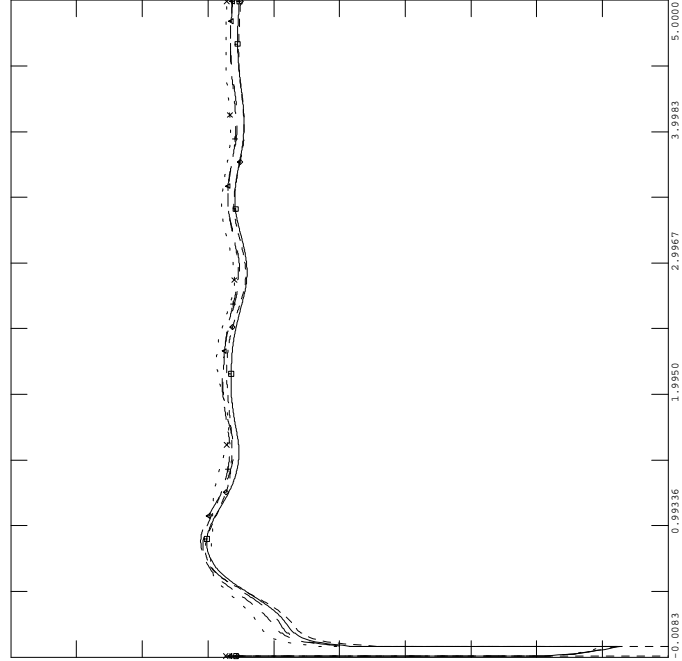
200.00	CHNL# 1028: [ANGSVGS 2G1]	x - - - - x	0.0
200.00	CHNL# 76: [ANGLLOUIS 1G]	↑ - - - - ↓	0.0
200.00	CHNL# 1: [ANGLFT CA31G]	◆ - - - - ◆	0.0
200.00	CHNL# 79: [ANG3CBLUF 3G]	← - - - - →	0.0
200.00	CHNL# 58: [ANG2GENTLM2G]	□ - - - - □	0.0



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ST JOE 345 KV
 3PH FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C05.965.C03

THU, APR 18 2013 16:02
 REGIONAL VOLTAGES

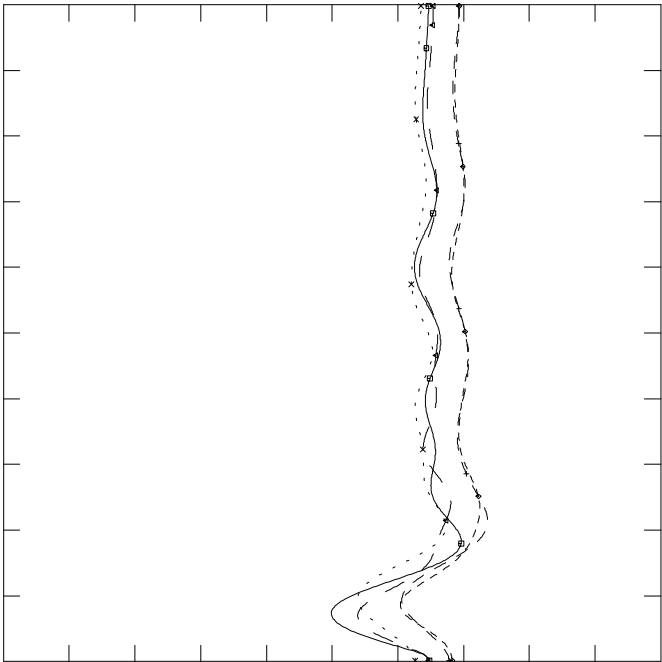
1.2000	CHNL# 338: [V- 571 GRIS3]	x - - - - x	0.70000
1.2000	CHNL# 1686: [VOLT [S1211 5161.00]]	↑ - - - - ↓	0.70000
1.2000	CHNL# 1685: [VOLT [ROKEYB 7115.00]]	◆ - - - - ◆	0.70000
1.2000	CHNL# 324: [V- 13451 S3451]	← - - - - →	0.70000
1.2000	CHNL# 426: [V-2492 CBLF3]	□ - - - - □	0.70000



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ST JOE 345 KV
 3PH FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C05.965.C03

THU, APR 18 2013 16:02
 LOCAL ROTOR ANGLES

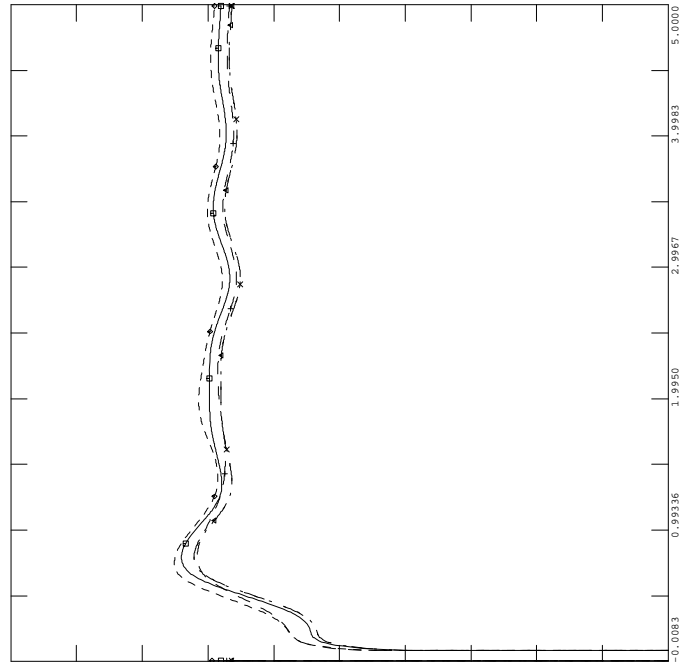
200.00	CHNL# 995: [ANGBEATST3G1]	x - - - - x	0.0
200.00	CHNL# 1018: [ANGCASS 1G1]	↑ - - - - ↓	0.0
200.00	CHNL# 59: [ANGSHELD 1G]	◆ - - - - ◆	0.0
200.00	CHNL# 2: [ANG1NEBRC31G]	← - - - - →	0.0
200.00	CHNL# 56: [ANGLCOOPER1G]	□ - - - - □	0.0



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ST JOE 345 KV
 3PH FAULT AT COOPER ON COOPER - ATCHISON 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C05.965.C03

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1.2000	CHNL# 1695: [VOLT [COOPER_ESST869.000]]	x - - - - x	0.70000
1.2000	CHNL# 1429: [VOLT [MOORE 3 345.00]]	↑ - - - - ↓	0.70000
1.2000	CHNL# 326: [V- 13458 S3458]	◆ - - - - ◆	0.70000
1.2000	CHNL# 1317: [VOLT [COOPER 5 161.00]]	← - - - - →	0.70000
1.2000	CHNL# 1316: [VOLT [COOPER 3 345.00]]	□ - - - - □	0.70000



Disturbance Description

STABILITY CASE NAME: C05.965.C11

PRIOR OUTAGE: COOPER - ST JOE 345 KV

POWERFLOW CASE NAME: C05.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: NO FAULT. LOSS OF COOPER GENERATION.
LOAD REJECTION. NO RECLOSE. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	LOSS OF COOPER GENERATION

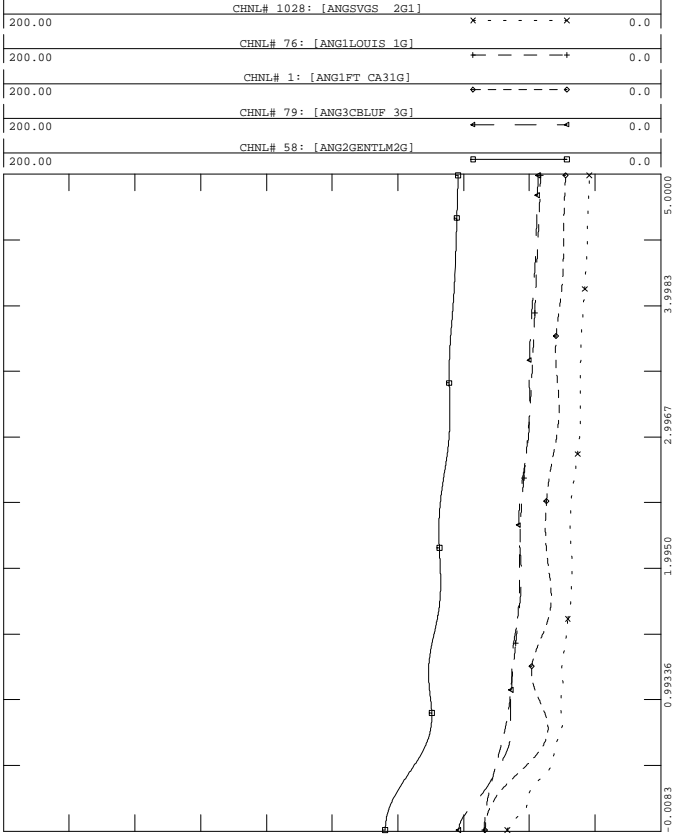
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



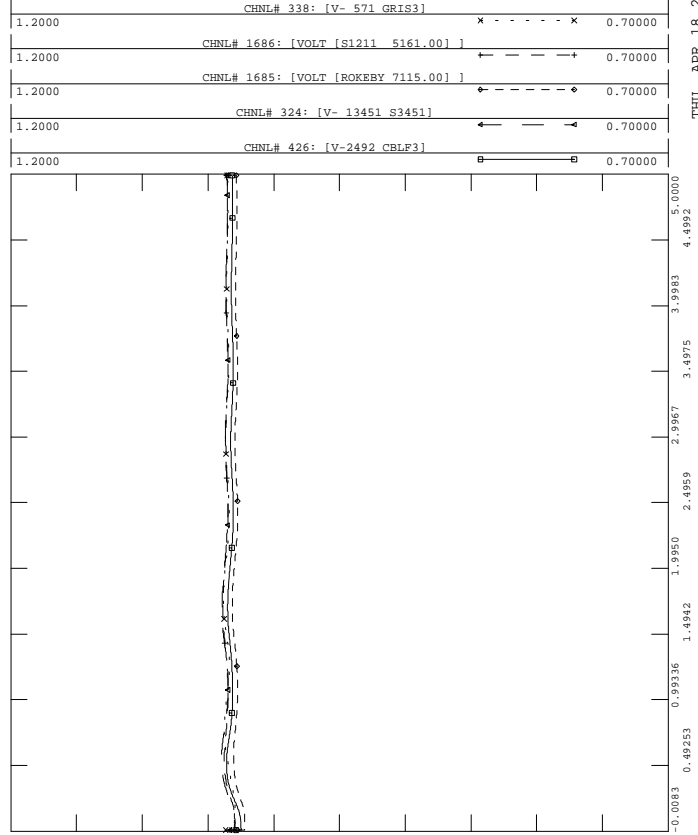
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ST JOE 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C05.965.C11

THU, APR 18 2013 16:02
 REGIONAL ROTOR ANGLES



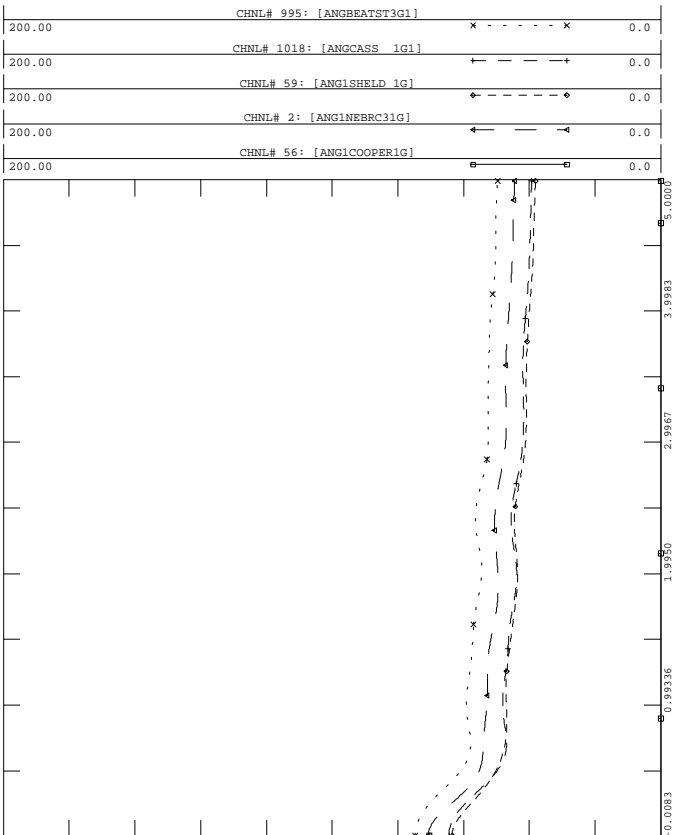
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ST JOE 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C05.965.C11

THU, APR 18 2013 16:02
 REGIONAL VOLTAGES



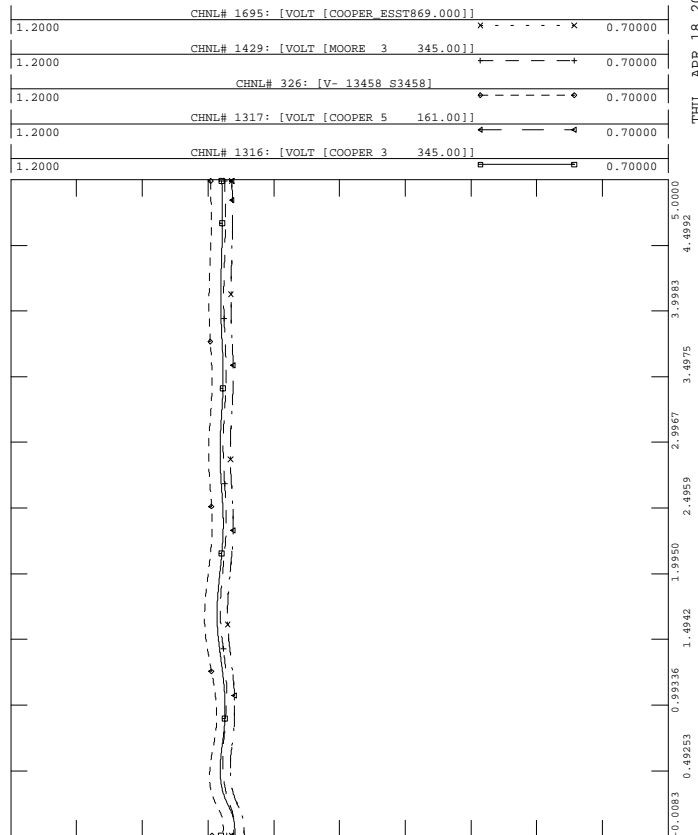
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ST JOE 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C05.965.C11

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ST JOE 345 KV
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C05.965.C11

THU, APR 18 2013 16:02
 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C05.965.C15

PRIOR OUTAGE: COOPER - ST JOE 345 KV

POWERFLOW CASE NAME: C05.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: SLG FAULT AT COOPER 345 KV ON COOPER - FAIRPORT - ST. JOE 345 KV LINE. OPEN ST JOE END OF COOPER - FAIRPORT - ST JOE 345 KV LINE. STUCK PCB 3322 AT COOPER. DELAYED CLEAR OF FAULT, COOPER - FAIRPORT - ST JOE 345 KV LINE, AND COOPER 345/161 KV T5. NO RECLOSING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	SLG FAULT (Y=620-j3470) AT COOPER 345 KV
0.0750	4.5	CLEAR ST JOE END OF COOPER - FAIRPORT - ST JOE 345 KV
0.2170	13.0	CLEAR FAULT AND COOPER END OF COOPER - FAIRPORT - ST JOE 345 KV LINE AND COOPER 345/161 KV T5

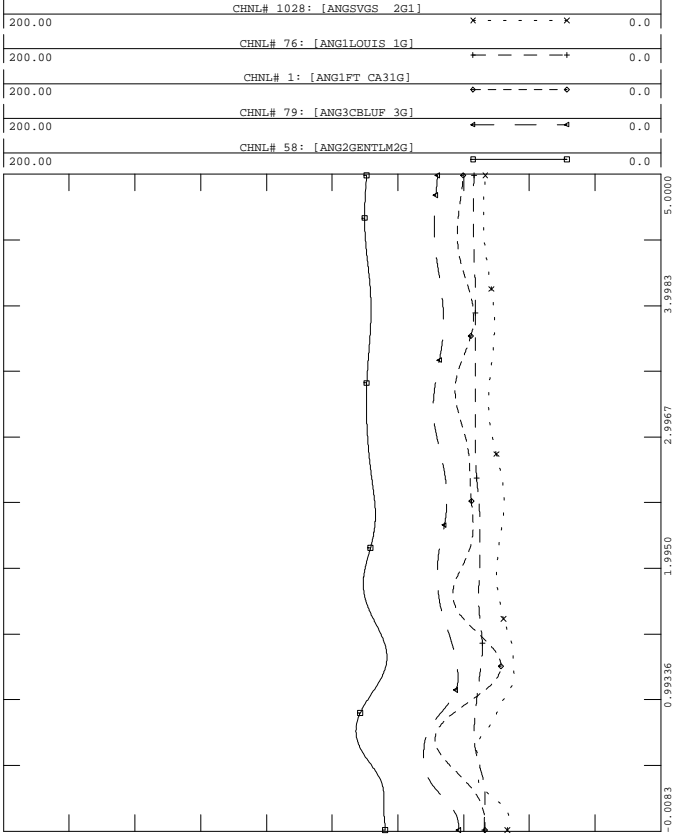
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



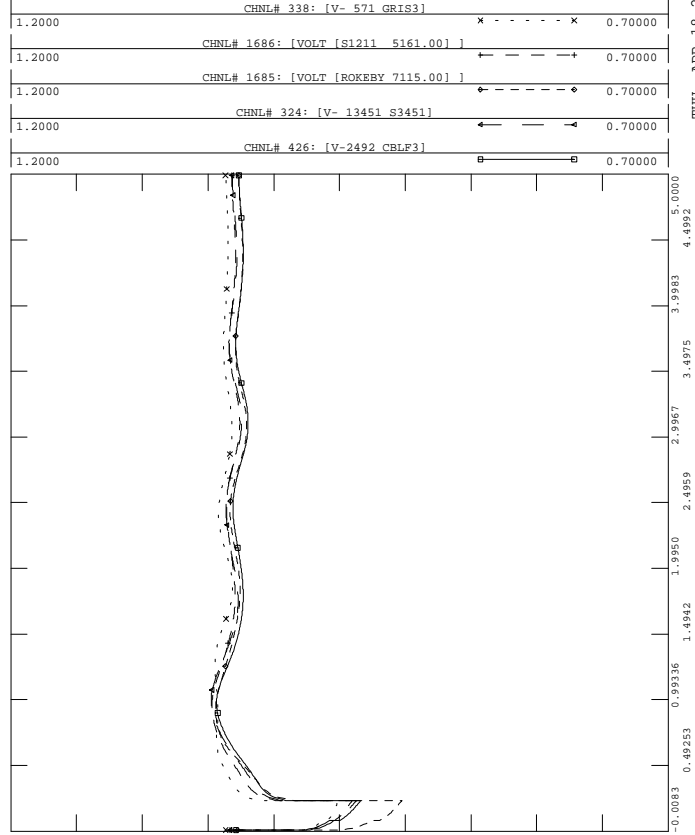
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ST JOE 345 KV
 SLG FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 STUCK PCB 3322; TRIP COOPER T5; NO RECLOSING
 FILE: chan/CH.C05.965.C15

THU, APR 18 2013 16:02
 REGIONAL ROTOR ANGLES



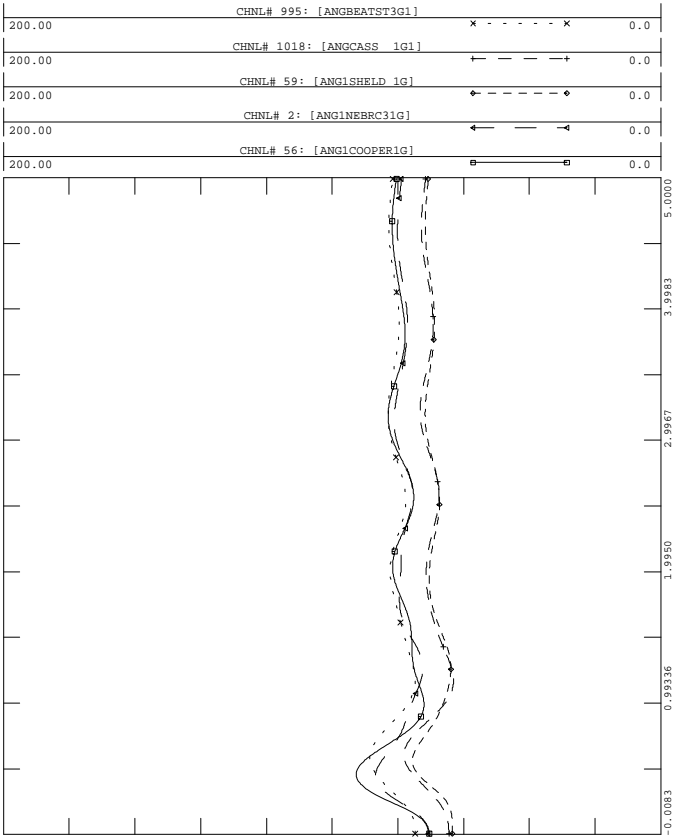
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ST JOE 345 KV
 SLG FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 STUCK PCB 3322; TRIP COOPER T5; NO RECLOSING
 FILE: chan/CH.C05.965.C15

THU, APR 18 2013 16:02
 REGIONAL VOLTAGES



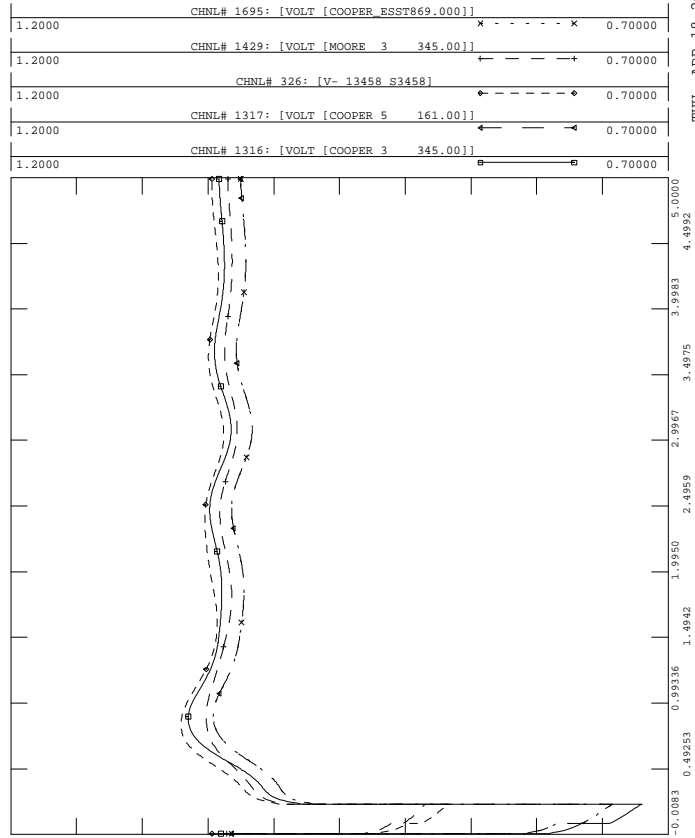
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ST JOE 345 KV
 SLG FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 STUCK PCB 3322; TRIP COOPER T5; NO RECLOSING
 FILE: chan/CH.C05.965.C15

THU, APR 18 2013 16:02
 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER - ST JOE 345 KV
 SLG FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 STUCK PCB 3322; TRIP COOPER T5; NO RECLOSING
 FILE: chan/CH.C05.965.C15

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C06.965.C02
PRIOR OUTAGE: COOPER 345/161 KV T2
POWERFLOW CASE NAME: C06.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - MOORE 345 KV LINE. CLEAR COOPER - MOORE 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - MOORE 345 KV LINE

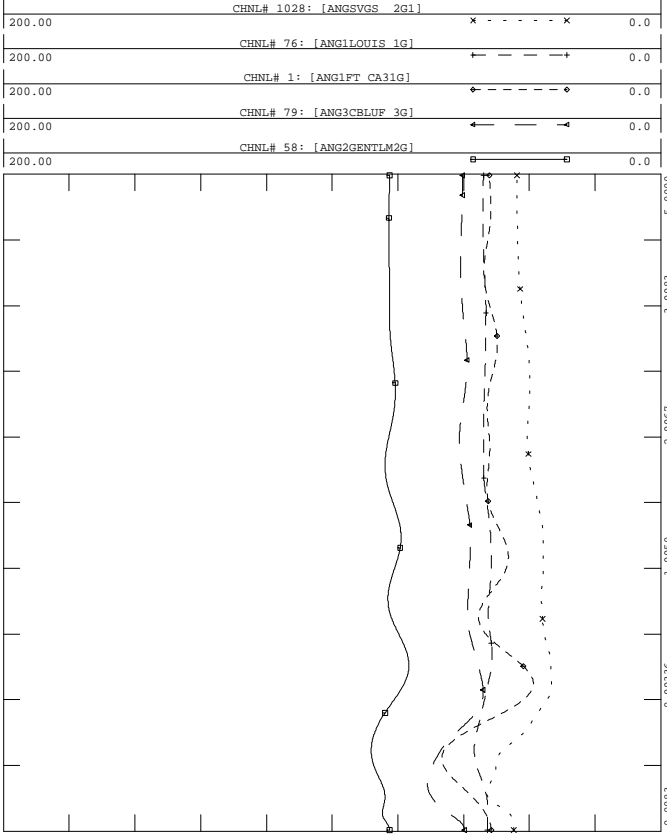
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



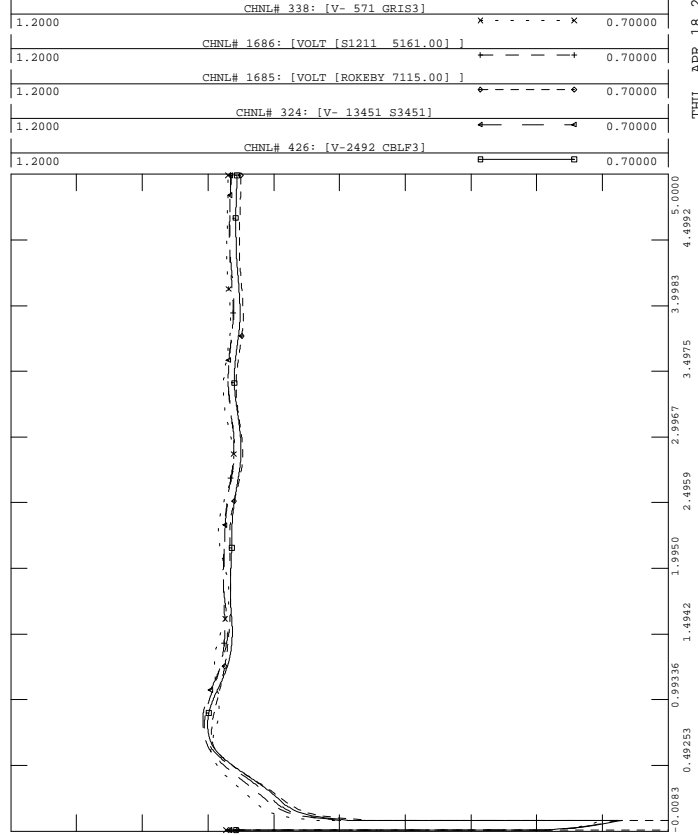
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T2
 3PH FAULT AT COOPER ON COOPER - MOORE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C06.965.C02

THU, APR 18 2013 16:02
 REGIONAL ROTOR ANGLES



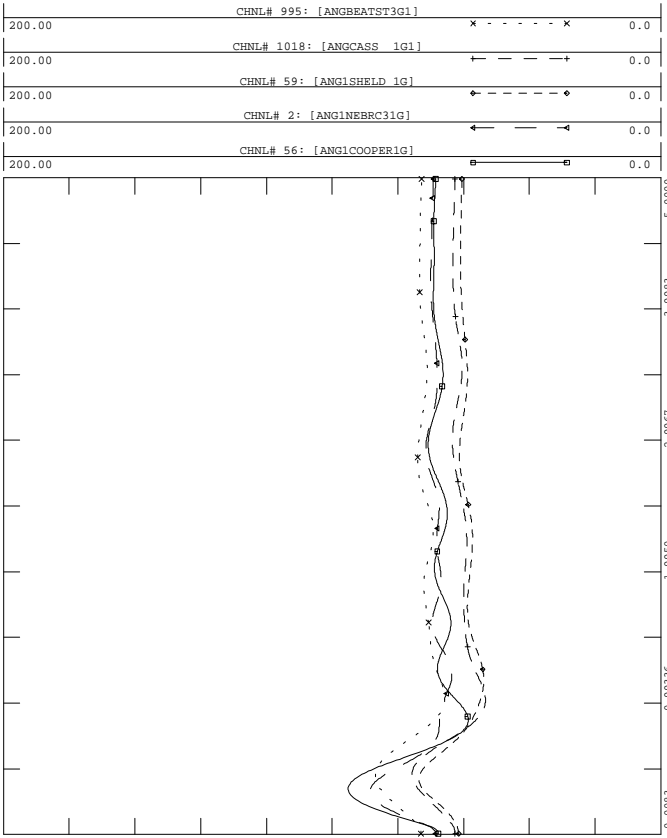
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T2
 3PH FAULT AT COOPER ON COOPER - MOORE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C06.965.C02

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 REGIONAL VOLTAGES



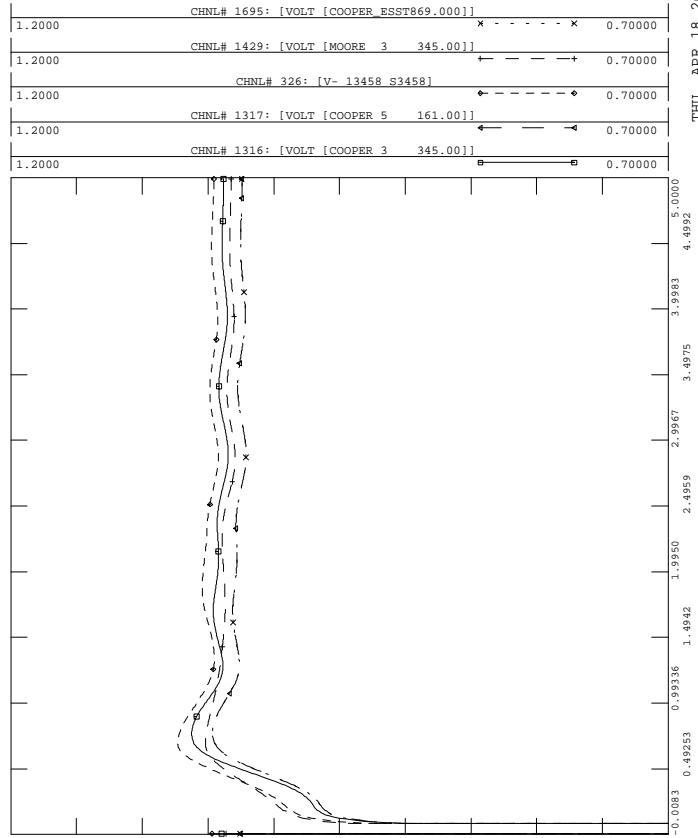
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T2
 3PH FAULT AT COOPER ON COOPER - MOORE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C06.965.C02

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T2
 3PH FAULT AT COOPER ON COOPER - MOORE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C06.965.C02

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C06.965.C09
PRIOR OUTAGE: COOPER 345/161 KV T2
POWERFLOW CASE NAME: C06.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 161 KV END OF COOPER 345 / 161 KV TRANSFORMER, T5. CLEAR COOPER 345 / 161 KV TRANSFORMER, T5. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 161 KV
0.0917	5.5	CLEAR COOPER 345 / 161 KV TRANSFORMER, T5

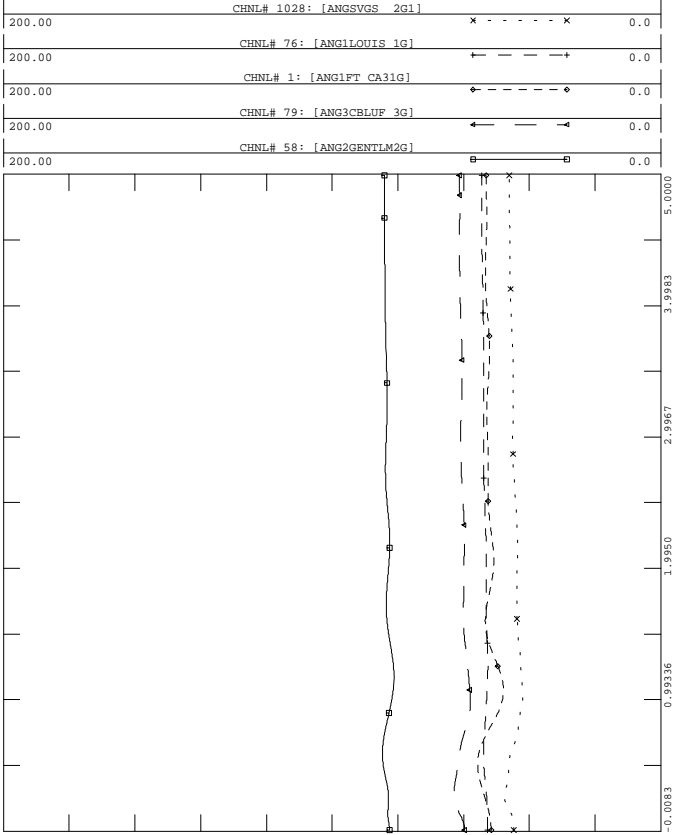
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



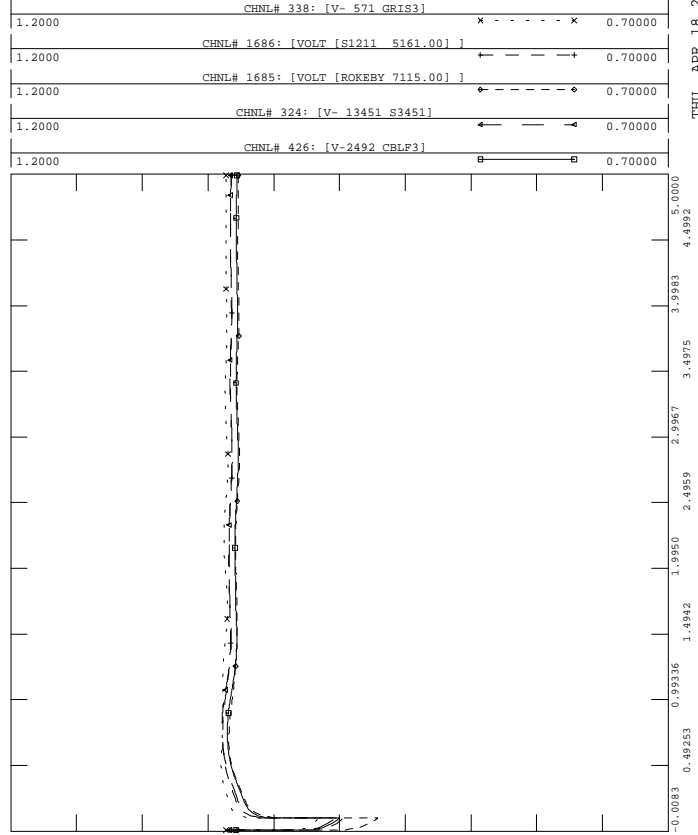
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T2
 3PH FAULT ON LOW-SIDE OF COOPER T5
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C06.965.C09

THU, APR 18 2013 16:03
 REGIONAL ROTOR ANGLES



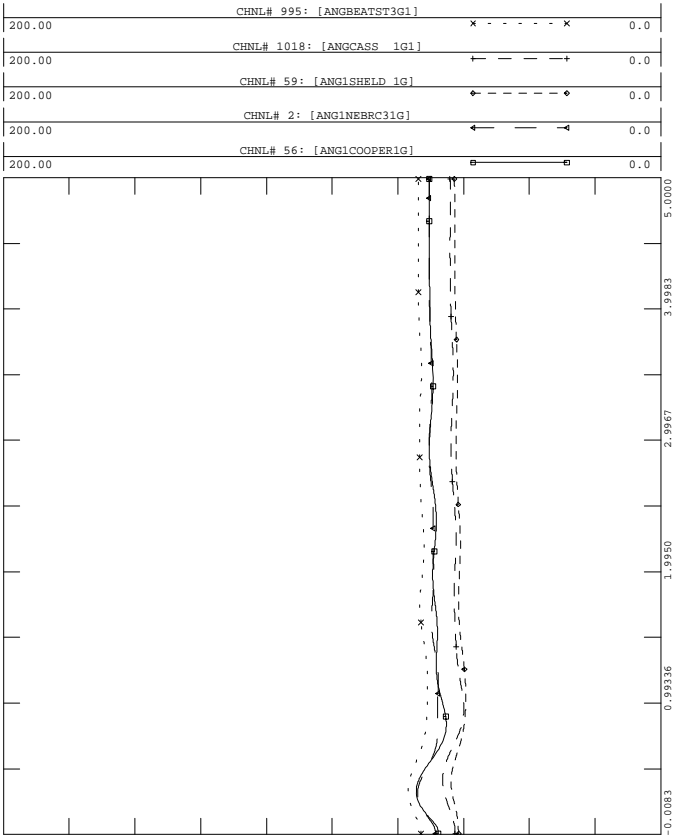
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T2
 3PH FAULT ON LOW-SIDE OF COOPER T5
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C06.965.C09

THU, APR 18 2013 16:03
 REGIONAL VOLTAGES



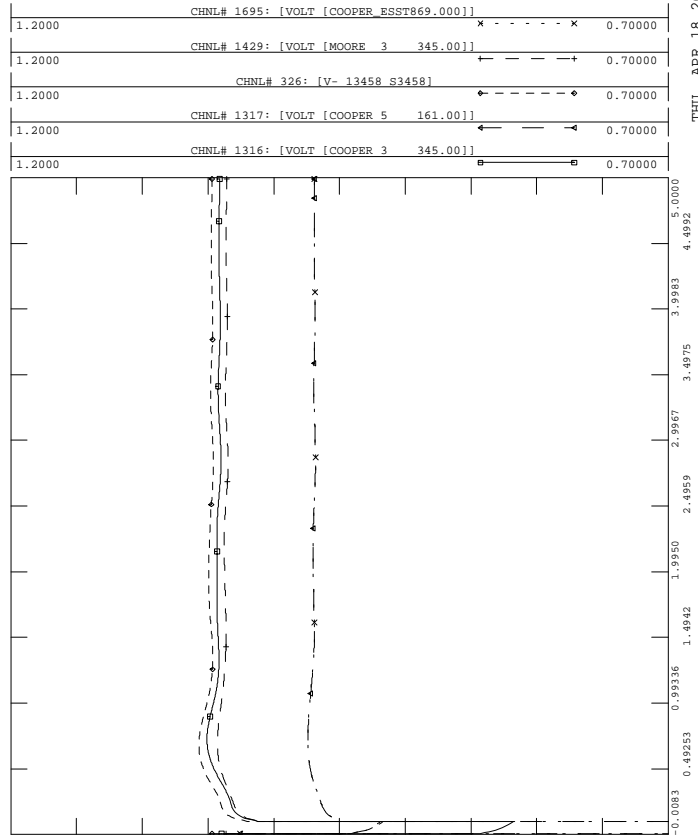
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T2
 3PH FAULT ON LOW-SIDE OF COOPER T5
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C06.965.C09

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2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T2
 3PH FAULT ON LOW-SIDE OF COOPER T5
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C06.965.C09

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Disturbance Description

STABILITY CASE NAME: C06.965.C11
PRIOR OUTAGE: COOPER 345/161 KV T2
POWERFLOW CASE NAME: C06.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: NO FAULT. LOSS OF COOPER GENERATION.
LOAD REJECTION. NO RECLOSE. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	LOSS OF COOPER GENERATION

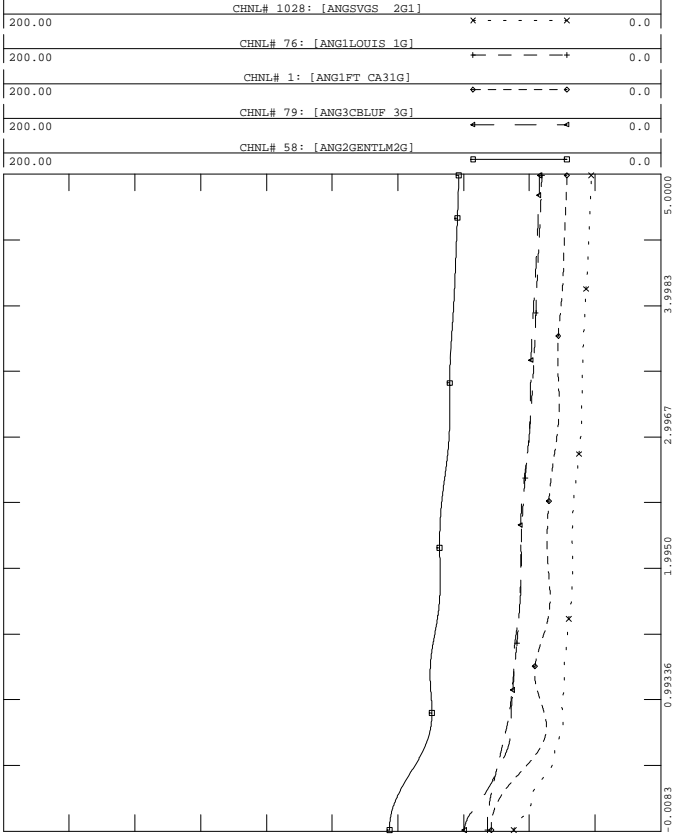
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



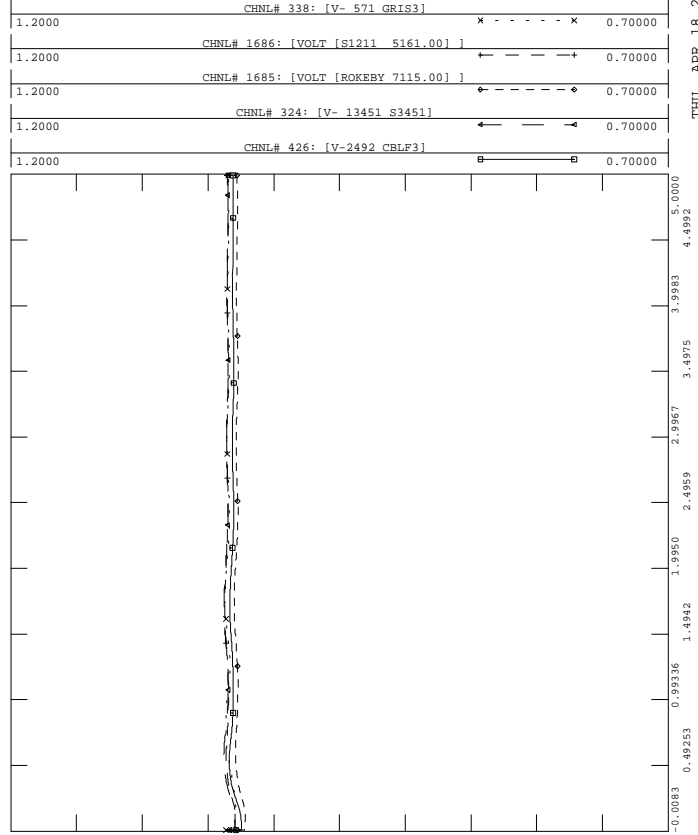
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T2
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C06.965.C11

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 REGIONAL ROTOR ANGLES



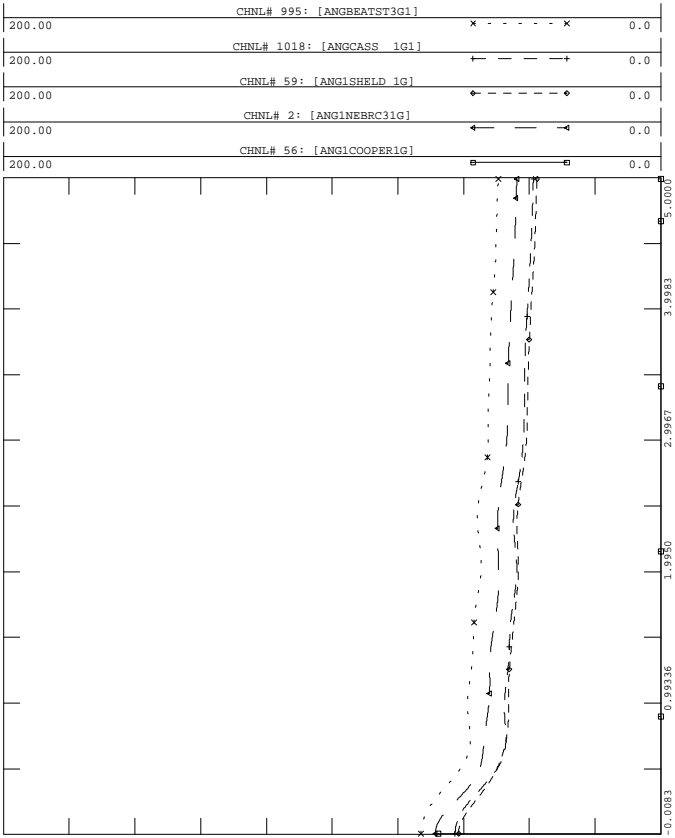
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T2
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C06.965.C11

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 REGIONAL VOLTAGES



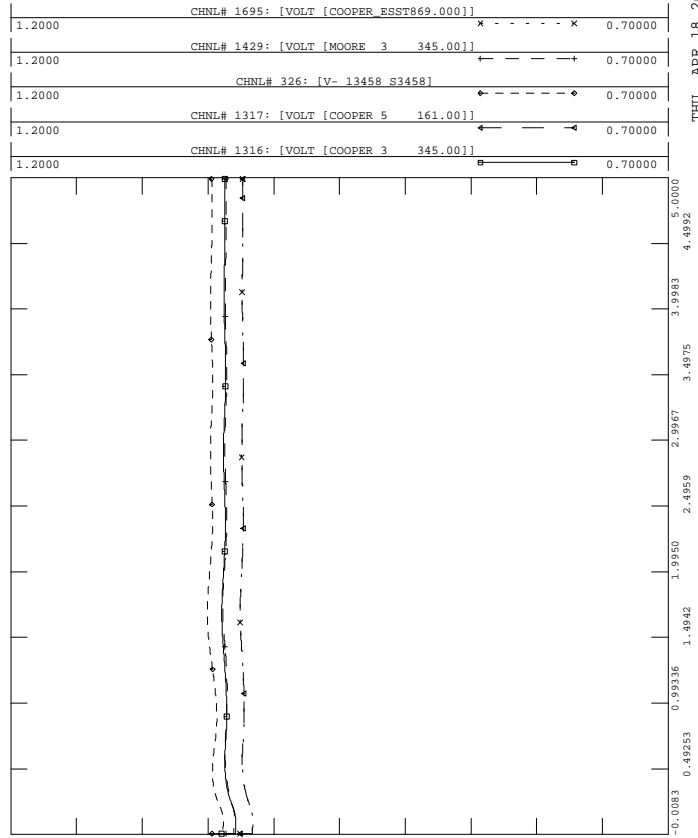
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T2
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C06.965.C11

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T2
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C06.965.C11

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Disturbance Description

STABILITY CASE NAME: C06.965.C15
PRIOR OUTAGE: COOPER 345/161 KV T2
POWERFLOW CASE NAME: C06.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: SLG FAULT AT COOPER 345 KV ON COOPER - FAIRPORT - ST. JOE 345 KV LINE. OPEN ST JOE END OF COOPER - FAIRPORT - ST JOE 345 KV LINE. STUCK PCB 3322 AT COOPER. DELAYED CLEAR OF FAULT, COOPER - FAIRPORT - ST JOE 345 KV LINE, AND COOPER 345/161 KV T5. NO RECLOSING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	SLG FAULT (Y=620-j3470) AT COOPER 345 KV
0.0750	4.5	CLEAR ST JOE END OF COOPER - FAIRPORT - ST JOE 345 KV
0.2170	13.0	CLEAR FAULT AND COOPER END OF COOPER - FAIRPORT - ST JOE 345 KV LINE AND COOPER 345/161 KV T5

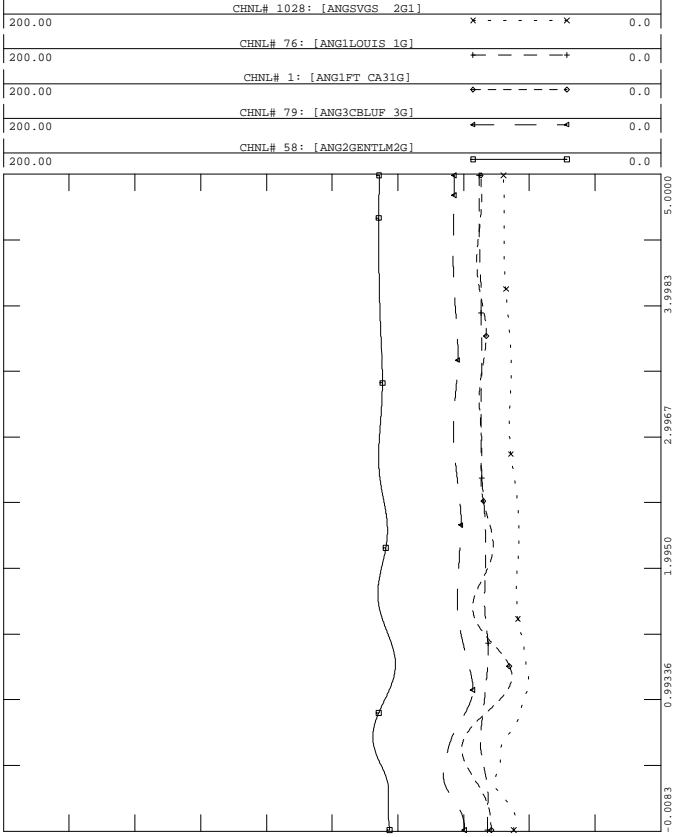
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



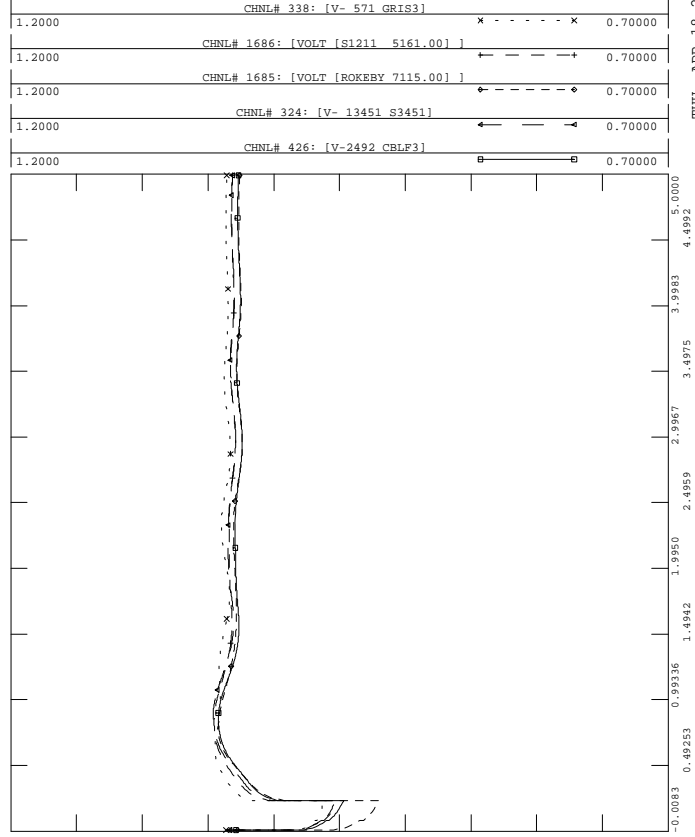
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T2
 SLG FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 STUCK PCB 3322; TRIP COOPER T5; NO RECLOSING
 FILE: chan/CH.C06.965.C15

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 REGIONAL ROTOR ANGLES



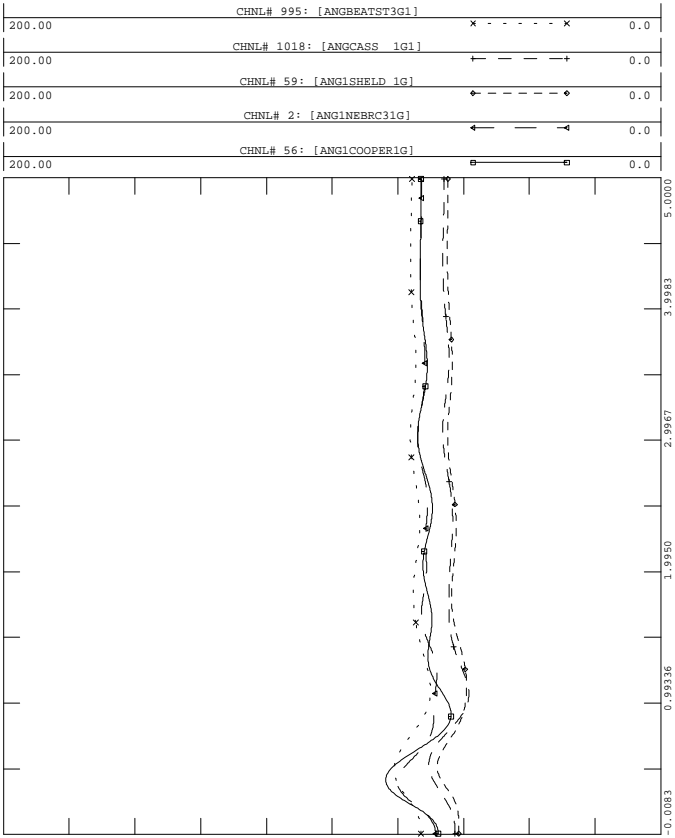
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T2
 SLG FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 STUCK PCB 3322; TRIP COOPER T5; NO RECLOSING
 FILE: chan/CH.C06.965.C15

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 REGIONAL VOLTAGES



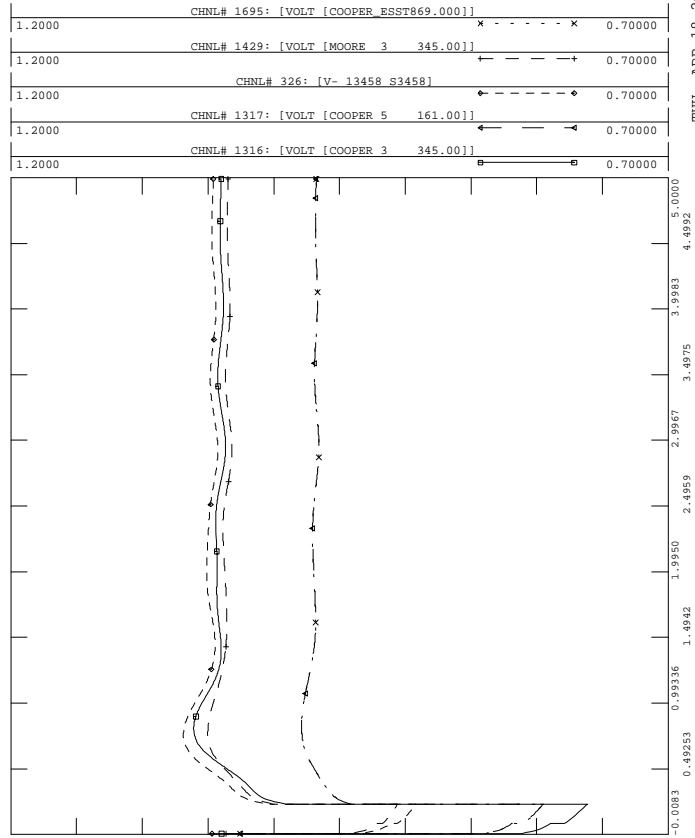
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T2
 SLG FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 STUCK PCB 3322; TRIP COOPER T5; NO RECLOSING
 FILE: chan/CH.C06.965.C15

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T2
 SLG FAULT AT COOPER ON COOPER - FAIRPORT 345KV LINE
 STUCK PCB 3322; TRIP COOPER T5; NO RECLOSING
 FILE: chan/CH.C06.965.C15

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C07.965.C01
PRIOR OUTAGE: COOPER 345/161 KV T5
POWERFLOW CASE NAME: C07.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - S3458 345 KV LINE. CLEAR COOPER - S3458 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - S3458 345 KV LINE

REMARKS:

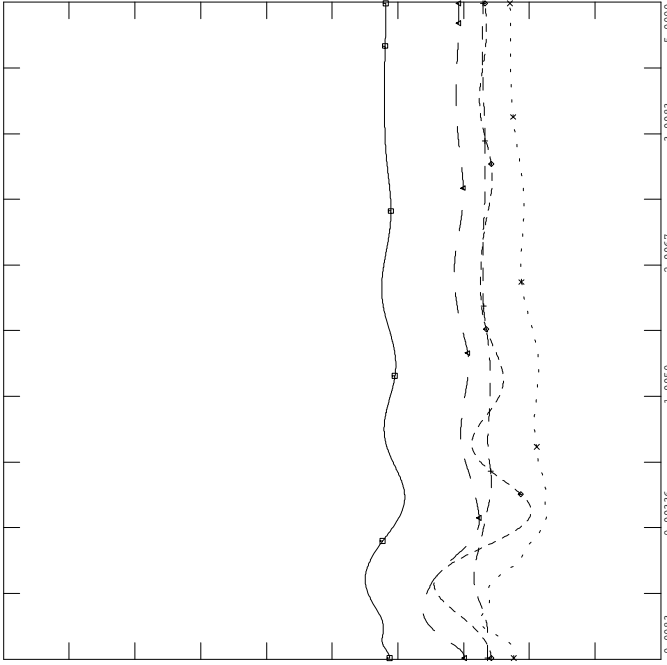
STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T5
 3PH FAULT AT COOPER ON COOPER - S3458 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C07.965.C01

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 REGIONAL ROTOR ANGLES

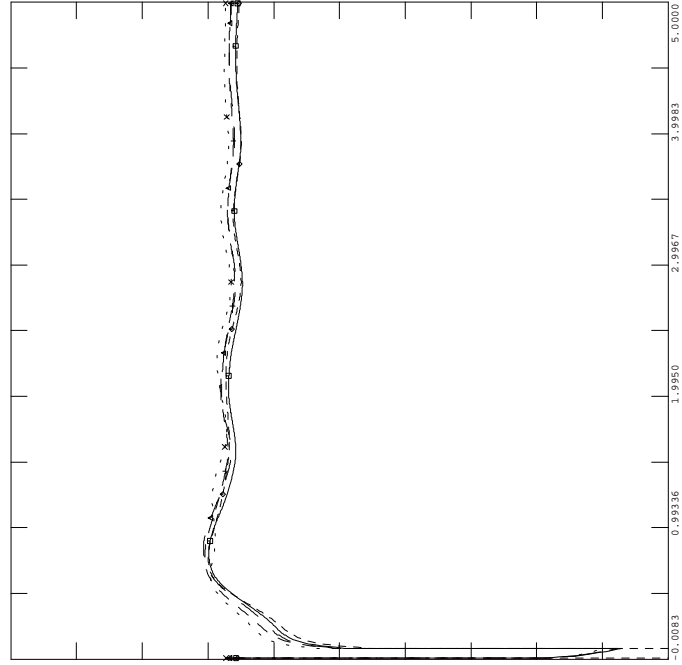
200.00	CHNL# 1028: [ANGSVGS 2G1]	x - - - - x	0.0
200.00	CHNL# 76: [ANGLLOUIS 1G]	↑ - - - - ↓	0.0
200.00	CHNL# 1: [ANGLFT CA31G]	◆ - - - - ◆	0.0
200.00	CHNL# 79: [ANG3CBLUF 3G]	← - - - - →	0.0
200.00	CHNL# 58: [ANG2GENTLM2G]	□ - - - - □	0.0



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T5
 3PH FAULT AT COOPER ON COOPER - S3458 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C07.965.C01

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 REGIONAL VOLTAGES

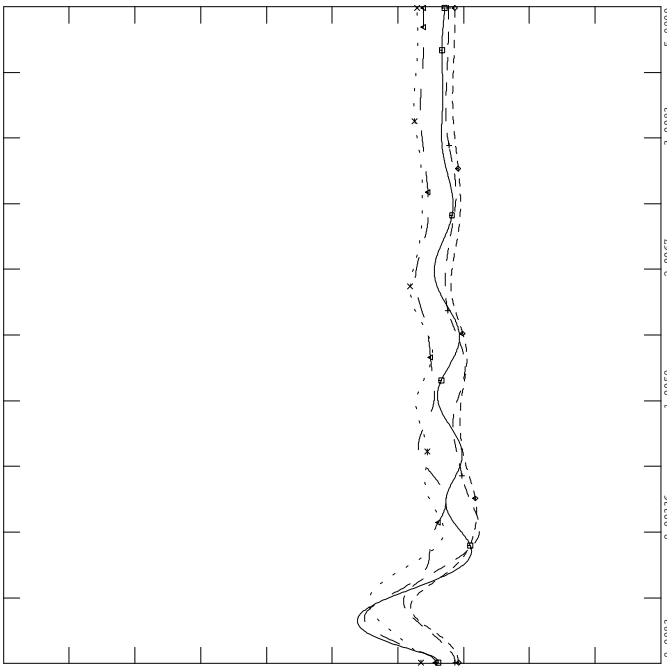
1.2000	CHNL# 338: [V- 571 GRIS3]	x - - - - x	0.70000
1.2000	CHNL# 1686: [VOLT [S1211 5161.00]]	↑ - - - - ↓	0.70000
1.2000	CHNL# 1685: [VOLT [ROKEYB 7115.00]]	◆ - - - - ◆	0.70000
1.2000	CHNL# 324: [V- 13451 S3451]	← - - - - →	0.70000
1.2000	CHNL# 426: [V-2492 CBLF3]	□ - - - - □	0.70000



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T5
 3PH FAULT AT COOPER ON COOPER - S3458 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C07.965.C01

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 LOCAL ROTOR ANGLES

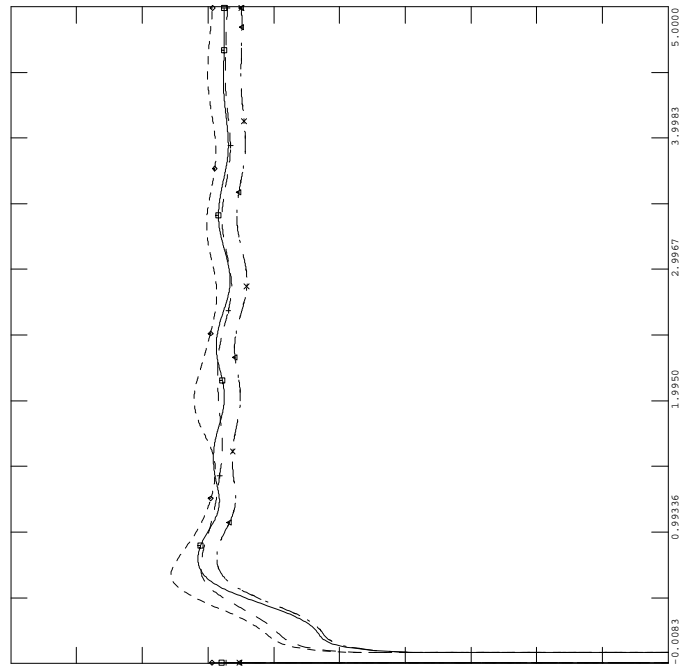
200.00	CHNL# 995: [ANGBEAT3G1]	x - - - - x	0.0
200.00	CHNL# 1018: [ANGCASS 1G1]	↑ - - - - ↓	0.0
200.00	CHNL# 59: [ANGSHELD 1G]	◆ - - - - ◆	0.0
200.00	CHNL# 2: [ANG1NEBRC31G]	← - - - - →	0.0
200.00	CHNL# 56: [ANGLCOOPER1G]	□ - - - - □	0.0



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T5
 3PH FAULT AT COOPER ON COOPER - S3458 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C07.965.C01

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1.2000	CHNL# 1695: [VOLT [COOPER ESST869.000]]	x - - - - x	0.70000
1.2000	CHNL# 1429: [VOLT [MOORE 3 345.00]]	↑ - - - - ↓	0.70000
1.2000	CHNL# 326: [V- 13458 S3458]	◆ - - - - ◆	0.70000
1.2000	CHNL# 1317: [VOLT [COOPER 5 161.00]]	← - - - - →	0.70000
1.2000	CHNL# 1316: [VOLT [COOPER 3 345.00]]	□ - - - - □	0.70000



Disturbance Description

STABILITY CASE NAME: C07.965.C07
PRIOR OUTAGE: COOPER 345/161 KV T5
POWERFLOW CASE NAME: C07.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: 3PH FAULT AT COOPER 345 KV ON COOPER - ST. JOE 345 KV LINE. CLEAR COOPER - ST. JOE 345 KV LINE. NORMAL CLEARING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	3PH FAULT AT COOPER 345 KV
0.0750	4.5	CLEAR COOPER - ST. JOE 345 KV LINE

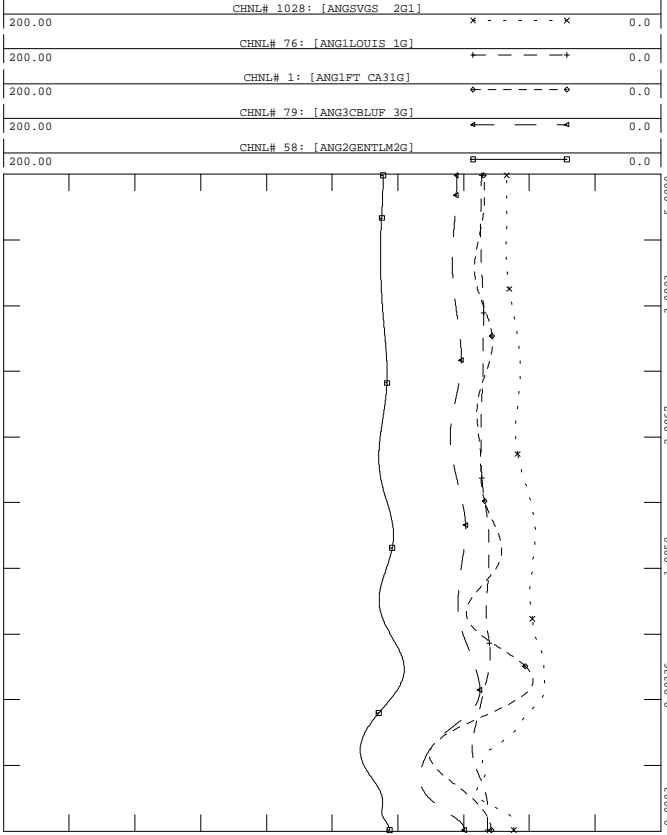
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



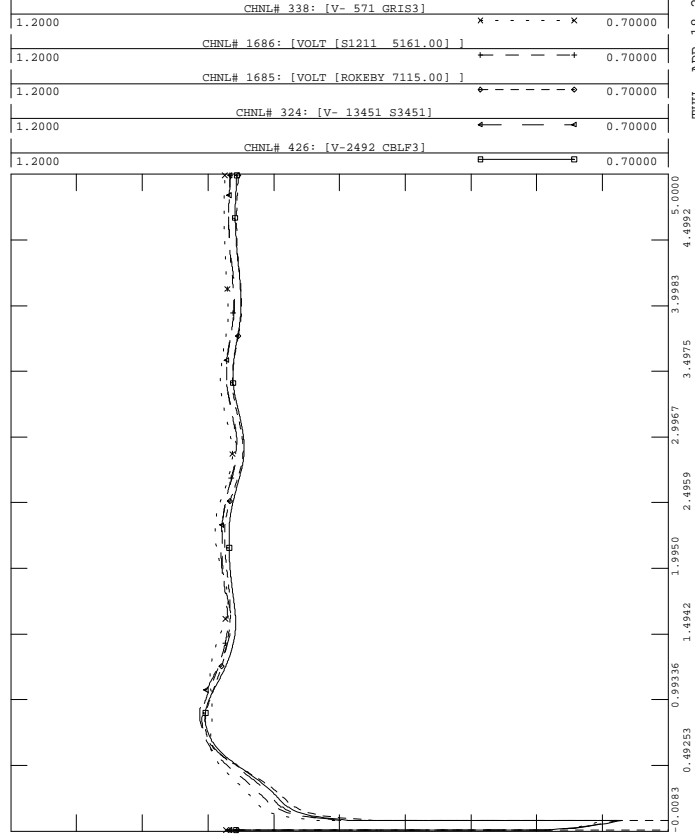
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T5
 3PH FAULT AT COOPER ON COOPER - ST.JOE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C07.965.C07

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 REGIONAL ROTOR ANGLES



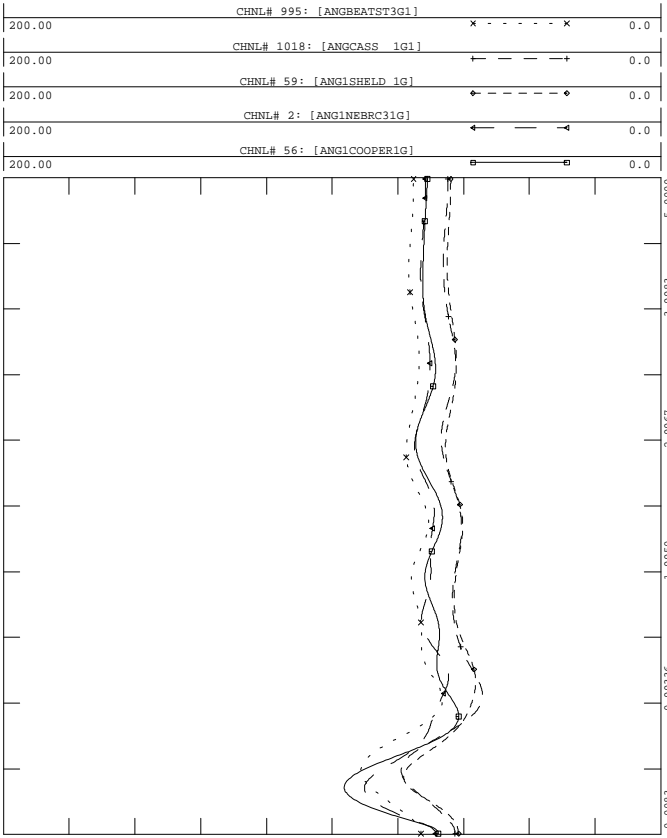
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T5
 3PH FAULT AT COOPER ON COOPER - ST.JOE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C07.965.C07

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 REGIONAL VOLTAGES



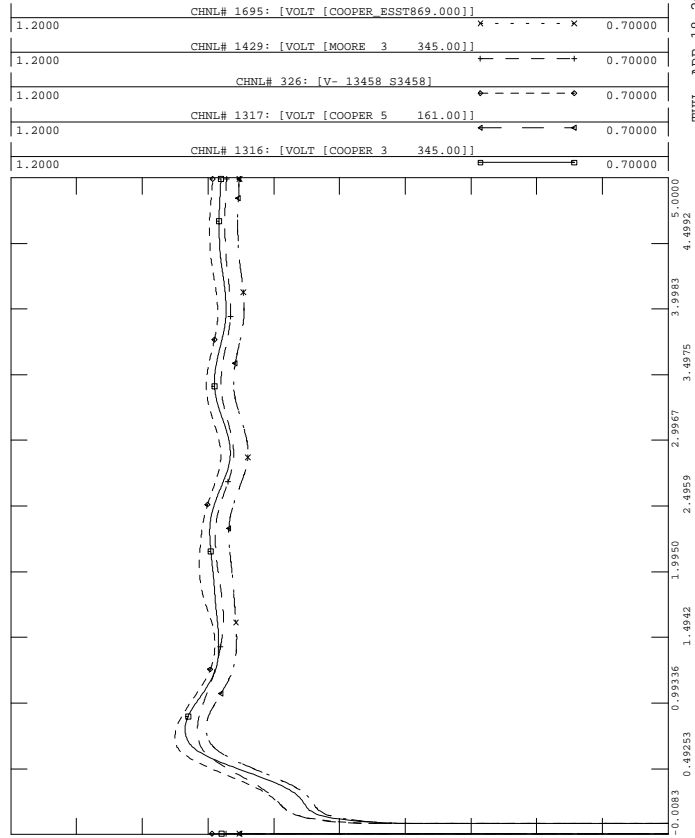
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T5
 3PH FAULT AT COOPER ON COOPER - ST.JOE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C07.965.C07

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T5
 3PH FAULT AT COOPER ON COOPER - ST.JOE 345KV LINE
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C07.965.C07

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C07.965.C11
PRIOR OUTAGE: COOPER 345/161 KV T5
POWERFLOW CASE NAME: C07.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: NO FAULT. LOSS OF COOPER GENERATION.
LOAD REJECTION. NO RECLOSE. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	LOSS OF COOPER GENERATION

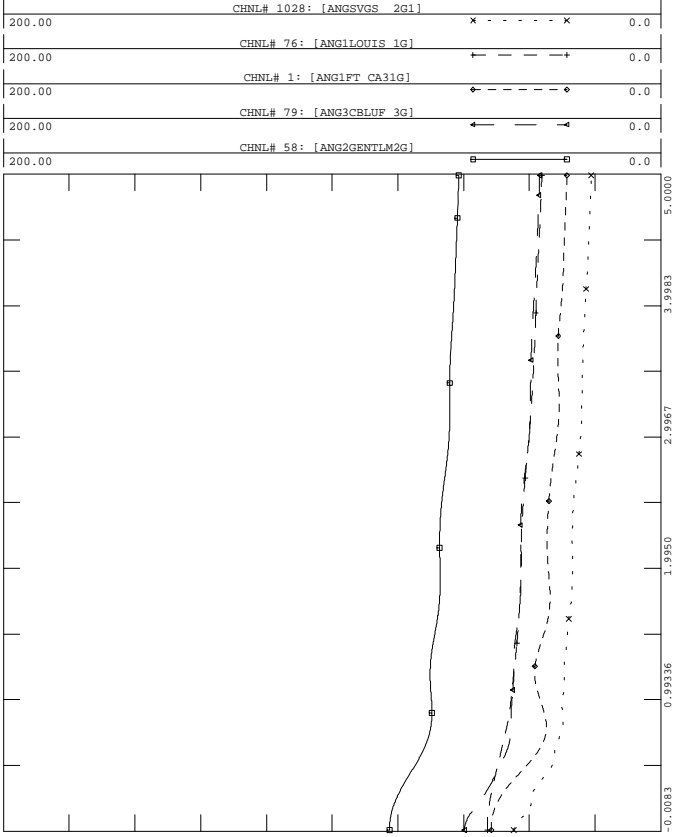
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



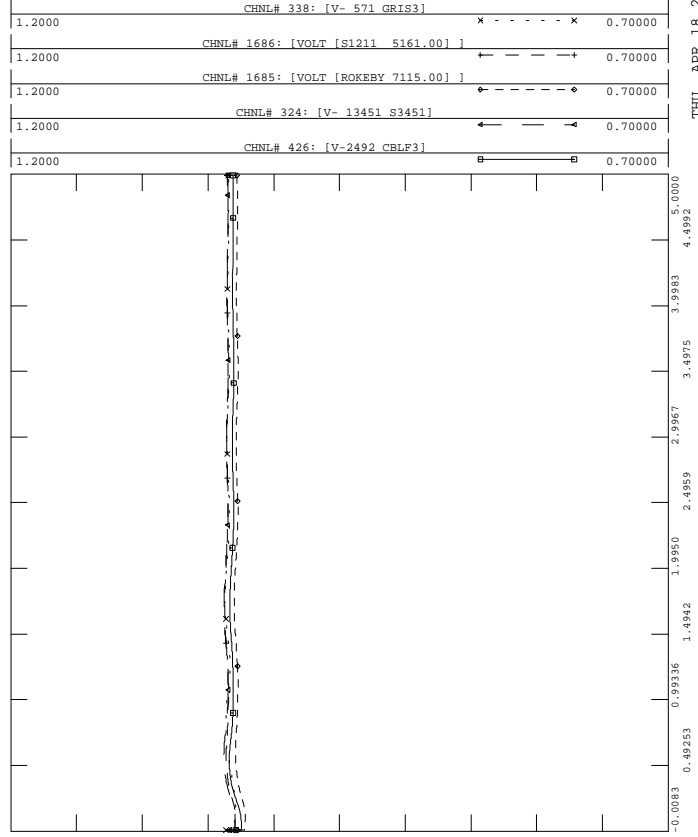
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T5
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C07.965.C11

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 REGIONAL ROTOR ANGLES



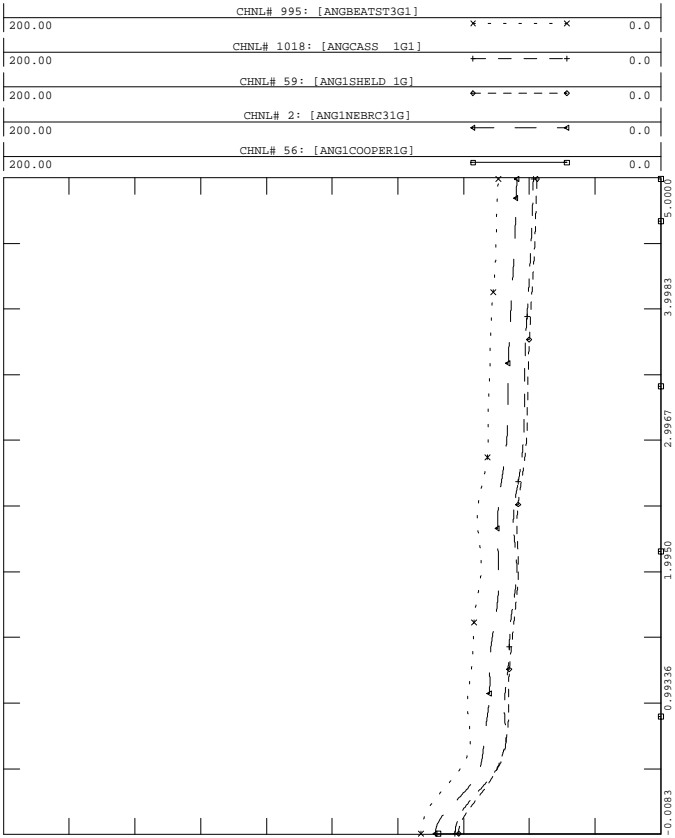
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T5
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C07.965.C11

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 REGIONAL VOLTAGES



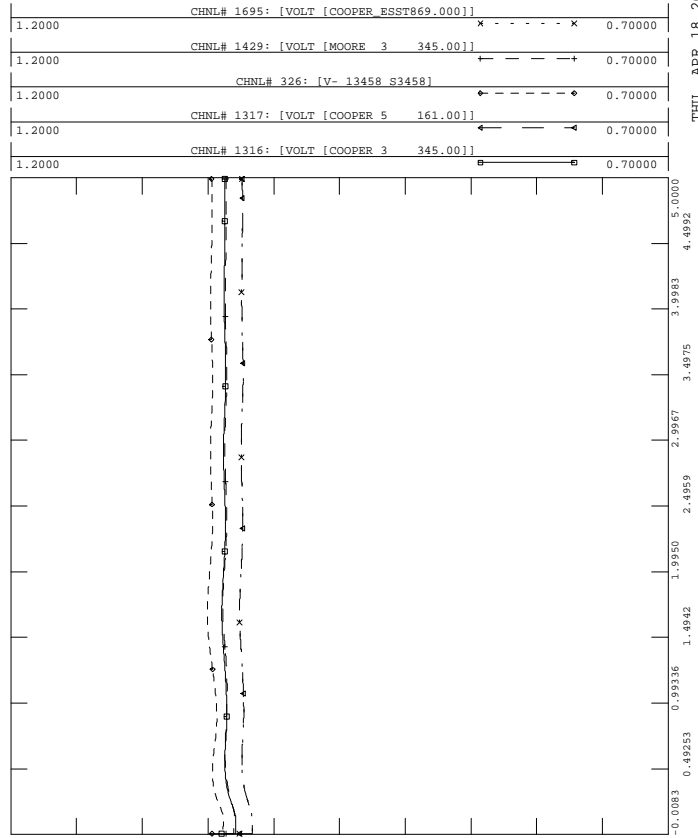
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T5
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C07.965.C11

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T5
 COOPER LOAD REJECTION
 NORMAL CLEARING; NO RECLOSING; NO CORRECTIVE ACTION
 FILE: chan/CH.C07.965.C11

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 LOCAL VOLTAGES



Disturbance Description

STABILITY CASE NAME: C07.965.C14
PRIOR OUTAGE: COOPER 345/161 KV T5
POWERFLOW CASE NAME: C07.965

PRE-DISTURBANCE CONDITIONS:

Cooper	= 965	Sheldon #1 = 105	Council Bluffs #1 = 46
Nebraska City #1	= 652	Sheldon #2 = 120	Council Bluffs #2 = 88
Nebraska City #2	= 682	Hallam CT = 52	Council Bluffs #3 = 720
Cass County #1	= 161	BPS = 250	Council Bluffs #4 = 790
Cass County #2	= 161	Iatan #1 = 706	Atchison Co Wind = 144
Flat Water Wind	= 60	Iatan #2 = 965	

DISTURBANCE DESCRIPTION: SLG FAULT AT COOPER 345 KV ON COOPER - S3458 345 KV LINE. OPEN S3458 END OF COOPER - S3458 345 KV LINE. STUCK PCB 3316 AT COOPER. DELAYED CLEAR OF FAULT, COOPER - S3458 345 KV LINE, AND COOPER 345/161 KV T2. NO RECLOSING. NO CORRECTIVE ACTION

SWITCHING SEQUENCE

<u>SEC</u>	<u>CYCLES</u>	<u>EVENT</u>
0.0000	0.0	SLG FAULT (Y=620-j3470) AT COOPER 345 KV
0.0750	4.5	CLEAR S3458 END OF COOPER - S3458 345 KV LINE
0.2170	13.0	CLEAR FAULT AND COOPER END OF COOPER - S3458 345 KV LINE AND COOPER 345/161 KV T2

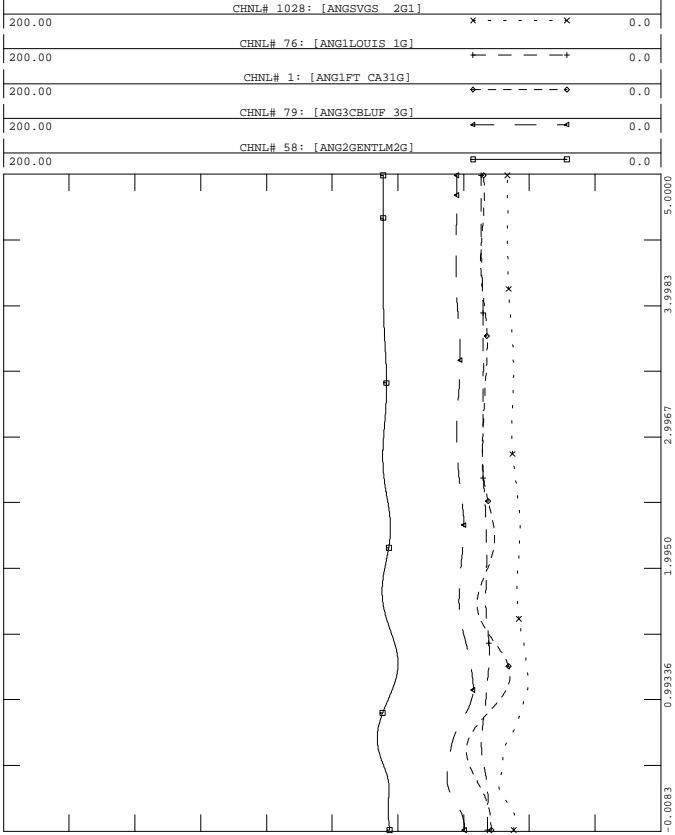
REMARKS:

STABLE SYSTEM RESPONSE. VOLTAGE SWINGS REMAIN WITHIN TRANSIENT VOLTAGE LIMITS. ROTOR ANGLE DEVIATIONS AND VOLTAGE SWINGS ARE WELL DAMPED.



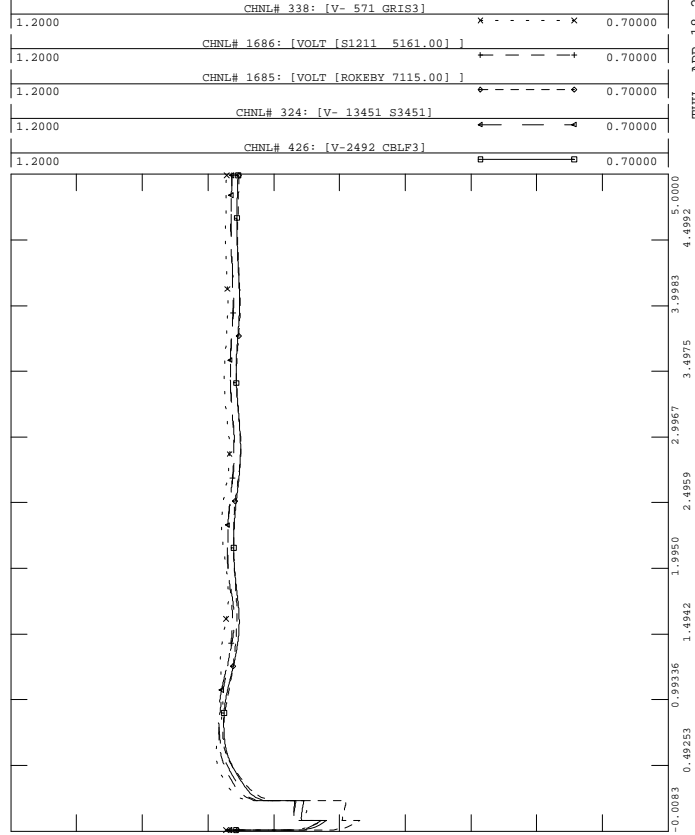
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T5
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C07.965.C14

THU, APR 18 2013 16:03
 REGIONAL ROTOR ANGLES



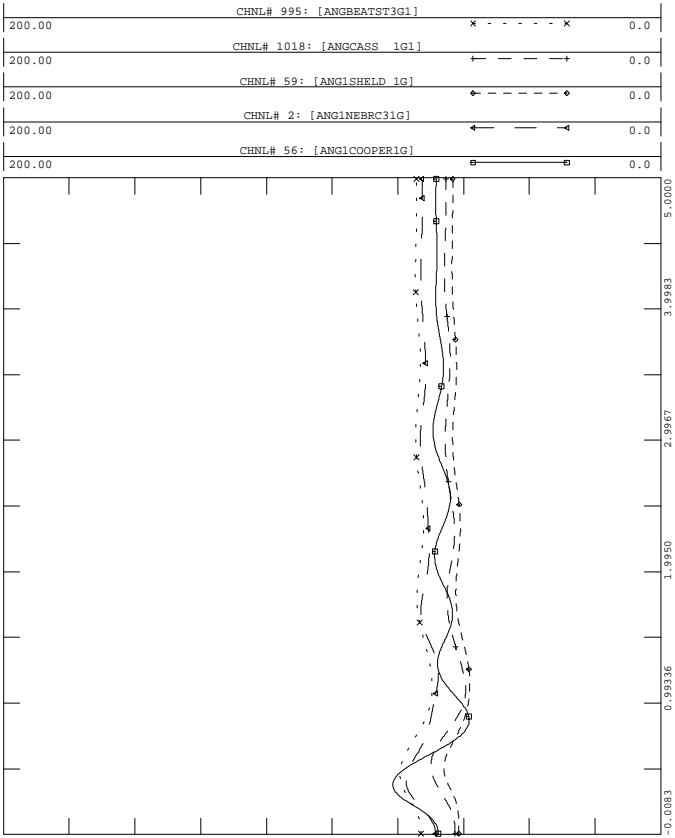
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T5
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C07.965.C14

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 REGIONAL VOLTAGES



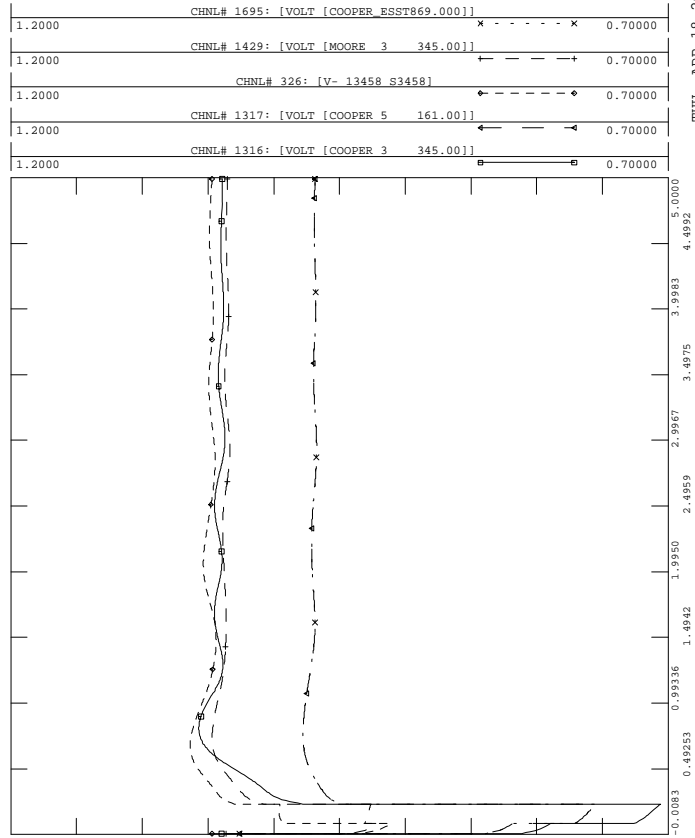
2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T5
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C07.965.C14

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 LOCAL ROTOR ANGLES



2011 WINTER | MAXIMUM GENERATION | CNS @ 965 MW NET
 PRIOR OUTAGE: COOPER 345/161 KV T5
 SLG FAULT AT COOPER ON COOPER - S3458 345KV LINE
 STUCK PCB 3316; TRIP COOPER T2; NO RECLOSING
 FILE: chan/CH.C07.965.C14

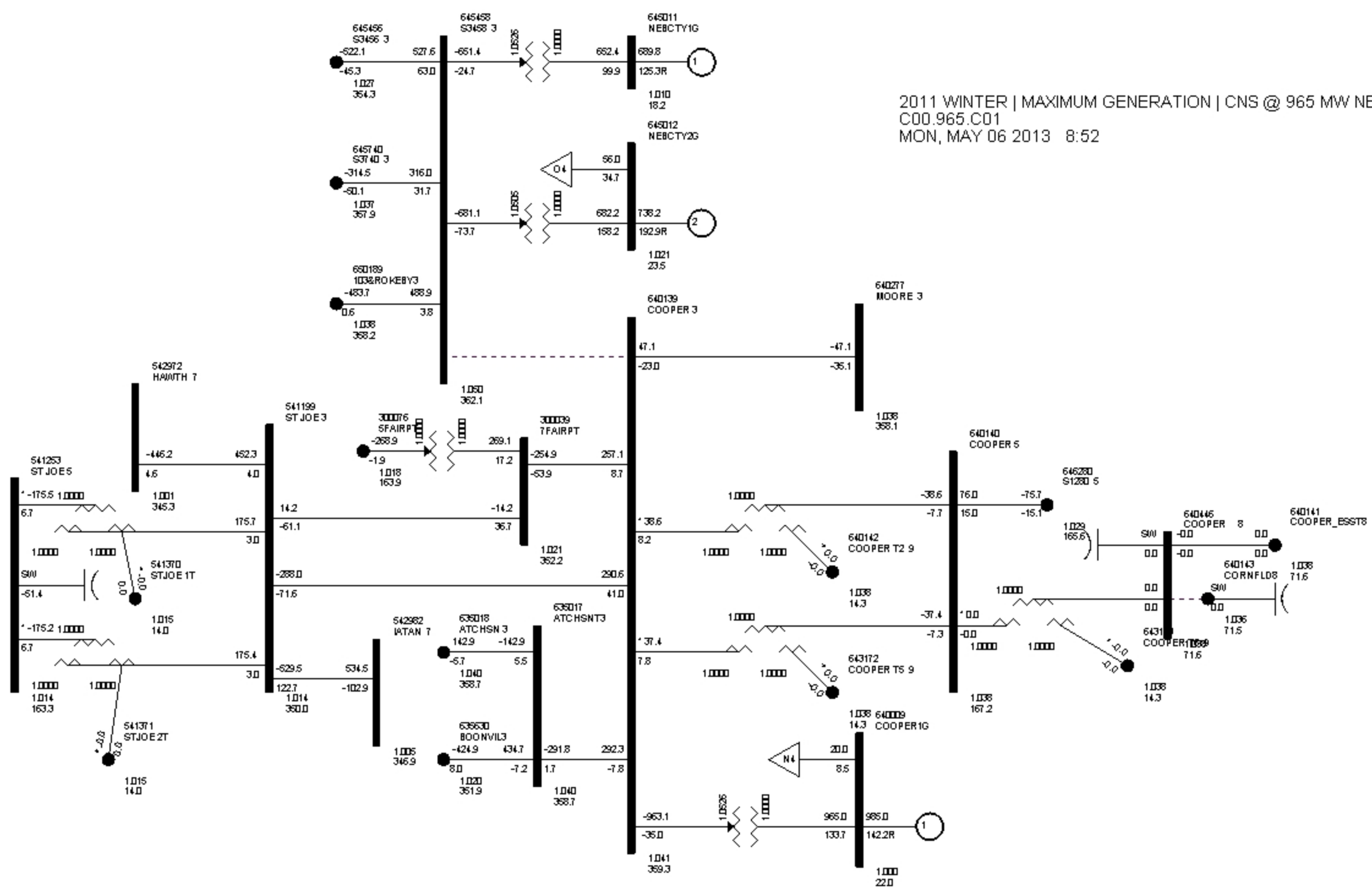
THU, APR 18 2013 16:03
 LOCAL VOLTAGES



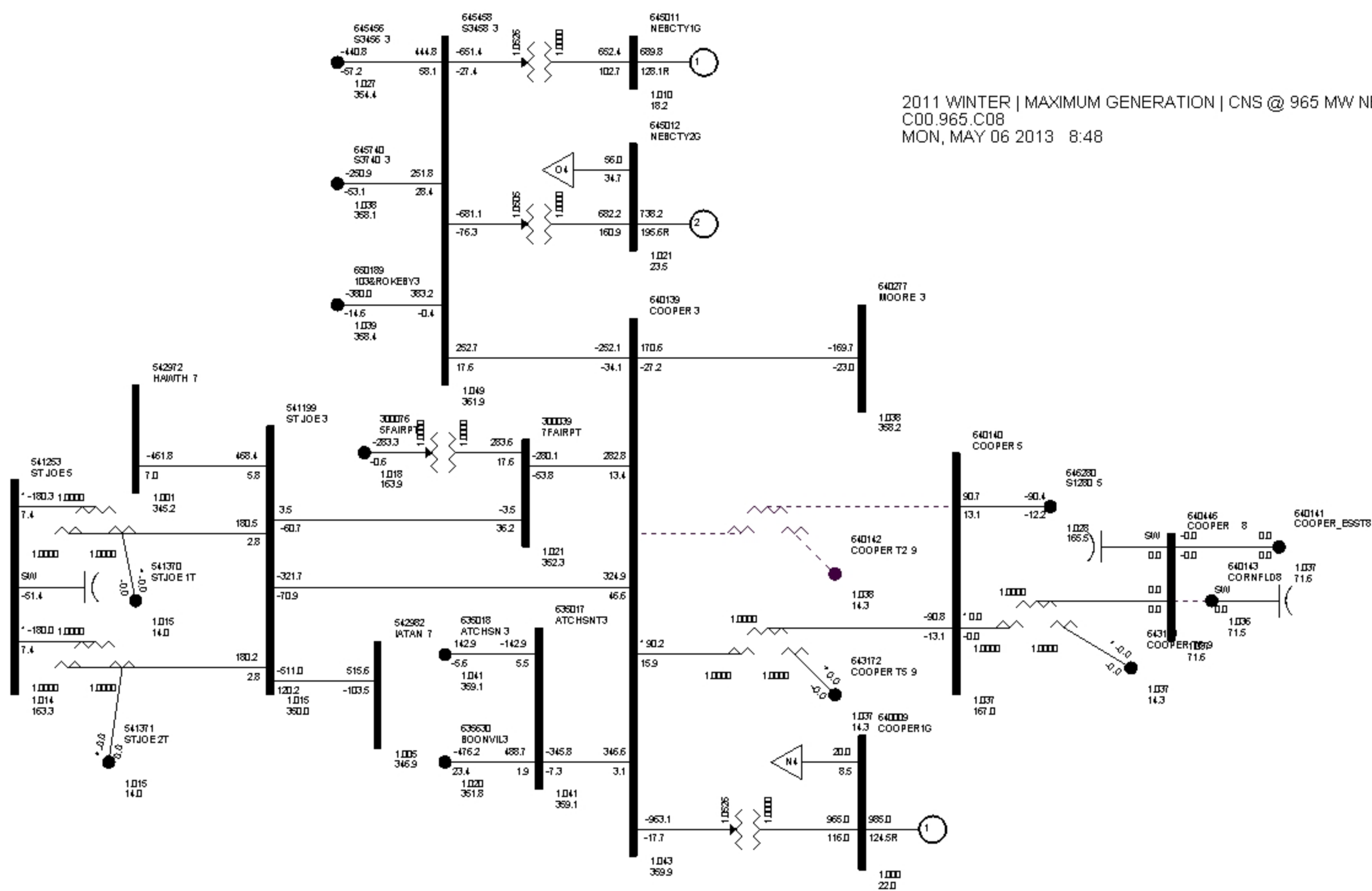
Section 7.5

Post-Disturbance Powerflow Analysis

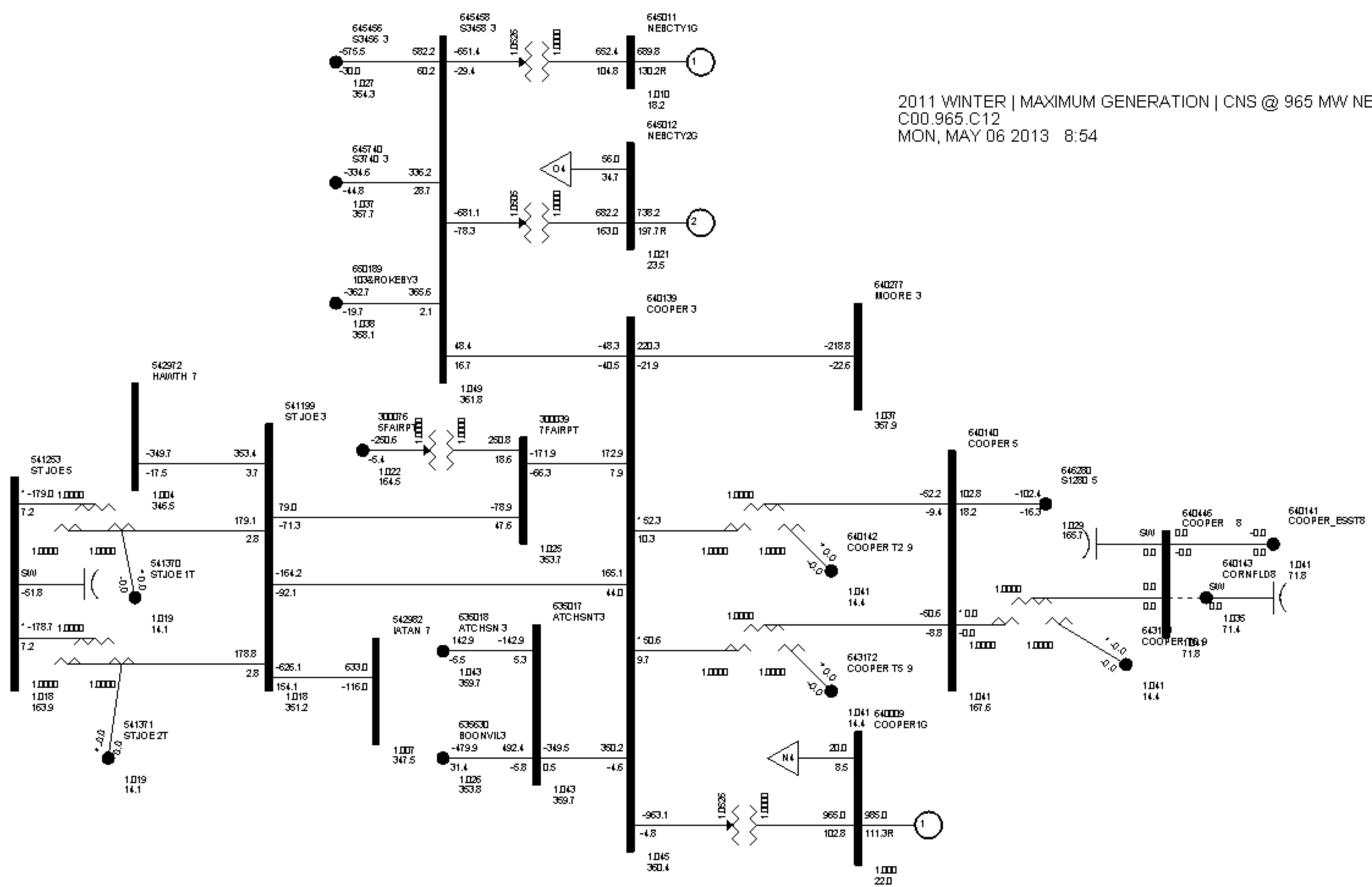
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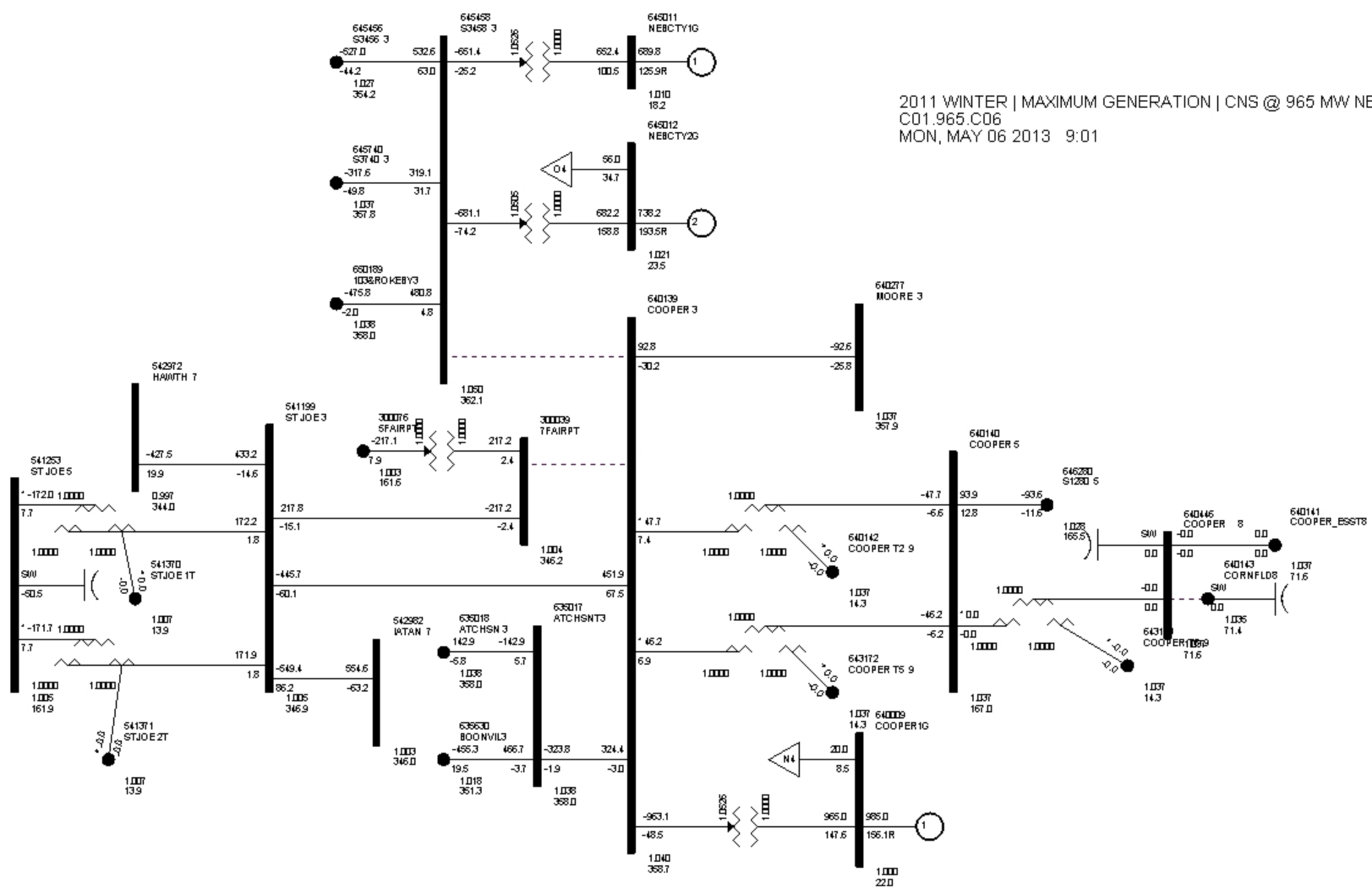
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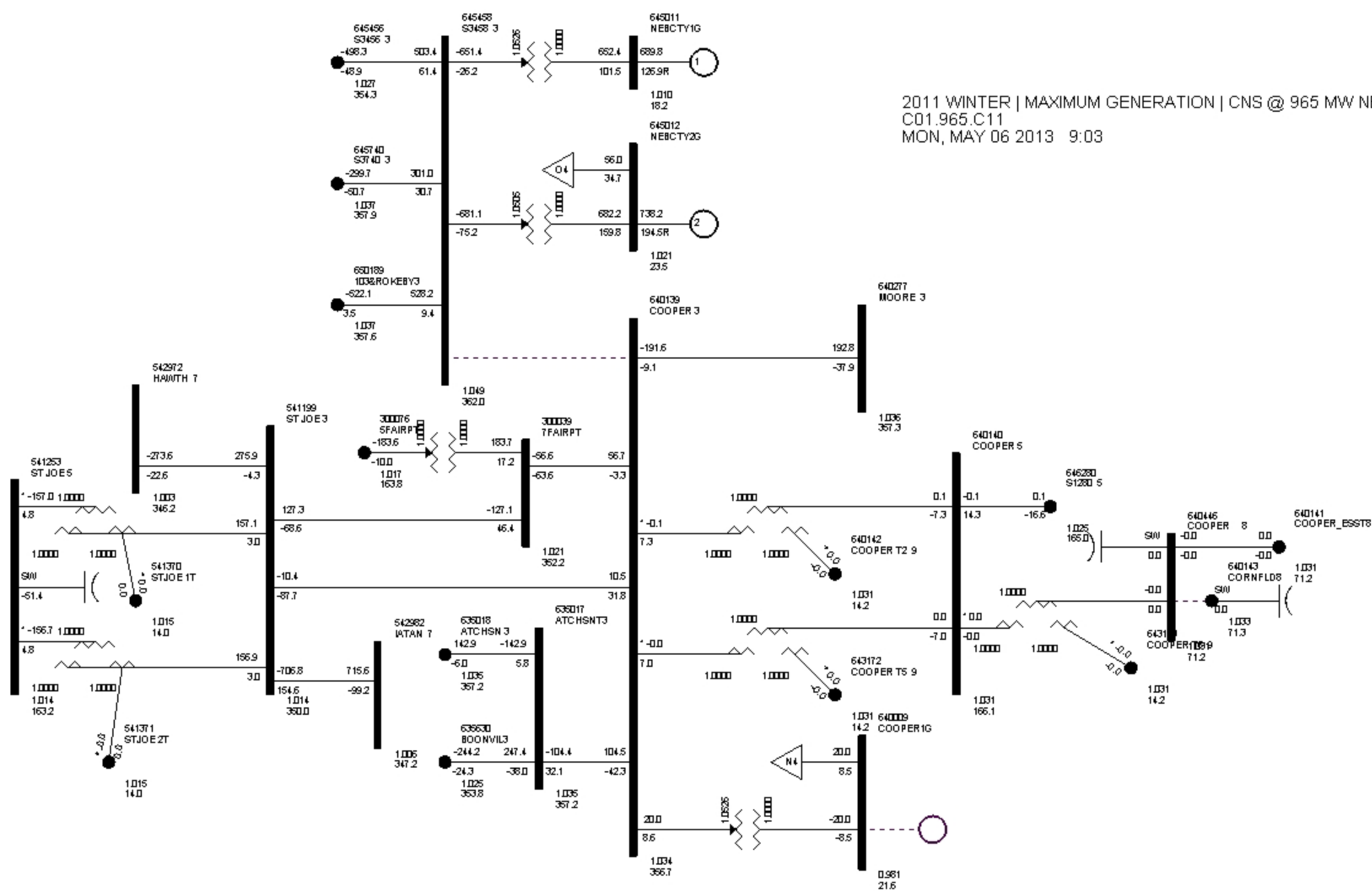
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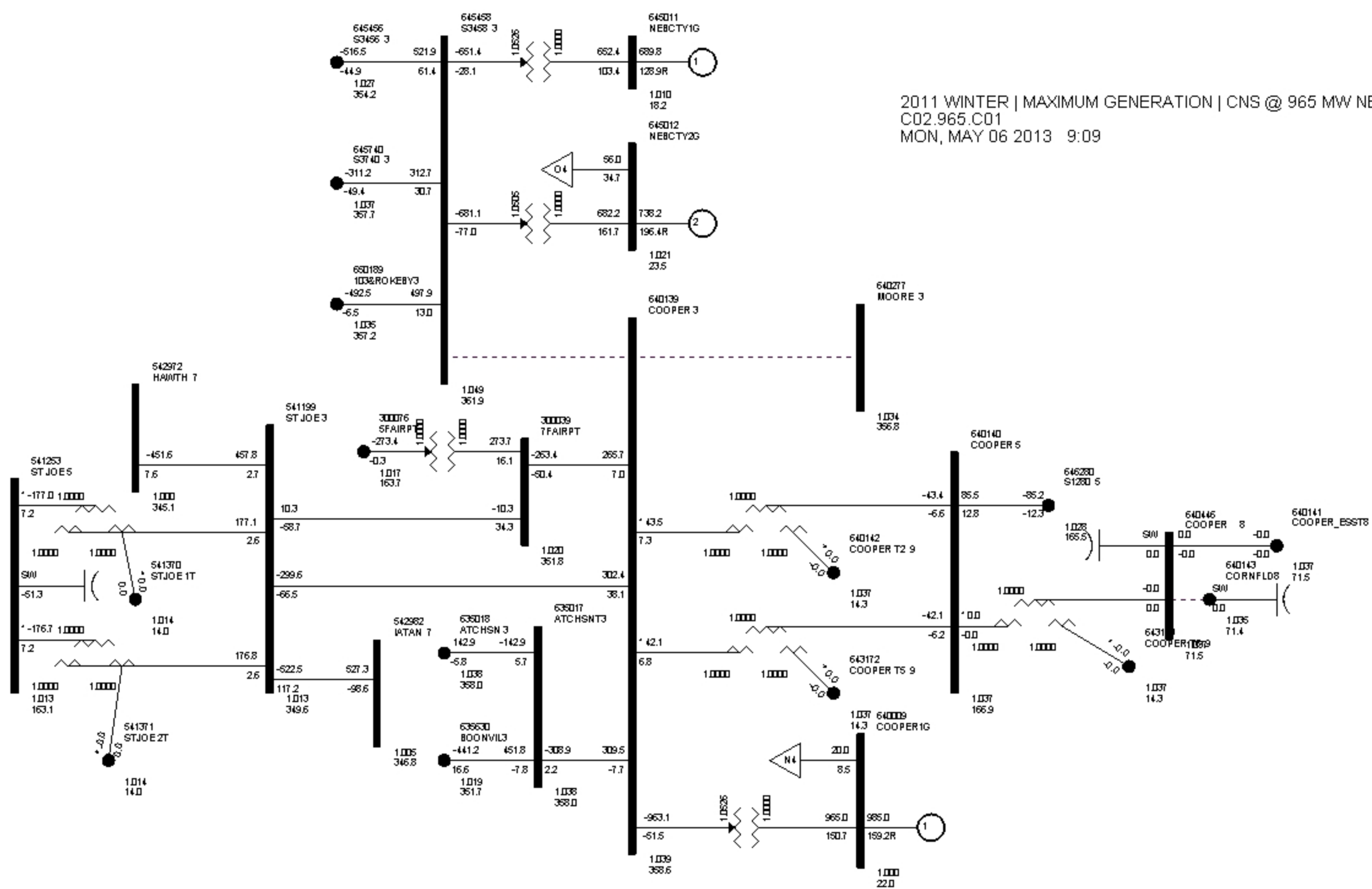
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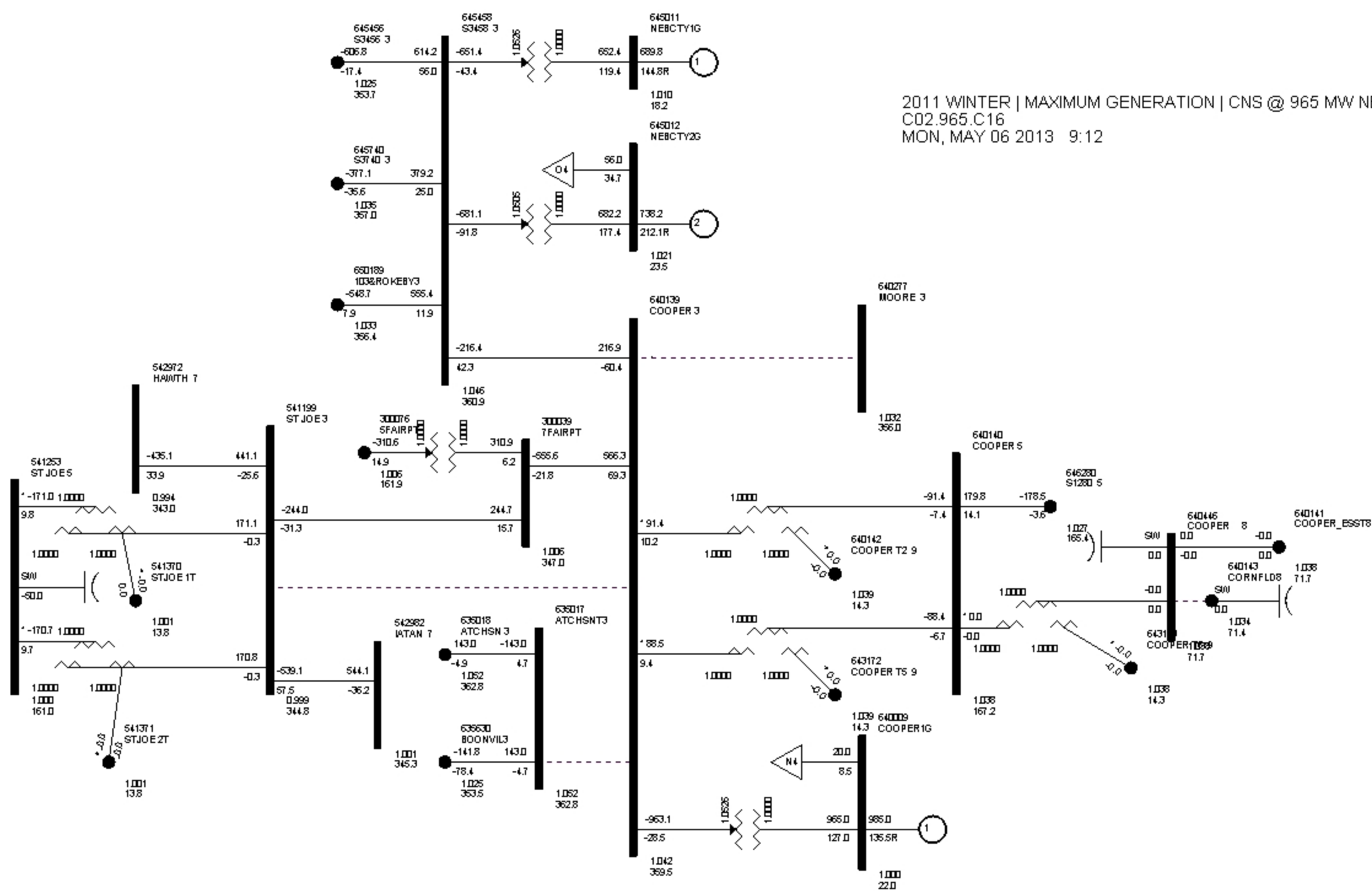
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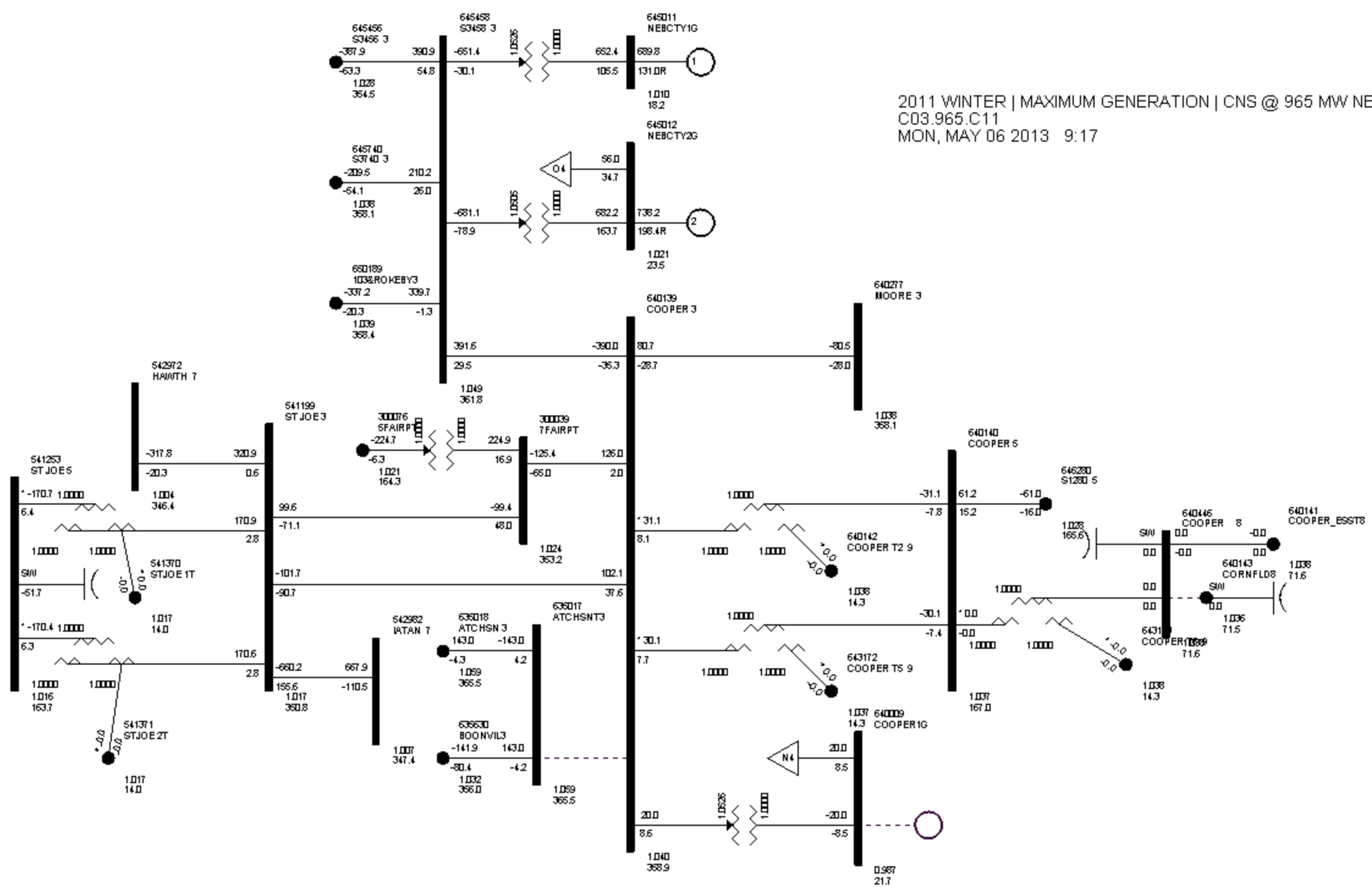
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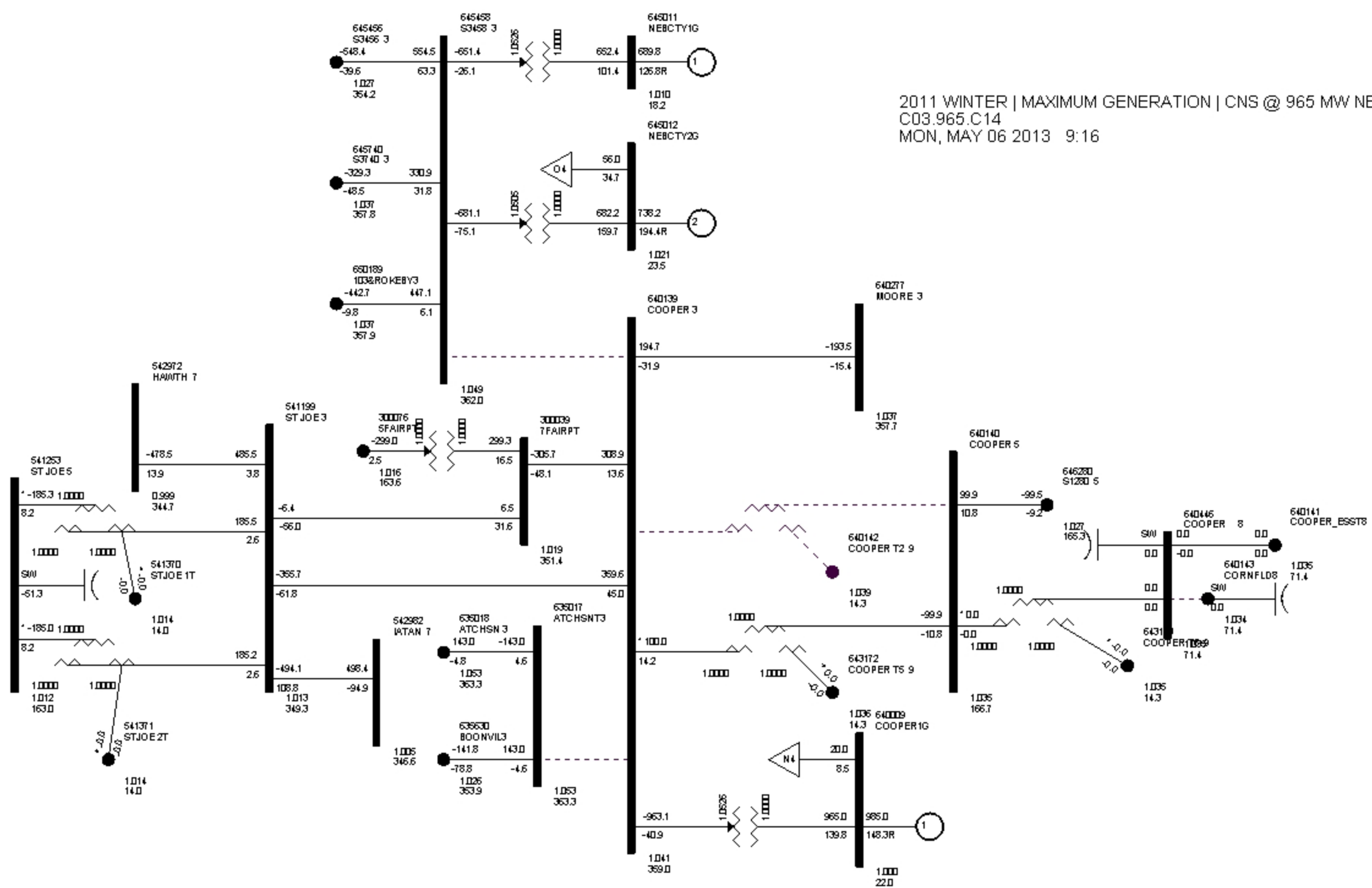
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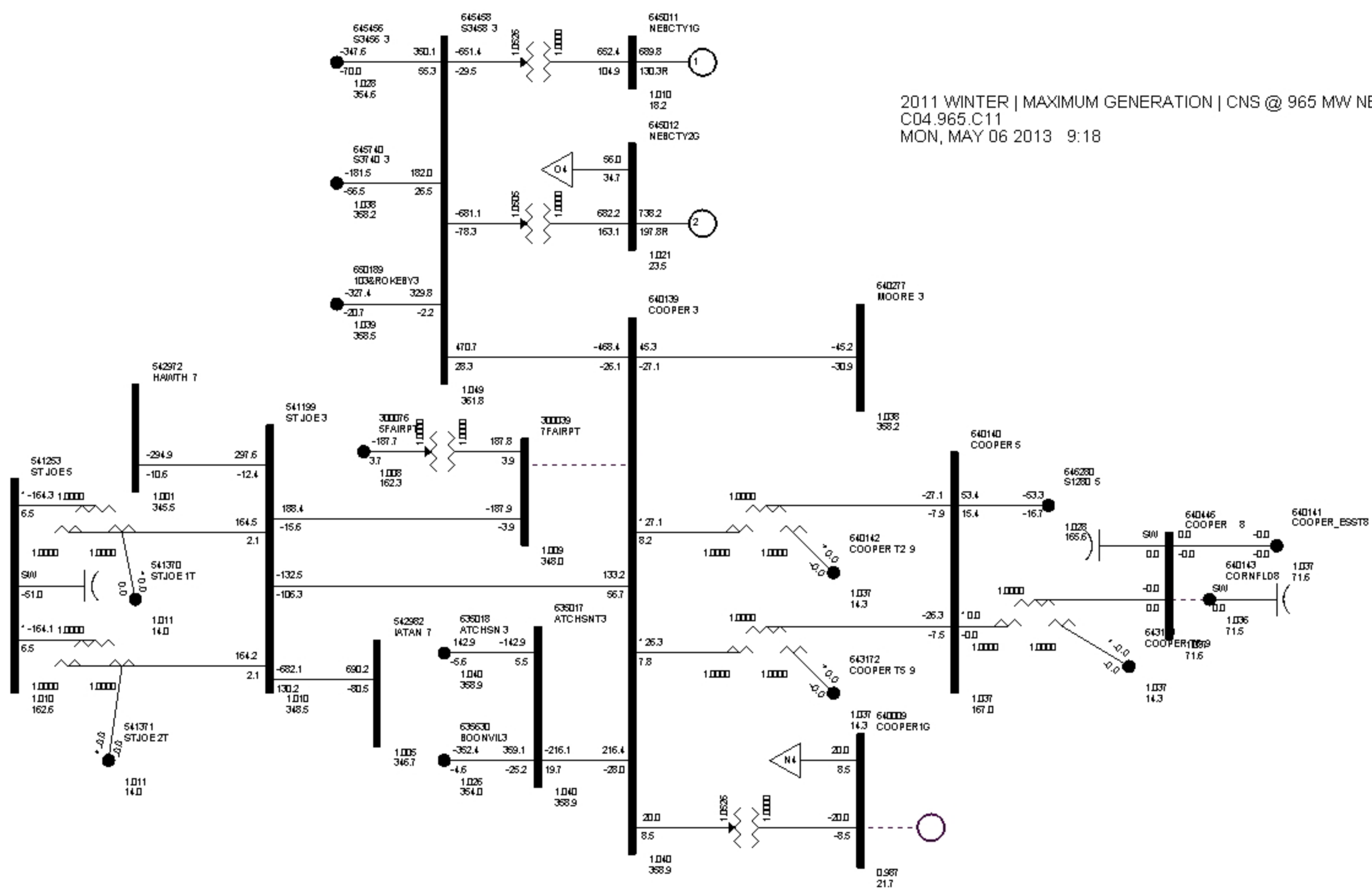
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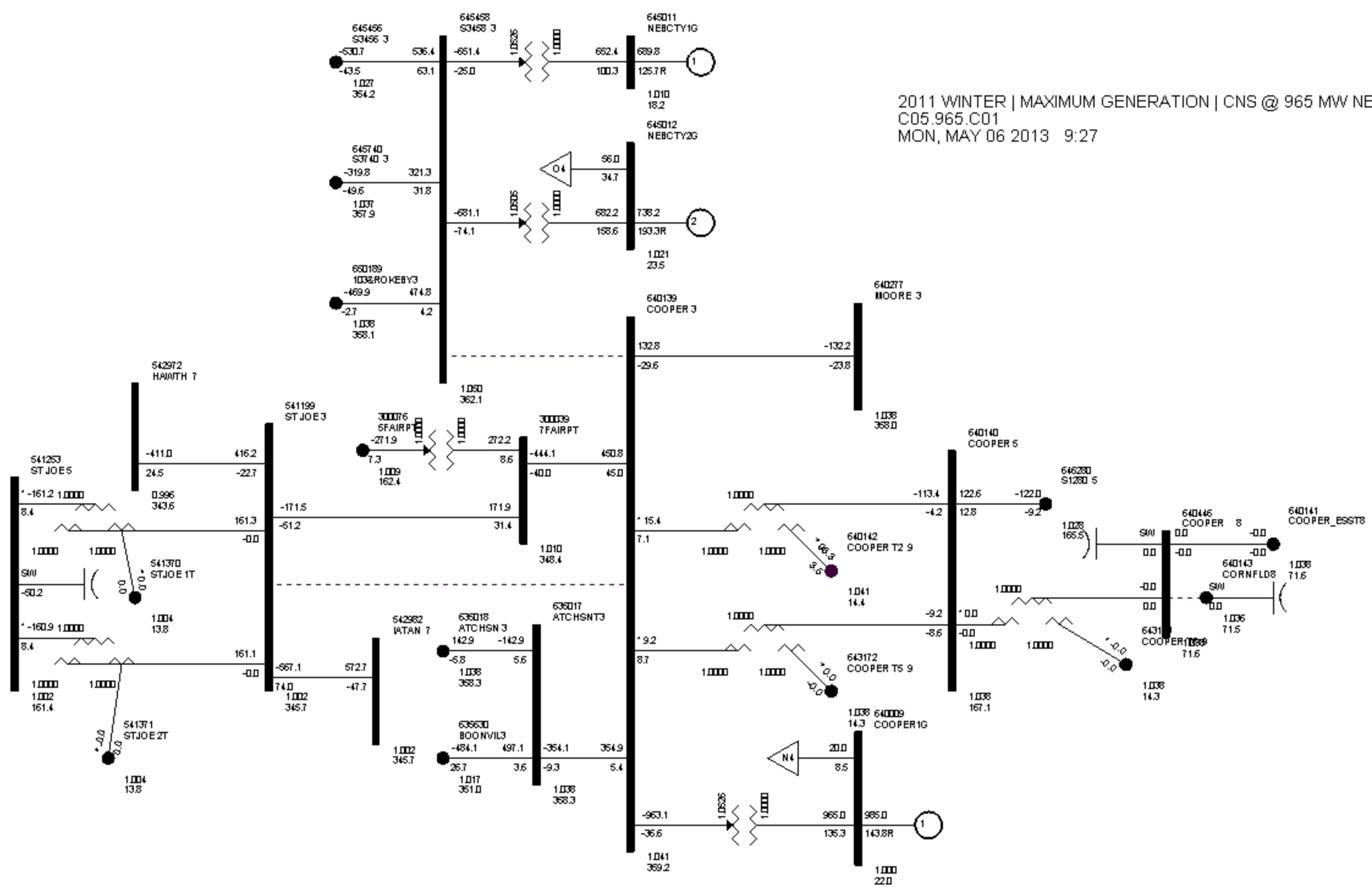
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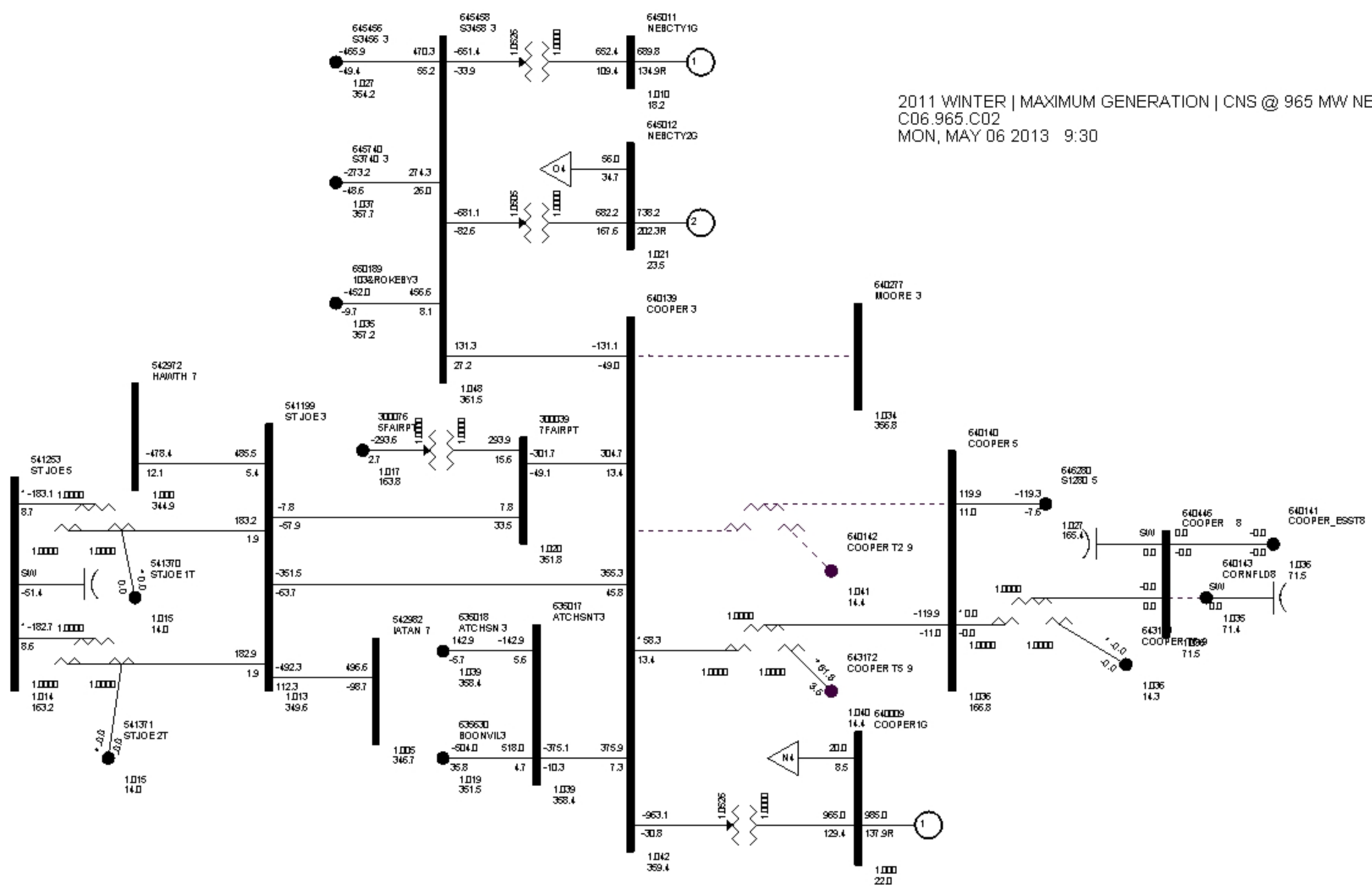
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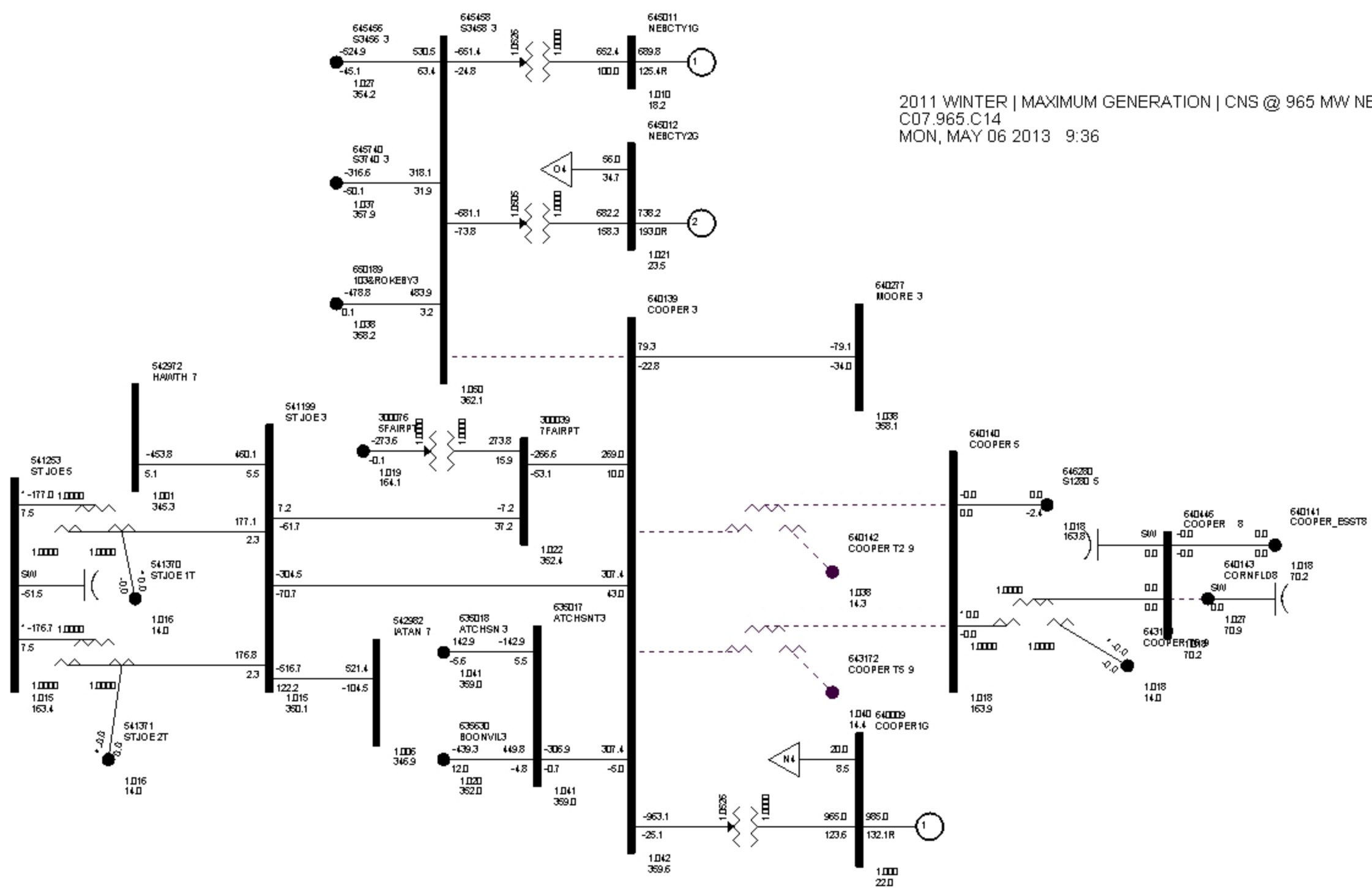
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8.0 Interconnection Facility Review

The Extended Power Uprate at Cooper Nuclear Station would require the 345 kV substation equipment to have at least 2000 Amp capability. The Generator Step-Up (GSU) Transformer was replaced in 2012 from a 1008 MVA unit (3-336 MVA single-phase units) to a 1230 MVA unit (3-410 MVA single-phase units). The EPU necessitates a detailed review of the 345 kV substation equipment from the high-side of the Generator Step-Up (GSU) transformer to the substation. As a result of this detailed engineering review, T&D Engineering has identified seven disconnect switches that would need upgraded to support the EPU requirements. The cost estimate to complete this work would be approximately \$720,000.

Cooper Nuclear Station has identified the need to increase the capability of the iso-phase bus as part of the Extended Power Uprate project. The scope of the iso-phase bus project is still being developed and assessed by the plant. Tentatively, the iso-phase bus work is anticipated to be completed during RE30 in 2018 to facilitate the increased capability requirements of the Extended Power Uprate.

9.0 Detailed Cost Estimates & Project Schedule

NPPD's Engineering, Asset Management, and Project Management groups have reviewed the list of interconnection facility upgrades that are required for the Extended Power Uprate at Cooper Nuclear Station. There were no network upgrades discovered in the system impact study or facility study. Detailed cost estimates have been prepared for each of the interconnection facility upgrades that were identified in the SPP DISIS-2012-002 system impact study and this facility study. The prepared cost estimates are budgetary level estimates (+75%/-25%) and assume implementation of standard NPPD construction and procurement practices. The cost estimates for the interconnection facilities and network upgrades are below:

- Uprate Cooper 345 kV substation terminal facilities to at least 2000 Amp – Upgrade seven disconnect switches in the Cooper 345 kV substation.

\$ 720,000

Total Interconnection & Network Upgrades: \$720,000

The substation one-line diagram highlighting the interconnection facility upgrades are on the following page. NPPD will work with the generation interconnection project to develop project schedules for the interconnection facilities and network upgrade projects listed above during the development of the generation interconnection agreement. Typical implementation schedules for new transmission lines (≥ 115 kV) are roughly 4 years or longer to accommodate the public routing process and construction schedules. Substation additions require less land acquisition and typically can be implemented in less time or approximately 2-3 years. Project schedule details will be further discussed in the development of the generator interconnection agreement (GIA) and the milestones associated with the generation interconnection project.

It should also be noted that the interconnection plan for the DISIS-2012-002 generation projects are dependent on the transmission upgrades/additions that are required as part of the previous Definitive Interconnection Studies. If there are any modifications to the these previous studies and related upgrades, then the interconnection plan for the DISIS-2012-002 project could be affected.

Cooper 345 kV Substation One-Line Diagram with Interconnection Facility Upgrades

