



***Expedited System Impact Study for  
Generation Interconnection Request***

***GEN-2004-013***

***SPP Tariff Studies***

***(#GEN-2004-013)***

**December 2004**

## Executive Summary

<OMITTED TEXT>Customer has requested an Expedited System Impact Study to evaluate a proposal to add up to 900MW of generation in eastern Atchison County, KS. The requested in-service date is June 1, 2009.

The Customer has proposed the addition of 900MW of coal-fired generation at the site. The unit will be interconnected to the existing Kansas City Power and Light (KCPL) Iatan 345kV substation.

This interconnection request was studied including a previously queued 900MW generation addition at the same interconnection point (GEN-2004-008). Including the existing 670MW of generation at Iatan and the 900MW for GEN-2004-008, the total generation capability at the Iatan 345kV substation would be a net of 2470MW.

The network upgrade requirements include expansion of the Iatan 345kV bus and installation of new 345kV circuit breakers to provide terminals for the unit and start/standby transformers. There are also numerous network upgrades required to alleviate the contingency overloading on the 345kV and 161kV transmission systems that results from the additional generation.

The total estimated cost of the required network upgrades for interconnection is \$41,500,000 including work at the Iatan substation.

Short circuit analysis will be performed as part of the Facility Study performed by the Transmission Owner if the customer wishes to proceed.

Transient stability analysis indicates that for more probable disturbances with normal fault clearing times, system stability is maintained. With the occurrence of a less probable, extreme fault condition at the Iatan bus, in which fault clearing is delayed due to stuck breaker conditions, the Iatan and Customer units exhibit poor damping until the fault is cleared. Instability appears to be limited to relatively low magnitude, high frequency voltage oscillations.

Equipment at the Iatan substation is equipped with independent pole tripping to reduce the likelihood of delayed clearing of the three-phase fault condition. New equipment for the interconnection facilities should include similar operational capability, and out-of-step relaying is recommended for equipment protection.

Transmission Service is not analyzed during the interconnection impact study.

# 1. Introduction

## 1.1 Project Description

<OMITTED TEXT>Customer has requested a System Impact Study to evaluate a proposal to add up to 900MW of generation in eastern Atchison County, KS. The requested generation addition is for a 900MW coal-fired unit at the customer's site near the existing KCPL Iatan 345kV substation. The requested in-service date is June 1, 2009.

This interconnection request was studied including a previously queued 900MW generation addition at the same interconnection point (GEN-2004-008). Including the existing 670MW of generation at Iatan and the 900MW for GEN-2004-008, the total generation capability at the Iatan 345kV substation would be a net of 2470MW.

## 1.2 Study Methodology

The Interconnection System Impact Study investigates the effect of new generation on system performance during normal and contingency conditions. Deliverability of power to final customers is not analyzed. Those facilities that are affected only by the interconnection of the generation are analyzed in the Interconnection System Impact Study. Separate studies evaluate the impact of deliverability of the plants output.

Comparison of the base case, which excludes the proposed facilities, to the study case, which includes the proposed Customer unit, reveals any system constraints that result from the proposed generation addition. The analysis cases are based on the 2005 April Minimum, 2007 summer peak, 2007 winter peak, 2010 summer peak and 2010 winter peak to address the different seasonal loading conditions of the system. The proposed plant is modeled at maximum output of 900MW for all study cases.

The proposed plant is to be located in the Kansas City Power & Light (KCPL) control area. In order to determine the impact on facilities based only on the interconnection of the facility, a single sink for the plant's output is not studied. The plant's output is allocated to KCPL and the rest of the SPP area footprint on a pro rata basis.

Full AC contingency analysis (ACCC) is used to investigate the limiting constraints of the transmission system during contingency events. The analysis is performed using Shaw PTI's PSS/E v. 29.5. Comparisons are made between the cases with and without the Customer generation in service in order to identify the severity and cause of the overloading conditions. All branches in the KCPL and surrounding control areas above 69kV and all ties with KCPL are monitored for overloads exceeding 100% of emergency rating (Rate B). A TDF of 3% is required before a facility is flagged as impacted. Buses are monitored for voltage deviations exceeding +/- 5% of nominal.

## 2. Powerflow Analysis

### 2.1 2005 April Minimum

The 2005 April Minimum study case is used to evaluate light loading conditions and the effect of the added generation. It is likely that load levels and facilities will be different from the 2005 season when the generating unit enters service. However, the 2005 April Minimum case will provide insight into what will occur during light load conditions.

Added generation at the Customer facility results in no base case overloads on the transmission system. Prior to the addition of the proposed network upgrades, several transmission facilities were overloaded due to contingencies. After addition of the proposed network upgrades, no overloads occur as a result of outages of transmission facilities in the 2005 April Minimum case.

### 2.2 2007 Summer Peak

The 2007 Summer Peak study case is used to evaluate summer peak loading conditions and the effect of the added generation. It is likely that load levels and facilities will be different from the 2007 season when the generating unit enters service. However, the 2007 Summer Peak case will provide insight into what will occur during summer peak loading conditions and the reasons for overloads in later seasons.

Added generation at the Customer facility results in no base case overloads on the transmission system. Prior to the addition of the proposed network upgrades, several transmission facilities were overloaded due to contingencies. After addition of the proposed network upgrades, some overloading still occurs as a result of outages of transmission facilities in the 2007 Summer Peak case. The table below documents the facilities impacted by the addition of the generation after the proposed network upgrades are added.

Facility Name	Case	Rate B	Base Case Loading	Transfer Case Loading	% TDF	Outage Contingency Causing Overload Or Undervoltage
PLATTE CITY - IATAN 161kV	07SP	335	93.0	115.0	8.2	NASHUA - HAWTHORN 345KV CKT 1

## 2.3 2007 Winter Peak

Added generation at the Customer facility results in no base case overloads on the transmission system. Prior to the addition of the proposed network upgrades, several transmission facilities were overloaded due to contingencies. After addition of the proposed network upgrades, some overloading still occurs as a result of outages of transmission facilities in the 2007 Winter Peak case. The table below documents the facilities impacted by the addition of the generation after the proposed network upgrades are added.

Facility Name	Case	Rate B	Base Case Loading	Transfer Case Loading	% TDF	Outage Contingency Causing Overload Or Undervoltage
PLATTE CITY - IATAN 161kV	07WP	335	86.9	108.4	8.0	NASHUA - HAWTHORN 345KV CKT 1
ST JOE - IATAN 345kV	07WP	956	74.7	101.4	28.4	NASHUA - HAWTHORN 345KV CKT 1

## 2.4 2010 Summer Peak

Added generation at the Customer facility results in no base case overloads on the transmission system. Prior to the addition of the proposed network upgrades, several transmission facilities were overloaded due to contingencies. After addition of the proposed network upgrades, some overloading still occurs as a result of outages of transmission facilities in the 2010 Summer Peak case. The table below documents the facilities impacted by the addition of the generation after the proposed network upgrades are added.

Facility Name	Case	Rate B	Base Case Loading	Transfer Case Loading	% TDF	Outage Contingency Causing Overload Or Undervoltage
NASHUA - HAWTHORN 345kV	10SP	1138	75.8	100.9	31.7	STRANGER - CRAIG 345KV CKT 1
PLATTE CITY - IATAN 161kV	10SP	335	93.4	114.5	7.9	STRANGER - CRAIG 345KV CKT 1

## 2.5 2010 Winter Peak

Added generation at the Customer facility results in no base case overloads on the transmission system. Prior to the addition of the proposed network upgrades, several transmission facilities were overloaded due to contingencies. After addition of the proposed network upgrades, some overloading still occurs as a result of outages of transmission facilities in the 2010 Winter Peak case. The table below documents the facilities impacted by the addition of the generation after the proposed network upgrades are added.

Facility Name	Case	Rate B	Base Case Loading	Transfer Case Loading	% TDF	Outage Contingency Causing Overload Or Undervoltage
PLATTE CITY - IATAN 161kV	10WP	335	87.1	107.6	7.6	STRANGER - CRAIG 345KV CKT 1
NASHUA – SMITHVILLE 161KV	10WP	262	56.0	135.4	23.1	STRANGER - CRAIG 345KV CKT 1
SMITHVILLE – PLATTE CITY 161KV	10WP	262	60.6	140.1	23.1	STRANGER - CRAIG 345KV CKT 1
ST JOE - IATAN 345kV	10WP	956	74.8	101.3	28.1	NASHUA - IATAN 345KV CKT 1

## 3. Interconnection Network Upgrades

### 3.1 Interconnection Substation

The Customer plant will be interconnected with the 345kV transmission system at the Iatan substation in northern Platte County, MO. The existing 345kV bus will be expanded to accommodate the new generating unit and two (2) unit auxiliary transformers. New circuit breakers will be added to accommodate the new unit.

### 3.2 Other Network Upgrades

Several facilities are required to be built or upgraded in the local area in order to allow for the interconnection of the proposed generator. These facilities are listed below in Table 1:

<b>Table 1 – Summary of Network Upgrade Costs for Interconnection</b>	
<b>Network Upgrades</b>	
Description	Cost
<b>latan</b>	
Add 1 345kv line terminal on the 345kV bus	
Add 161kv ring bus consisting of 4 breakers, 1 transformer position, and 3 line terminals	
Add a 400MVA 345/161kv transformer	\$ 6,187,000.00
<b>Tap Platte City - Stranger Creek 161kV at latan</b>	
Run existng Platte City - Stranger Creek 161kV line into and out of new 161kV ring bus at latan.	\$ 1,420,000.00
<b>latan - Lake Road 161kV</b>	
23 miles of new 161 kV line including associated right-of-way	\$ 8,158,000.00
<b>2nd Circuit latan - Stranger Creek 345kV</b>	
13 miles of new 345kV line including associated right-of-way and extra terminal at Stranger Creek	\$ 6,100,000.00
<b>Nashua 345/161kV Transformer</b>	
New 345/161kV transformer at Nashua substation	\$ 5,000,000.00
<b>Platte City - latan 161kV</b>	
Required terminal changes at Platte City to increase rating to 584/630MVA	\$ 850,000.00
<b>St. Joe - latan 345kV</b>	
Structure change-outs to increase rating to 1195MVA	\$ 3,000,000.00
<b>Platte City - Smithville 161kV</b>	
Rebuild with 795 ACSR	\$ 6,067,500.00
<b>Nashua - Smithville 161kV</b>	
Rebuild with 795 ACSR	\$ 1,717,500.00
<b>Nashua - Hawthorn 345kV</b>	
Structure change-outs to increase rating to 1195MVA	\$ 3,000,000.00
<b>Total Required Network Upgrades</b>	<b>\$ 41,500,000.00</b>

The facilities mentioned above are required only for interconnection of the generation facility. The costs do not include any costs associated with the deliverability of the energy to final customers. These costs are determined by separate studies when the Customer requests transmission service through Southwest Power Pool's OASIS.

## 4. Short Circuit Analysis

A short circuit study will be conducted by KCPL as part of the Facility Study to determine if fault current levels exceed equipment ratings at KCPL facilities.

## 5. Transient Stability Analysis

Transient Stability analysis was performed to verify dynamic system response to disturbances on the system using the 2010 summer peak model. The customer provided machine data for the proposed Customer plant. Typical values were provided for a 1000MVA generator with an ESST4B exciter. This data was used to create a PTI dynamics model for the Customer plant.

The machine data for the remaining system was obtained from the current SPP dynamics data files modified to include all previously queued plants proposed for the study period. Selected fault scenarios were applied with clearing times specified in accordance with KCPL Planning Criteria. Single phase and three phase fault conditions were tested at the interconnection point and machines in the KCPL, WERE, MIPU, NPPD, OPPD, and KACY control areas were monitored for stability. Analysis of stuck breaker events was included to examine the effects of extreme disturbances. A list of the faults applied is in Table 4 below.

**Table 4 Selected Faults**

<b>Fault #</b>	<b>Fault Description</b>
FLT_1_1PH	Single Phase fault at Stranger Creek on the Stranger Creek -- Iatan 345kV line
FLT_1_3PH	Three Phase fault at Stranger Creek on the Stranger Creek -- Iatan 345kV line
FLT_2_1PH	Single Phase fault at St. Joe on the St. Joe -- Iatan 345kV line
FLT_2_3PH	Three Phase fault at St. Joe on the St. Joe -- Iatan 345kV line
FLT_3_1PH	Single Phase fault at Stranger Creek on the Stranger Creek -- Craig 345kV line
FLT_3_3PH	Three Phase fault at Stranger Creek on the Stranger Creek -- Craig 345kV line
FLT_4_1PH	Single Phase fault at Stranger Creek on the Stranger Creek -- Hoyt 345kV line
FLT_4_3PH	Three Phase fault at Stranger Creek on the Stranger Creek -- Hoyt 345kV line
FLT_5_1PH	Single Phase fault at St. Joe on the St. Joe -- Cooper 345kV line
FLT_5_3PH	Three Phase fault at St. Joe on the St. Joe -- Cooper 345kV line
FLT_6_1PH	Single Phase fault at St. Joe on the St. Joe -- Fairport 345kV line
FLT_6_3PH	Three Phase fault at St. Joe on the St. Joe -- Fairport 345kV line
FLT_7_1PH	Single Phase fault at the Midpoint on the Cooper -- Fairport 345kV line
FLT_7_3PH	Three Phase fault at the Midpoint on the Cooper -- Fairport 345kV line
FLT_8_1PH	Single Phase fault at St. Joe on the St. Joe -- Hawthorn 345kV line
FLT_8_3PH	Three Phase fault at St. Joe on the St. Joe -- Hawthorn 345kV line
FLT_9	Trip Iatan Unit #1 (670MW)
FLT_10	Trip Customer Unit at Iatan (900MW)
FLT_11	Trip Jeffrey Energy Center Unit #2 (681MW)
FLT_12_1PH	Single Phase fault at Iatan on the St. Joe -- Iatan 345kV line
FLT_12_3PH	Three Phase fault at Iatan on the St. Joe -- Iatan 345kV line
FLT_12_1PH_stuck	Stuck breaker/delayed clearing -- Single Phase fault at Iatan on the St. Joe -- Iatan 345kV line
FLT_12_3PH_stuck	Stuck breaker/delayed clearing -- Three Phase fault at Iatan on the St. Joe -- Iatan 345kV line



The faults above were applied in two scenarios: A basecase without the Customer plant or the proposed network upgrades in service, and a case with the Customer plant online at 900MW and the proposed network upgrades in service.

The study analysis indicates that normally cleared single-phase and three-phase fault events do not cause system instability. However, a less probable, extreme disturbance involving a stuck breaker with delayed clearing of a three-phase fault causes the units connected to the latan substation to become unstable. The terminal voltage of the plants begins to oscillate wildly. Out-of-synchronism relaying would trip the latan and Customer units offline and the remainder of the system should remain stable. Oscillations are generally damped following all fault clearing. The use of Independent pole tripping at the latan substation reduces the likelihood of the three-phase delayed clearing condition and is recommended, in addition to out-of-step relaying for generator protection during the extreme disturbance events.

Plots of machine angles and selected 345kV system voltages for all scenarios analyzed are attached in the Appendices to this report.

## **6. Conclusion**

This System Impact Study was requested by Customer to assess the interconnection requirements for the addition of 900MW of new generation sited in eastern Atchison County, KS. The analysis evaluates the impact of introducing the new generation on the power system during normal operation and contingency conditions.

The addition of 900MW generating capacity at the proposed site results in the overloading of transmission facilities during outages on the 345kV and 161kV system. The existing circuits from the latan substation are inadequate for the additional generation. Several new outlets from the latan substation are required for the plant interconnection to allow the transfer of power from the latan site under contingency conditions.

Network upgrades are also required at the latan substation to accommodate the proposed plant. Expansion of the 345kV ring-bus and installation of new 345kV circuit breakers is necessary for the new unit terminal. Land acquisition and environmental impact issues are not included in the cost of constructing interconnection facilities. The total estimated cost for the network upgrades is \$41,500,000. An estimated project schedule will be determined during the Facility Study.

The costs do not include any costs associated with the deliverability of the energy to final customers. These costs are determined by separate studies when the Customer requests transmission service through Southwest Power Pool's OASIS.

## **Appendix A-1**

### **Plots of Fault Simulations**

**Plots of selected machine angle response during faults**

**Scenario:  
2010 Summer Peak  
Basecase**

SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
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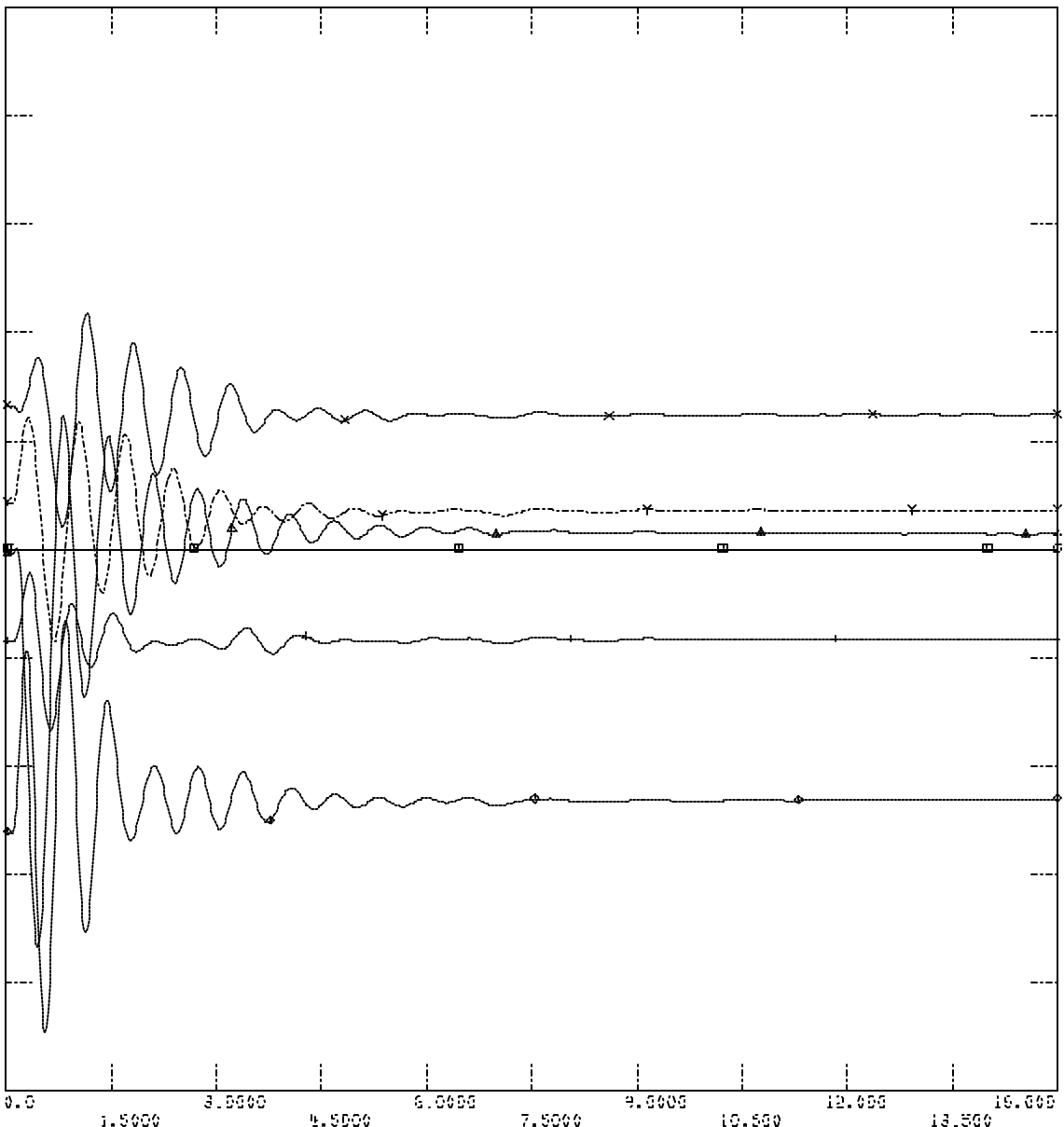
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25.000 CHNL # 5: CRNG HAWTHORNE GS KCPL3

35.000 CHNL # 4: CRNG JARVIS G1 KCPL3

50.000 CHNL # 3: CRNG JARVIS G2 KCPL3

50.000 CHNL # 2: CRNG RICHMOND 1 KCPL3



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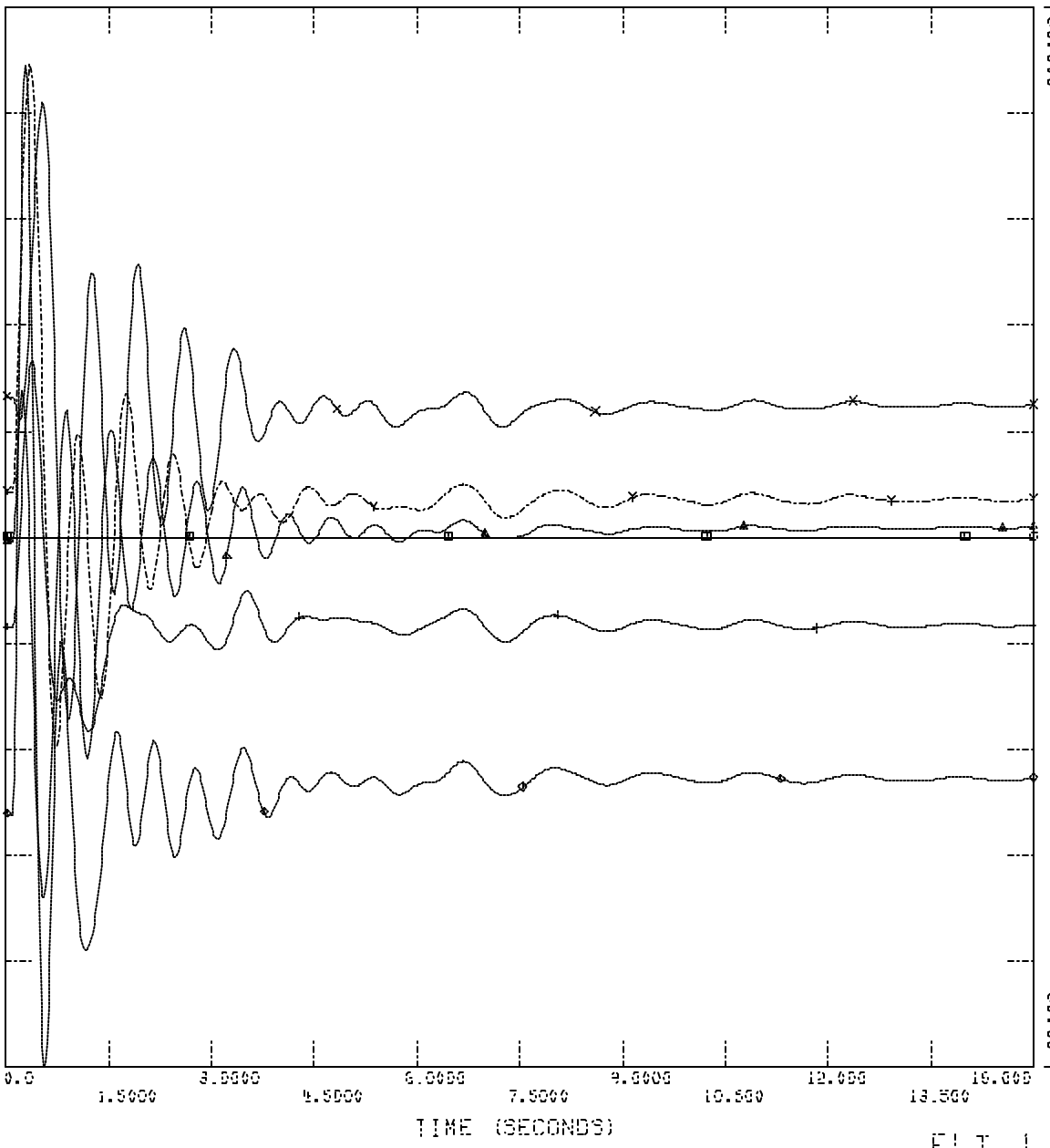
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50.000 CHNL # 3: CRNG JARVIS G2 KCPLJ 0.0

50.000 CHNL # 2: CRNG RICHMOND 1 KCPLJ -50.000



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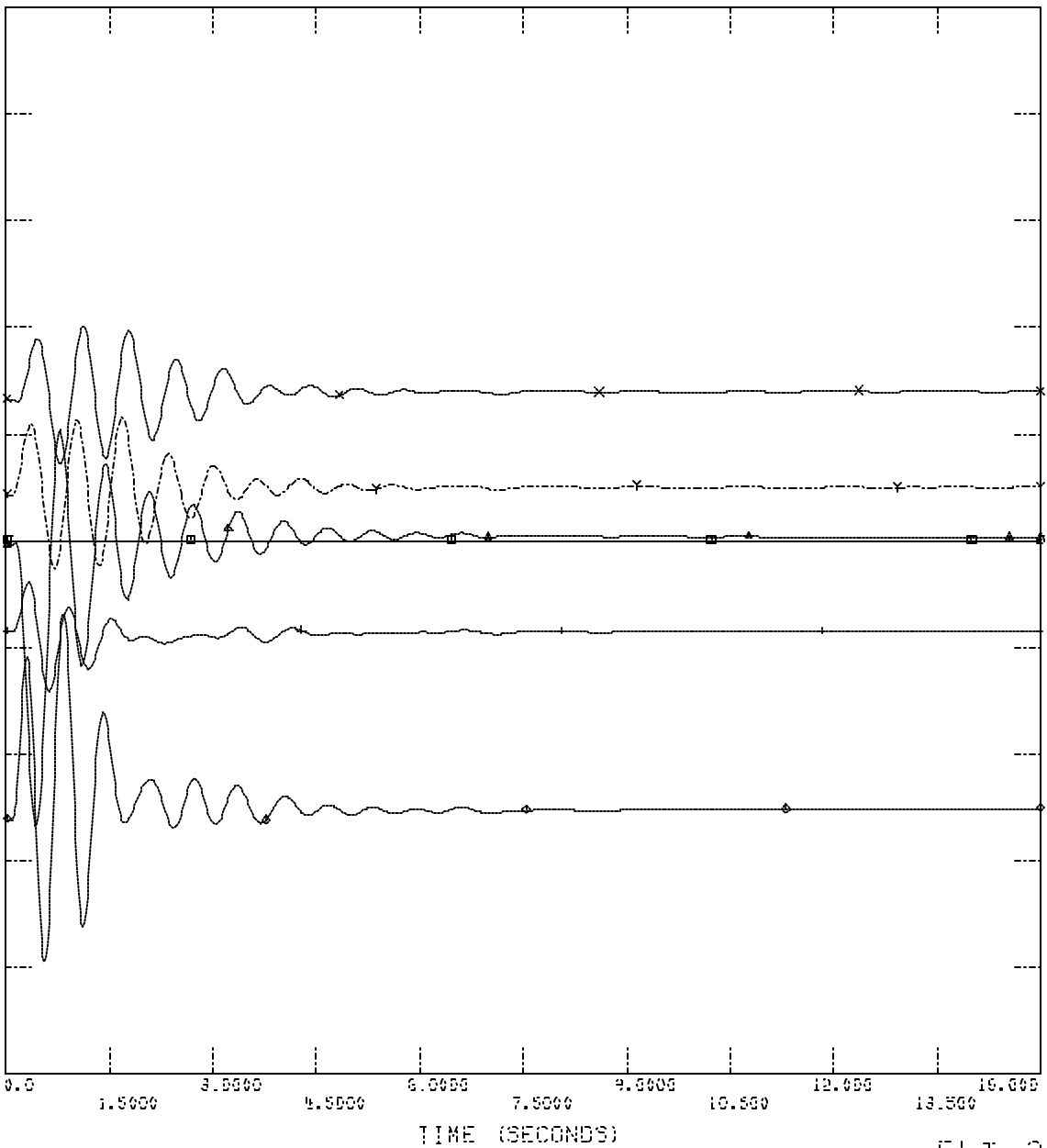
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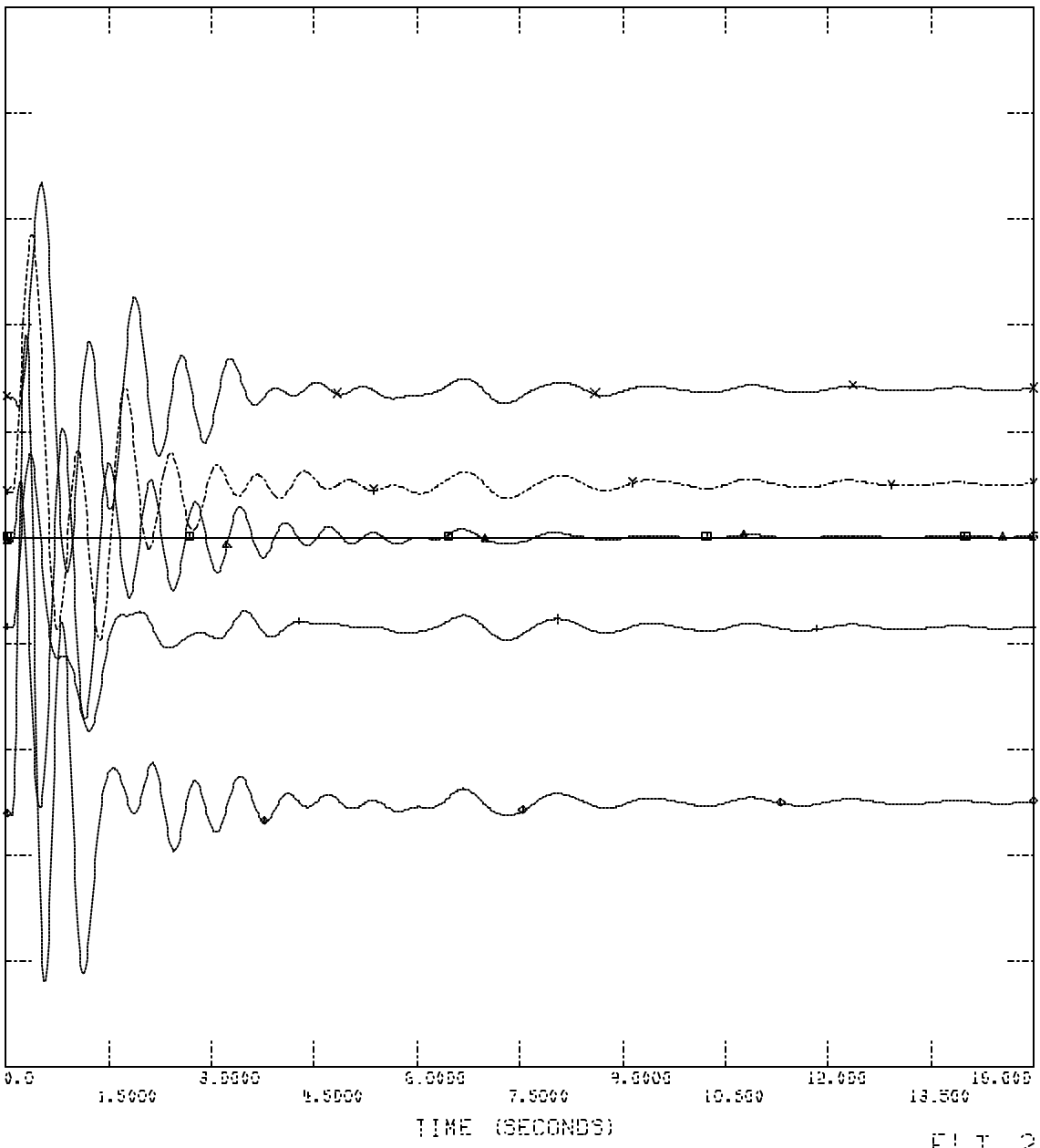
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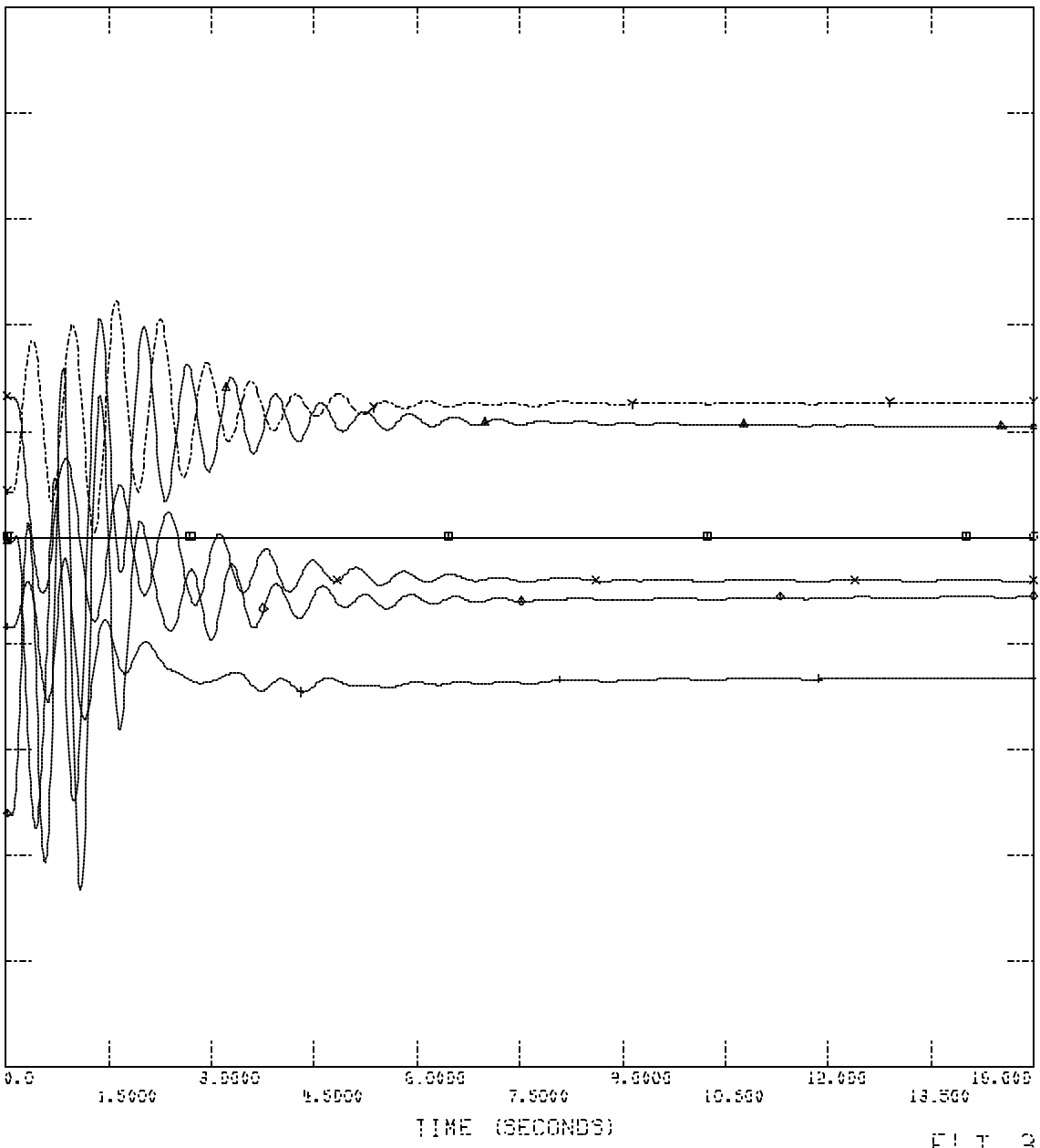
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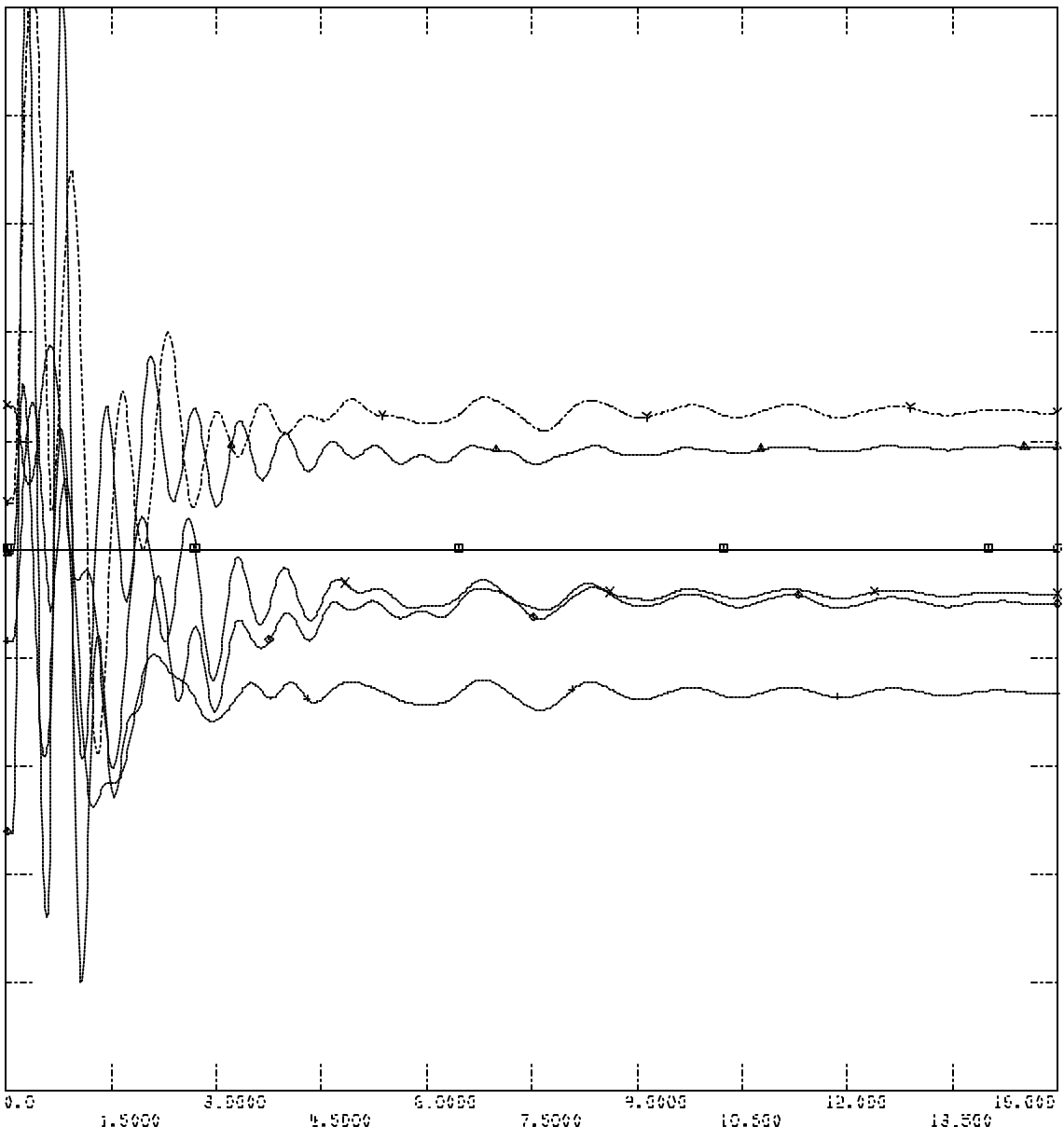
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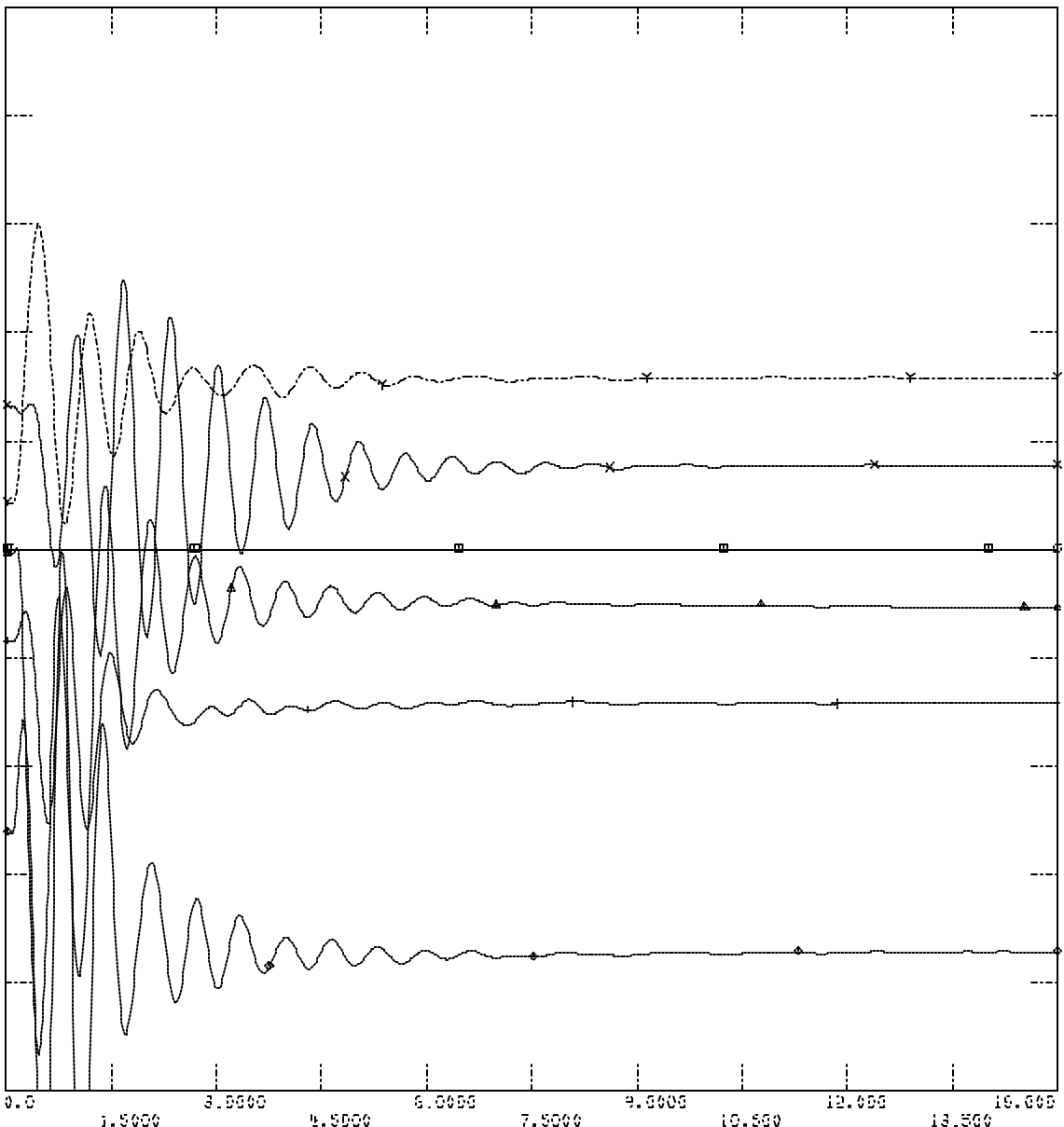
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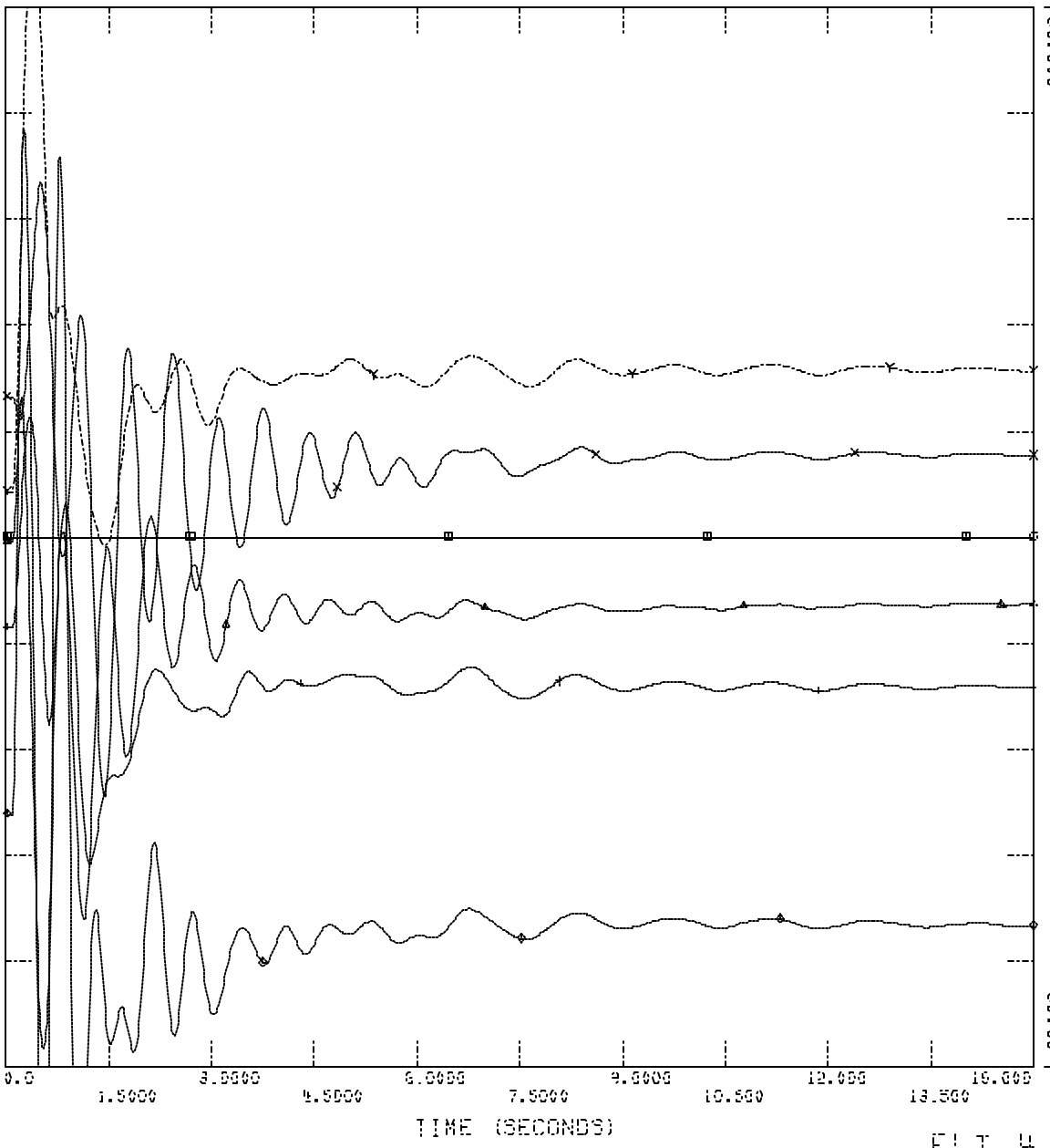
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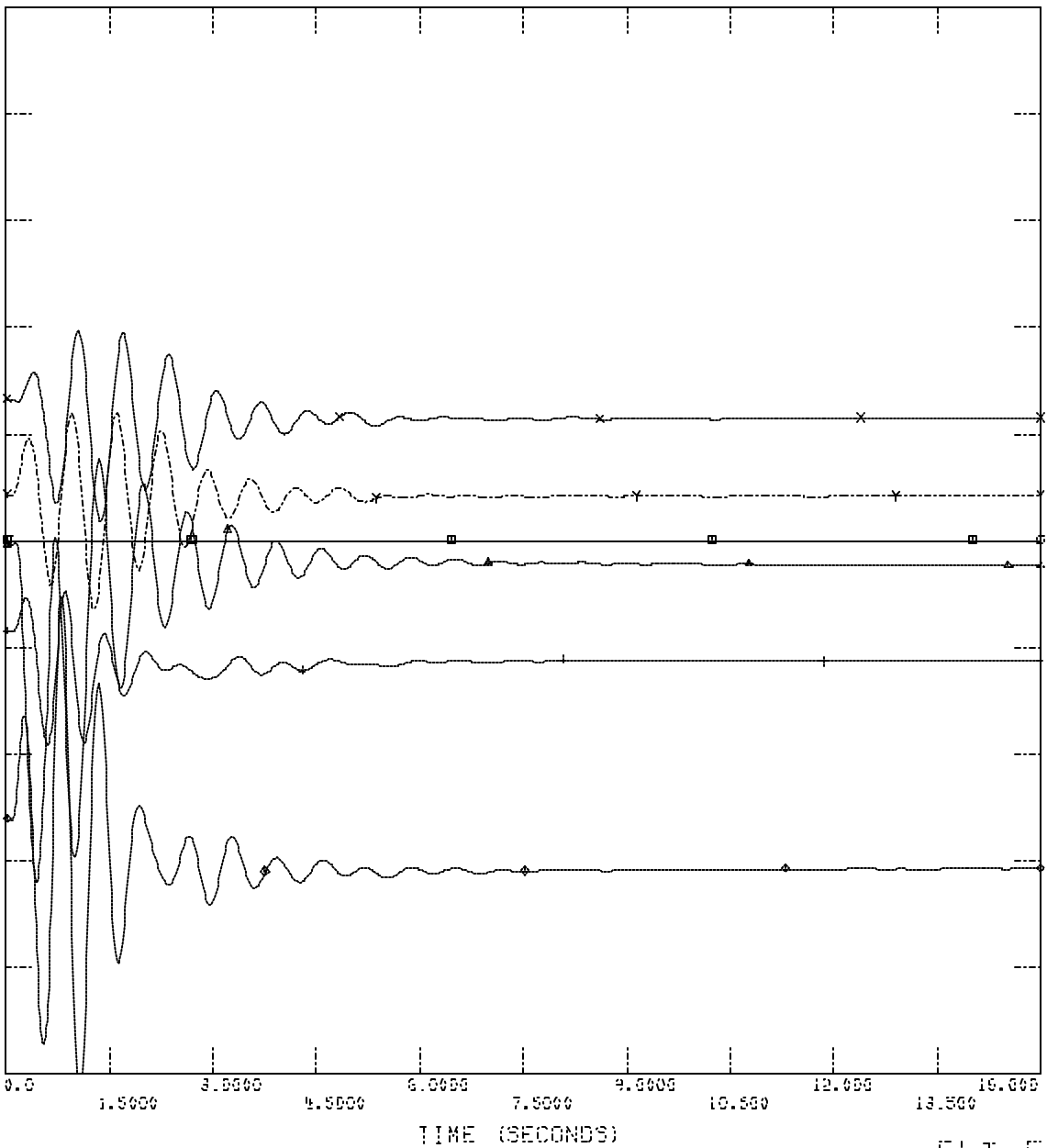
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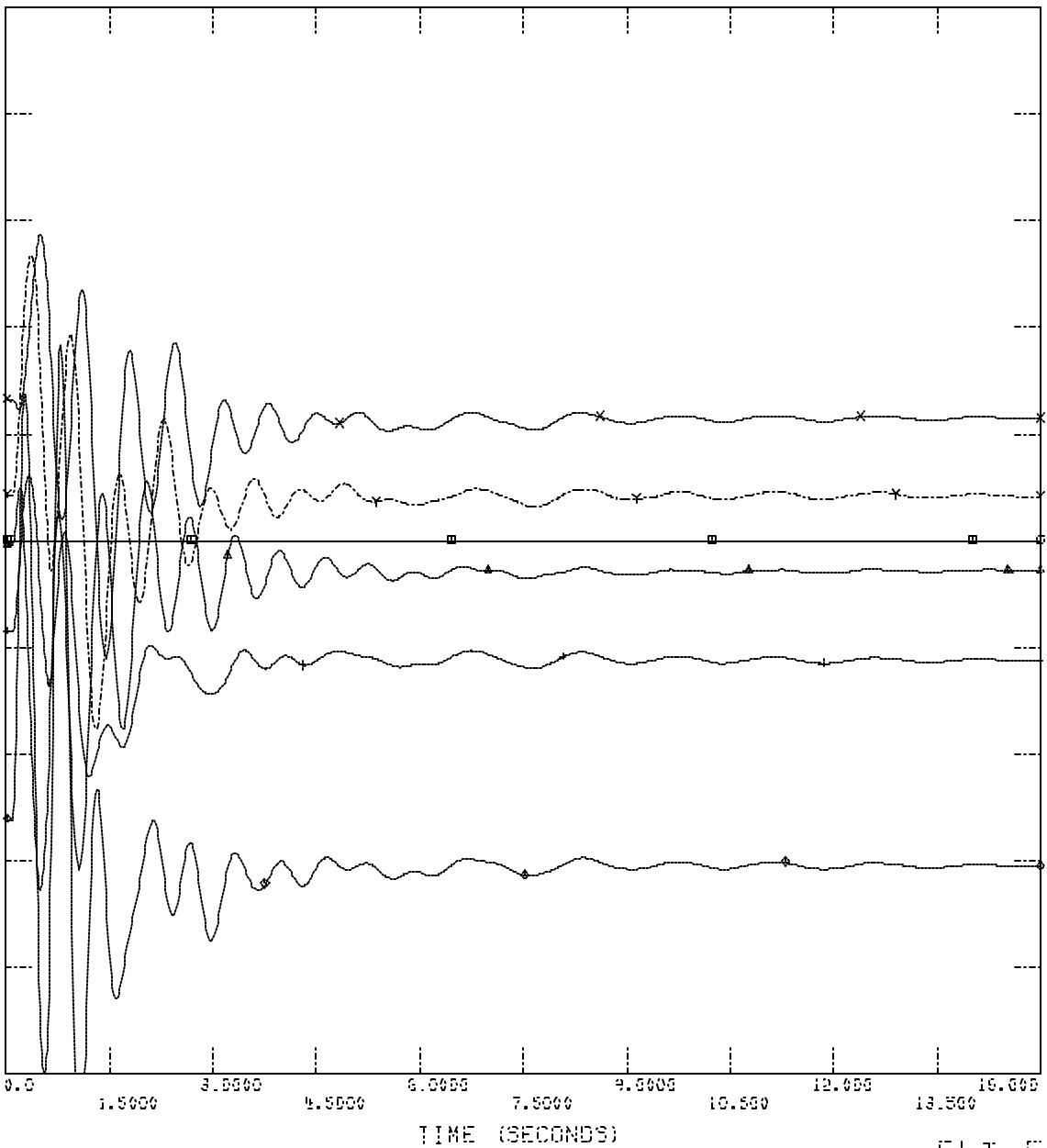
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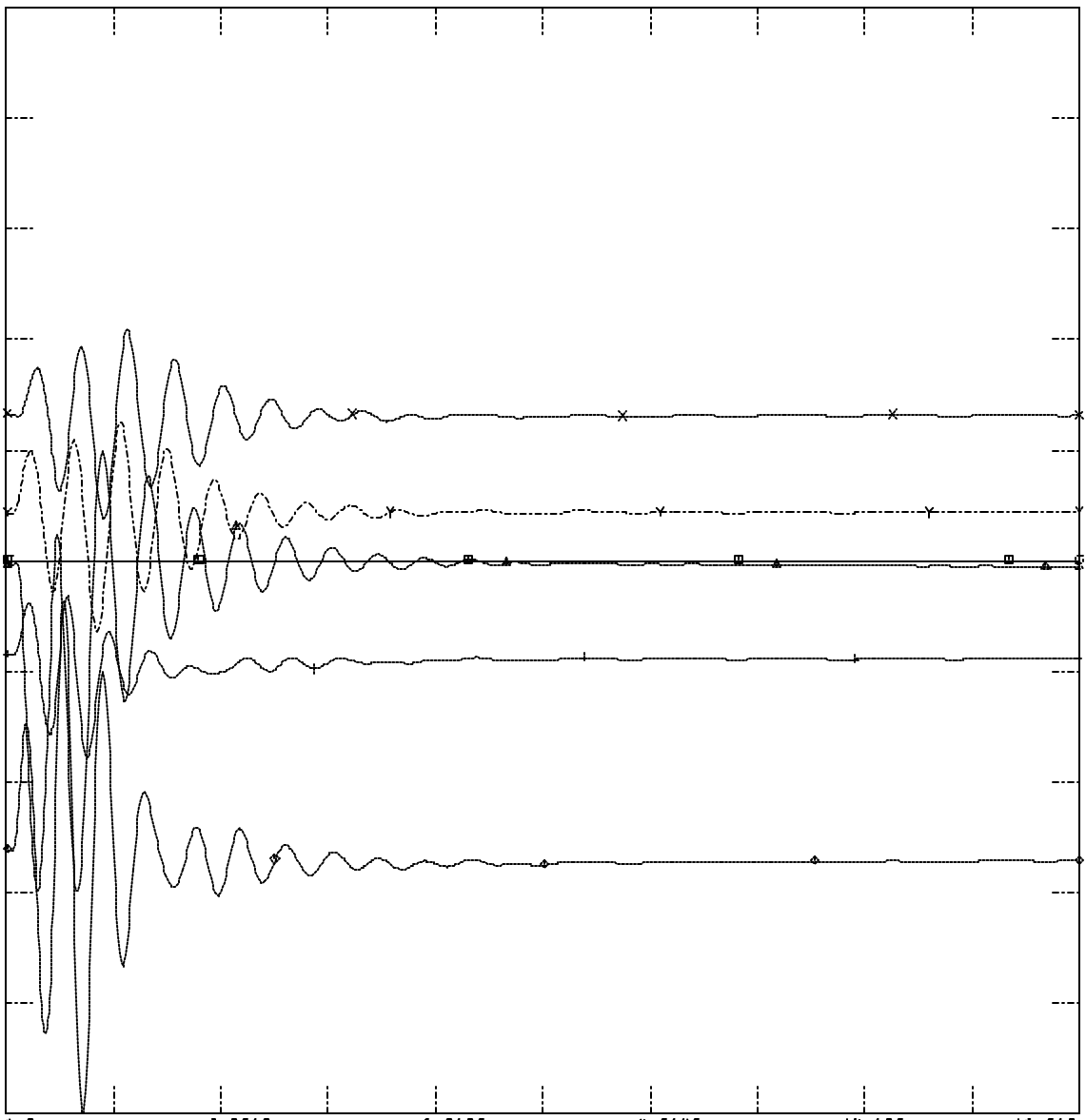
35.000 10.000

CHNL # 3: CRNG JARIN G2 KCPL3

50.000 0.0

CHNL # 2: CRNG RICHMOND 1 KCPL3

50.000 -50.000



TUE, OCT 12 2004 8:56

FLT\_6\_1PH\_MACHINE ANGLES

SPP MDMG Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR QUEUED

3000  
 1000  
 0000

FILE: C:\Interconnection Studies\Worling\RESU175\FLT\_6\_3PH.OUT

CHNL # 15: CRNG JEFFREY LN CNTR MDEB3

35.000 10.000

CHNL # 14: CRNG WEST GARDNER CT KCPL3

-15.000 -40.000

CHNL # 5: CRNG HAMTHORNE GS KCPL3

25.000 0.0

CHNL # 4: CRNG JARVIS G1 KCPL3

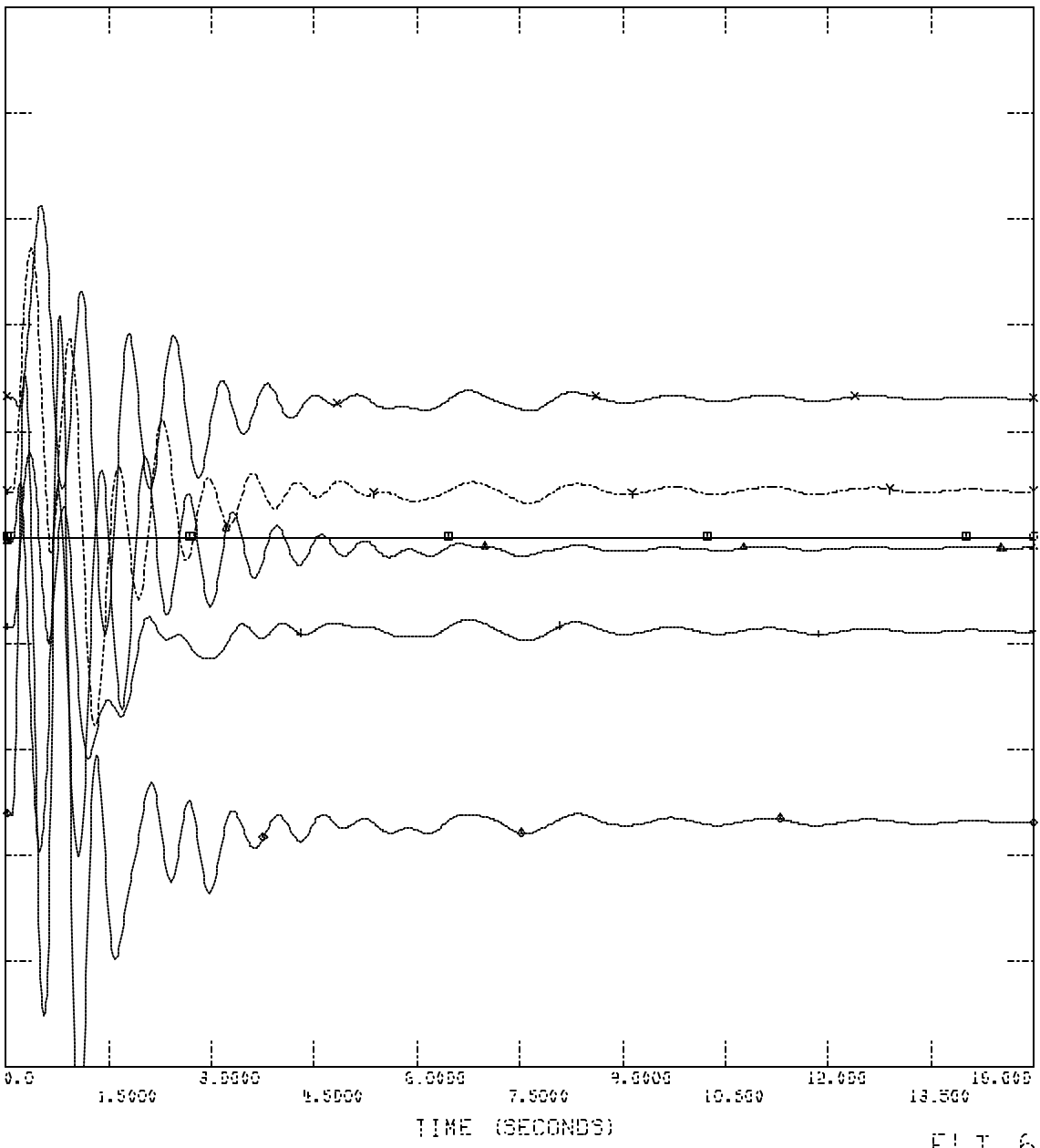
35.000 10.000

CHNL # 3: CRNG JARVIS G2 KCPL3

50.000 0.0

CHNL # 2: CRNG RICHMOND 1 KCPL3

50.000 -50.000



TUE, OCT 12 2004 8:56

FLT\_6\_3PH\_MACHINE ANGLES

3000  
1000  
0  
-1000  
-2000

SPP MDMG Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR QUEUED

FILE: C:\Interconnection Studies\WORKING\RESU175\FLT\_7\_1PH.OUT

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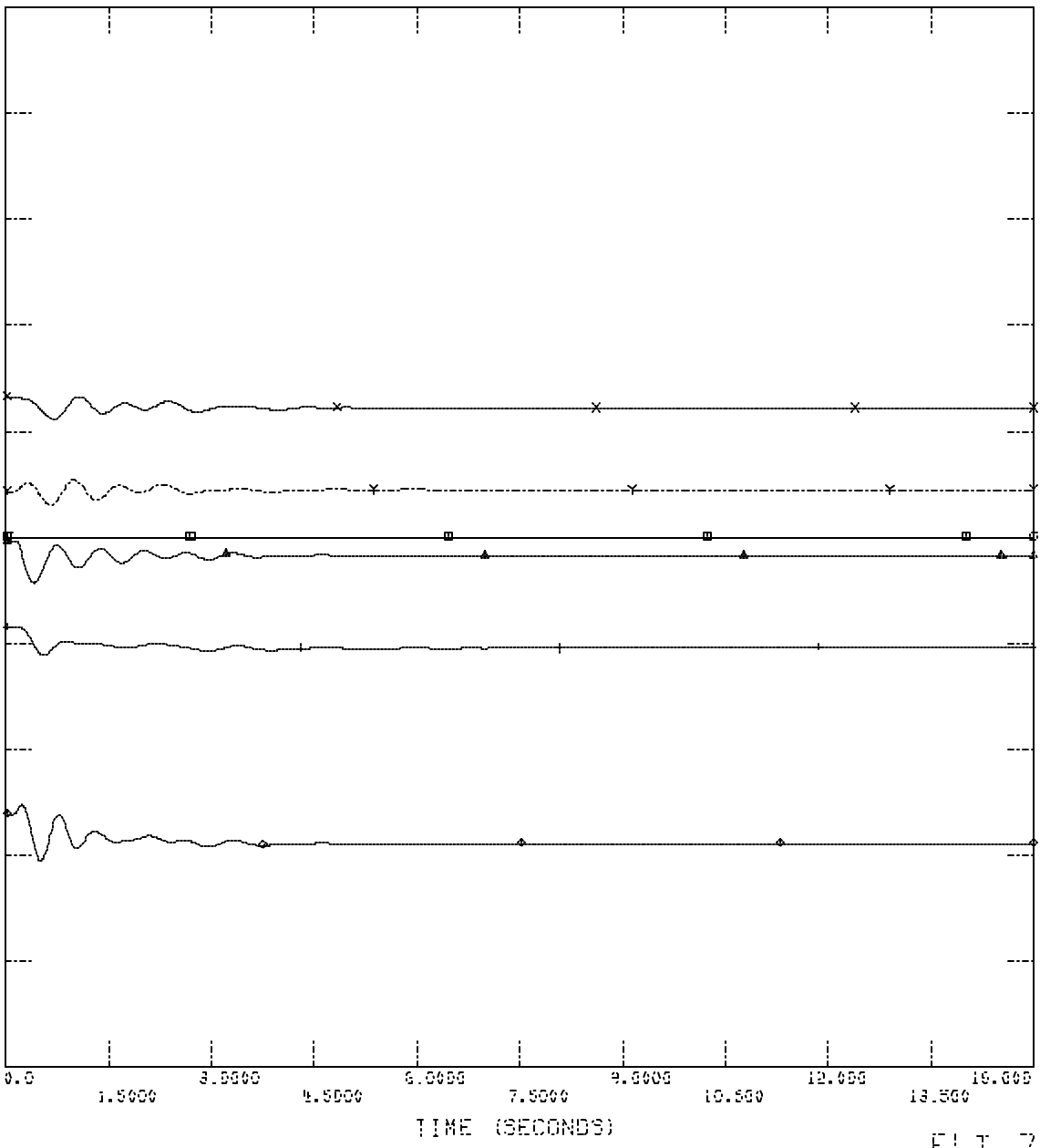
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CHNL # 5: CRNG HAMTHORNE GS KCPL3 0.0

CHNL # 4: CRNG JARVIS G1 KCPL3 10.000

CHNL # 3: CRNG JARVIS G2 KCPL3 0.0

CHNL # 2: CRNG RICHMOND 1 KCPL3 -50.000



TUE, OCT 12 2004 8:56

FLT\_7\_1PH\_MACHINE ANGLES

SPP MDMG Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GOLFED

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1000  
0  
-1000  
-2000

FILE: C:\Interconnection Studies\Worling\RESU175\F11\_7\_3PH.OUT  
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35.000 10.000

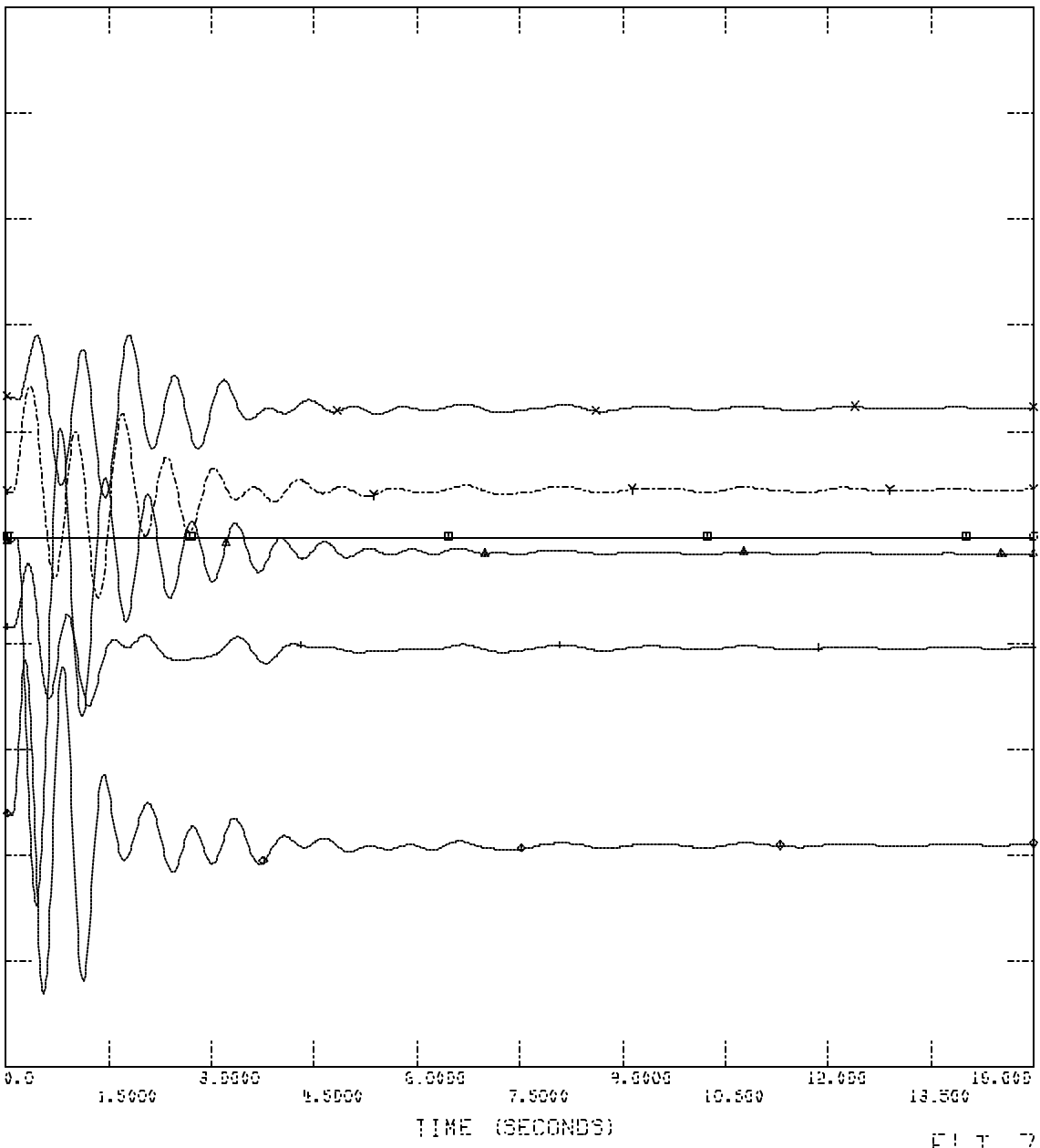
-15.000 CHNL # 14: CRNG WEST GARDNER CT KCPL1 X X -40.000

25.000 CHNL # 5: CRNG HAMTHORNE GS KCPL1 + + 0.0

35.000 CHNL # 4: CRNG JATRN G1 KCPL1 + + 10.000

50.000 CHNL # 3: CRNG JATRN G2 KCPL1 + + 0.0

50.000 CHNL # 2: CRNG RICHMOND 1 KCPL1 + + -50.000



TUE, OCT 12 2004 8:56

FLT\_7\_3PH\_MACHINE ANGLES



SPP MDMG Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR QUELLED

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1000  
500  
0  
-500  
-1000

FILE: C:\Interconnection Studies\WOL1\NOVRESU175\FLT\_8\_1PH.OUT

CHNL # 15: CRNG JEFFREY LN CNTR MBBB3

35.000 10.000

-15.00 CHNL # 14: CRNG WEST GARDNER CT KCPL3

CHNL # 5: CRNG HAMTHORNE GS KCPL3

25.000 -40.00

35.000 CHNL # 4: CRNG JARVIS G1 KCPL3

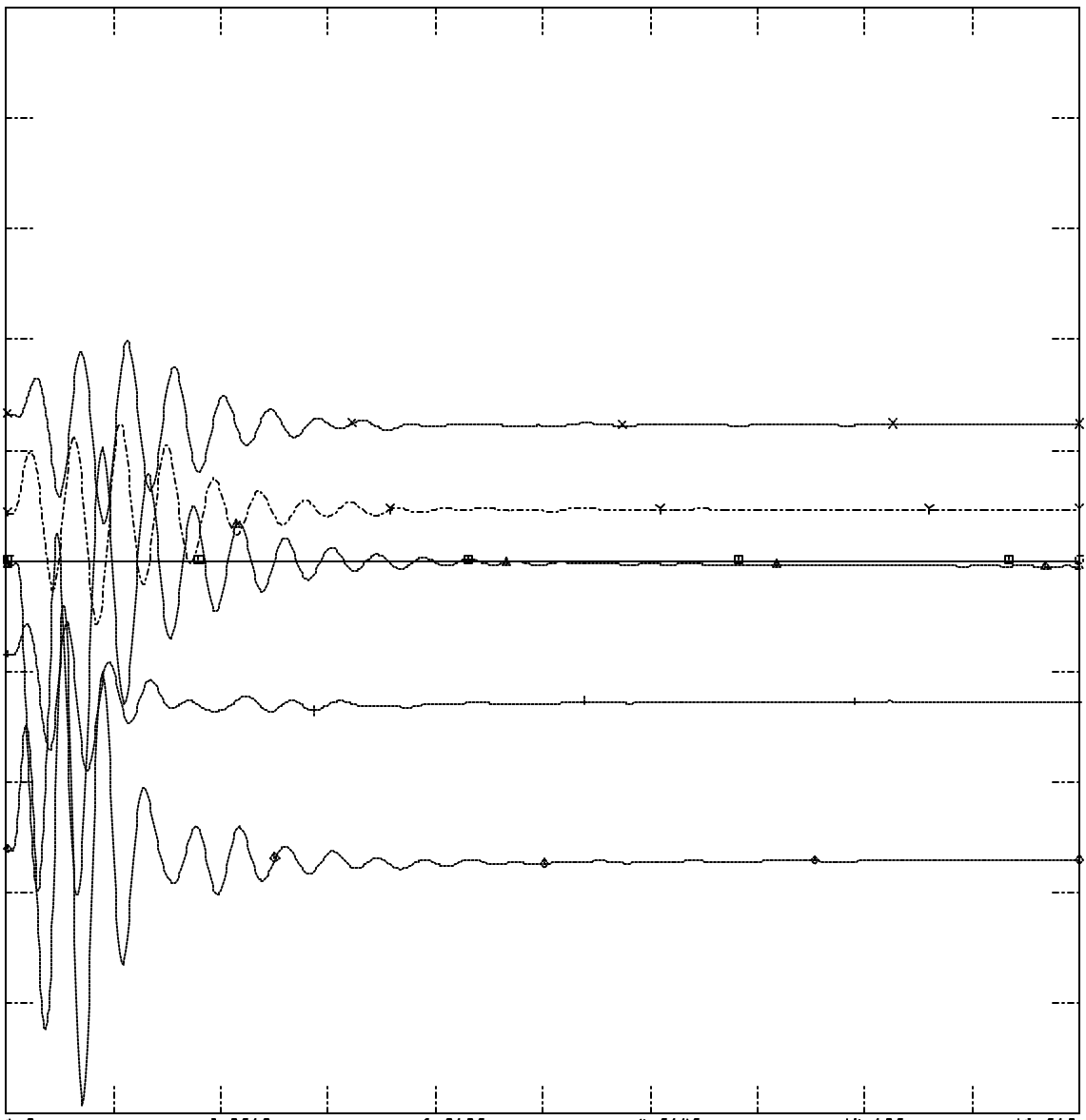
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50.000 10.000

50.000 CHNL # 2: CRNG RICHMOND 1 KCPL3

0.0

-50.00



TUE, OCT 12 2004 8:56

FLT\_8\_1PH\_MACHINE ANGLES

3000  
1000  
0  
-1000  
-2000

SPP MDMG Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR QUEUED

FILE: C:\Interconnection Studies\Worlino\RESU175\FLT\_8\_SPH.OUT

CHNL # 15: CRNG JOSEPH LN CNTR MBBE3

35.000

10.000

-15.000

X

X

-40.000

CHNL # 14: CRNG WEST GARDNER CT KCPL3

25.000

+

+

0.0

CHNL # 5: CRNG HAMTHORNE GS KCPL3

35.000

10.000

CHNL # 3: CRNG JARVAN G2 KCPL3

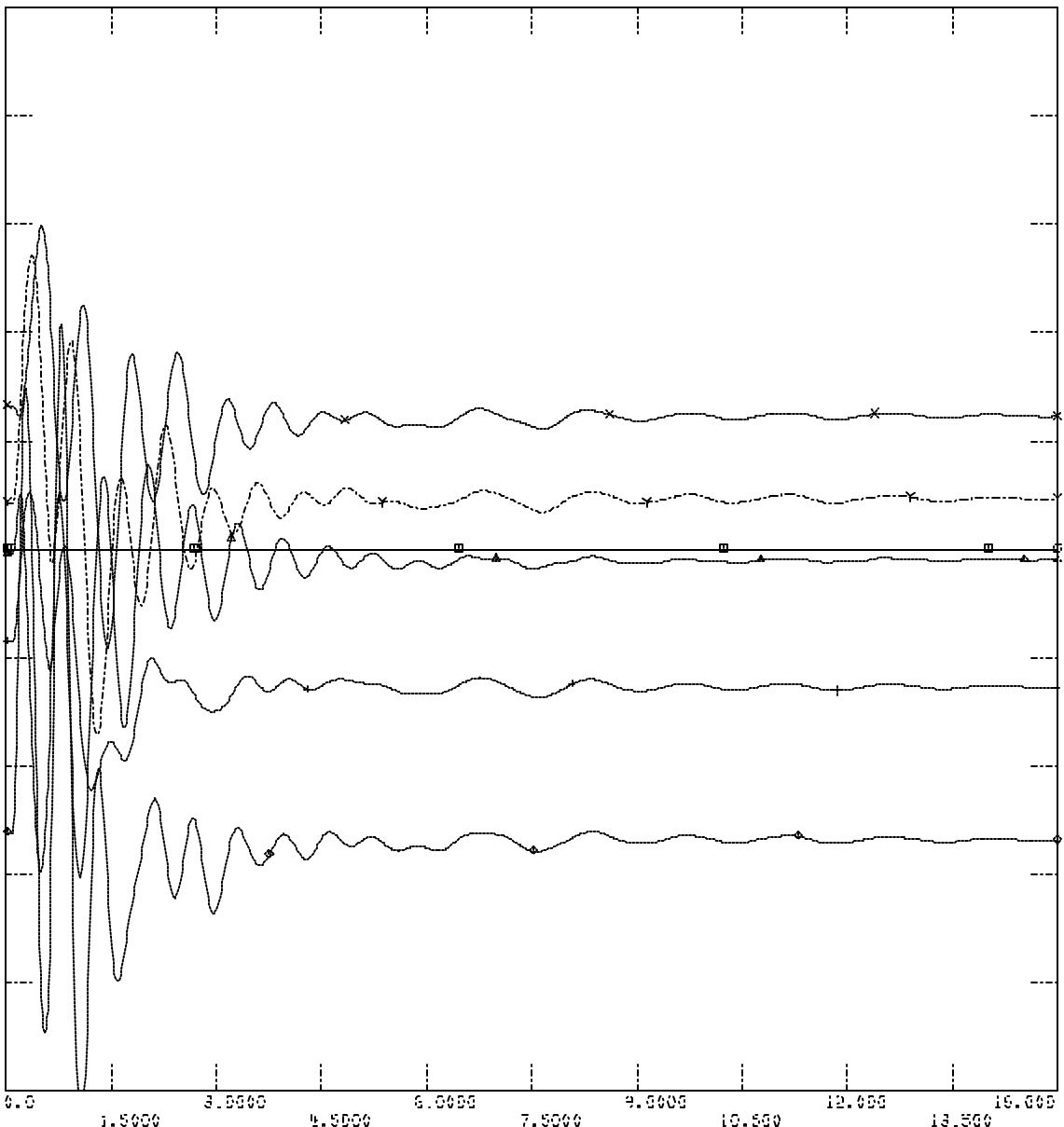
50.000

0.0

CHNL # 24: CRNG RICHMOND 1 KCPL3

50.000

-50.000



TUE, OCT 12 2004 8:57

FLT\_8\_SPH\_MACHINE ANGLES

SPP MDMG Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR GOLFED

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 2000  
 1000  
 0  
 -1000  
 -2000

FILE: C:\Interconnection Studies\Marketing\RESUL TS\F11\_9\_001

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35.000 10.000

CHNL # 14: CRNG WEST GARDNER CT KCPLJ

-15.000 -40.000

CHNL # 5: CRNG HAMTHORNE GS KCPLJ

25.000 0.0

CHNL # 4: CRNG JARIN G1 KCPLJ

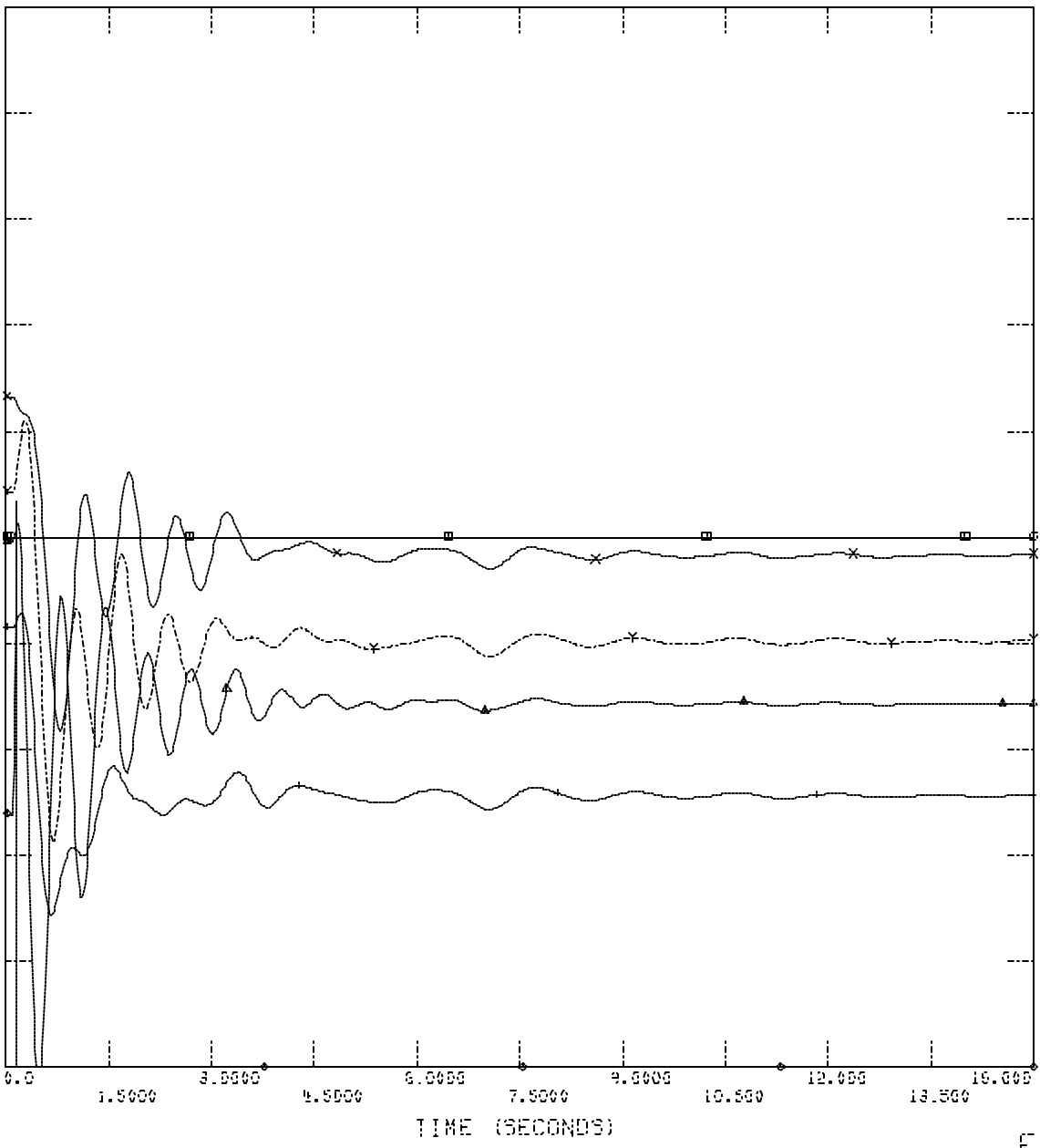
35.000 10.000

CHNL # 3: CRNG JARIN G2 KCPLJ

50.000 0.0

CHNL # 2: CRNG RICHMON L KCPLJ

50.000 -50.000



TUE, OCT 12 2004 8:57

FLT\_9\_MACHINE ANGLES

SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR GOLFED

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 2000  
 1000  
 0  
 -1000  
 -2000

FILE: C:\Interconnection Studies\WGK\ING\RESUL\TSVPL1\_110.DAT

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35.000 10.000

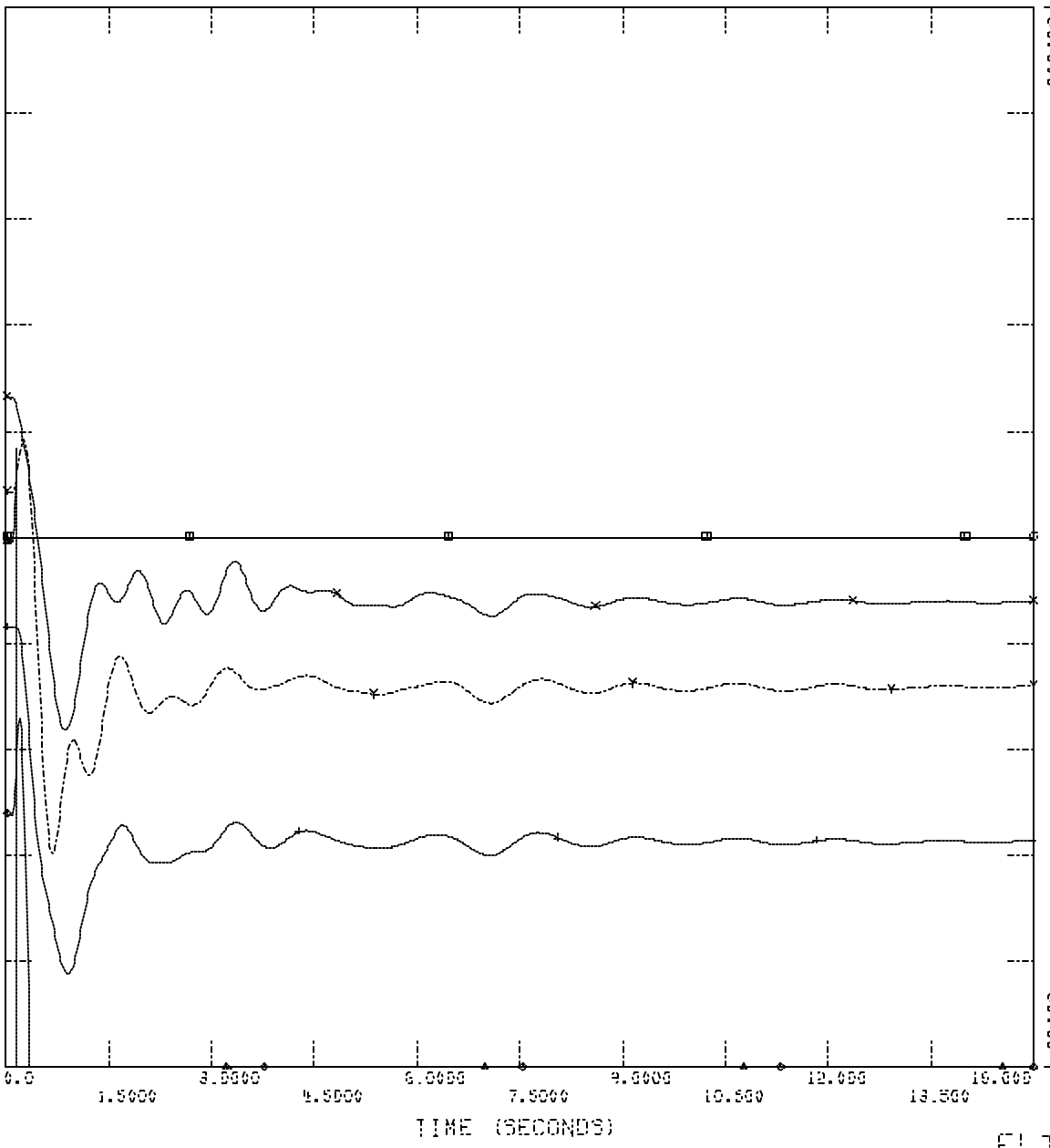
-15.00 CHNL # 14: CRNG WEST GARDNER CT KCPLJ X X -40.00

25.000 CHNL # 5: CRNG HAMTHORNE GS KCPLJ + + 0.0

35.000 CHNL # 4: CRNG JARIN G1 KCPLJ + + 10.000

50.000 CHNL # 3: CRNG JARIN G2 KCPLJ + + 0.0

50.000 CHNL # 2: CRNG RICHMON L KCPLJ + + -50.00



TUE, OCT 12 2004 8:57

FLT\_10\_MACHINE ANGLES

SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GUEFED

3000  
3000  
3000  
3000

FILE: C:\Interconnection Studies\WorKing\RESULTS\PL1\_11.007

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35.000 10.000

CHNL # 14: ERNG WEST GARDNER CT KCPL1

-15.000 -40.000

CHNL # 5: ERNG HAWTHORNE GS KCPL1

25.000 0.0

CHNL # 4: ERNG JATRN G1 KCPL1

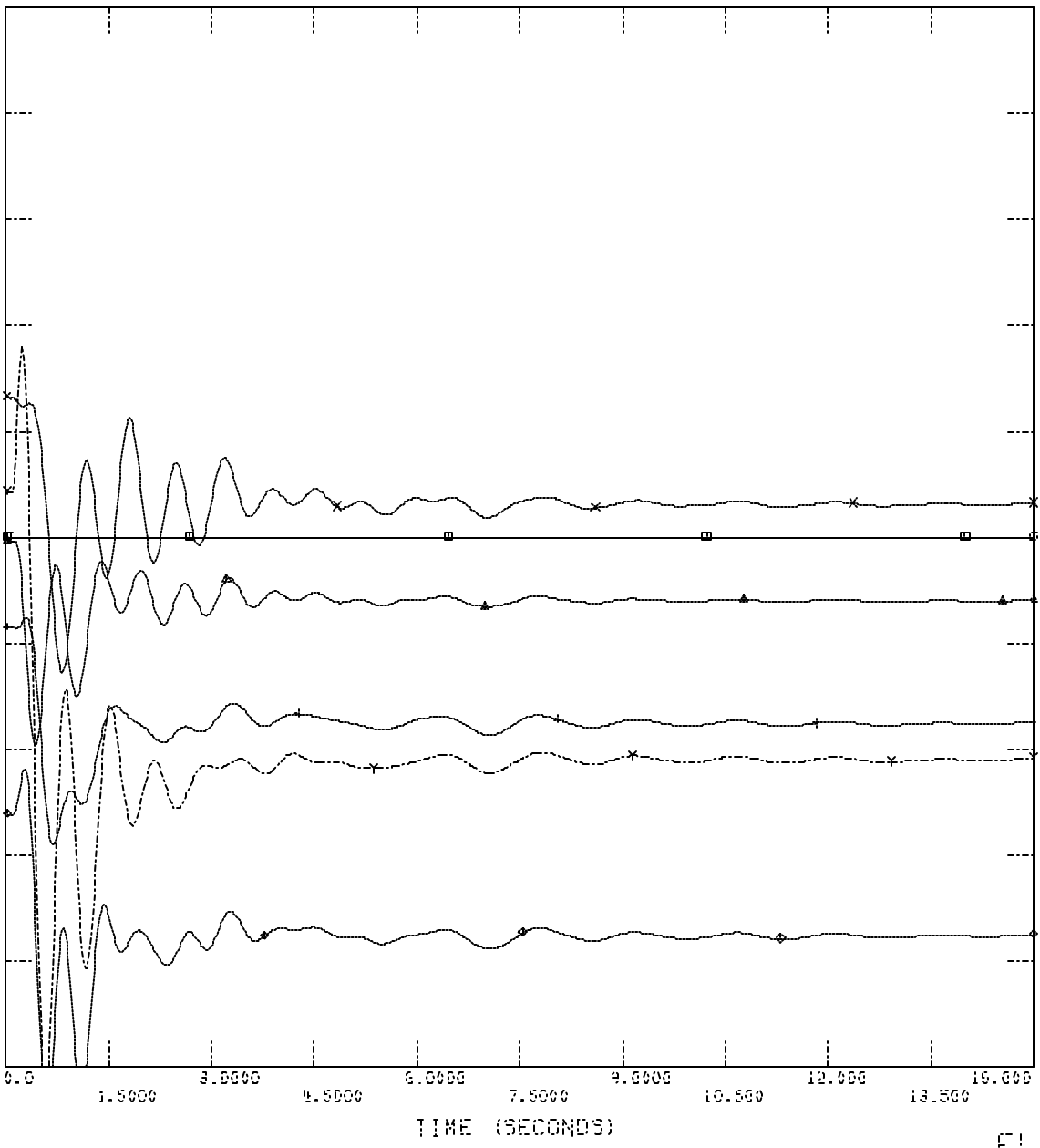
35.000 10.000

CHNL # 3: ERNG JATRN G2 KCPL1

50.000 0.0

CHNL # 2: ERNG RICHMOND 1 KCPL1

50.000 -50.000



TUE, OCT 12 2004 8:57

FLT\_11\_MACHINE ANGLES

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR QUEUED

FILE: C:\Interconnection Studies\Work\Inq\RESUL TS\FLT\_12\_1PH.001

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 35.000 10.000

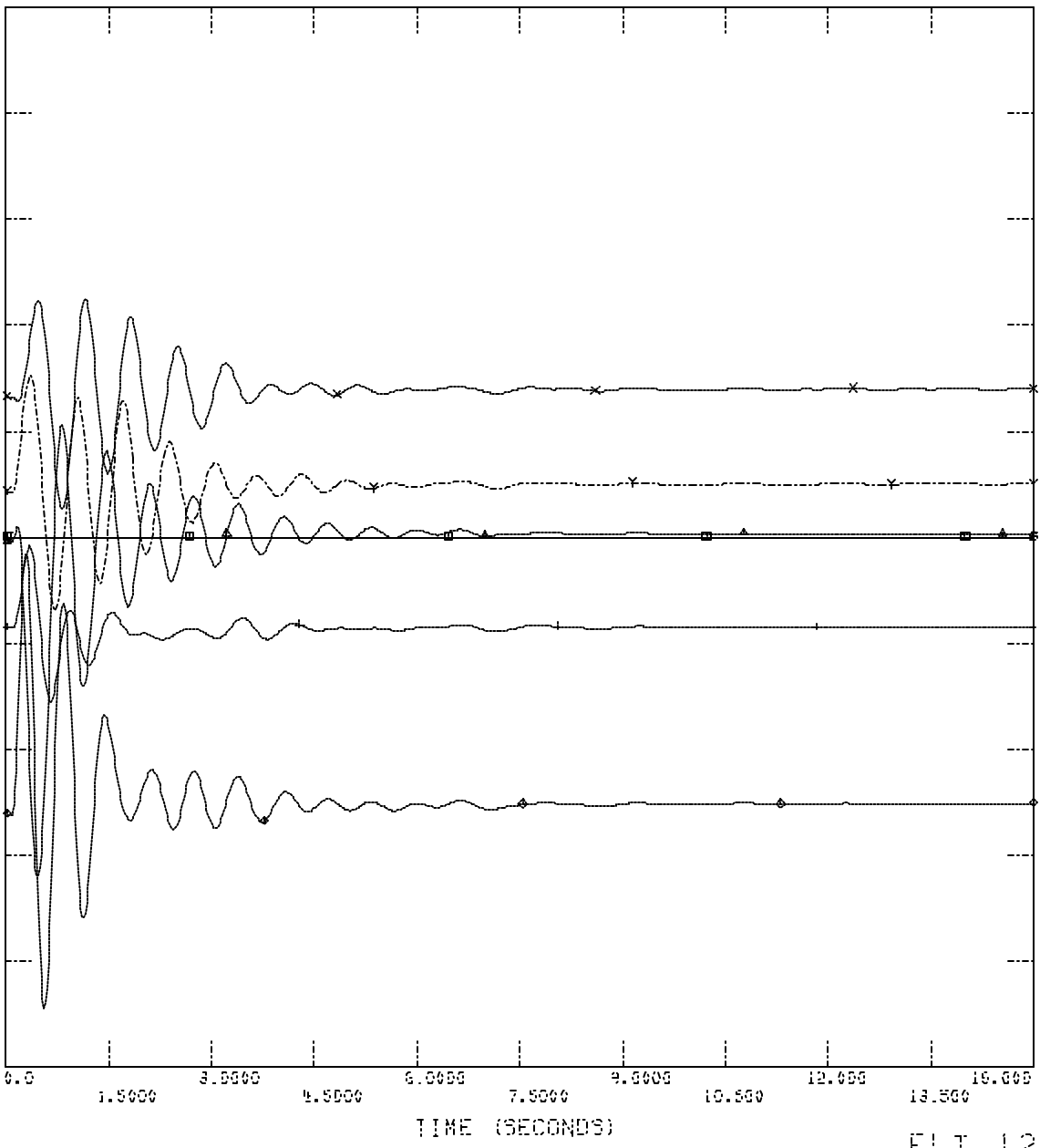
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 -15.000 -40.000

CHNL # 5: CRNG HAWTHORNE GS KCPLJ  
 25.000 0.0

CHNL # 4: CRNG JATRN G1 KCPLJ  
 35.000 10.000

CHNL # 3: CRNG JATRN G2 KCPLJ  
 50.000 0.0

CHNL # 2: CRNG RICHMON L KCPLJ  
 50.000 -50.000



TUE, OCT 12 2004 8:57

FLT\_12\_1PH\_MACHINE ANGLES

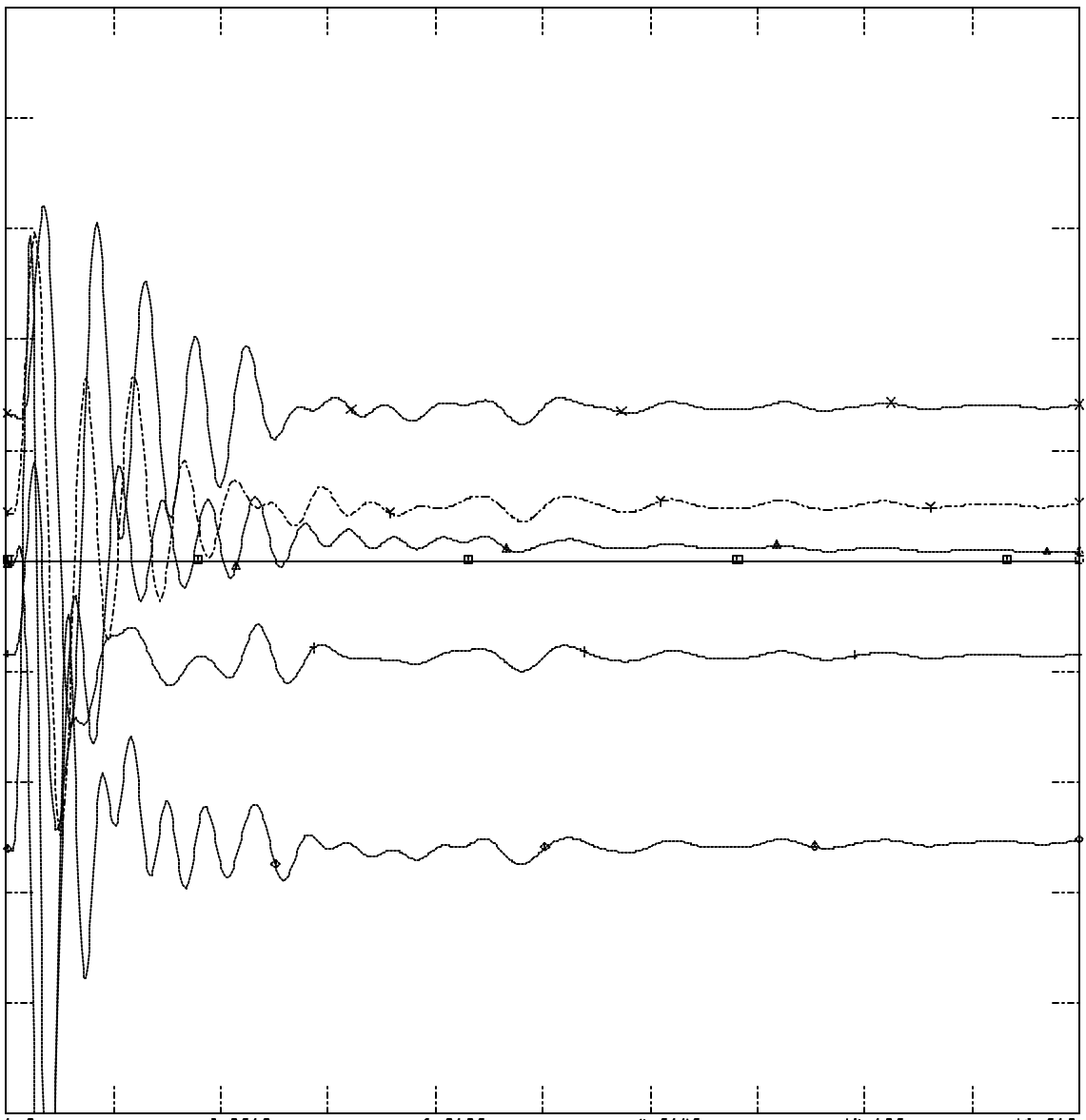
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SPP MDMG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR QUEUED

FILE: C:\Interconnection Studies\Working\RESU175\FLT\_12\_IPH\_STUCK.OUT  
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CHNL # 14: ERNG WEST GARDNER CT KCPLJ  
 CHNL # 5: ERNG HAMTHORNE GS KCPLJ  
 CHNL # 4: ERNG JATRN G1 KCPLJ  
 CHNL # 3: ERNG JATRN G2 KCPLJ  
 CHNL # 2: ERNG RICHMOND 1 KCPLJ

-15.00  
 25.000  
 35.000  
 50.000  
 50.000



TIME (SECONDS)

TUE, OCT 12 2004 8:57

FLT\_12\_IPH\_STUCK\_MACHINE

SPP MDWG Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GOLFED

FILE: C:\Ninterconnection Studies\Work\Inq\RESUL TS\FLT\_12\_3PH.OUT

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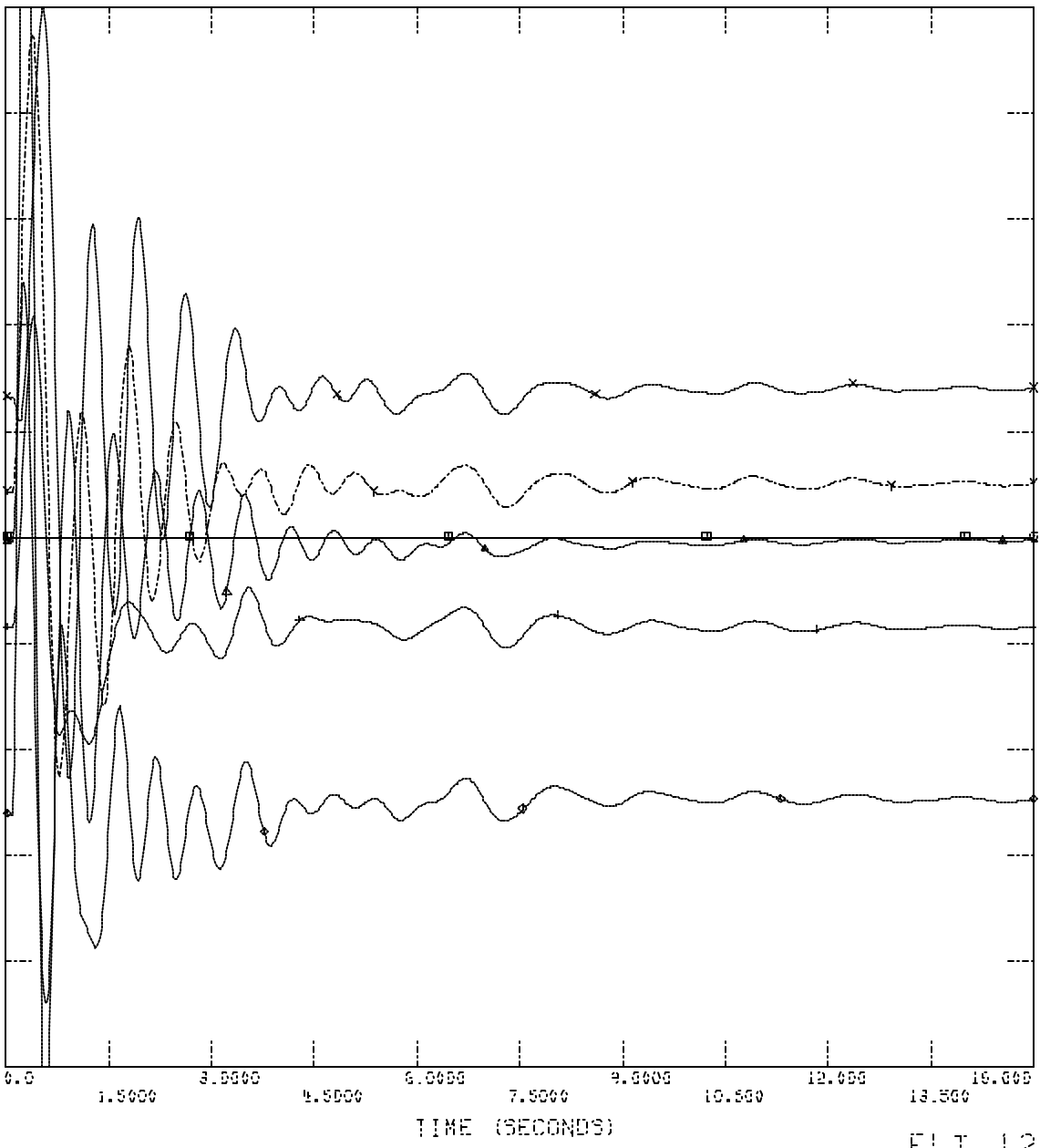
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CHNL # 5: ERNG HAMTHORNE GS KCPLJ  
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CHNL # 4: ERNG JARIN G1 KCPLJ  
10.000

CHNL # 3: ERNG JARIN G2 KCPLJ  
0.0

CHNL # 2: ERNG RICHMOND 1 KCPLJ  
-50.000



TUE, OCT 12 2004 8:57

FLT\_12\_3PH\_MACHINE ANGLES



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500  
250  
100  
50  
25  
10  
5  
2.5  
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0.00000000000000000000000000000000000000091835496158014729611139062499970834375000000001818989403545856475781250000000000003433226562500000027135883203125000000116415321826934765625000000000000012732626343750093132257461153125  
0.000000000000000000000000000000000000000459177480790073648055695312499985416718750000000009094947017729282378125000000000000171661328125000000135679416625000000116415321826934765625000000000000006366313171875004656612873077390625  
0.000000000000000000000000000000000000000229588740395036824027847656249999270834375000000000454747350886046421890625000000000000858306640625000000109339708593750000001164153218269347656250000000000000318315658750023283064365386953125  
0.00000000000000000000000000000000000000011479437019751841201392187500000000022737367544323095947265625000000000004291533203125000000054669854296875000000116415321826934765625000000000000015915782937500116415321826934765625  
0.0000000

## **Appendix A-2**

### **Plots of Fault Simulations**

**Plots of selected bus voltage response during faults**

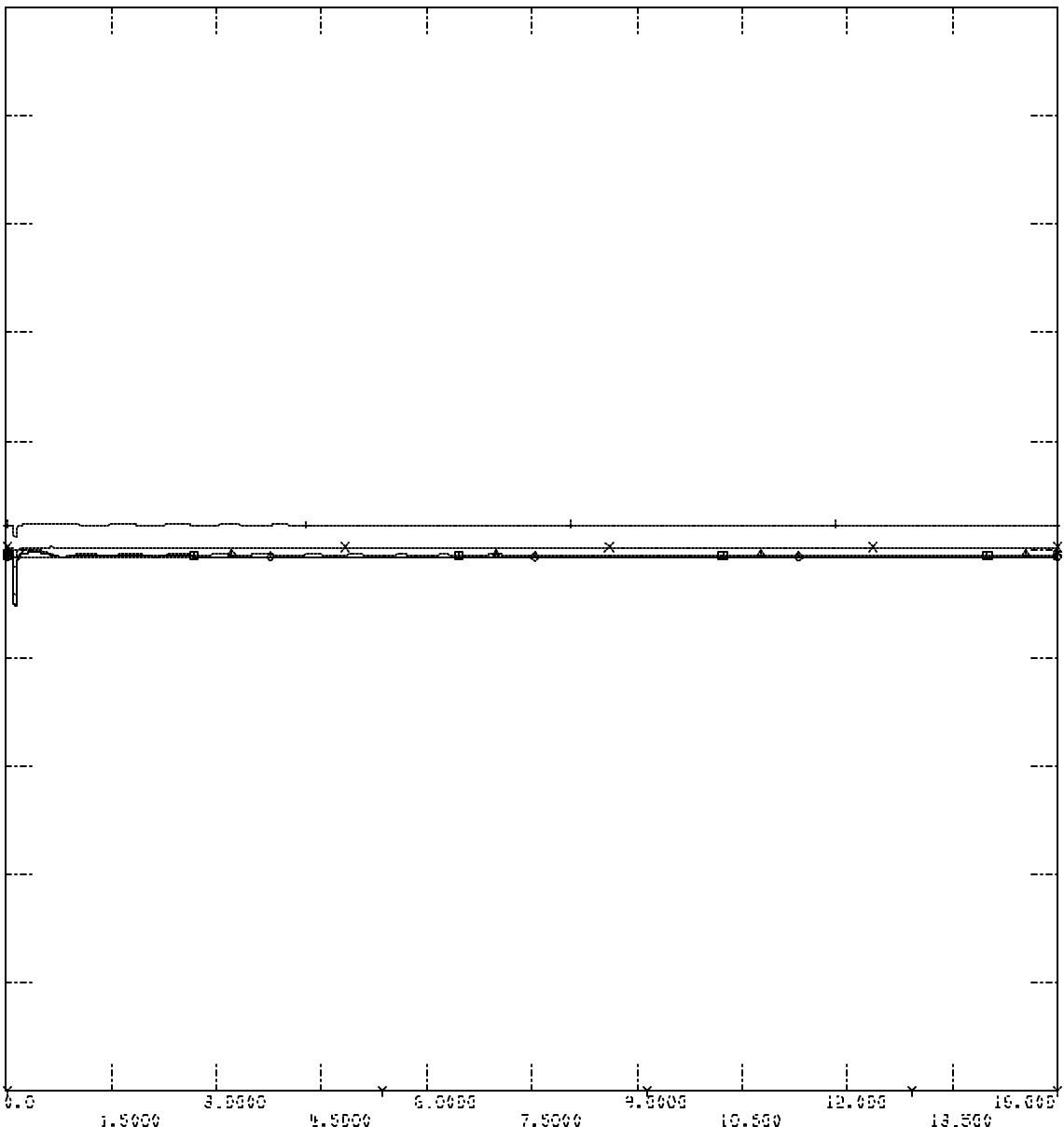
**Scenario:  
2010 Summer Peak  
Basecase**

395KVA  
 395KVA  
 395KVA  
 395KVA

SPP MDMS Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLY

FILE: C:\Interconnection Studies\WOLING\RESUL\SNFLT\_1\_1PH.OUT

2.0000	CHNL # 278: VOLTAGE BIRMINGM_1_KOPFL	0.0
2.0000	CHNL # 293: VOLTAGE NIOSHO_395KVA	0.0
2.0000	CHNL # 296: VOLTAGE WOLFCRK_395KVA	0.0
2.0000	CHNL # 292: VOLTAGE BENTON_395KVA	0.0
2.0000	CHNL # 281: VOLTAGE HAMTH_395KVA	0.0
2.0000	CHNL # 279: VOLTAGE W.GORDNR_395KVA	0.0



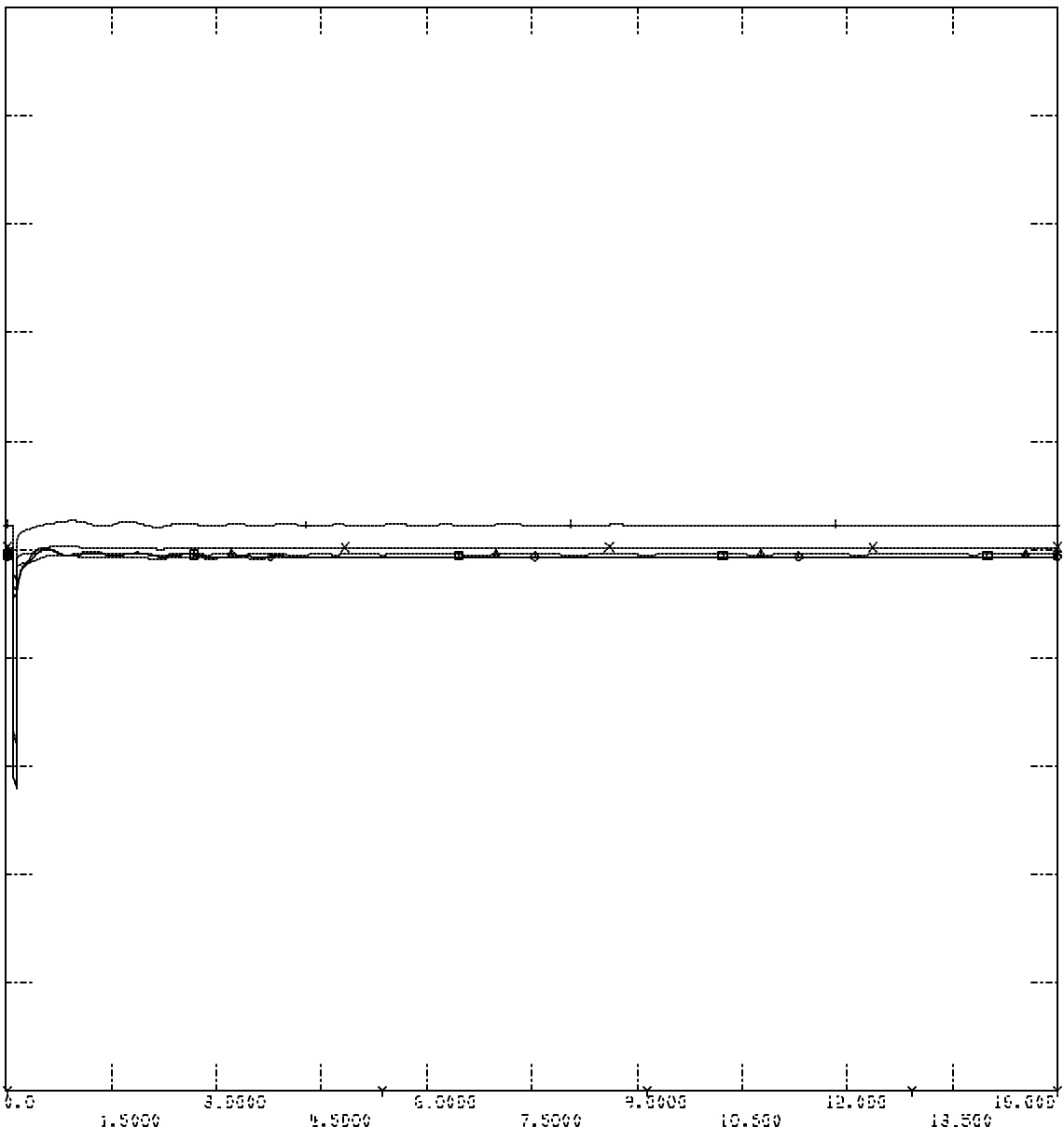
TUE, OCT 12 2004 9:00  
 FLT\_1\_1PH\_VOLTAGES

395KVA  
 299A  
 292A  
 279A

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLEMENT

FILE: C:\Interconnection Studies\MDT\Inq\RESUL 15\FLT\_1\_3PH.OUT

Channel #	Channel Name	Scale
2.0000	CHNL # 299: CVOLTAGE NIOSHO 395KVA	0.0
2.0000	CHNL # 296: CVOLTAGE WOLFCRK 395KVA	0.0
2.0000	CHNL # 292: CVOLTAGE BENTON 395KVA	0.0
2.0000	CHNL # 281: CVOLTAGE HAMTH 395KVA	0.0
2.0000	CHNL # 279: CVOLTAGE W.GORDNR 395KVA	0.0



TUE, OCT 12 2004 9:00  
 FLT\_1\_3PH\_VOLTAGES

395KVA  
299A  
292A  
279A

SPP MDMS ON STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE: C:\Interconnection Studies\WOLING\RESUL 15\FLT\_2\_1PH.OUT

CHNL # 279: VOLTAGE BIRMINGM\_1\_KOPFL

2.0000 0.0

CHNL # 293: VOLTAGE NEOSHO 395KV3

2.0000 0.0

CHNL # 296: VOLTAGE WOLFCRK 395KV3

2.0000 0.0

CHNL # 292: VOLTAGE BENTON 395KV3

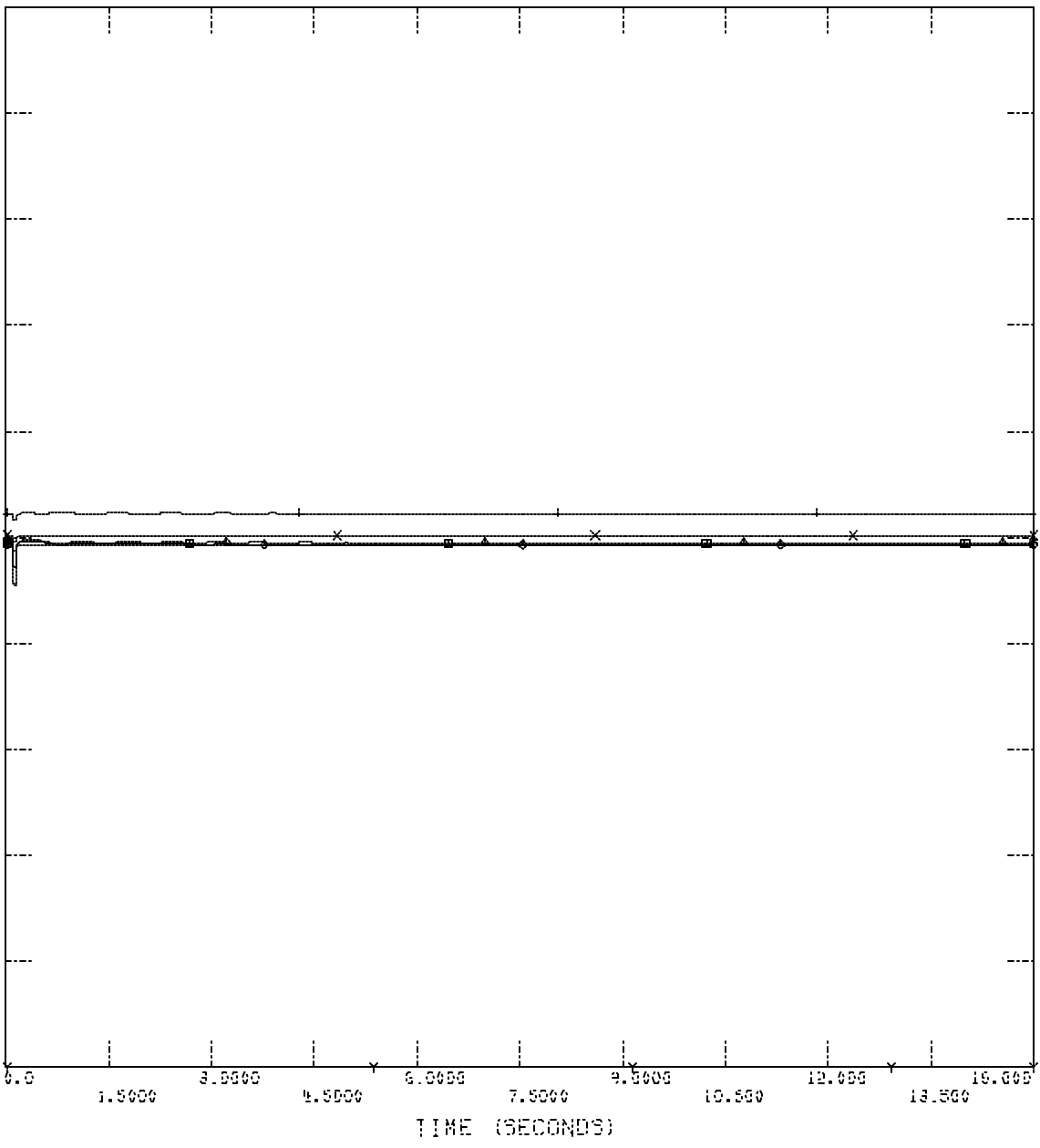
2.0000 0.0

CHNL # 281: VOLTAGE HAMTH 395KV3

2.0000 0.0

CHNL # 279: VOLTAGE WOLFCRK 395KV3

2.0000 0.0



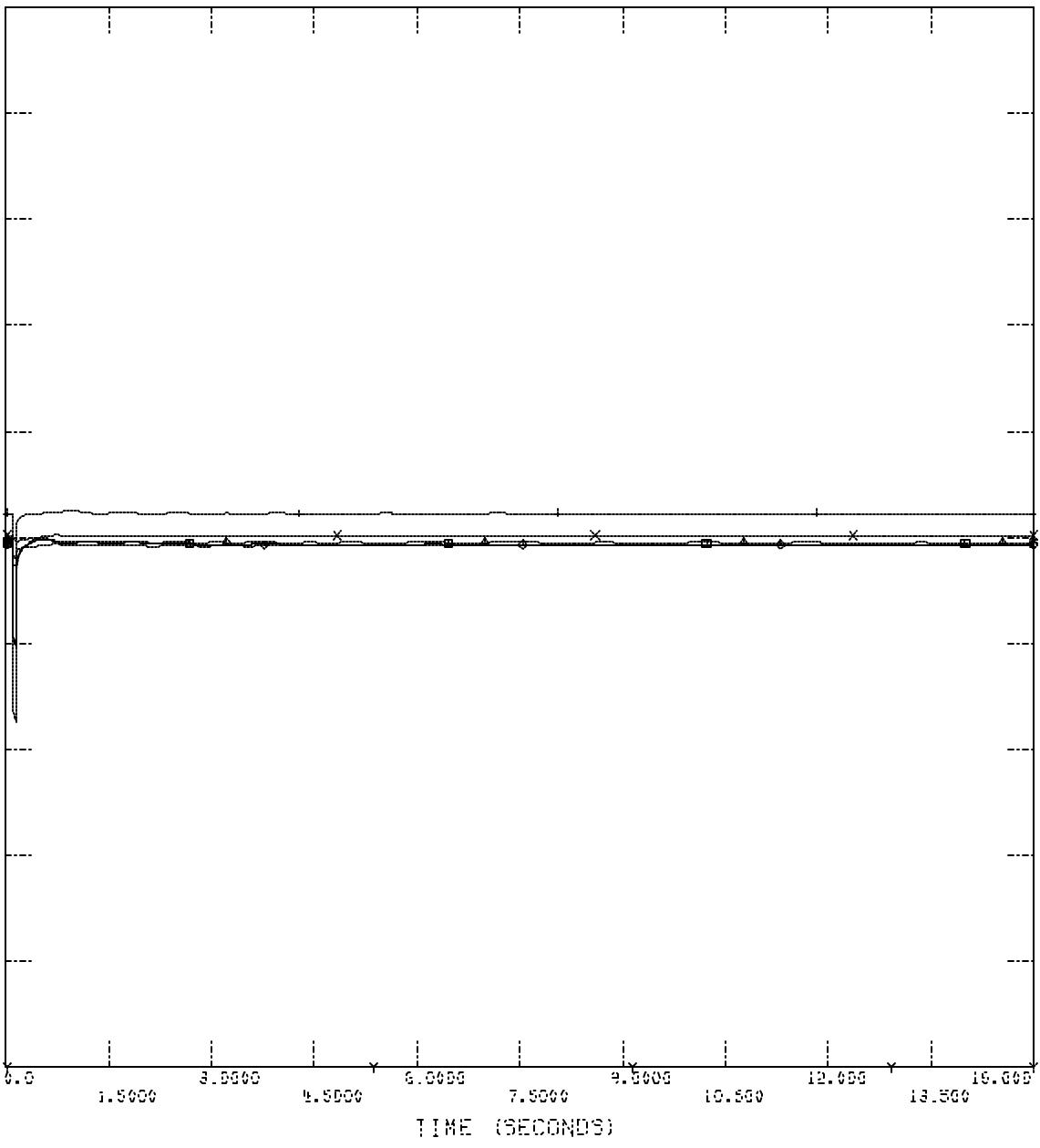
TUE, OCT 12 2004 9:00  
FLT\_2\_1PH\_VOLTAGES

395KVA  
 299A  
 292A  
 279A

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLEMENT

FILE: C:\Interconnection Studies\WOLING\RESUL 15\FLT\_2\_3PH.OUT

2.0000	CHNL # 279: CVOLTAGE BIRMINGHAM_1_KOPFL	0.0
2.0000	CHNL # 293: CVOLTAGE NIOSHO 395KVA	0.0
2.0000	CHNL # 296: CVOLTAGE WOLFCRK 395KVA	0.0
2.0000	CHNL # 292: CVOLTAGE BENTON 395KVA	0.0
2.0000	CHNL # 281: CVOLTAGE HAMTH 395KVA	0.0
2.0000	CHNL # 279: CVOLTAGE WOLFCRK 395KVA	0.0



TUE, OCT 12 2004 9:00  
 FLT\_2\_3PH\_VOLTAGES

395KV  
299A  
292A  
279A

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE: C:\Interconnection Studies\WOLING\RESUL 15\FLT\_3\_1PH.OUT

CHNL # 279: CVOLTAGE BIRMINGHAM\_KOPFL

2.0000 0.0

CHNL # 299: CVOLTAGE NIOSHO 395KV

2.0000 0.0

CHNL # 296: CVOLTAGE WOLFCRK 395KV

2.0000 0.0

CHNL # 292: CVOLTAGE BENTON 395KV

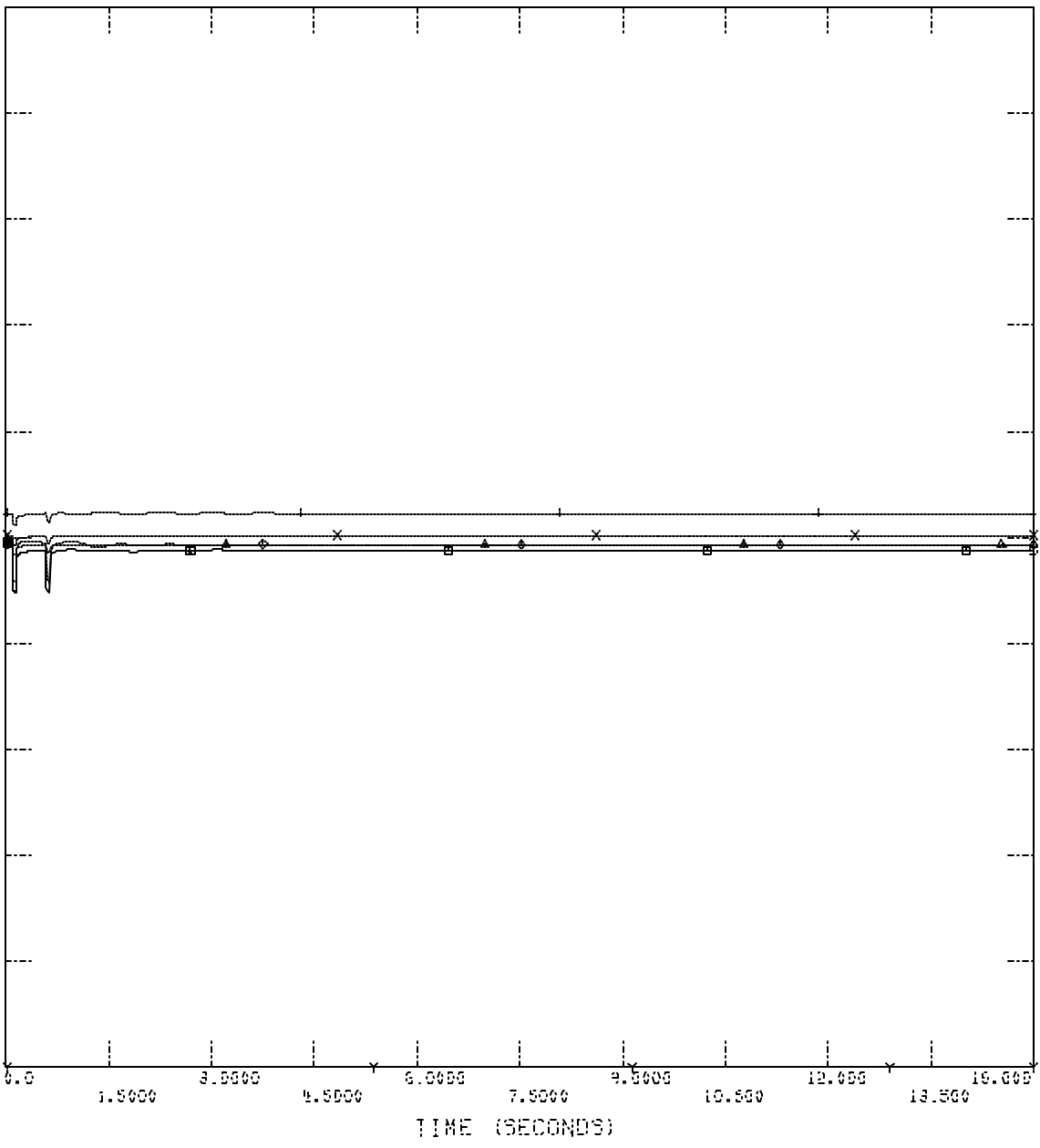
2.0000 0.0

CHNL # 281: CVOLTAGE HAWTH 395KV

2.0000 0.0

CHNL # 279: CVOLTAGE WOLFCRK 395KV

2.0000 0.0



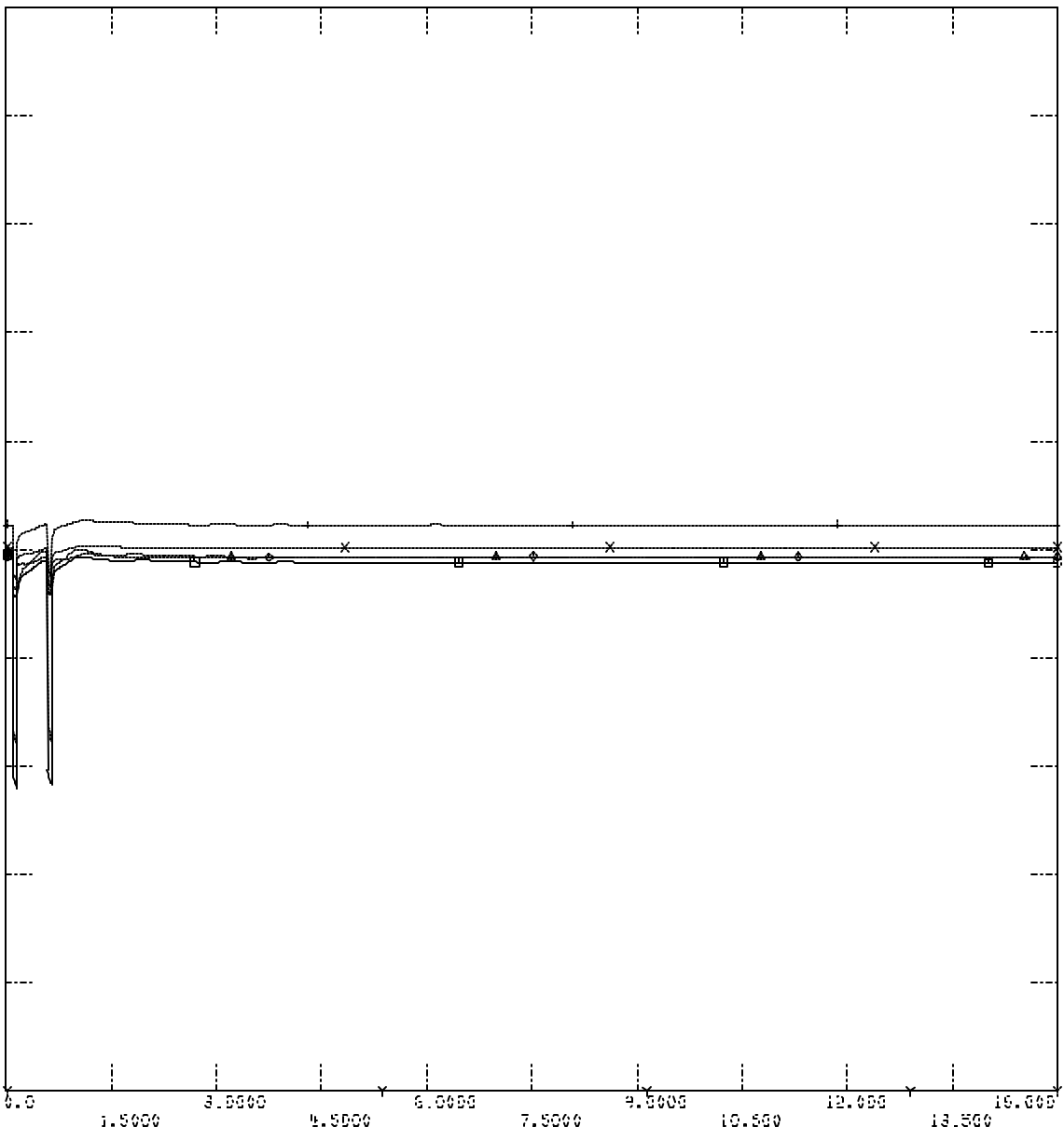
TUE, OCT 12 2004 9:00  
FLT\_3\_1PH\_VOLTAGES

395KV  
 292KV  
 279KV  
 296KV

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLEMENT

FILE: C:\Interconnection Studies\WOLING\RESUL 15\FIT\_3\_SPH.OUT

2.0000	CHNL # 279: CVOLTAGE BIRMINGHAM_1_KOPFL	0.0
2.0000	CHNL # 293: CVOLTAGE NIOSHO 395KV3	0.0
2.0000	CHNL # 296: CVOLTAGE WOLFCRK 395KV3	0.0
2.0000	CHNL # 292: CVOLTAGE BENTON 395KV3	0.0
2.0000	CHNL # 281: CVOLTAGE HAMTH 395KV3	0.0
2.0000	CHNL # 279: CVOLTAGE WOLFCRK 395KV3	0.0



TUE, OCT 12 2004 9:00  
 FIT\_3\_SPH\_VOLTAGES



395KVA  
299A  
292A  
279A

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLEMENT

FILE: C:\Interconnection Studies\WOLING\RESUL\5NFLT\_4\_1PH.OUT

CHNL # 279: CVOLTAGE BIRMINGM\_1.KOPCJ

2.0000

0.0

CHNL # 293: CVOLTAGE NIOSHO\_395KVA

2.0000

0.0

CHNL # 296: CVOLTAGE WOLFCRK\_395KVA

2.0000

0.0

CHNL # 292: CVOLTAGE BENTON\_395KVA

2.0000

0.0

CHNL # 281: CVOLTAGE HAMTH\_395KVA

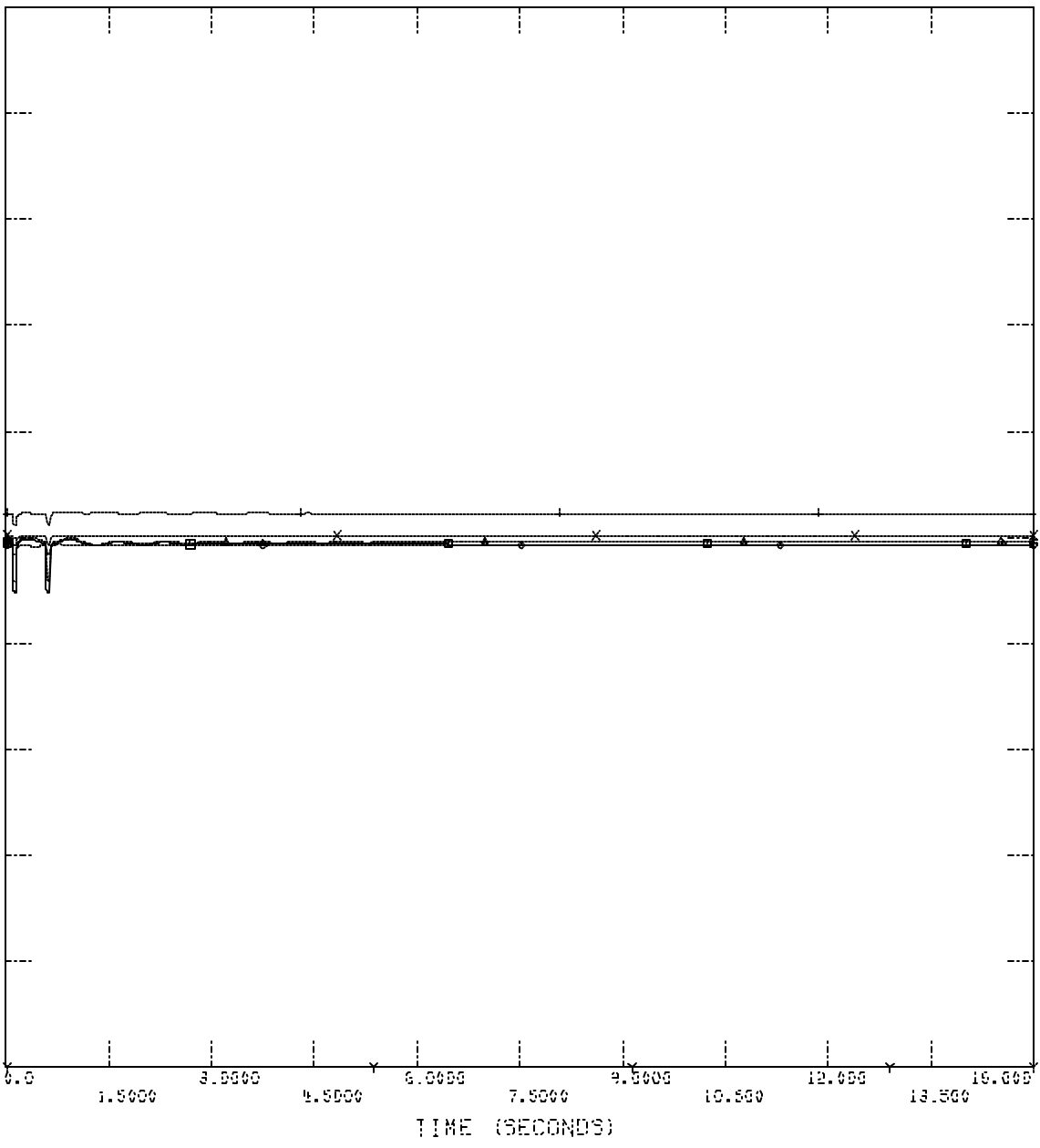
2.0000

0.0

CHNL # 279: CVOLTAGE W.GORDNR\_395KVA

2.0000

0.0



TUE, OCT 12 2004 9:00  
FLT\_4\_1PH\_VOLTAGES

395KVA  
292KVA  
296KVA  
279KVA

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLEMENT

FILE: C:\Interconnection Studies\WOLING\RESUL15\FLT\_4\_3PH.OUT

CHNL # 279: VOLTAGE BIRMINGM\_1\_KOPFL

2.0000

0.0

CHNL # 293: VOLTAGE NIOSHO\_395KVA

2.0000

0.0

CHNL # 296: VOLTAGE MOLFCHK\_395KVA

2.0000

0.0

CHNL # 292: VOLTAGE BENTON\_395KVA

2.0000

0.0

CHNL # 281: VOLTAGE HAWTH\_395KVA

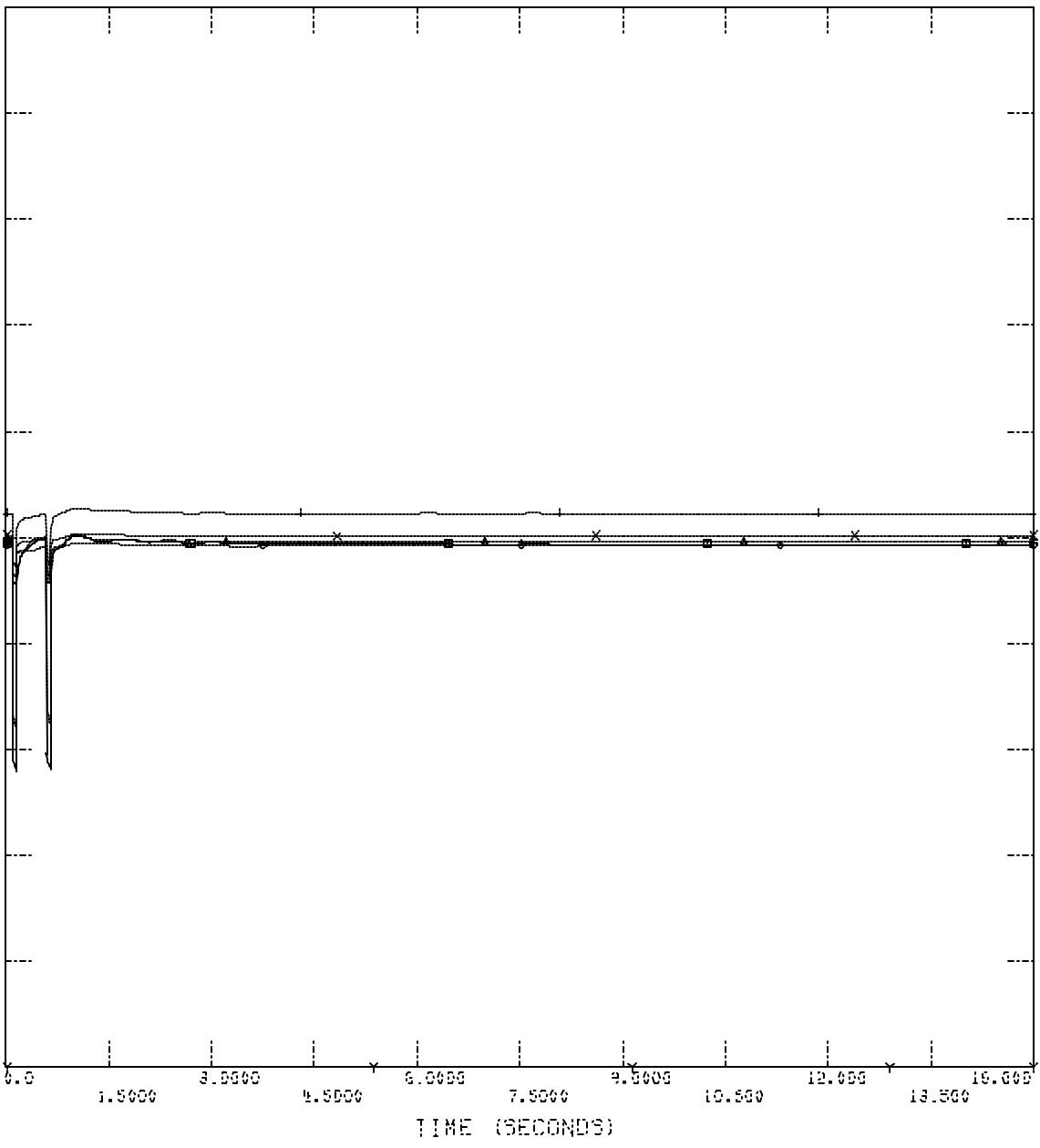
2.0000

0.0

CHNL # 279: VOLTAGE W.GORDNR\_395KVA

2.0000

0.0



TUE, OCT 12 2004 9:00  
FLT\_4\_3PH\_VOLTAGES

395KVA  
2.0000  
0.0

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE: C:\Interconnection Studies\WOLING\RESUL 15\FLT\_5\_1PH.OUT  
CHNL # 278: CVOLTAGE BIRMINGHAM\_1\_KOPFL

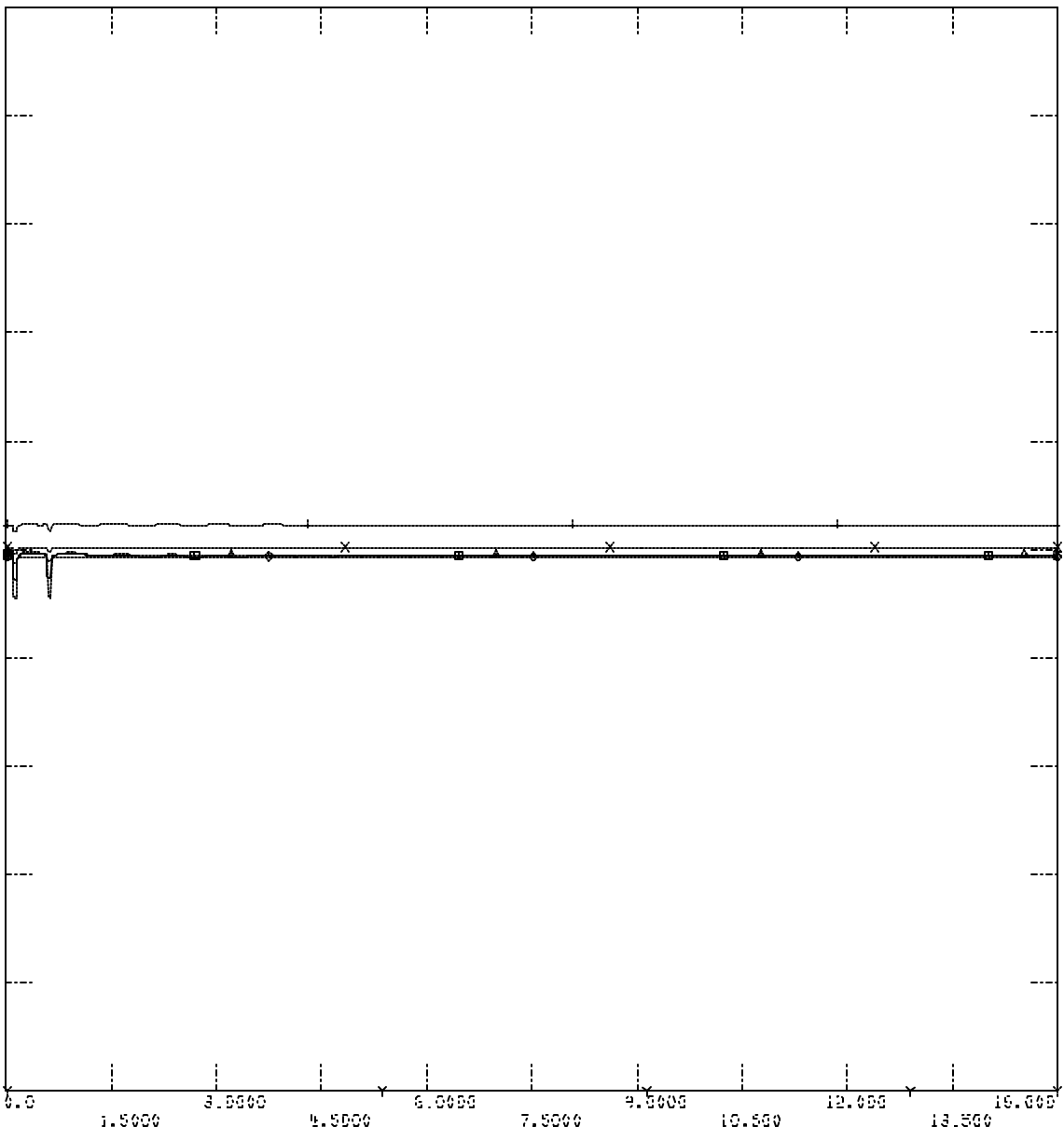
2.0000 CHNL # 293: CVOLTAGE NIOSHO 395KVA 0.0

2.0000 CHNL # 296: CVOLTAGE WOLFCRK 395KVA 0.0

2.0000 CHNL # 292: CVOLTAGE BENTON 395KVA 0.0

2.0000 CHNL # 281: CVOLTAGE HAMTH 395KVA 0.0

2.0000 CHNL # 279: CVOLTAGE W.GORDNR 395KVA 0.0



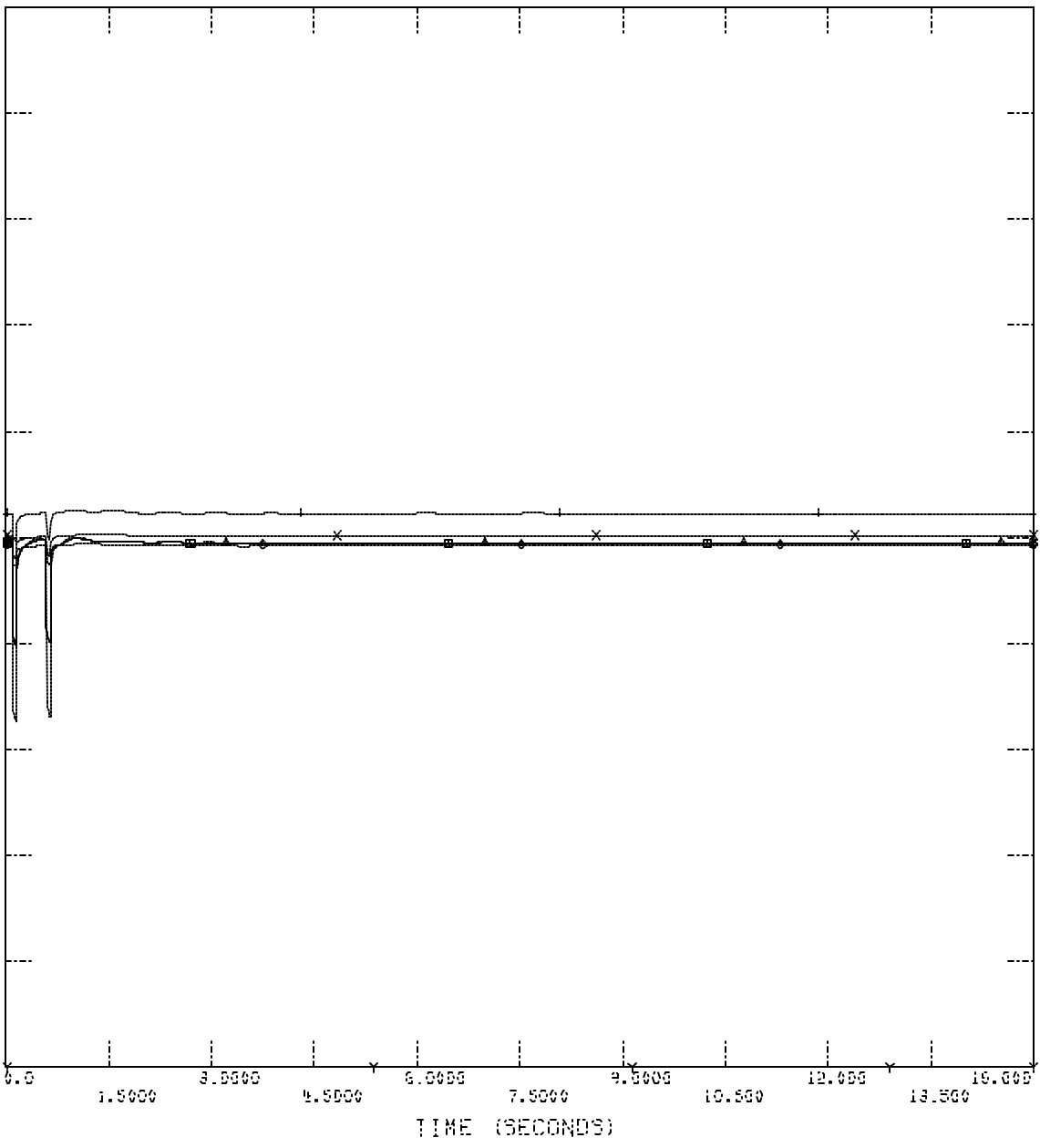
TUE, OCT 12 2004 9:00  
FLT\_5\_1PH\_VOLTAGES

395KVA  
 395KVA  
 395KVA

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLEMENT

FILE: C:\Interconnection Studies\WOLING\RESUL15\FLT\_5\_SPH.001

2.0000	CHNL # 278: VOLTAGE BIRMINGM_1_KOPFL	0.0
2.0000	CHNL # 293: VOLTAGE NEOSHO 395KVA	0.0
2.0000	CHNL # 296: VOLTAGE WOLFCRK 395KVA	0.0
2.0000	CHNL # 292: VOLTAGE BENTON 395KVA	0.0
2.0000	CHNL # 281: VOLTAGE HRMITH 395KVA	0.0
2.0000	CHNL # 279: VOLTAGE W.GORDNR 395KVA	0.0



TUE, OCT 12 2004 9:00  
 FLT\_5\_SPH\_VOLTAGES

395KVA  
 395KVA  
 395KVA

SPP MDMS Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE: C:\Interconnection Studies\WOLTRNG\RESUL 15\FLT\_6\_1PH.OUT

CHNL # 278: VOLTAGE BIRMINGM\_1\_KOPFL

2.0000 0.0

CHNL # 293: VOLTAGE NEOSHO\_395KVA

2.0000 0.0

CHNL # 296: VOLTAGE WOLFCRK\_395KVA

2.0000 0.0

CHNL # 292: VOLTAGE BENTON\_395KVA

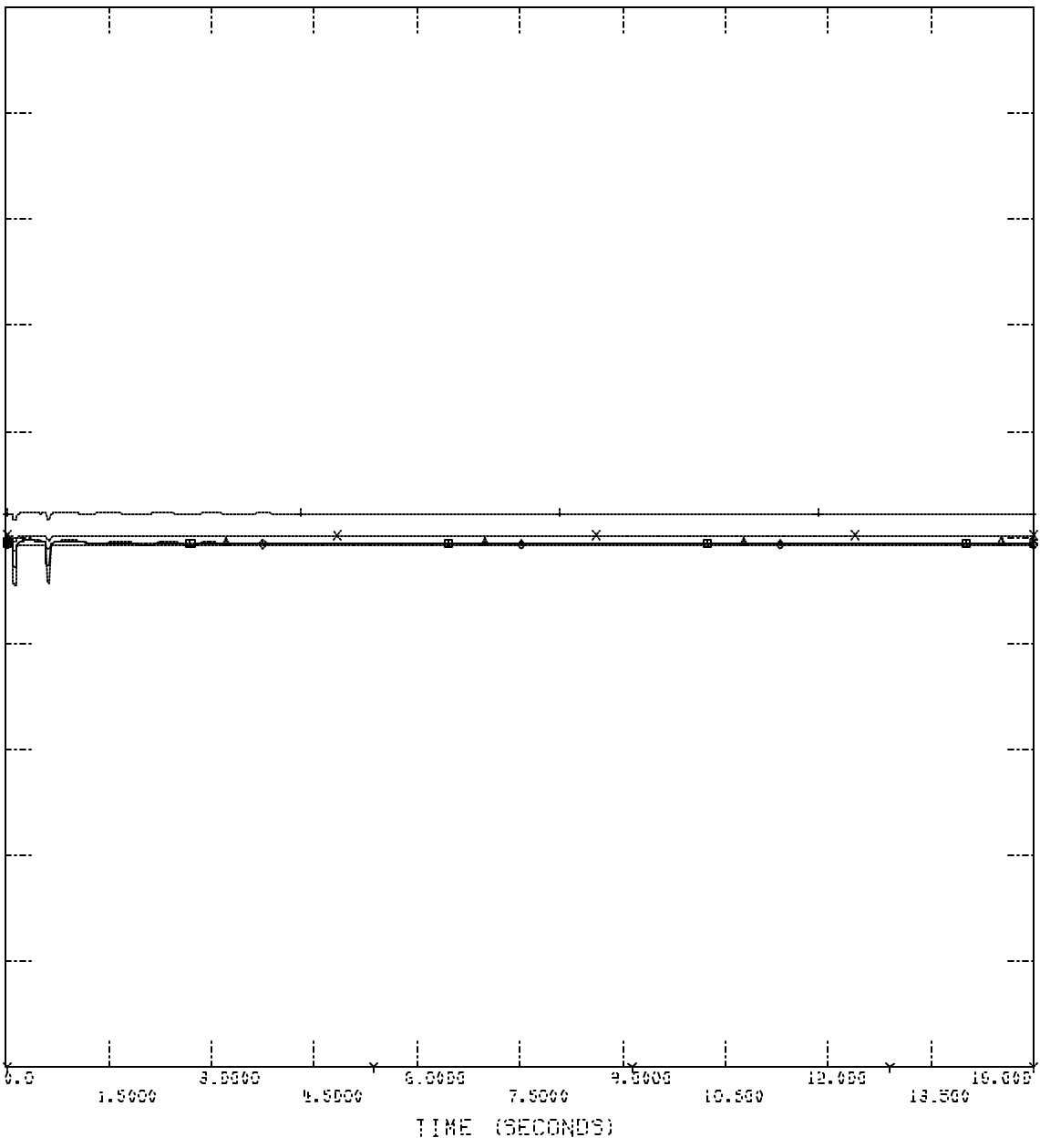
2.0000 0.0

CHNL # 281: VOLTAGE HRMITH\_395KVA

2.0000 0.0

CHNL # 279: VOLTAGE W.GORDNR\_395KVA

2.0000 0.0



TUE, OCT 12 2004 9:00  
 FLT\_6\_1PH\_VOLTAGES

395KVA  
299A  
292A  
279A

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLEMENT

FILE: C:\Interconnection Studies\WOLING\RESUL 15\FLT\_6\_3PH.OUT

CHNL # 279: VOLTAGE BIRMINGM\_1\_KOPFL

2.0000 0.0

CHNL # 293: VOLTAGE NEOSHO 395KVA

2.0000 0.0

CHNL # 296: VOLTAGE WOLFCRK 395KVA

2.0000 0.0

CHNL # 292: VOLTAGE BENTON 395KVA

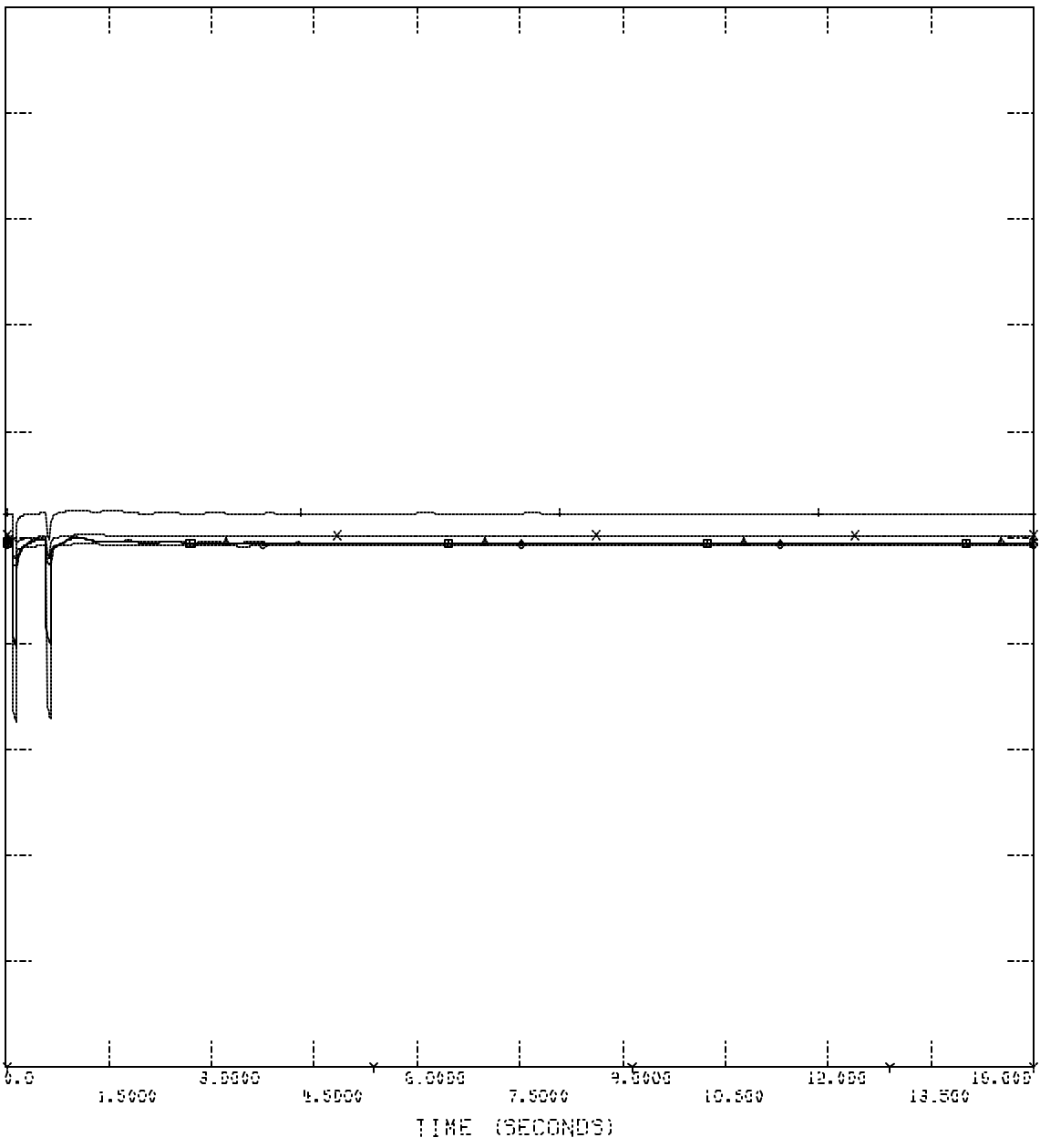
2.0000 0.0

CHNL # 281: VOLTAGE HAWTH 395KVA

2.0000 0.0

CHNL # 279: VOLTAGE WOLFCRK 395KVA

2.0000 0.0



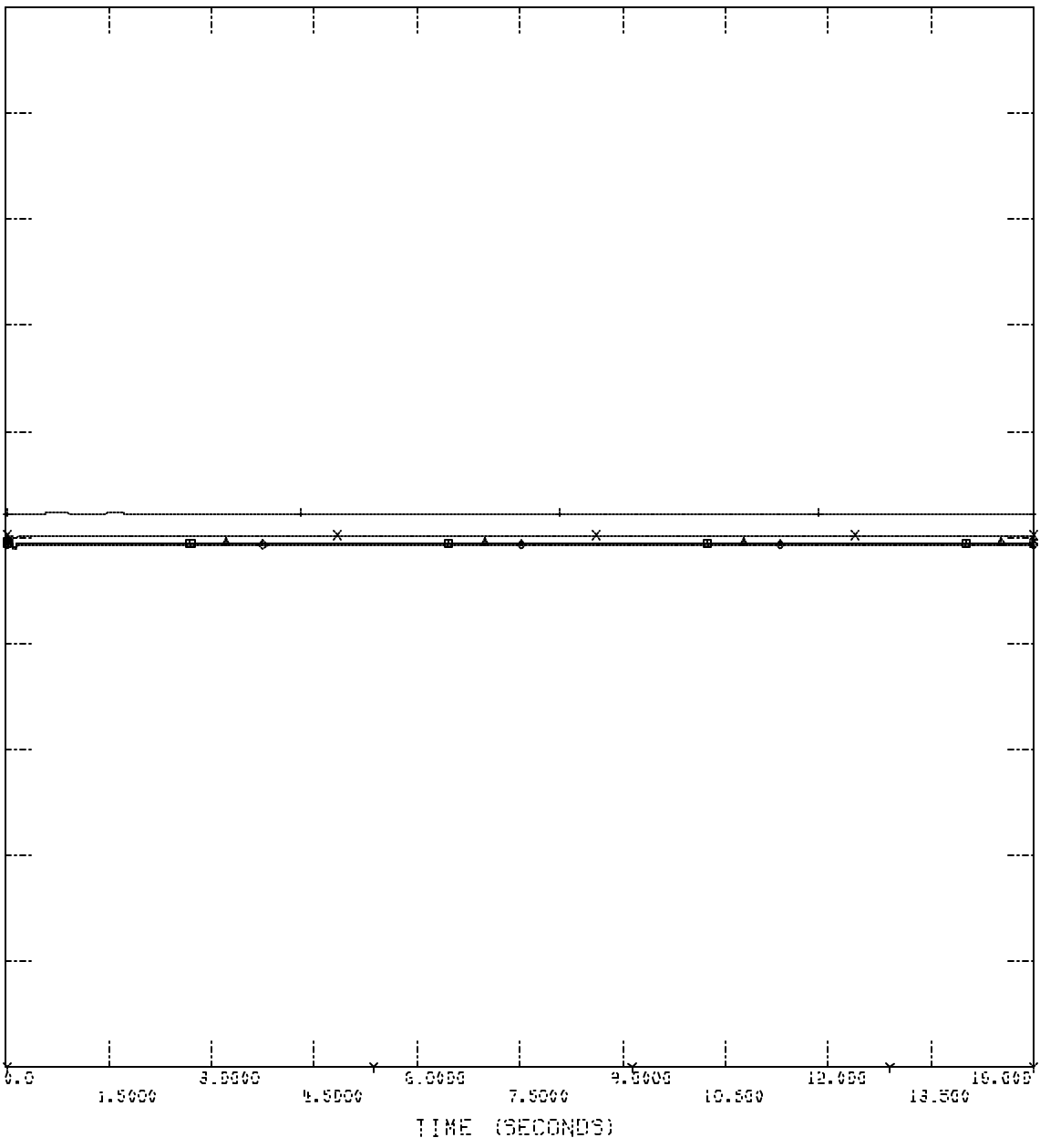
TUE, OCT 12 2004 9:00  
FLT\_6\_3PH\_VOLTAGES

395KVA  
 299A  
 292A  
 279A

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE: C:\Interconnection Studies\WOLING\RESUL 75\FLT\_7\_1PH.OUT

Channel #	Channel Name	Value
279A	CVOLTAGE BIRNISON_1_KOPFL	0.0
299A	CVOLTAGE NIOSHO 395KVA	0.0
292A	CVOLTAGE BENTON 395KVA	0.0
279A	CVOLTAGE HAWTH 395KVA	0.0
279A	CVOLTAGE W.GORDNR 395KVA	0.0



TUE, OCT 12 2004 9:00  
 FLT\_7\_1PH\_VOLTAGES

395KVA  
2.0000  
0.0

SPP MDMS ON STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLEMENT

FILE: C:\Interconnection Studies\WOLING\RESUL 15\FLT\_7\_3PH.OUT

CHNL # 278: VOLTAGE BIRMINGHAM\_KOPFL

2.0000

0.0

CHNL # 293: VOLTAGE NIOSHO 395KVA

2.0000

0.0

CHNL # 296: VOLTAGE WOLFCRK 395KVA

2.0000

0.0

CHNL # 292: VOLTAGE BENTON 395KVA

2.0000

0.0

CHNL # 281: VOLTAGE HAMTH 395KVA

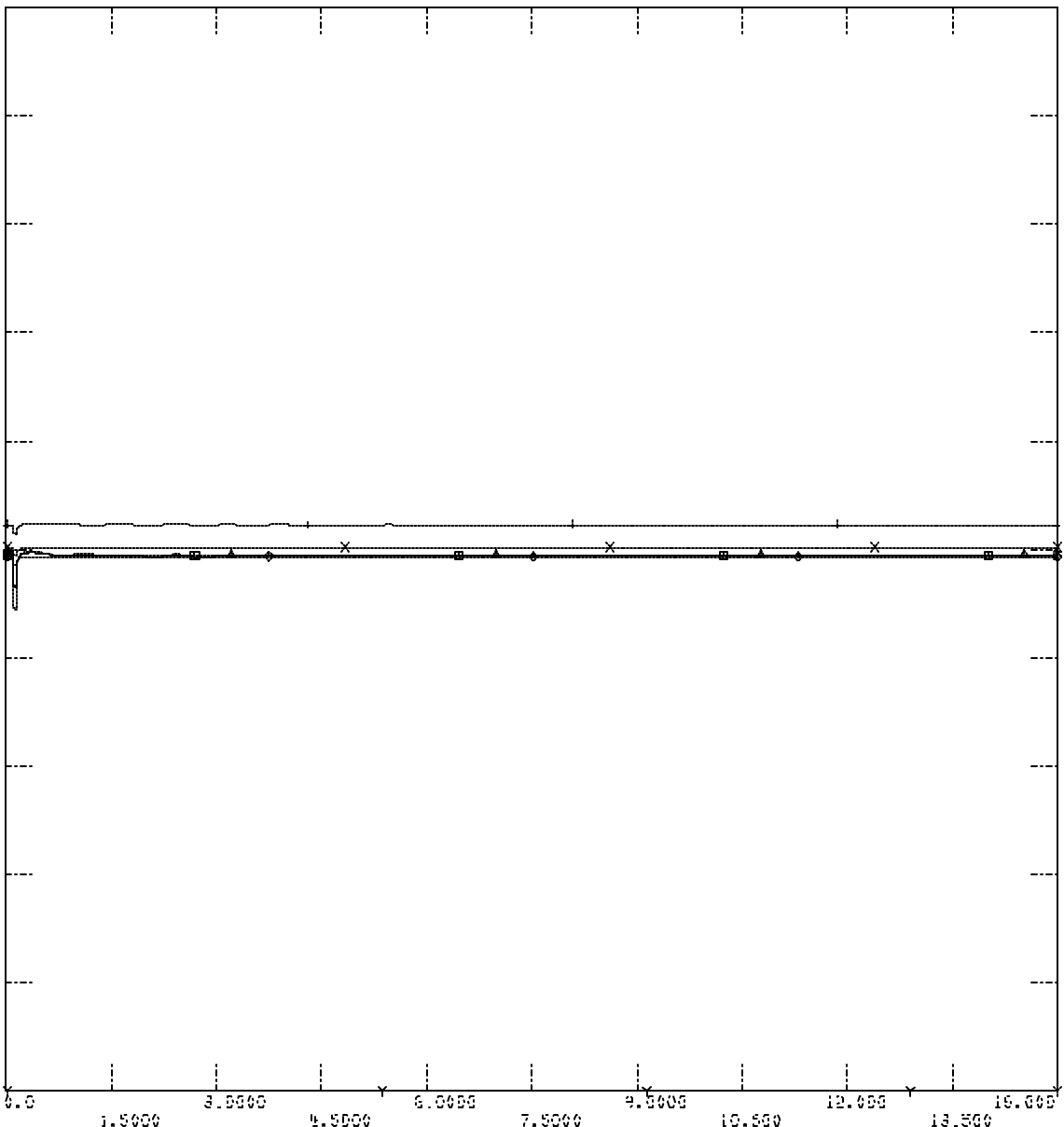
2.0000

0.0

CHNL # 279: VOLTAGE W.GORDNR 395KVA

2.0000

0.0



TUE, OCT 12 2004 9:00  
FLT\_7\_3PH\_VOLTAGES

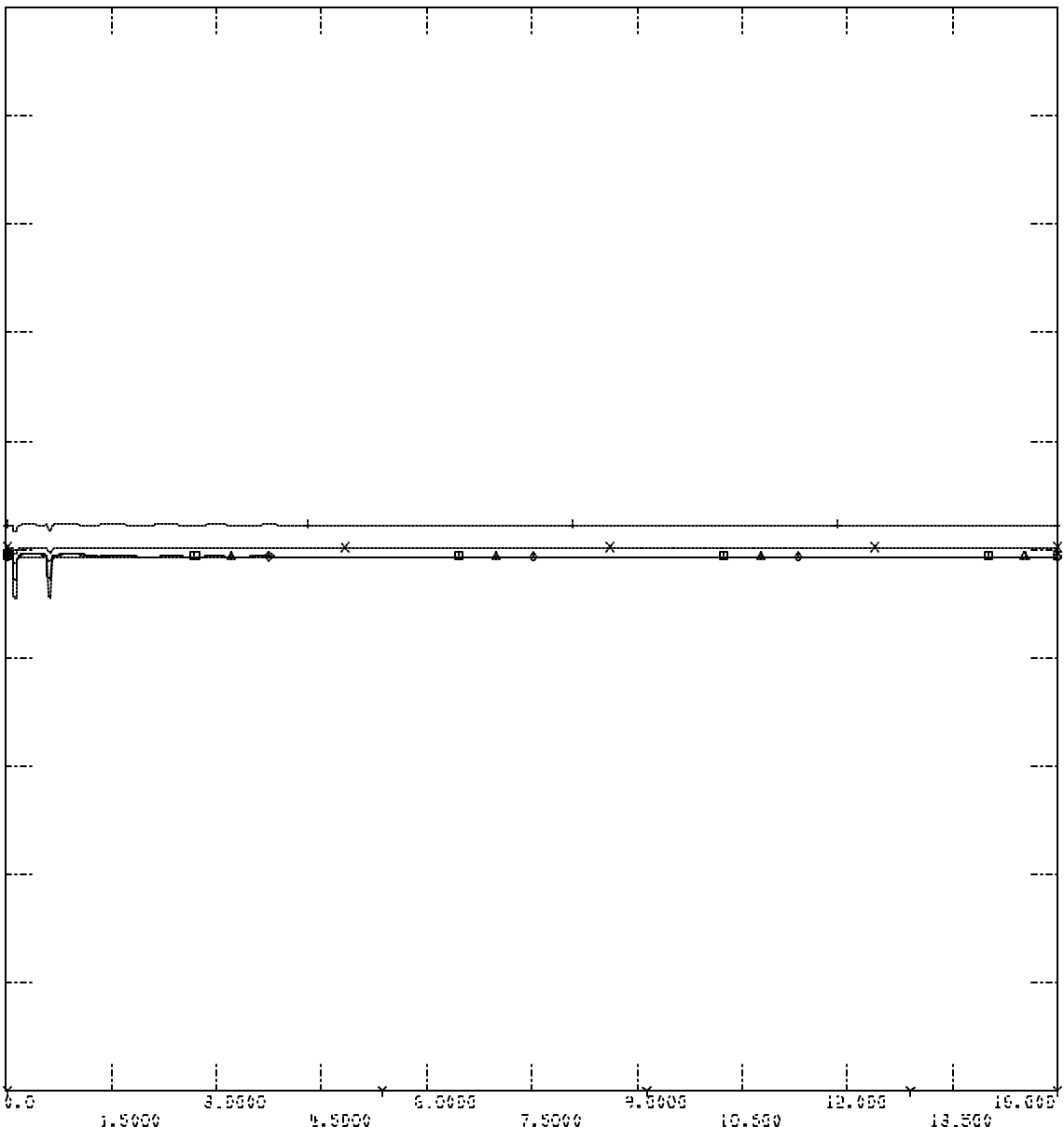


395KV  
 299A  
 292A  
 279A

SPP MDMS Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE: C:\Interconnection Studies\WOLING\RESUL 19\FLT\_0\_1PH.OUT

2.0000	CHNL # 279: CVOLTAGE BIRMINGHAM_1_KOPFL	0.0
2.0000	CHNL # 299: CVOLTAGE NIOSHO 395KV3	0.0
2.0000	CHNL # 296: CVOLTAGE WOLFCRK 395KV3	0.0
2.0000	CHNL # 292: CVOLTAGE BENTON 395KV3	0.0
2.0000	CHNL # 281: CVOLTAGE HAMTH 395KV3	0.0
2.0000	CHNL # 279: CVOLTAGE WOLFCRK 395KV3	0.0



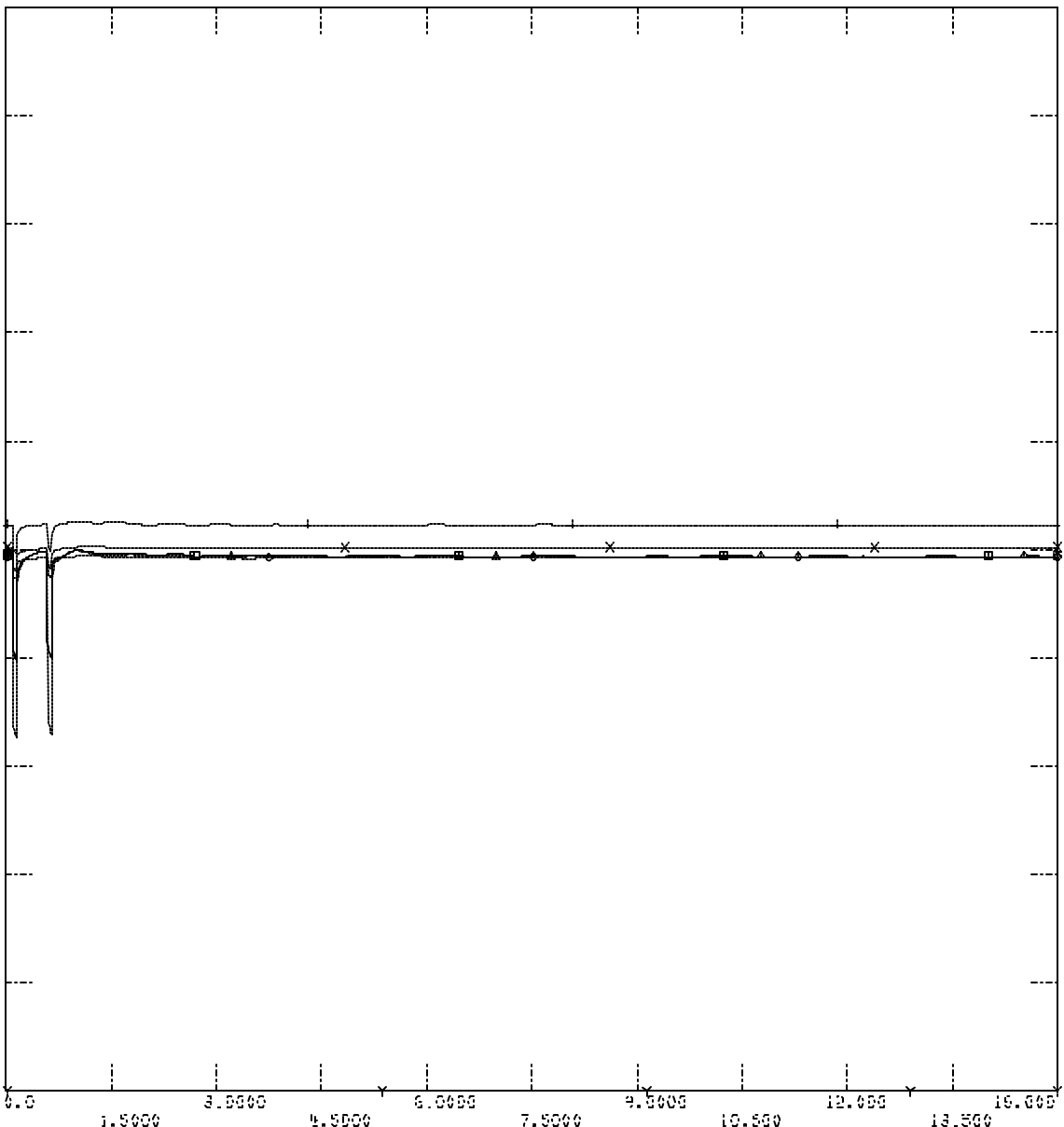
TUE, OCT 12 2004 9:00  
 FLT\_0\_1PH\_VOLTAGES

395KV  
 292KV  
 296KV  
 279KV

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLEMENT

FILE: C:\Interconnection Studies\WOLING\RESUL 15\FLT\_0\_3PH.OUT

2.0000	CHNL # 279: VOLTAGE BIRMINGHAM_1_KOPFL	0.0
2.0000	CHNL # 293: VOLTAGE NIOSHO 395KV3	0.0
2.0000	CHNL # 296: VOLTAGE WOLFCRK 395KV3	0.0
2.0000	CHNL # 292: VOLTAGE BENTON 395KV3	0.0
2.0000	CHNL # 281: VOLTAGE HAWTH 395KV3	0.0
2.0000	CHNL # 279: VOLTAGE WOLFCRK 395KV3	0.0



TUE, OCT 12 2004 9:00  
 FLT\_0\_3PH\_VOLTAGES

395KV  
279A  
279B

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLEMENT

FILE: C:\Interconnection Studies\Marketing\RESUL TS\F11\_9\_001

CHNL # 279A: CVOLTAGE BIRMINGHAM\_1.ACPL3

2.0000

0.0

CHNL # 293: CVOLTAGE NIOSHO\_395KV3

2.0000

0.0

CHNL # 296: CVOLTAGE WOLFCRK\_395KV3

2.0000

0.0

CHNL # 292: CVOLTAGE BENTON\_395KV3

2.0000

0.0

CHNL # 281: CVOLTAGE HAWTH\_395KV3

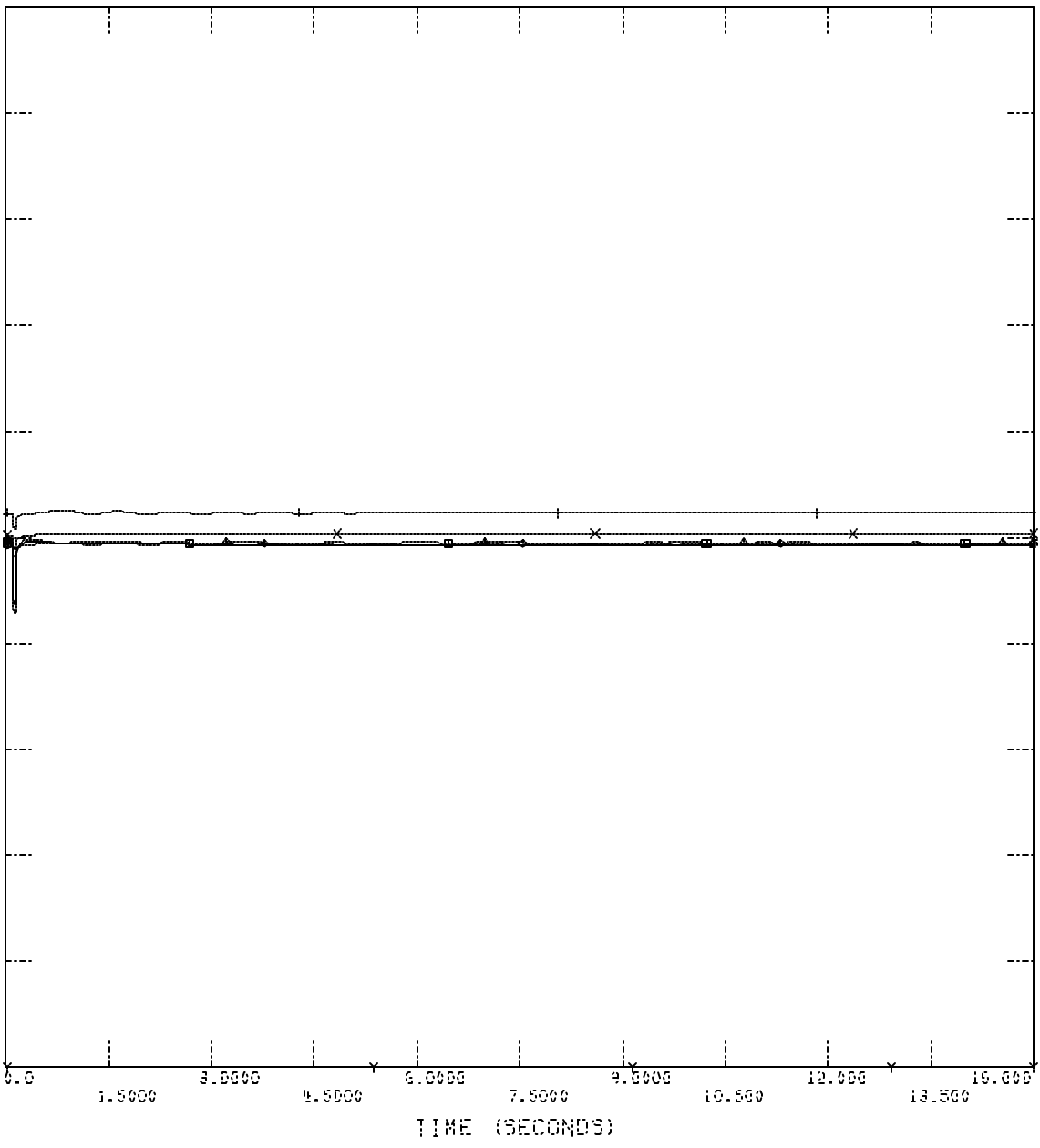
2.0000

0.0

CHNL # 279: CVOLTAGE W.GORDNR\_395KV3

2.0000

0.0



TUE, OCT 12 2004 9:00  
FLT\_9\_VOLTAGES

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

395KV  
292KV  
279KV

FILE: C:\Interconnection Studies\MDG\RING\RESUL\TSVPL\_1\_10\_007  
CHNL # 279: CVOLTAGE BIRMINGM\_1\_KOPFL

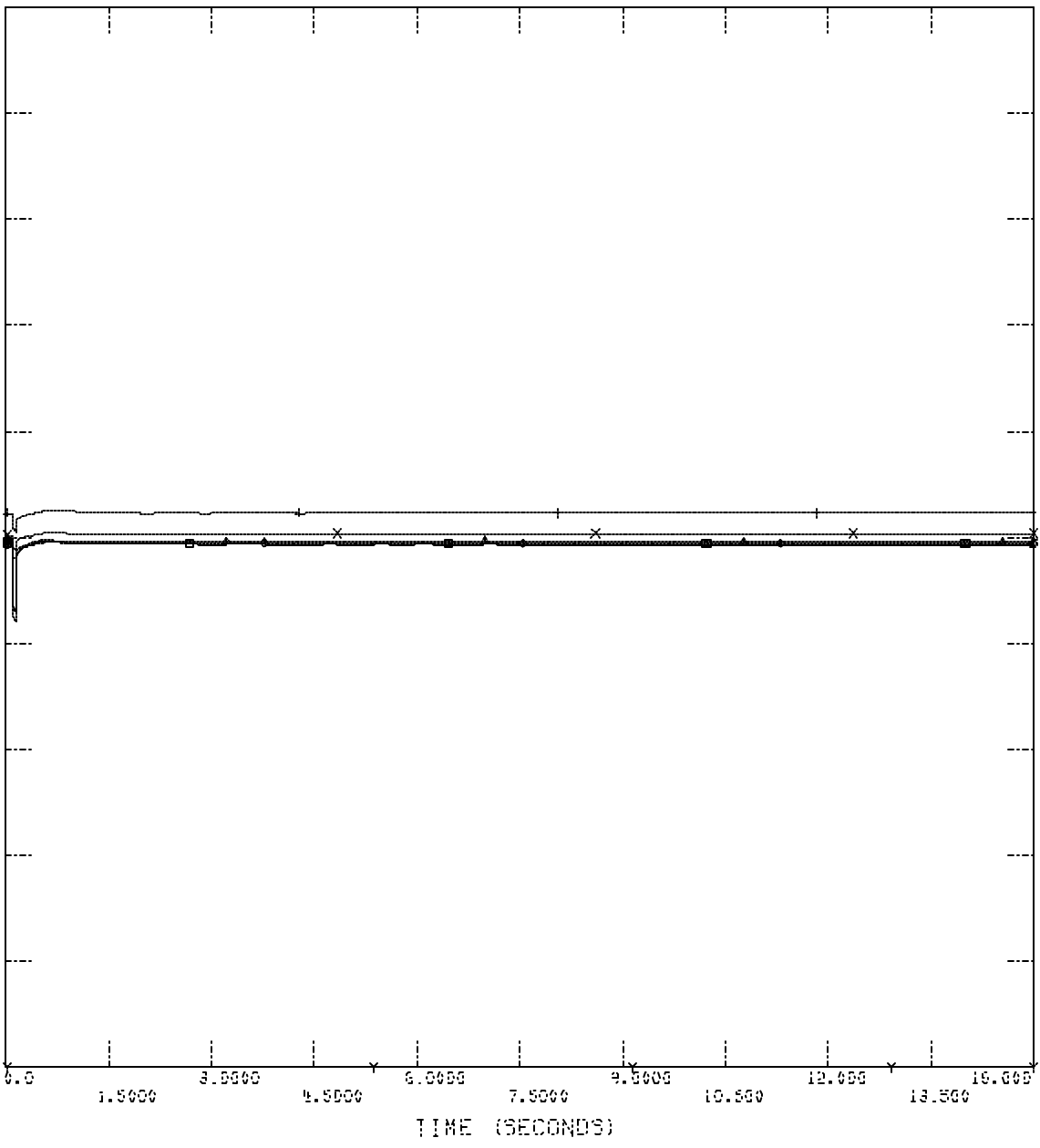
2.0000 CHNL # 293: CVOLTAGE NIOSHO\_395KV] 0.0

2.0000 CHNL # 296: CVOLTAGE WOLFCRK\_395KV] 0.0

2.0000 CHNL # 292: CVOLTAGE BENTON\_395KV] 0.0

2.0000 CHNL # 281: CVOLTAGE HAWTH\_395KV] 0.0

2.0000 CHNL # 279: CVOLTAGE WOLFDR\_395KV] 0.0



TUE, OCT 12 2004 9:00  
FLT\_10\_VOLTAGES

395KV  
2993  
2996  
2922  
281

SPP MDMS ON STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE: C:\Interconnection Studies\WOT\RING\RESUL\TSVPL\_1\_11\_007  
CHNL # 276: CVOLTAGE BIRMINGM\_1\_KOPC3

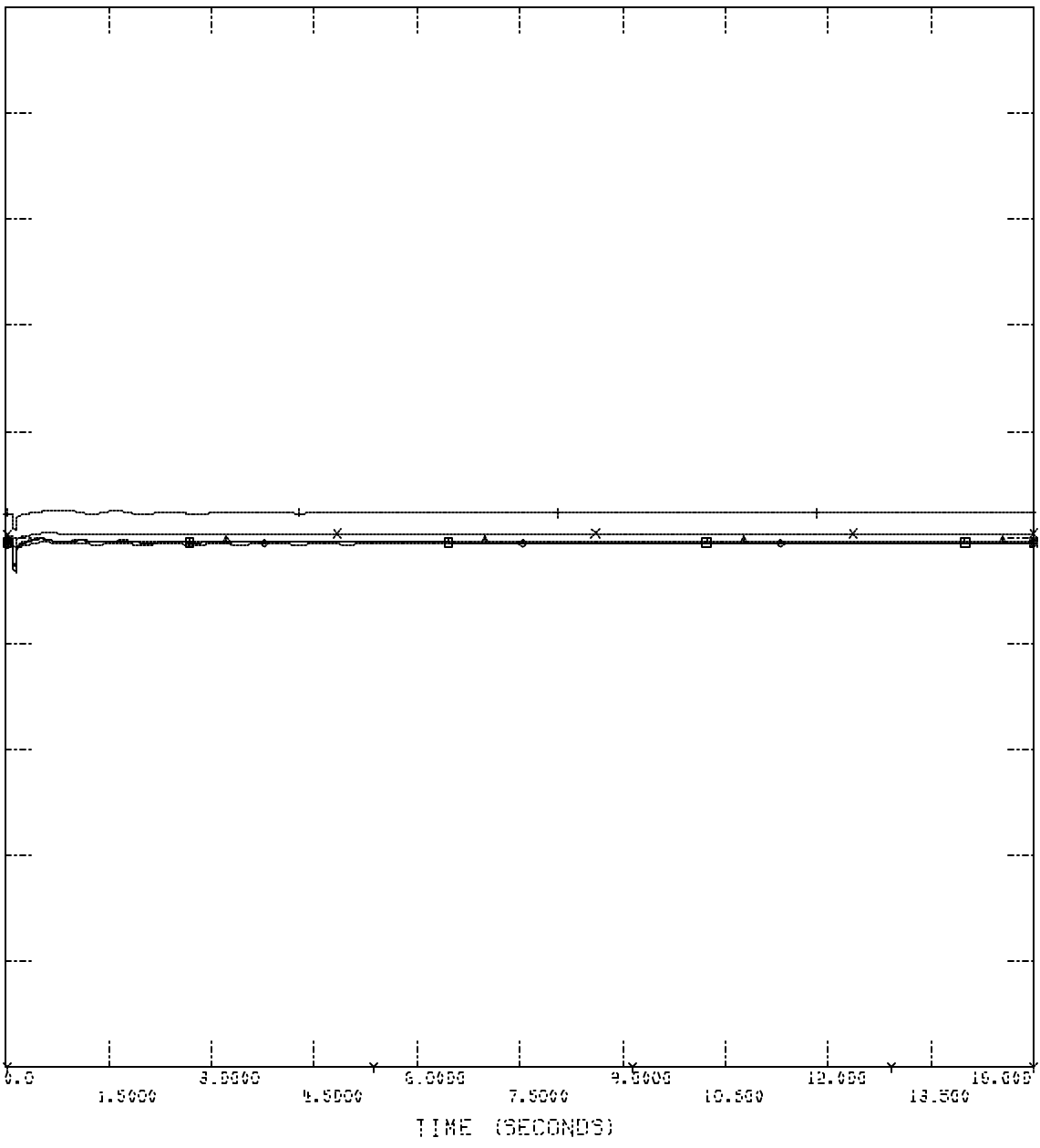
2.0000 CHNL # 293: CVOLTAGE NIOSHO\_395KV3 0.0

2.0000 CHNL # 296: CVOLTAGE WOLFCRK\_395KV3 0.0

2.0000 CHNL # 292: CVOLTAGE BENTON\_395KV3 0.0

2.0000 CHNL # 281: CVOLTAGE HAWTH\_395KV3 0.0

2.0000 CHNL # 279: CVOLTAGE W.GORDNR\_395KV3 0.0



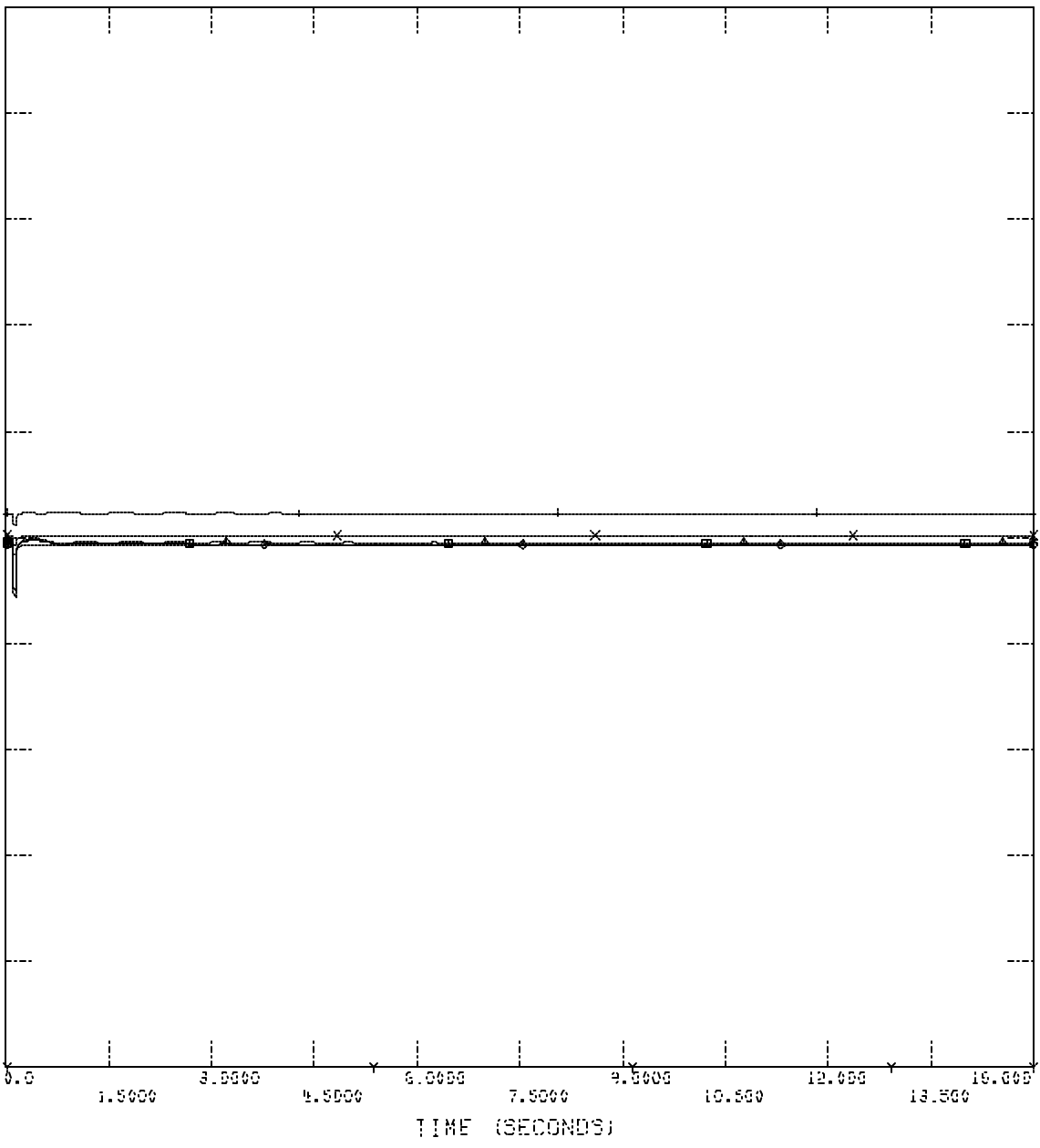
TUE, OCT 12 2004 9:00  
FLT\_11\_VOLTAGES

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

395KVA  
112.1PH

FILE: C:\Interconnection Studies\Work\110\RESULTS\FLT\_12\_1PH.DAT  
PHL # 276: CVOLTAGE BIRMINGM\_1.KOPD

2.0000	CHNL # 293: CVOLTAGE NIOSHO 395KV3	0.0
2.0000	CHNL # 296: CVOLTAGE WOLFCRK 395KV3	0.0
2.0000	CHNL # 292: CVOLTAGE BENTON 395KV3	0.0
2.0000	CHNL # 281: CVOLTAGE HAMTH 395KV3	0.0
2.0000	CHNL # 279: CVOLTAGE W.GORDNR 395KV3	0.0



TUE, OCT 12 2004 9:01  
FLT\_12\_1PH\_VOLTAGES

3945  
10/12/04 9:01 AM

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE: C:\Interconnection Studies\Working\RESU\RESU112\IPH\_STUCK.OUT  
CHNL # 276: CVOLTAGE BIRNISON\_1.KOPCJ

2.0000 0.0

CHNL # 293: CVOLTAGE NEOSHO\_395KVJ

2.0000 0.0

CHNL # 296: CVOLTAGE MQLFCRK\_395KVJ

2.0000 0.0

CHNL # 292: CVOLTAGE BENTON\_395KVJ

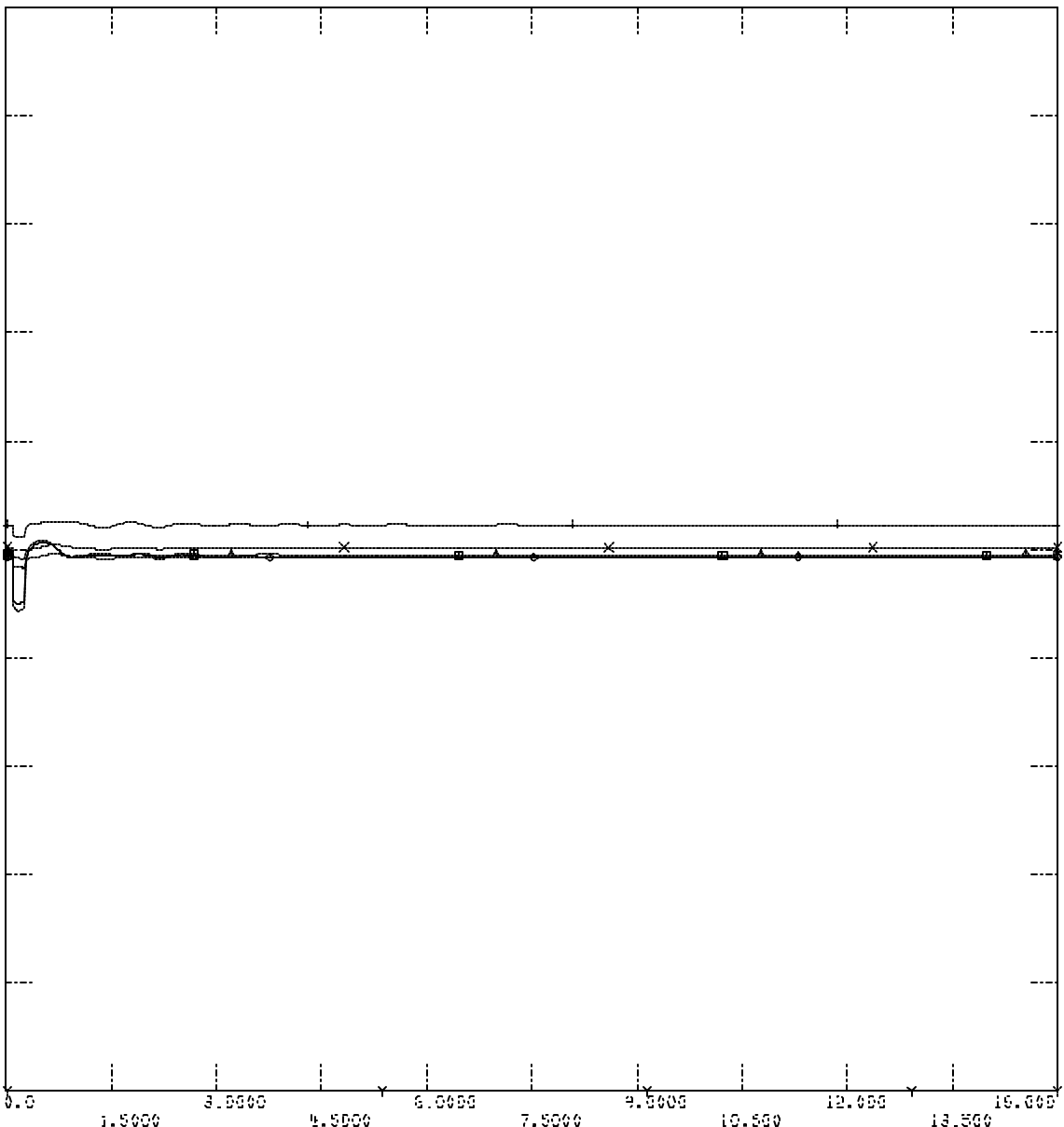
2.0000 0.0

CHNL # 281: CVOLTAGE HAWTH\_395KVJ

2.0000 0.0

CHNL # 279: CVOLTAGE W.GORDNR\_395KVJ

2.0000 0.0



TUE, OCT 12 2004 9:01

FLT\_12\_1PH\_STUCK\_VOLTAGES

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GOLFED

3PH VOLTAGE  
1000  
1000  
1000

FILE: C:\Interconnection Studies\Work\10\RESULTS\SYFLT\_12\_3PH.OUT

CHNL # 276: VOLTAGE BIRMINGHAM\_1\_KOPFL

2.0000 0.0

CHNL # 293: VOLTAGE NIOSHO\_395KV3

2.0000 0.0

CHNL # 296: VOLTAGE WOLFCRK\_395KV3

2.0000 0.0

CHNL # 292: VOLTAGE BENTON\_395KV3

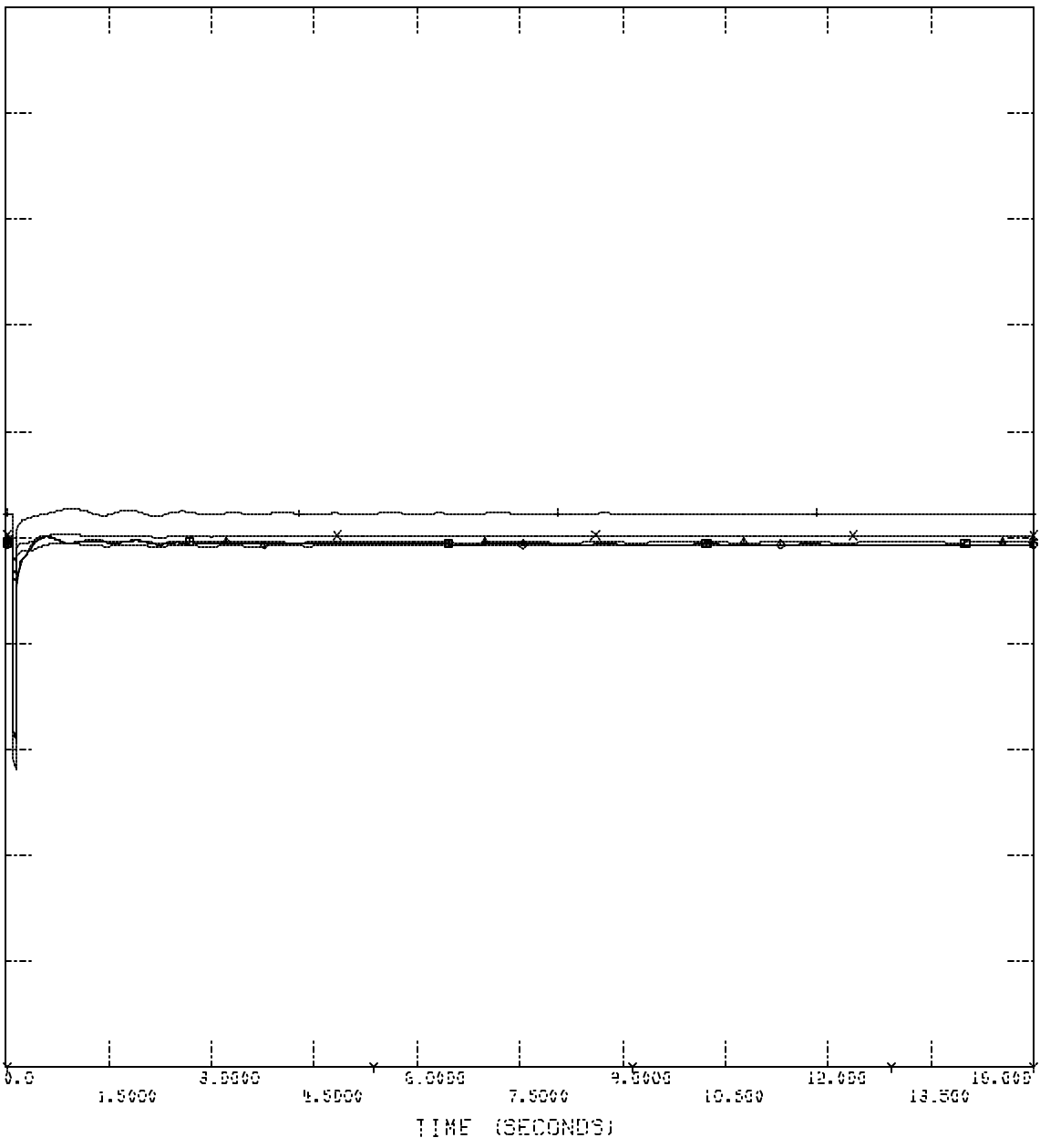
2.0000 0.0

CHNL # 281: VOLTAGE HAMTH\_395KV3

2.0000 0.0

CHNL # 279: VOLTAGE W.GORDNR\_395KV3

2.0000 0.0



TUE, OCT 12 2004 9:01  
FLT\_12\_3PH\_VOLTAGES

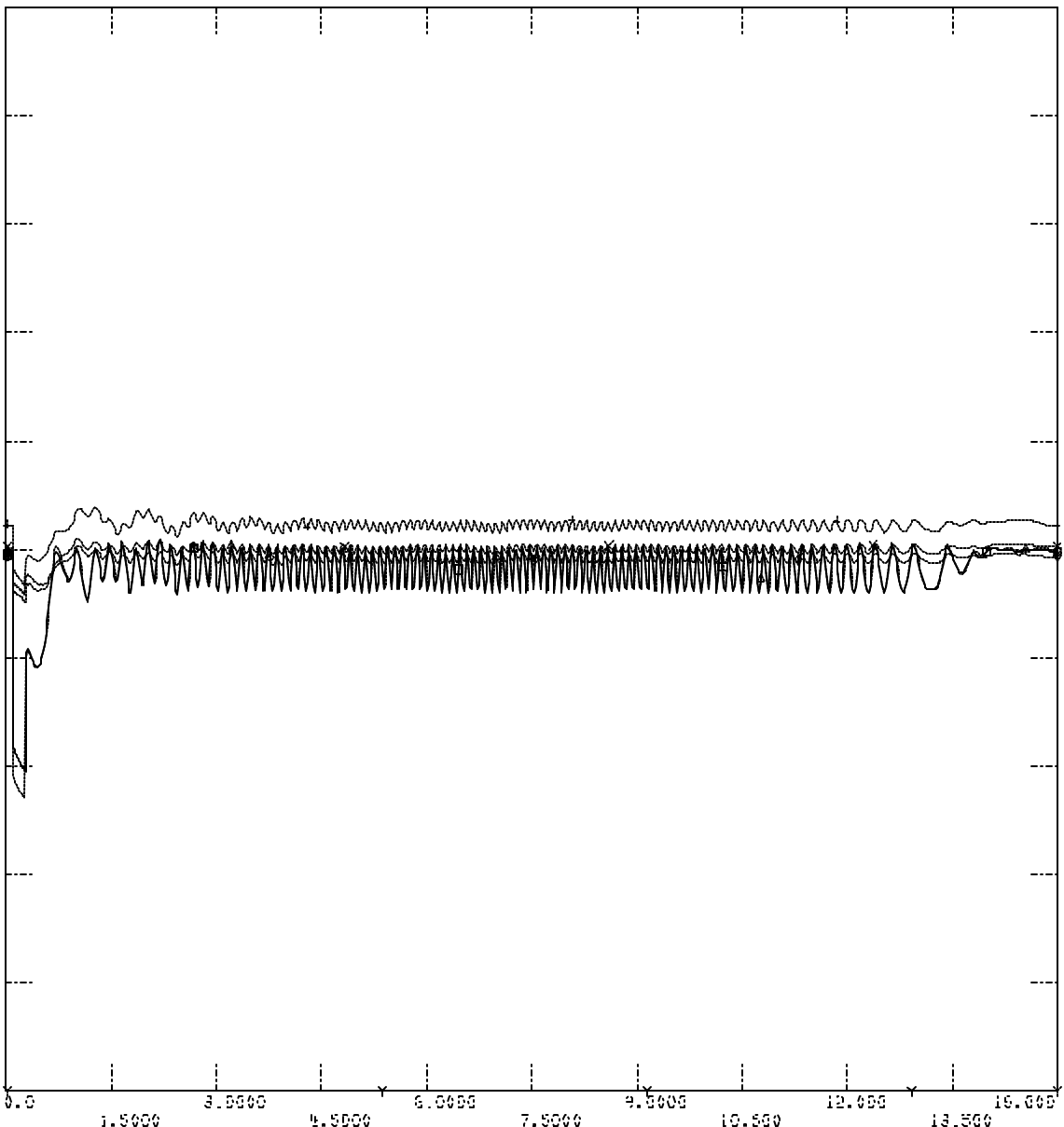


3945  
10/12/04 9:01 AM

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLEMENT

FILE: C:\Interconnection Studies\Working\RESU1\SYFLT\_12\_3PH\_STUCK.OUT

2.0000	CHNL # 279: CVOLTAGE BIRNISON_1_KOPFL	0.0
2.0000	CHNL # 293: CVOLTAGE NEOSHO_395KV3	0.0
2.0000	CHNL # 296: CVOLTAGE MOLFCRK_395KV3	0.0
2.0000	CHNL # 292: CVOLTAGE BENTON_395KV3	0.0
2.0000	CHNL # 281: CVOLTAGE HRMTH_395KV3	0.0
2.0000	CHNL # 279: CVOLTAGE W.GORDNR_395KV3	0.0



TUE, OCT 12 2004 9:01

FLT\_12\_3PH\_STUCK\_VOLTAGES

## **Appendix B-1**

### **Plots of Fault Simulations**

**Plots of selected machine angle response during faults**

**Scenario:  
2010 Summer Peak**

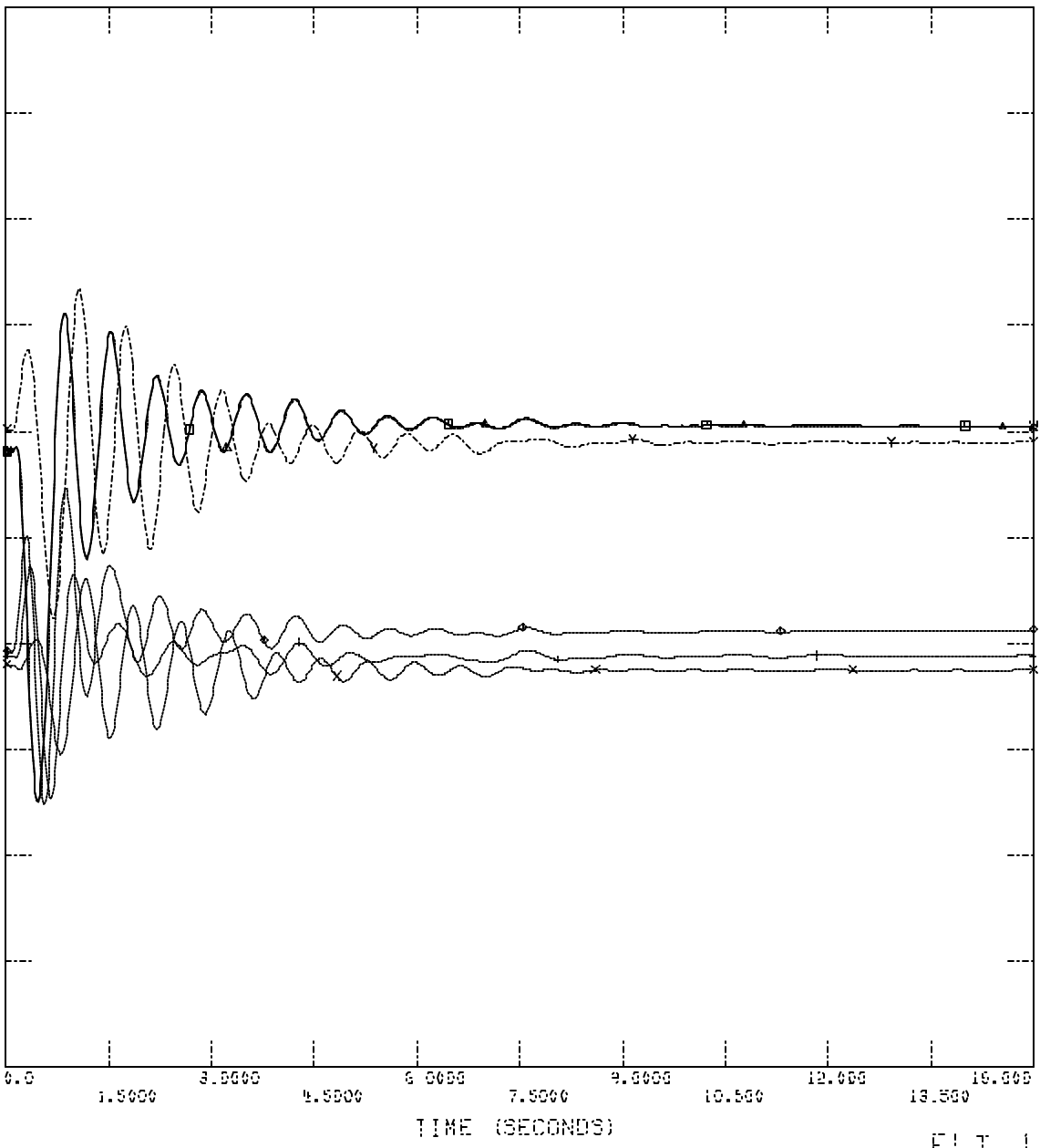
**[Customer plant at 900MW]**

3000  
 2000  
 1000  
 0  
 -1000  
 -2000  
 -3000

SPP MDMG Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDRSE INCL UDINO PRIOR SUPPDED

FILE: C:\Interconnection Studies\Worlino\RESUL15N\FLT\_1\_1.PH.001  
 CHNL # 15: LANG JEFFREY LN CHIA WEDEC

35.000 CHNL # 14: LANG WEST GARDNER CT KCPLJ 10.000  
 0.0 CHNL # 5: LANG HAMTHORNE GS KCPLJ -50.000  
 15.000 CHNL # 4: LANG JARIN G1 KCPLJ -10.000  
 50.000 CHNL # 3: LANG JARIN G2 KCPLJ 0.0  
 50.000 CHNL # 2: LANG RICHMOND 1 KCPLJ 0.0



FRI, OCT 08 2004 10:10

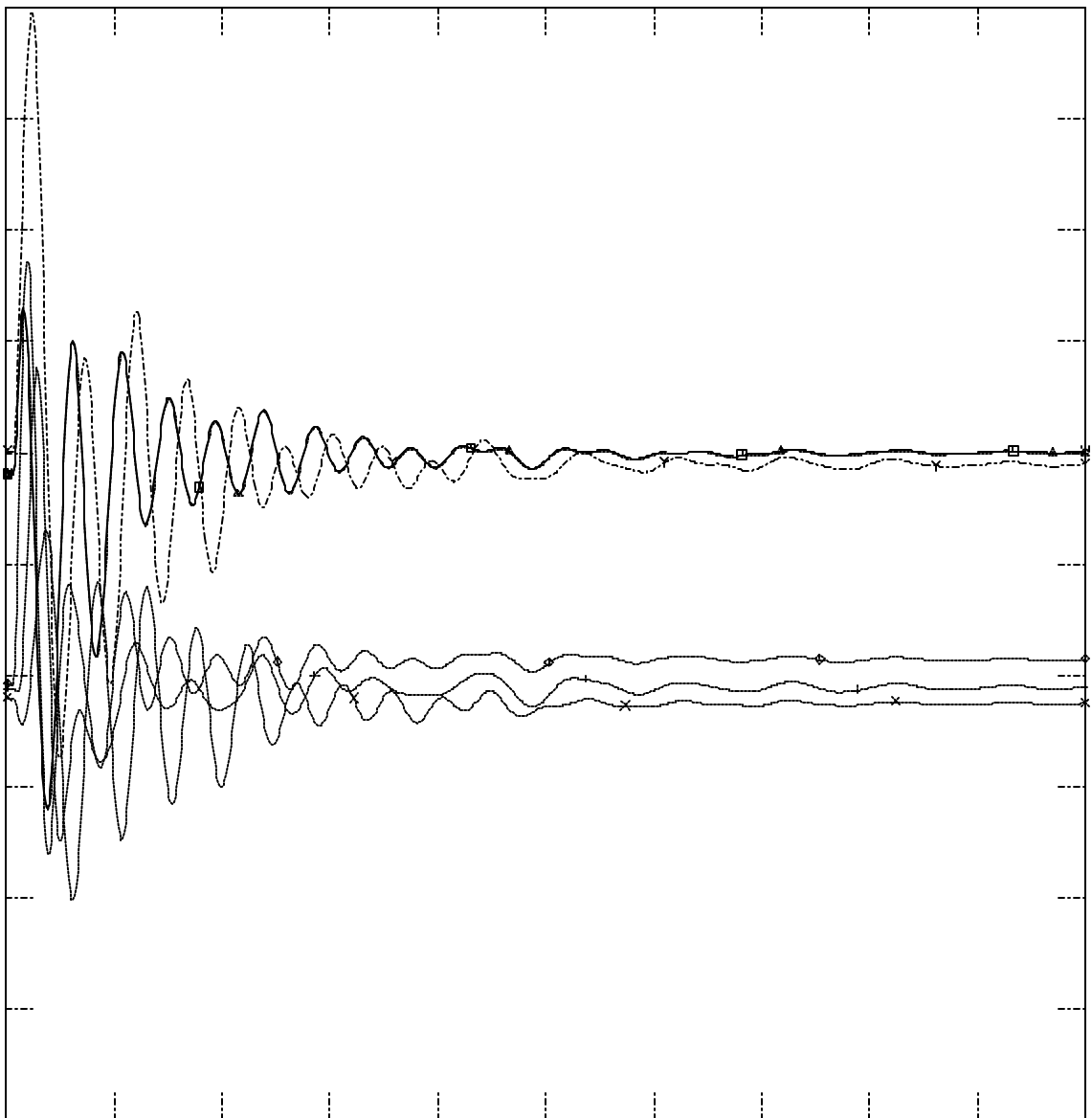
FLT\_1\_1PH\_MACHINE ANGLES

5000  
 10000  
 15000  
 20000  
 25000  
 30000  
 35000  
 40000  
 45000  
 50000  
 55000  
 60000  
 65000  
 70000  
 75000  
 80000  
 85000  
 90000  
 95000  
 100000

SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDHSE INCLUDING PRIOR SCHEDULE

FILE: C:\Interconnection Studies\WOL\IND\RESUL\SNFLT\_1\_3PH.OUT  
 CHNL # 15: LANG JEFFREY LN CNTR WEDEC

35.000 CHNL # 14: LANG WEST GARDNER CT KCPLT 10.000  
 0.0 CHNL # 5: LANG HAMTHORNE GS KCPLT -50.000  
 15.000 CHNL # 4: LANG JARVIS G1 KCPLT -10.000  
 50.000 CHNL # 3: LANG JARVIS G2 KCPLT 0.0  
 50.000 CHNL # 2: LANG RICHMOND 1 KCPLT 0.0



TIME (SECONDS)

FRI, OCT 08 2004 10:10

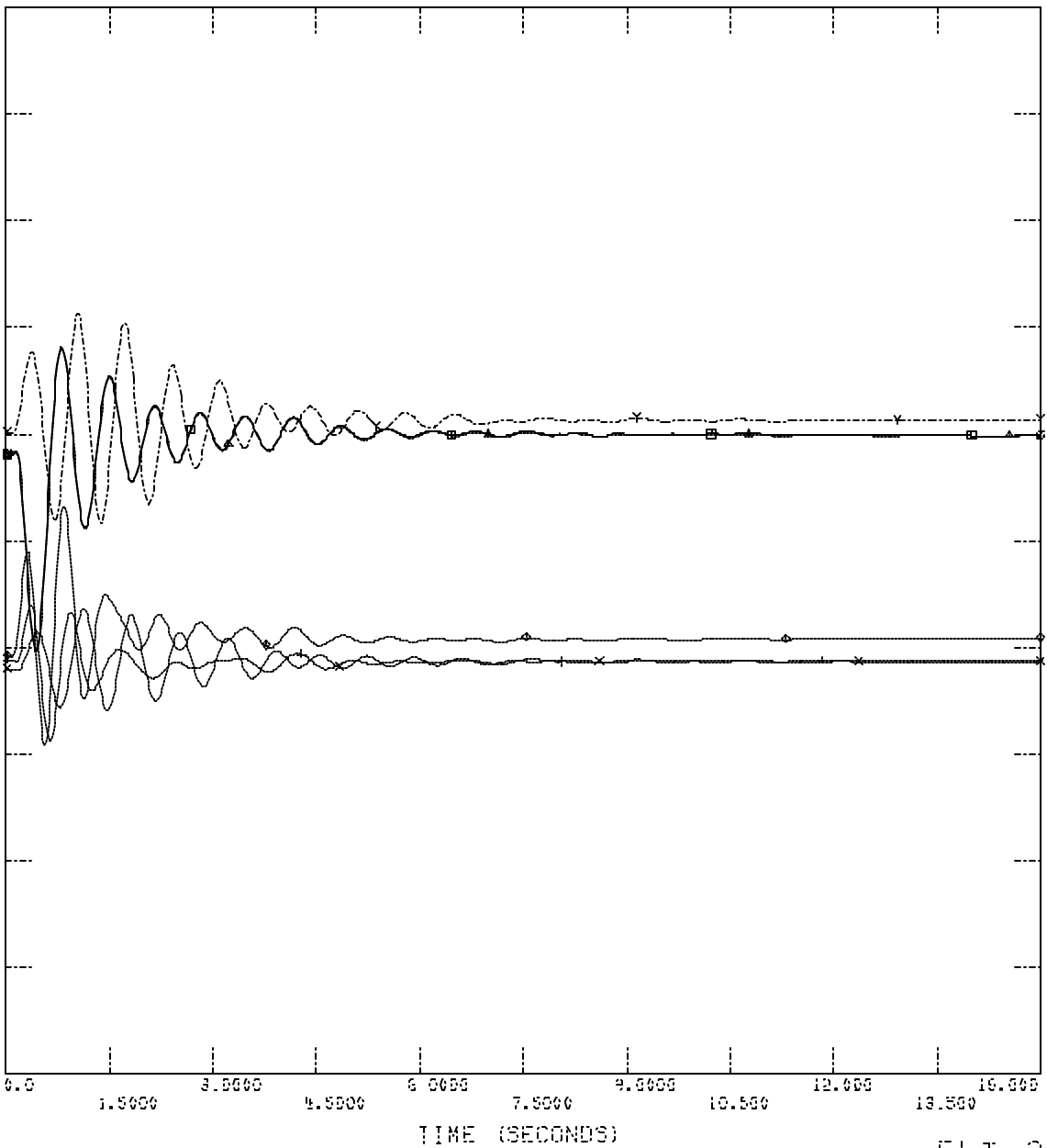
FLT\_1\_3PH\_MACHINE ANGLES

3000  
 2000  
 1000  
 0  
 -1000  
 -2000  
 -3000

SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDHSE INCLUDING PRIOR SUPPDED

FILE: C:\Interconnection Studies\Worlind\RESUL15\FLT\_2\_1PH.OUT  
 CHANNEL # 151: LANG JEFFREY LN DATA.WEBC

35.000	CHNL # 14: LANG WEST GARDNER CT KCPL1	10.000
0.0	CHNL # 5: LANG HAMTHORNE GS KCPL1	-50.000
15.000	CHNL # 4: LANG JARVIS G1 KCPL1	-10.000
50.000	CHNL # 3: LANG JARVIS G2 KCPL1	0.0
50.000	CHNL # 2: LANG RICHMOND 1 KCPL1	0.0



FRI, OCT 08 2004 10:10

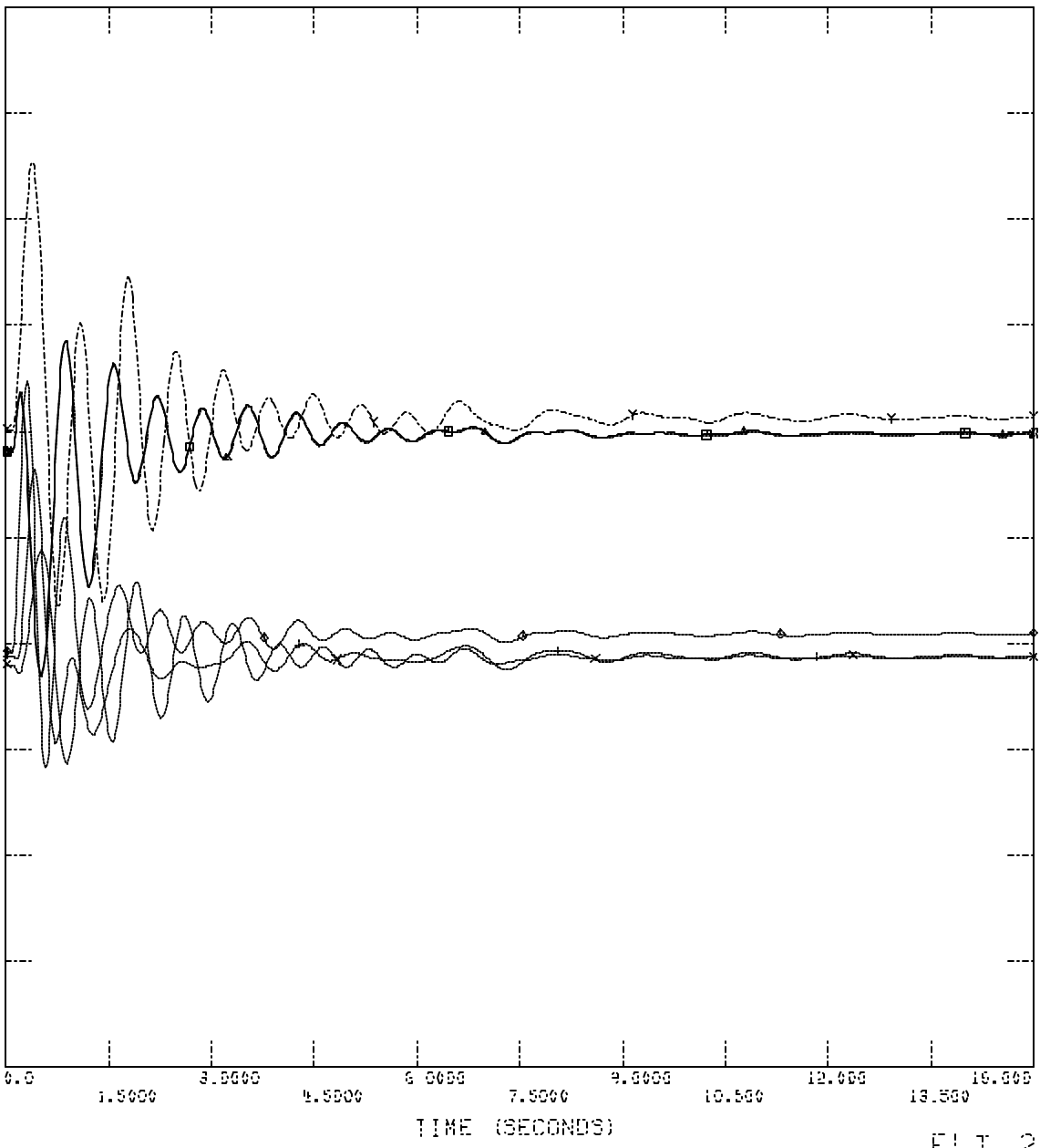
FLT\_2\_1PH\_MACHINE ANGLES

3000  
 2000  
 1000  
 0  
 -1000  
 -2000  
 -3000

SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDRSE INCL UDINO PRIOR SUPPDED

FILE: C:\Interconnection Studies\WorlIno\RESUL 15\FLT\_2\_3PH.001  
 CHNL # 151: CANG JOSEPH LN CTRA WEBC

35.000 CHNL # 14: CANG WEST GARDNER CT KCPL1 10.000  
 0.0 CHNL # 5: CANG HAMTHORNE GS KCPL1 -50.000  
 15.000 CHNL # 4: CANG JARIN G1 KCPL1 -10.000  
 50.000 CHNL # 3: CANG JARIN G2 KCPL1 0.0  
 50.000 CHNL # 2: CANG RICHISON 1 KCPL1 0.0



FRI, OCT 08 2004 10:10

FLT\_2\_3PH\_MACHINE ANGLES

SMP  
 GEN-2004-012  
 BRSDHSE  
 INCLDING  
 PRIOR  
 SUPPDR

SPP MDWG Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSDHSE INCLDING PRIOR SUPPDR

FILE: C:\Interconnection Studies\Worling\RESUL1\SNPL1\_3\_1PH.OUT  
 CHNL # 15: LANG JEFFREY LN CNTR WEDS

35.000 CHNL # 14: LANG WEST GARDNER CT KPPL1 10.000

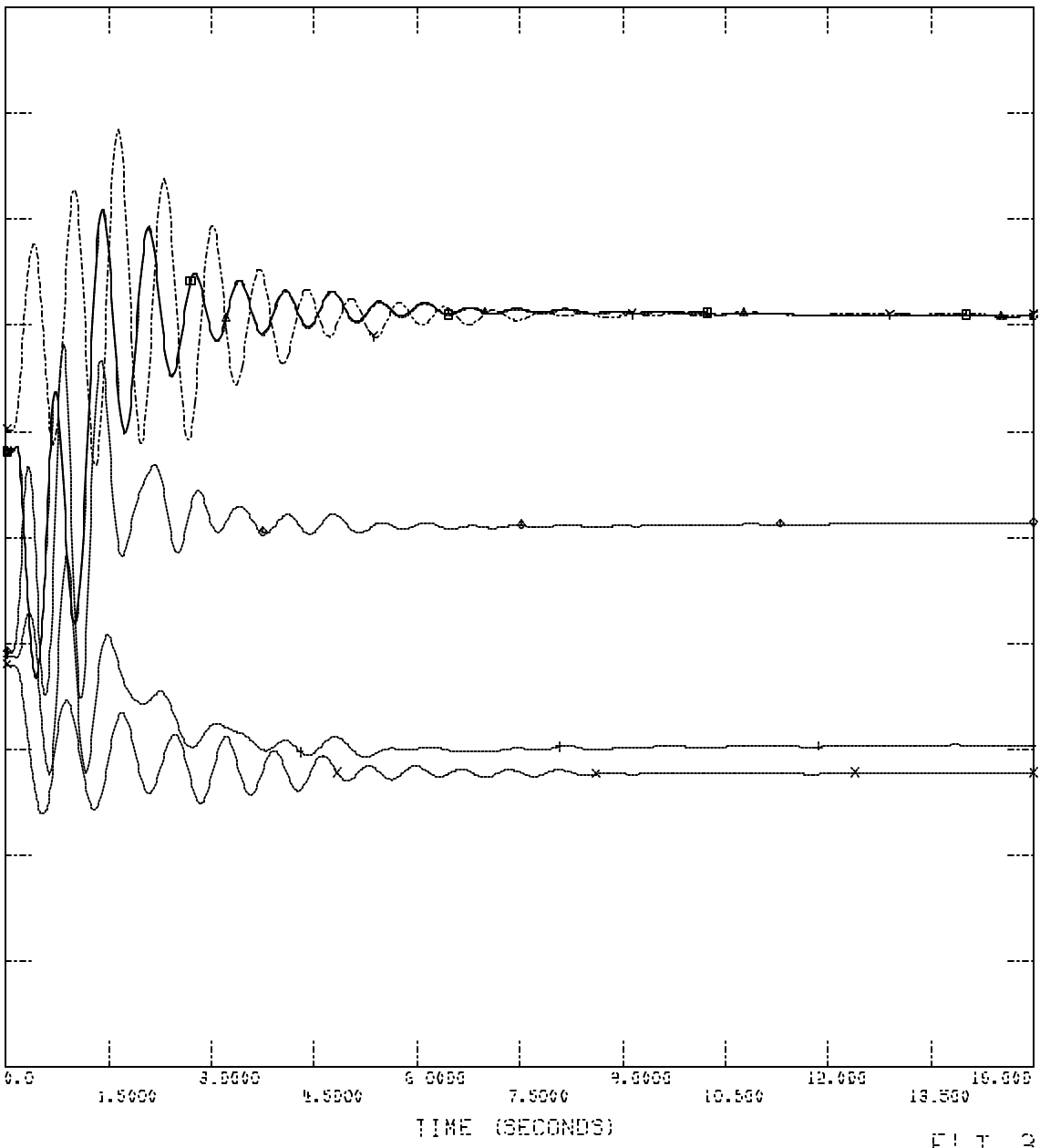
0.0 CHNL # 14: LANG WEST GARDNER CT KPPL1 -50.000

15.000 CHNL # 5: LANG HAWTHORNE GS KPPL1 -10.000

50.000 CHNL # 4: LANG JARVIS G1 KPPL1 0.0

50.000 CHNL # 3: LANG JARVIS G2 KPPL1 0.0

50.000 CHNL # 2: LANG RICHMOND 1 KPPL1 5.0



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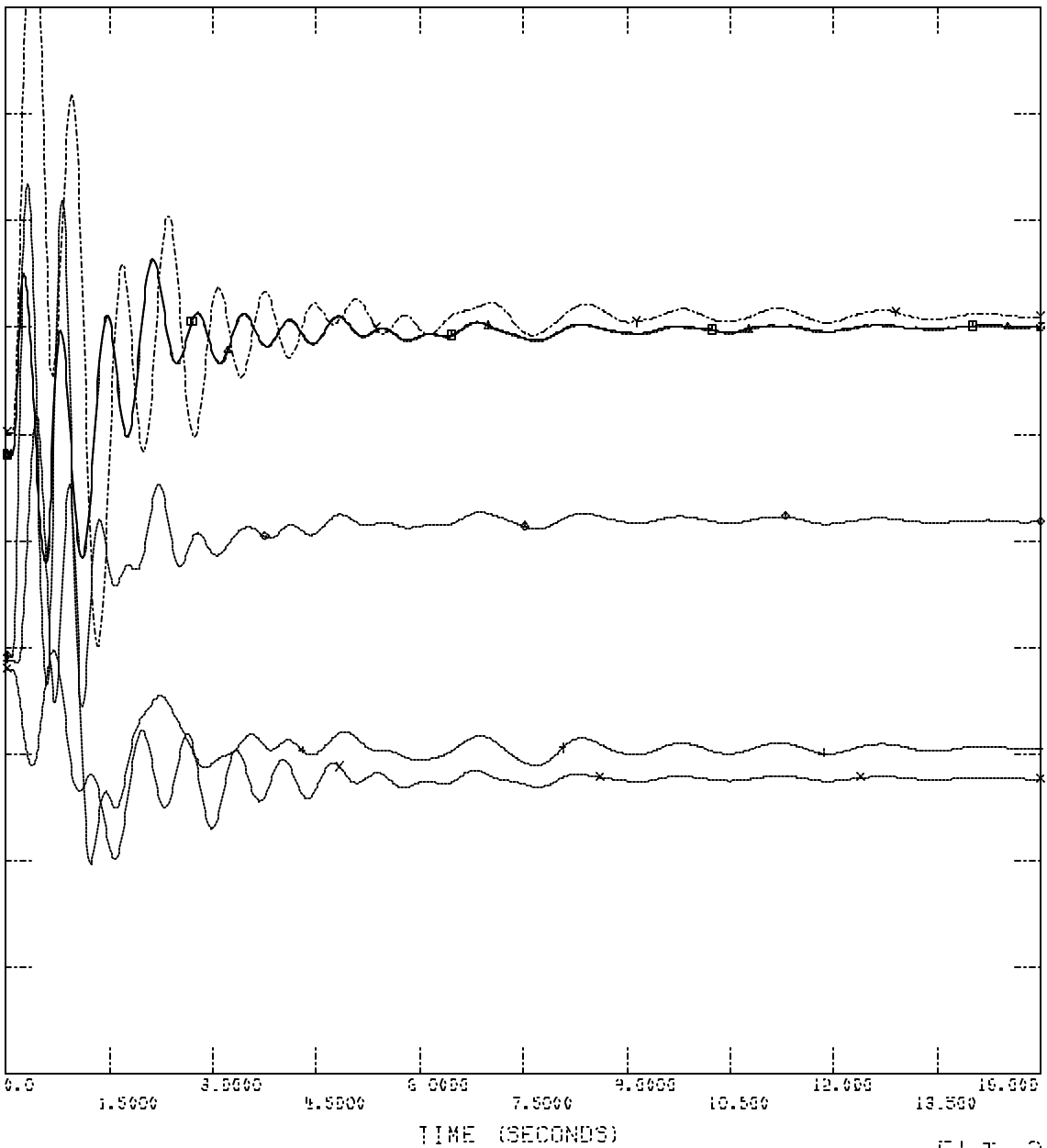
FLT\_3\_1PH\_MACHINE ANGLES

3000  
 2000  
 1000  
 0  
 -1000  
 -2000  
 -3000

SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDRSE INCLUDING PRIOR SCHEDULE

FILE: C:\Interconnection Studies\Worlind\RESUL\SNFLT\_3\_3PH.001  
 CHNL # 151: LANG JEFFREY LN CNTR WEDG

35.000 CHNL # 141: LANG WEST GARDNER CT KCPLT 10.000  
 0.0 CHNL # 14: LANG WEST GARDNER CT KCPLT -50.000  
 15.000 CHNL # 51: LANG HAMTHORNE GS KCPLT -10.000  
 50.000 CHNL # 4: LANG JATRN G1 KCPLT 0.0  
 50.000 CHNL # 3: LANG JATRN G2 KCPLT 0.0  
 50.000 CHNL # 24: LANG RICHMOND 1 KCPLT 0.0



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FLT\_3\_3PH\_MACHINE ANGLES

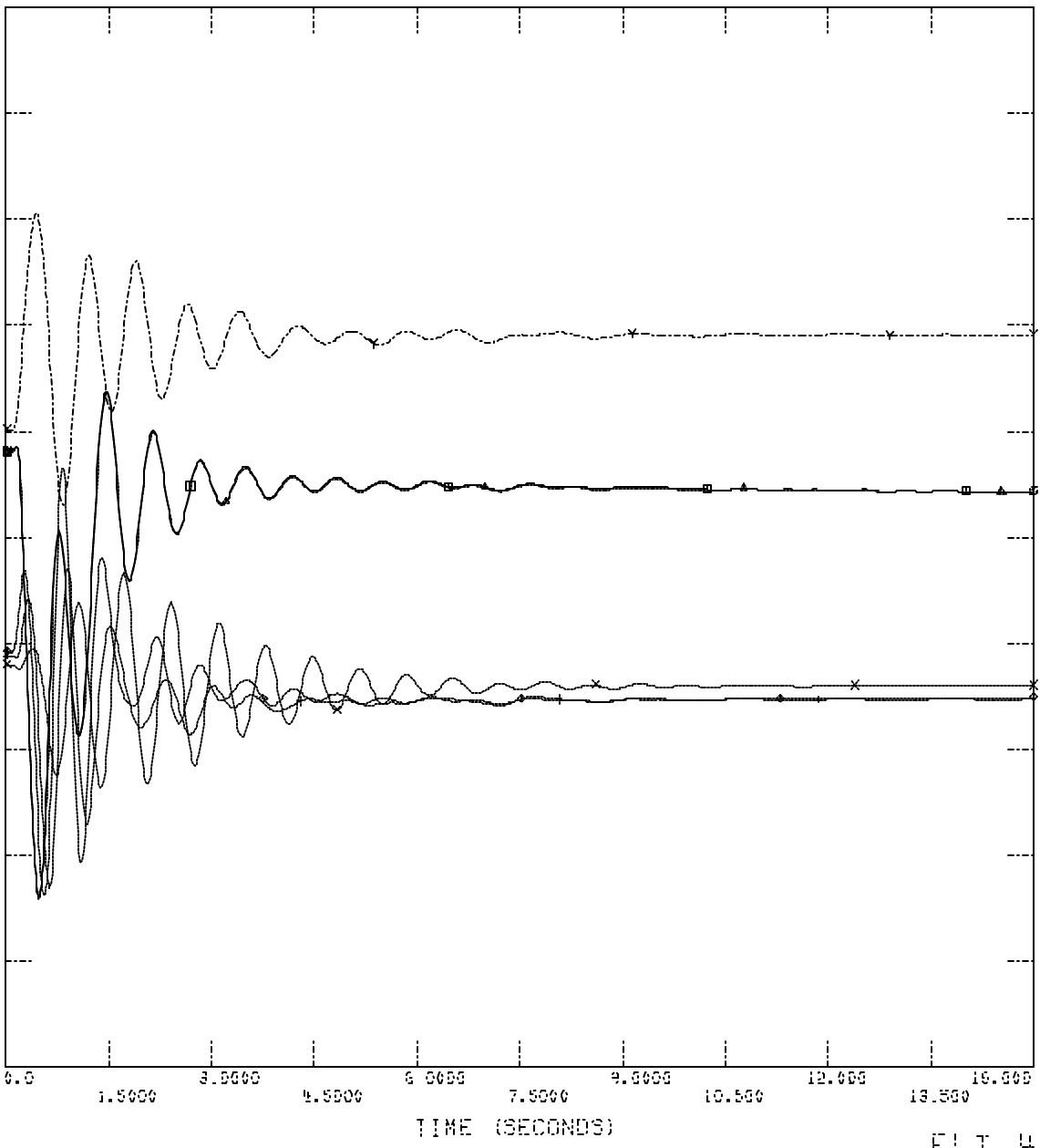


3000  
 2000  
 1000  
 0  
 -1000  
 -2000  
 -3000

SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDHSE INCLUDING PRIOR SCHEDULE

FILE: C:\Interconnection Studies\Worling\RESU175\FLT\_4\_IPH.OUT  
 CHNL # 15: LANG JEFFREY LN CHIA WEDS

35.000 CHNL # 14: LANG WEST GARDNER CT KCPLT 10.000  
 0.0 CHNL # 5: LANG HAMTHORNE GS KCPLT -50.000  
 15.000 CHNL # 4: LANG JARVIS G1 KCPLT -10.000  
 50.000 CHNL # 3: LANG JARVIS G2 KCPLT 0.0  
 50.000 CHNL # 2: LANG RICHMOND 1 KCPLT 0.0



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FLT\_4\_IPH\_MACHINE ANGLES

30000  
 20000  
 10000  
 0  
 -10000  
 -20000  
 -30000

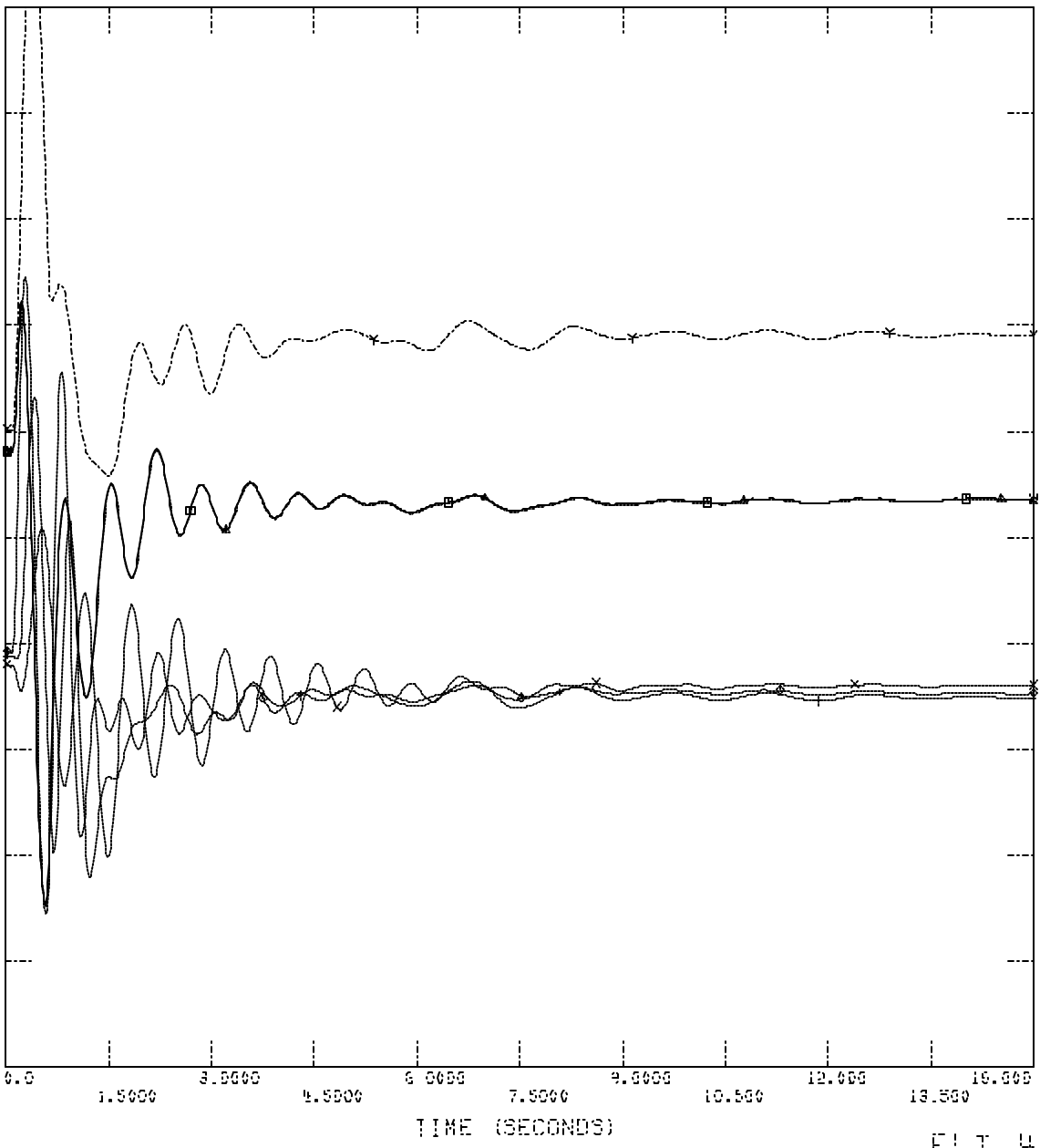
SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDRSE INCLUDING PRIOR SCHEDULE

FILE: C:\Interconnection Studies\WorlIno\RESUL 15\FLT\_4\_3PH.OUT  
 CHANNEL # 151: LANG JEFFREY LN DATA WEDS

35.000  
 15.000  
 50.000  
 50.000  
 50.000

CHANNEL # 14: LANG WEST GARDNER CT KCPLT  
 CHANNEL # 5: LANG HAMTHORNE GS KCPLT  
 CHANNEL # 4: LANG JARVIS G1 KCPLT  
 CHANNEL # 3: LANG JARVIS G2 KCPLT  
 CHANNEL # 2: LANG RICHMOND 1 KCPLT

10.000  
 -50.00  
 -10.00  
 0.0  
 0.0  
 0.0



FRI, OCT 08 2004 10:10

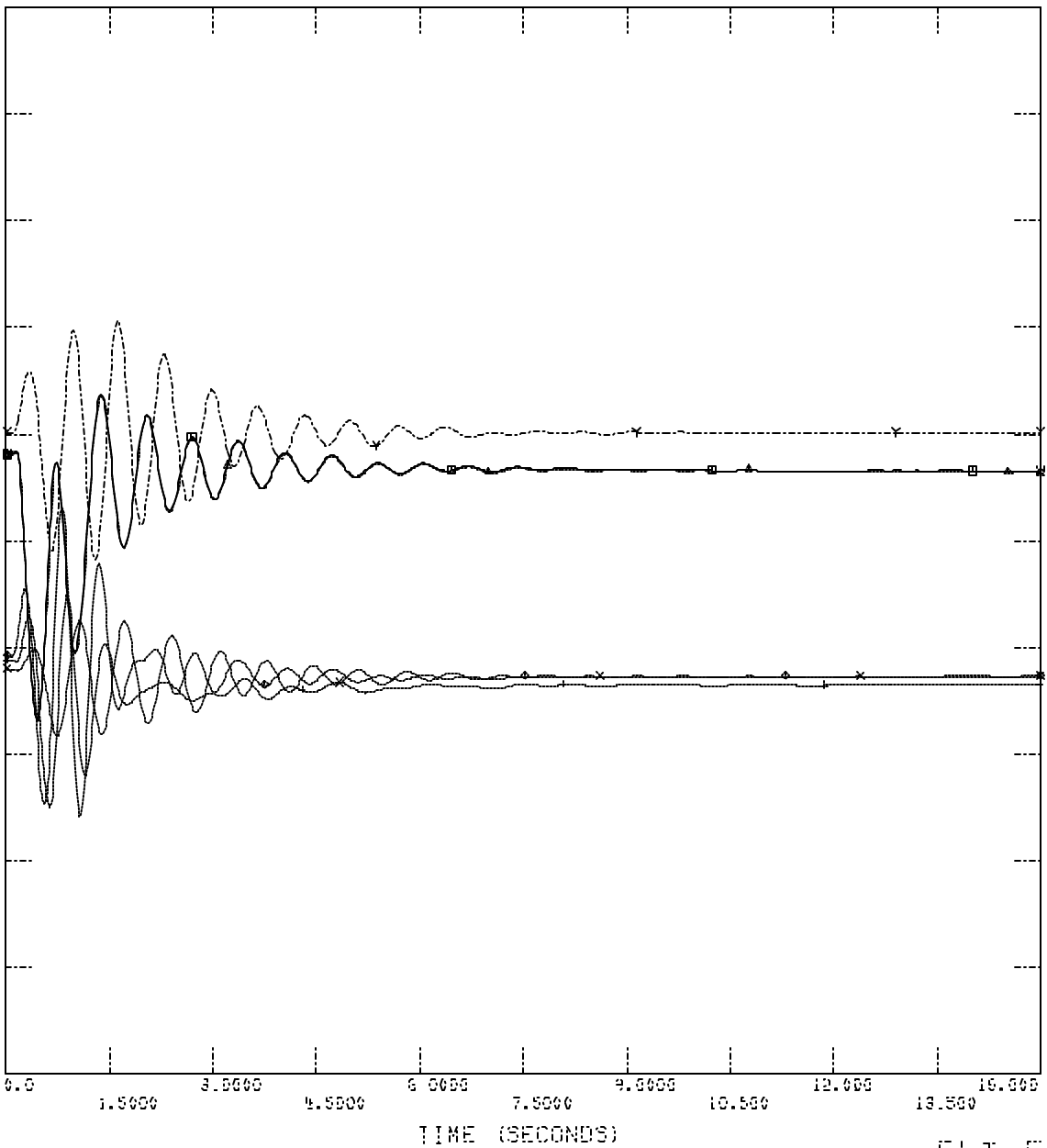
FLT\_4\_3PH\_MACHINE ANGLES

3000  
 2000  
 1000  
 0  
 -1000  
 -2000  
 -3000

SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDHSE INCLUDING PRIOR SUPPDED

FILE: C:\Interconnection Studies\WORKING\RESUL 75\FLT\_5\_IPH.OUT  
 CHNL # 15: LANG JEFFREY LN CNTR WEBC

35.000 CHNL # 14: LANG WEST GARDNER CT KCPLT 10.000  
 0.0 CHNL # 5: LANG HAMTHORNE GS KCPLT -50.000  
 15.000 CHNL # 4: LANG JARVIS G1 KCPLT -10.000  
 50.000 CHNL # 3: LANG JARVIS G2 KCPLT 0.0  
 50.000 CHNL # 2: LANG RICHMOND 1 KCPLT 0.0



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FLT\_5\_IPH\_MACHINE ANGLES

3000  
 2000  
 1000  
 0  
 -1000  
 -2000  
 -3000

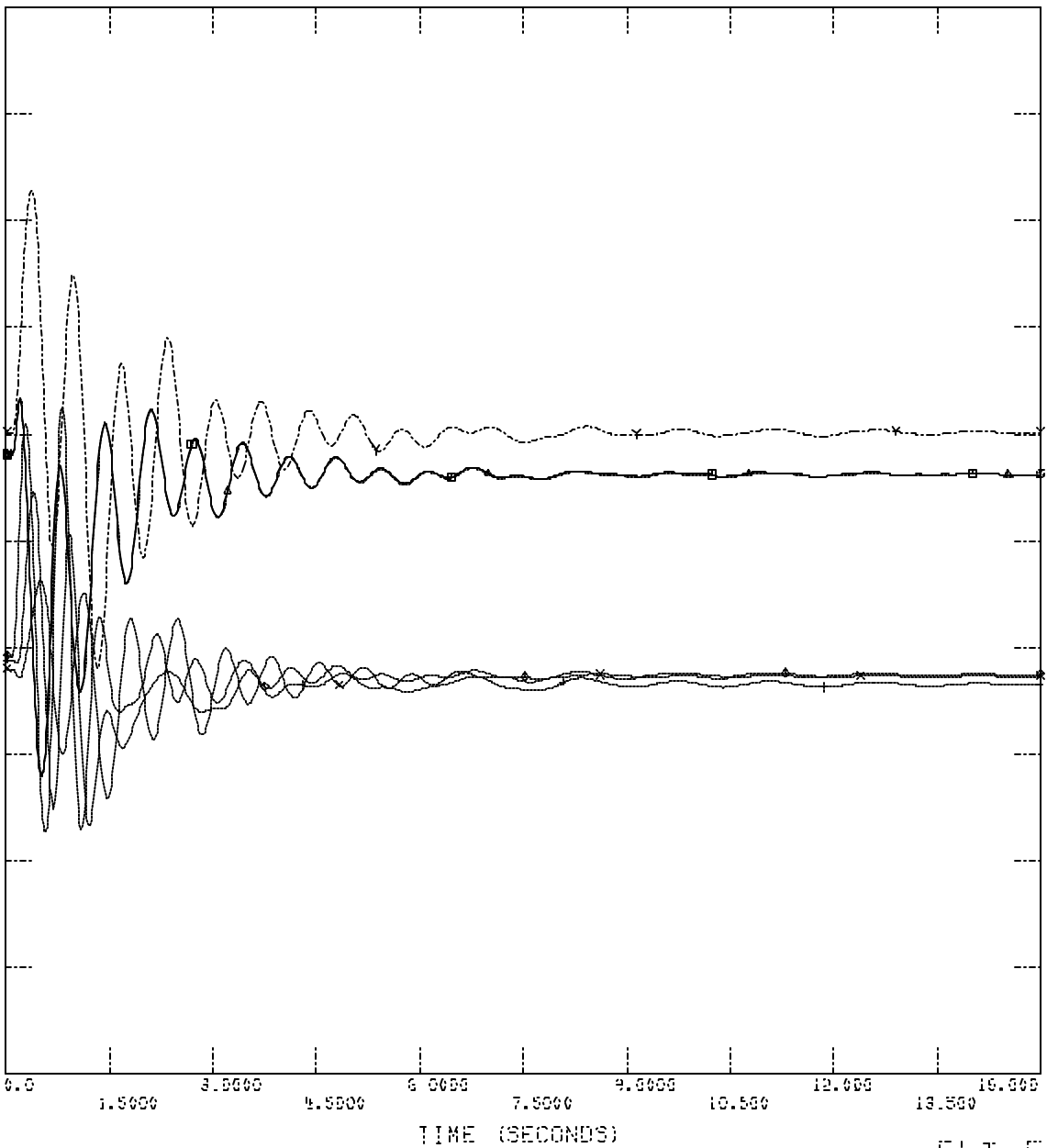
SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDHSE INCLUDING PRIOR SCHEDULE

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35.000 CHNL # 14: LANG WEST GARDNER CT KCPLT 10.000  
 0.0 CHNL # 14: LANG WEST GARDNER CT KCPLT -50.000

15.000 CHNL # 5: LANG HAMTHORNE GS KCPLT -10.000  
 50.000 CHNL # 4: LANG JARVIS G1 KCPLT 0.0

50.000 CHNL # 3: LANG JARVIS G2 KCPLT 0.0  
 50.000 CHNL # 2: LANG RICHMOND 1 KCPLT 0.0



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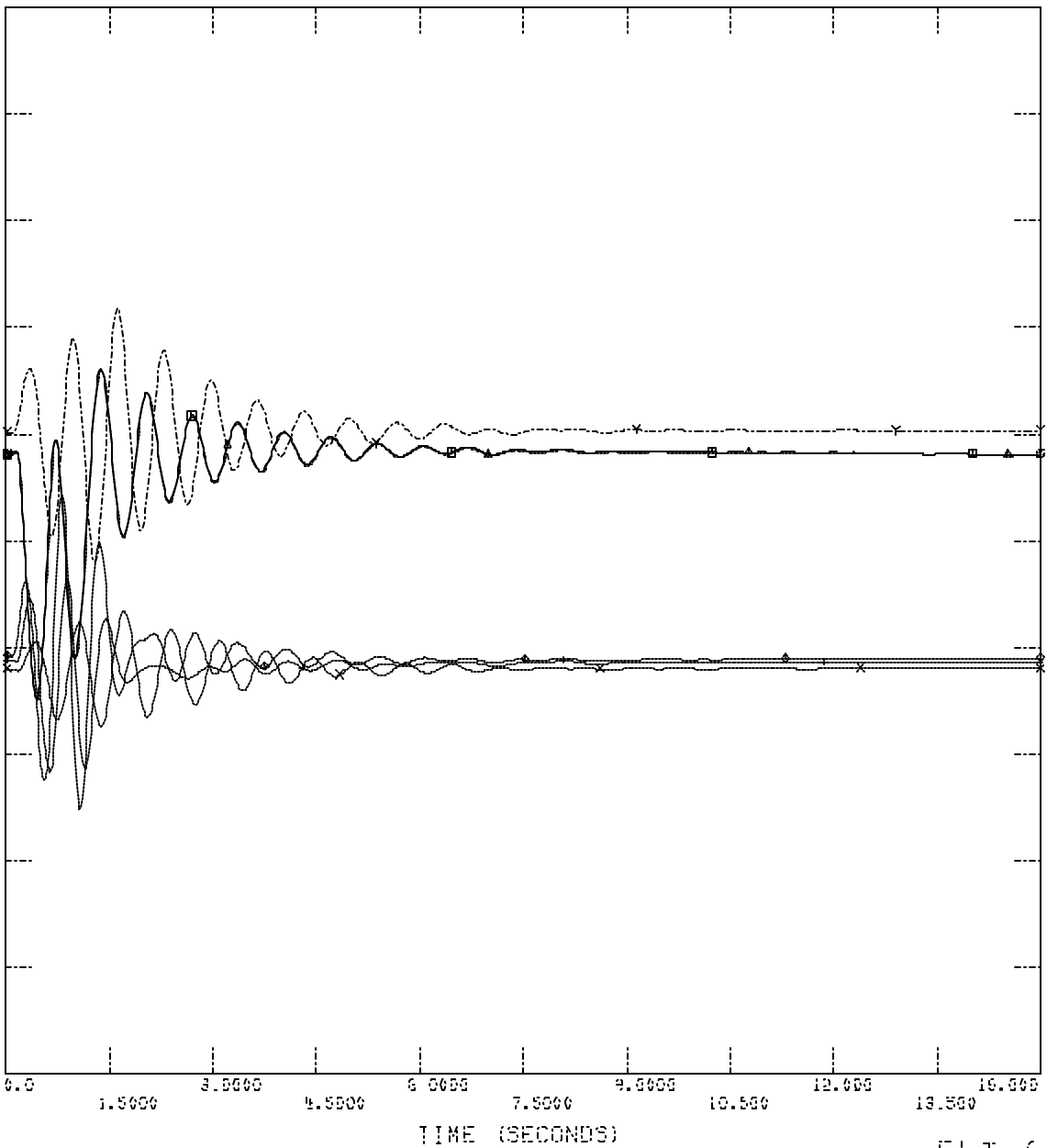
FLT\_5\_SPH\_MACHINE ANGLES

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 2000  
 1000  
 0  
 -1000  
 -2000  
 -3000

SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDHSE INCLUDING PRIOR CORRECTION

FILE: C:\Interconnection Studies\Worlind\RESUL15\FLT\_6\_1PH.OUT  
 CHNL # 151: LANG JEFFREY LN CHIA WEDS

35.000 CHNL # 141: LANG WEST GARDNER CT KCPL1 10.000  
 0.0 CHNL # 14: LANG WEST GARDNER CT KCPL1 -50.000  
 15.000 CHNL # 51: LANG HAMTHORNE GS KCPL1 -10.000  
 50.000 CHNL # 4: LANG JARVIS G1 KCPL1 0.0  
 50.000 CHNL # 3: LANG JARVIS G2 KCPL1 0.0  
 50.000 CHNL # 2: LANG RICHMOND 1 KCPL1 0.0



FRI, OCT 08 2004 10:10

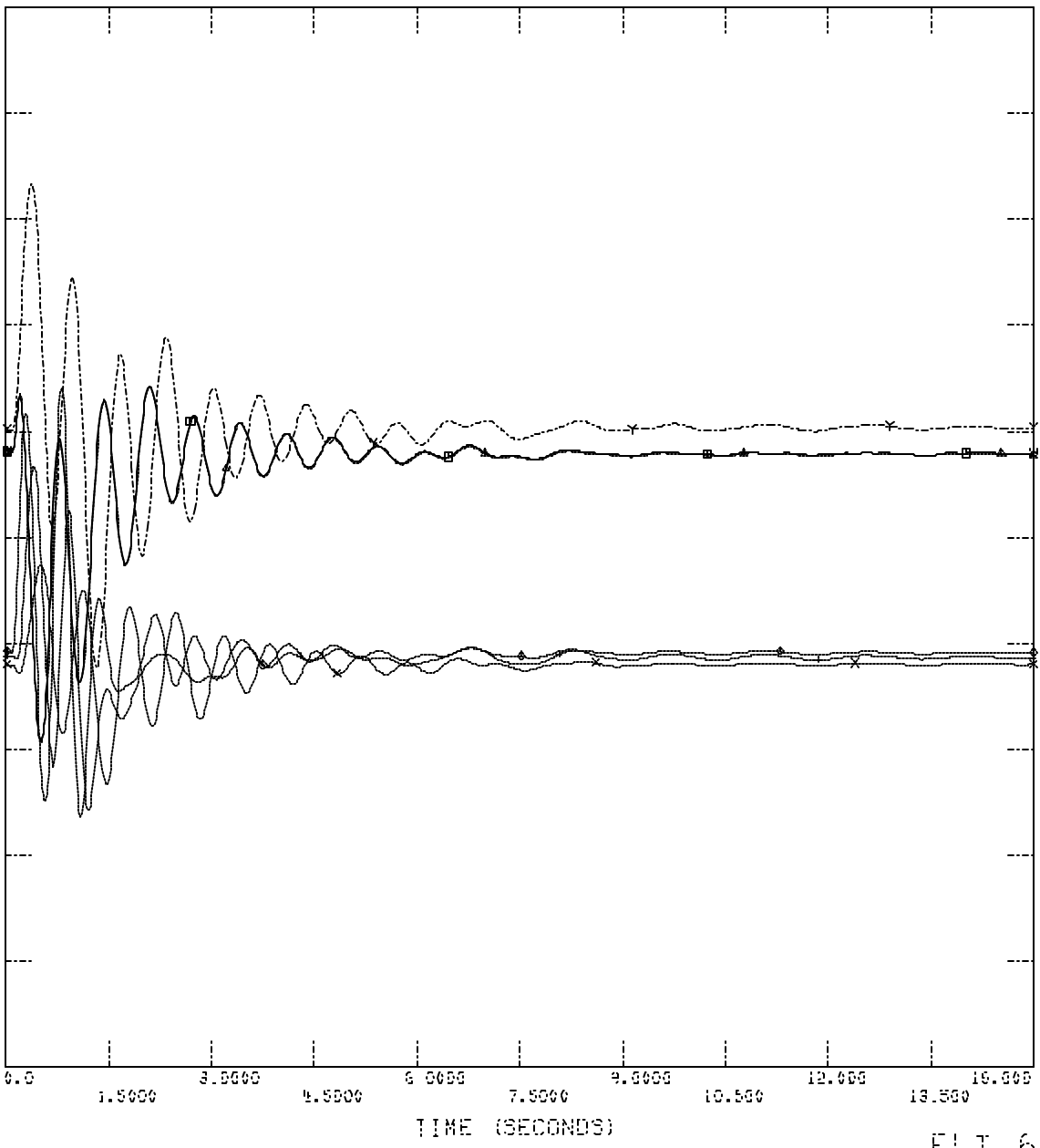
FLT\_6\_1PH\_MACHINE ANGLES

3000  
 2000  
 1000  
 0  
 -1000  
 -2000  
 -3000

SPP MDMG Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDRSE INCL UDINO PRIOR SUFFED

FILE: C:\Interconnection Studies\Worlino\RESUL 75\FLT\_6\_3PH.OUT  
 CHNL # 15: LANG JEFFREY LN CHIA WEBC

35.000 CHNL # 14: LANG WEST GARDNER CT KCPLT 10.000  
 0.0 CHNL # 5: LANG HAMTHORNE GS KCPLT -50.000  
 15.000 CHNL # 4: LANG JARIN G1 KCPLT -10.000  
 50.000 CHNL # 3: LANG JARIN G2 KCPLT 0.0  
 50.000 CHNL # 2: LANG RICHMOND 1 KCPLT 0.0



FRI, OCT 08 2004 10:10

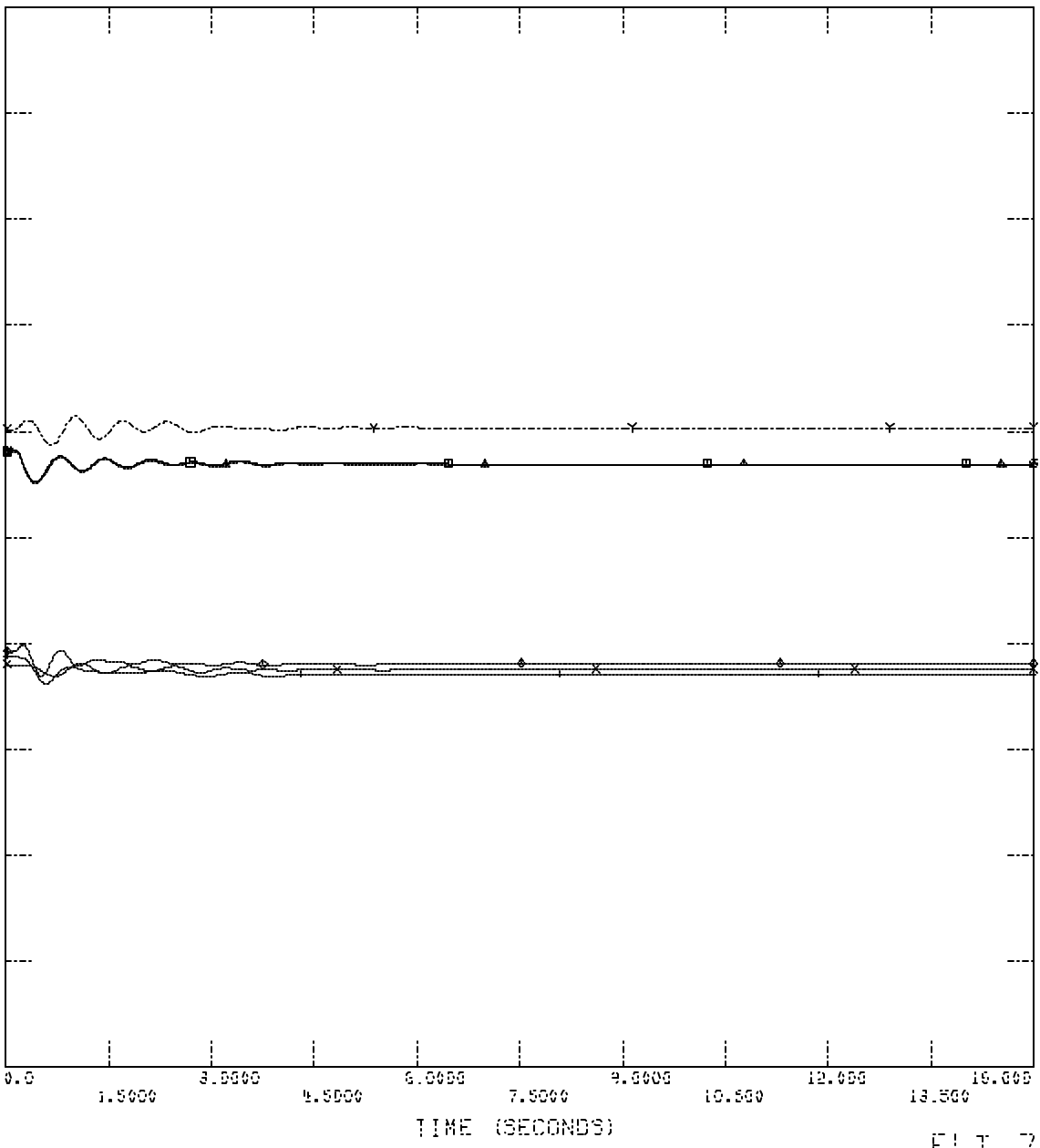
FLT\_6\_3PH\_MACHINE ANGLES

3000  
 1000  
 500  
 0

SPP MDMG Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR QUEUED

FILE: C:\Interconnection Studies\Worling\RESU175\FLT\_7\_1PH.OUT  
 CHNL # 15: ERNG JEFFREY LN CNTR MDEB3

35.000 CHNL # 14: ERNG WEST GARDNER CT KCPL3 10.000  
 0.0 CHNL # 5: ERNG HAMTHORNE GS KCPL3 -50.000  
 15.000 CHNL # 4: ERNG JARIN G1 KCPL3 -10.000  
 50.000 CHNL # 3: ERNG JARIN G2 KCPL3 0.0  
 50.000 CHNL # 2: ERNG RICHMOND 1 KCPL3 0.0



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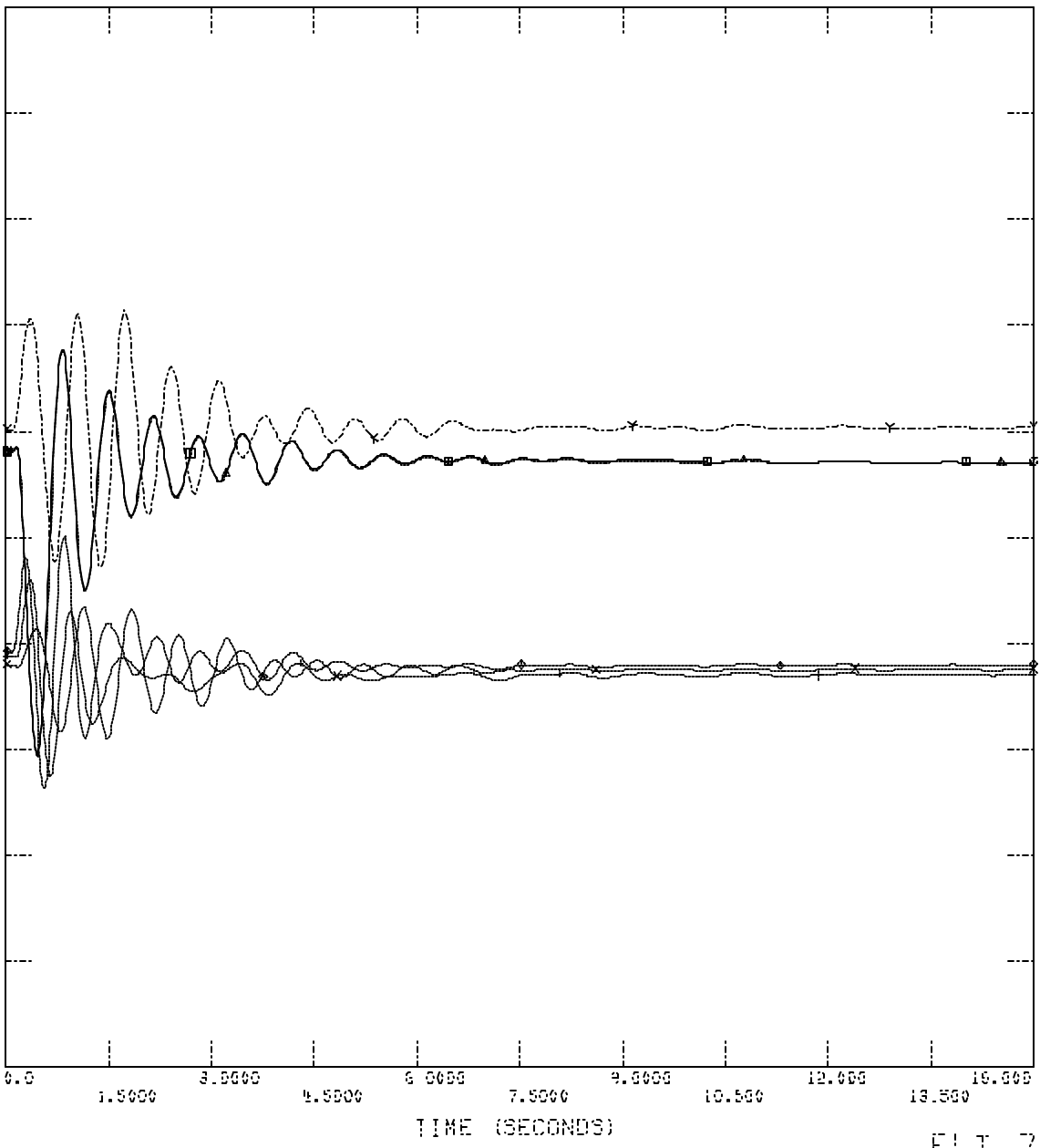
FLT\_7\_1PH\_MACHINE ANGLES

3000  
 2000  
 1000  
 0  
 -1000  
 -2000  
 -3000

SPP MDMG Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDRSE INCLUDING PRIOR SCHEDULE

FILE: C:\Interconnection Studies\Worling\RESUL 75\FLT\_7\_SPH.OUT  
 CHNL # 15: LANG JEFFREY LN CNTR WEBC

35.000 CHNL # 14: LANG WEST GARDNER CT KCPLT 10.000  
 15.000 CHNL # 5: LANG HAMTHORNE GS KCPLT -50.000  
 50.000 CHNL # 4: LANG JARVIS G1 KCPLT -10.000  
 50.000 CHNL # 3: LANG JARVIS G2 KCPLT 0.000  
 50.000 CHNL # 2: LANG RICHMOND 1 KCPLT 0.000



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FLT\_7\_SPH\_MACHINE ANGLES

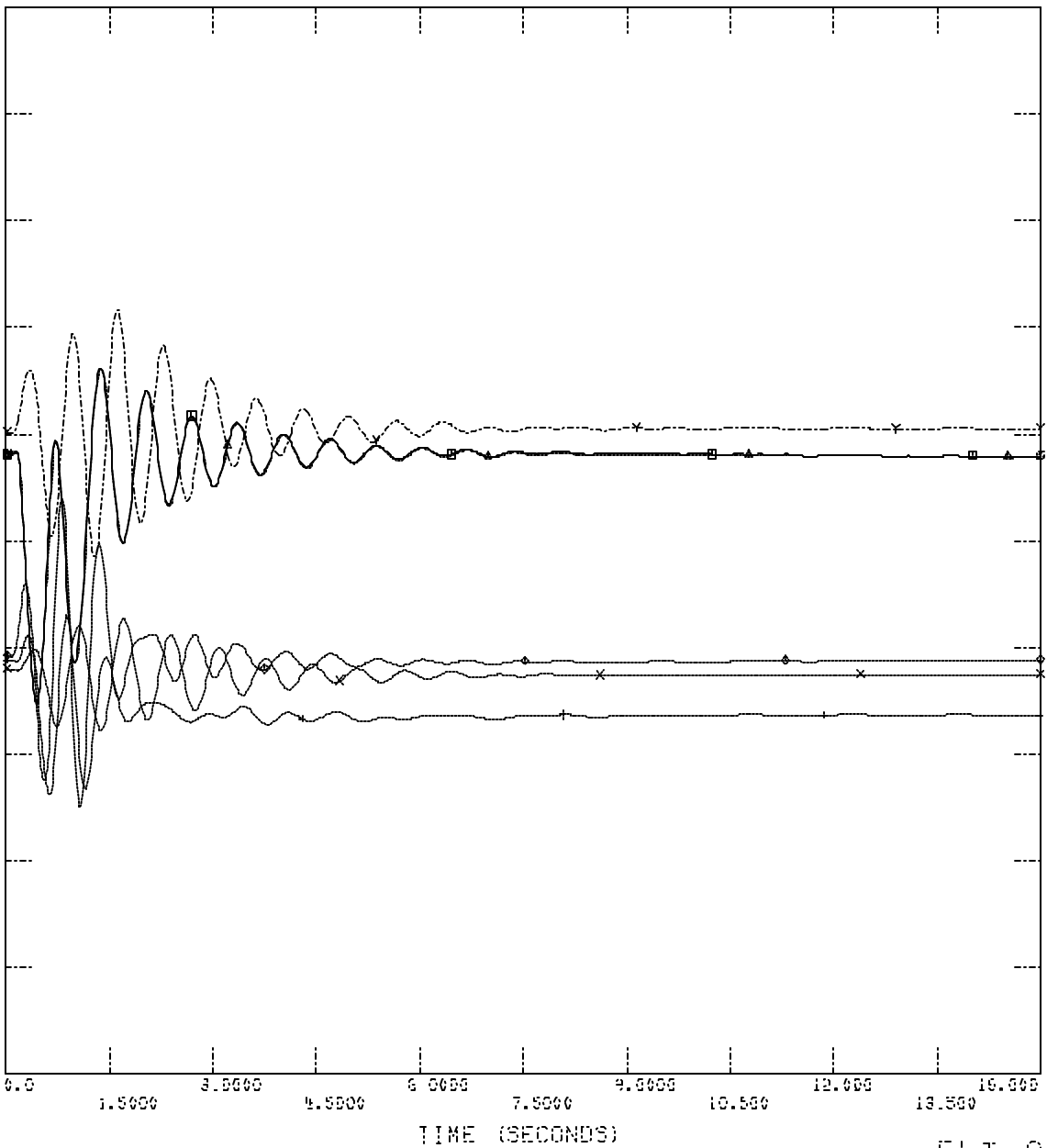


3000  
 2000  
 1000  
 0  
 -1000  
 -2000  
 -3000

SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDHSE INCLUDING PRIOR SCHEDULE

FILE: C:\Interconnection Studies\Worling\RESU175\FLT\_8\_1PH.OUT  
 CHNL # 151: CANG JEFFREY LN CTRA WEBC

35.000 CHNL # 141: CANG WEST GARDNER CT KCPL1 10.000  
 0.0 CHNL # 141: CANG WEST GARDNER CT KCPL1 -50.000  
 15.000 CHNL # 51: CANG HAMTHORNE GS KCPL1 -10.000  
 50.000 CHNL # 4: CANG JATRN G1 KCPL1 0.0  
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 50.000 CHNL # 2: CANG RICHMOND 1 KCPL1 0.0



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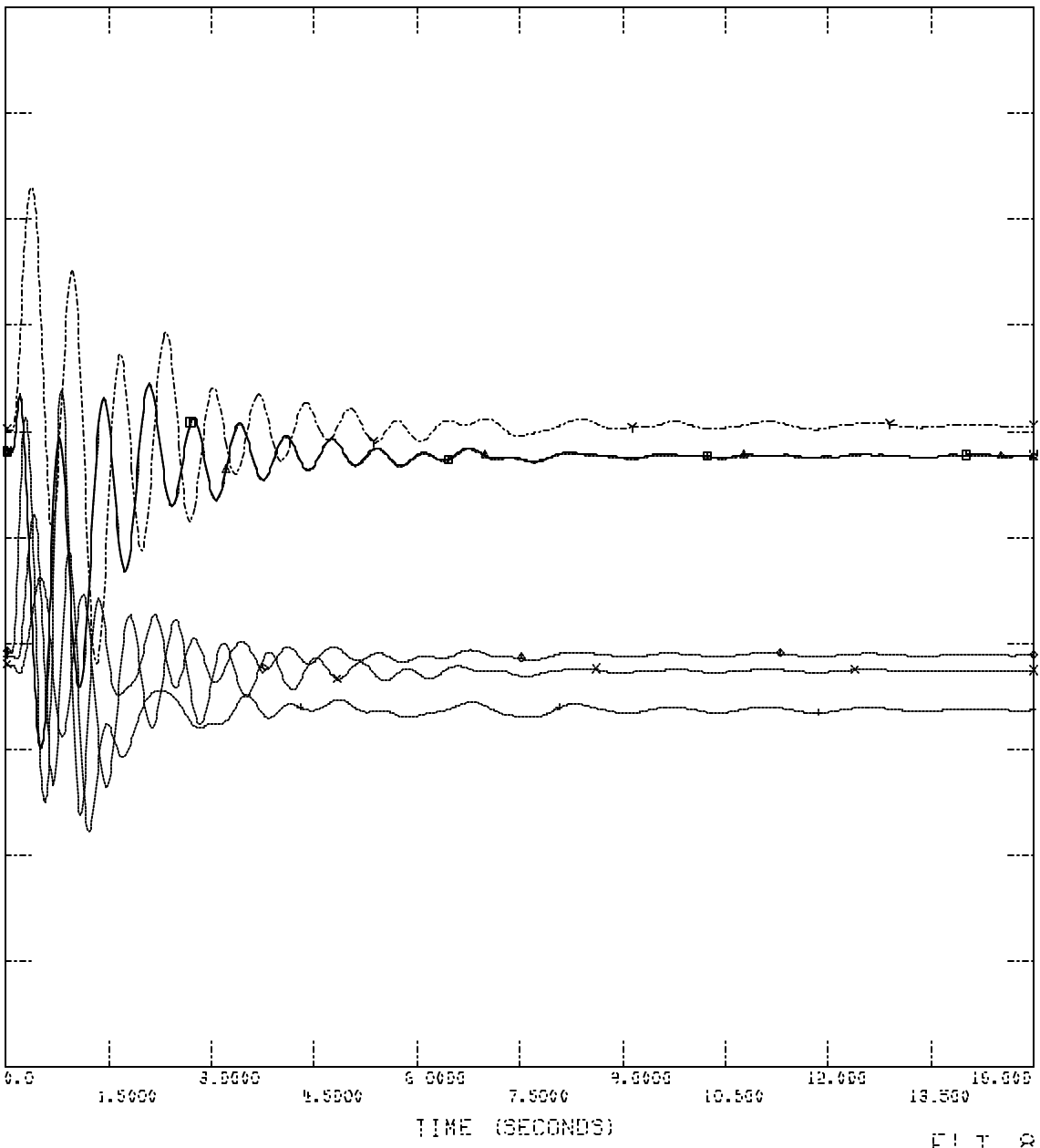
FLT\_8\_1PH\_MACHINE ANGLES

11/11/04  
 11:00 AM  
 11/11/04  
 11:00 AM

SPP MDMG Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDRSE INCL UDING PRIOR SUPPRED

FILE: C:\Interconnection Studies\WOL\Ino\RESUL 75\FLT\_8\_SPH.OUT  
 CHANNEL # 151: LANG JEFFREY LN CHIA WEEB

35.000	CHNL # 14: LANG WEST GARDNER CT KCPLT	10.000
0.0	CHNL # 5: LANG HAMTHORNE GS KCPLT	-50.000
15.000	CHNL # 4: LANG JARIN G1 KCPLT	-10.000
50.000	CHNL # 3: LANG JARIN G2 KCPLT	0.0
50.000	CHNL # 2: LANG RICHISON 1 KCPLT	0.0
50.000		0.0



FRI, OCT 08 2004 10:10

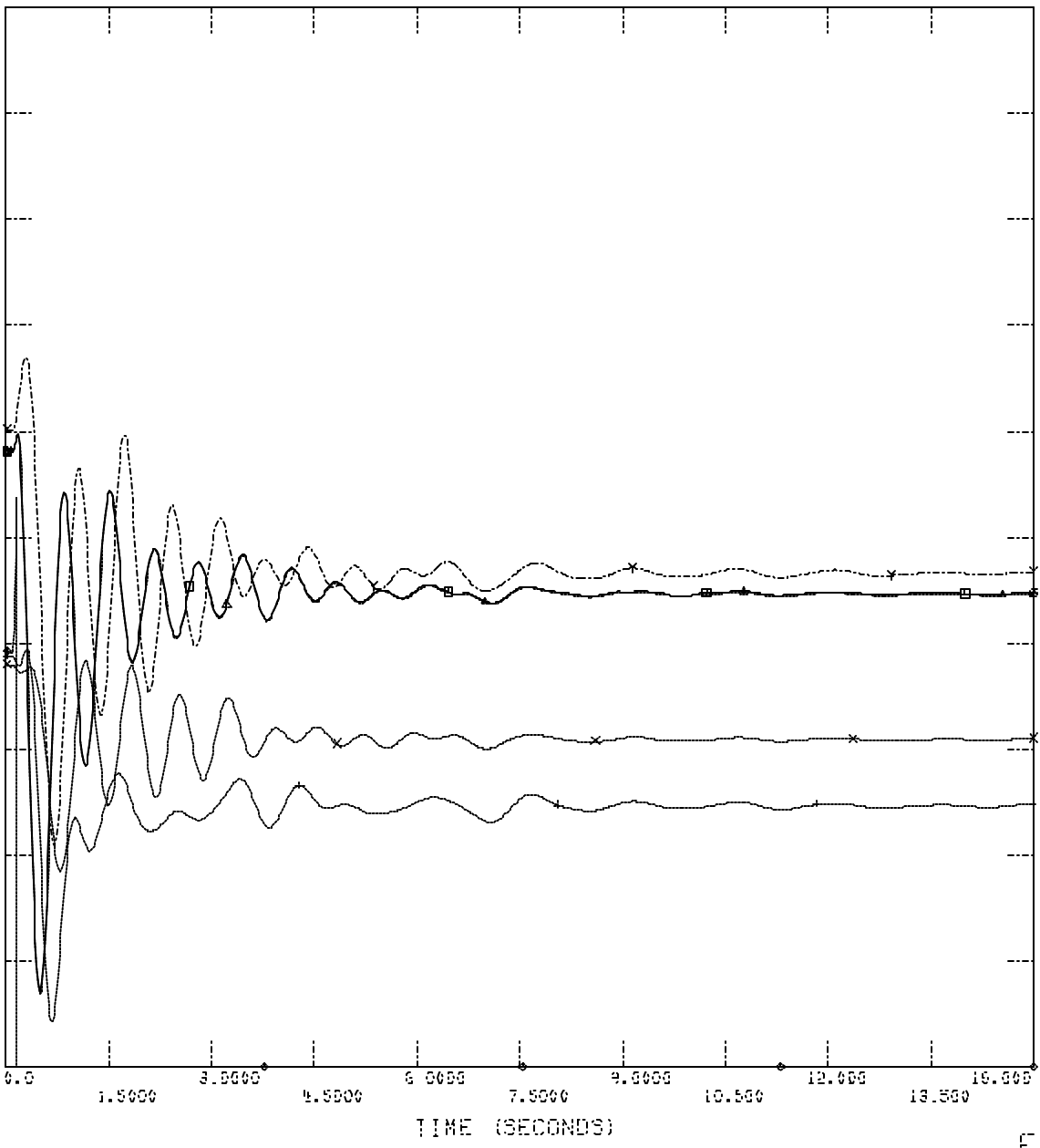
FLT\_8\_SPH\_MACHINE ANGLES

SPP  
 GEN-2004-012  
 BRSECHSE

SPP MDWG Q4 STABILITY:2010 SUM PEAK: MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR SCHEDULE

FILE: C:\Interconnection Studies\Working\RESUL TS\F11\_9.001  
 CHNL # 151: ERNG JEFFREY LN CNIA.MEDC

35.000	CHNL # 141: ERNG WEST GARDNER CT KCPLJ	10.000
0.0	CHNL # 141: ERNG WEST GARDNER CT KCPLJ	-50.000
15.000	CHNL # 51: ERNG HAWTHORNE GS KCPLJ	-10.000
50.000	CHNL # 41: ERNG JARVIS G1 KCPLJ	0.0
50.000	CHNL # 31: ERNG JARVIS G2 KCPLJ	0.0
50.000	CHNL # 21: ERNG RICHMOND 1 KCPLJ	0.0



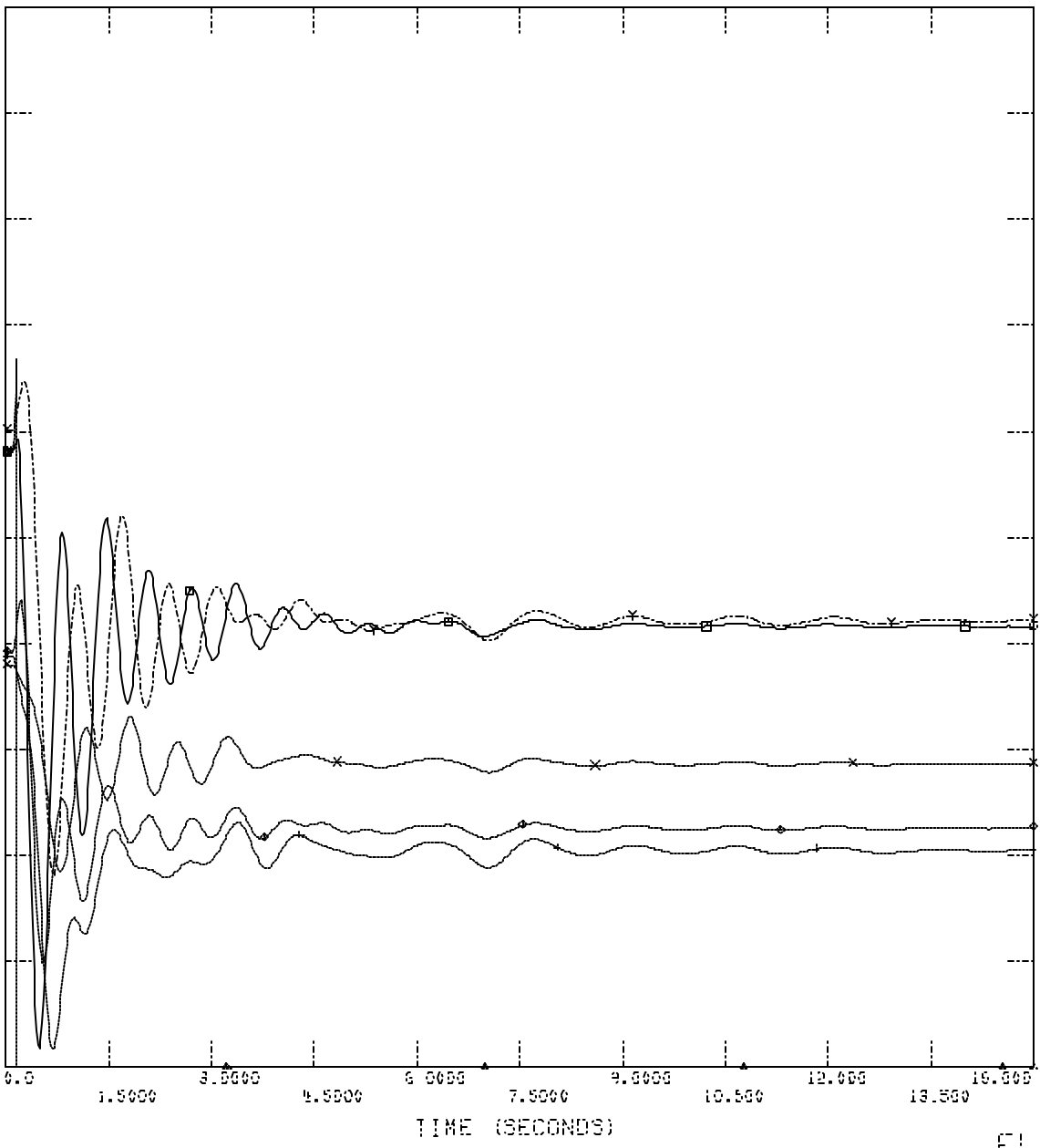
FRI, OCT 08 2004 10:10  
 FLT\_9\_MACHINE ANGLES

3000  
 2000  
 1000  
 0  
 -1000  
 -2000  
 -3000

SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDHSE INCLUDING PRIOR SUPPLEMENT

FILE: C:\Interconnection Studies\MDWG\RESUL\TSVPL1\_110.DAT  
 CHNL # 15: LANG JEFFREY LN CNTR WEDS

35.000 CHNL # 14: LANG WEST GARDNER CT KCPL1 10.000  
 0.0 CHNL # 5: LANG HAWTHORNE GS KCPL1 -50.000  
 15.000 CHNL # 4: LANG JARVIS G1 KCPL1 -10.000  
 50.000 CHNL # 3: LANG JARVIS G2 KCPL1 0.0  
 50.000 CHNL # 2: LANG RICHMOND 1 KCPL1 0.0



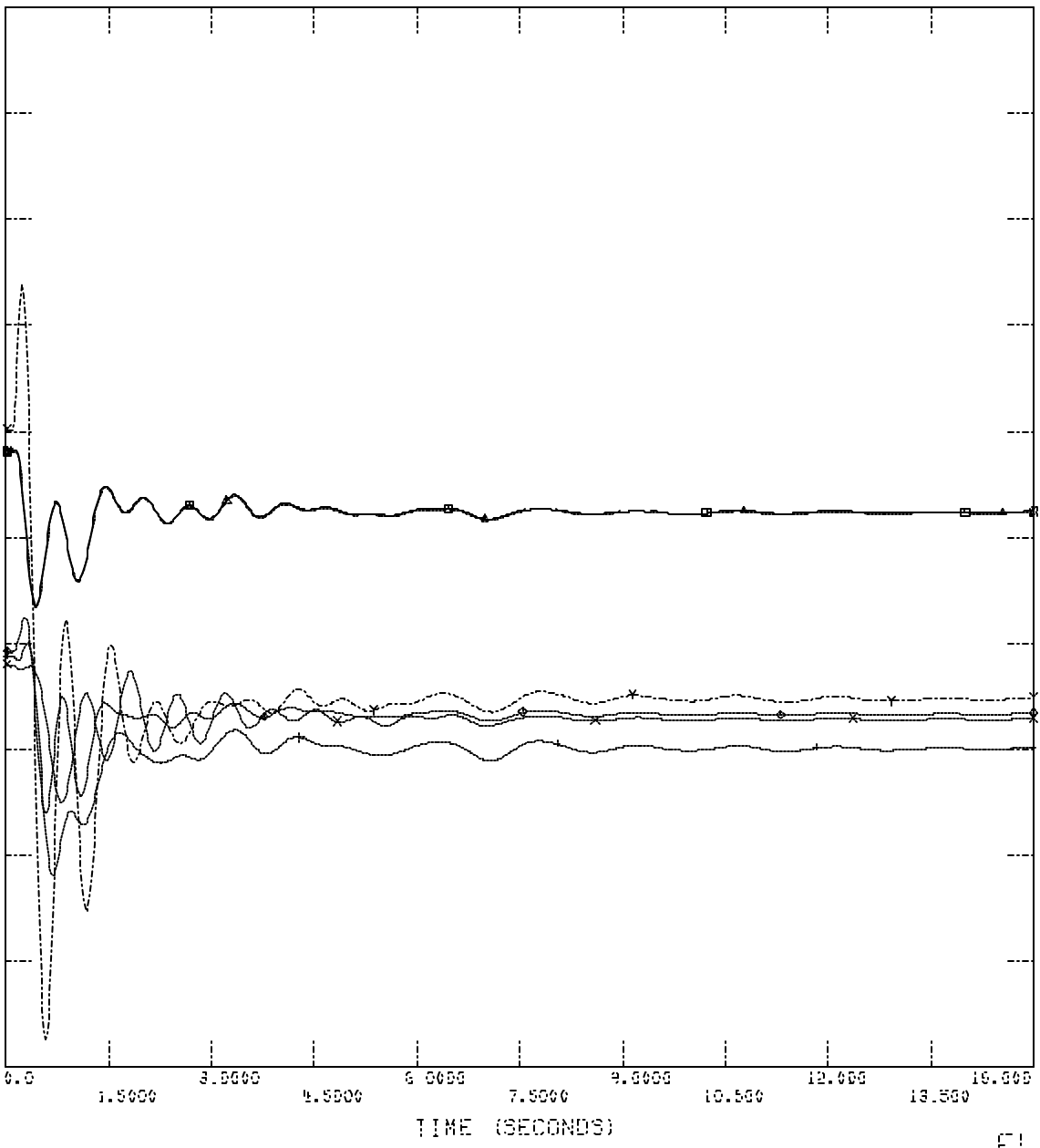
FRI, OCT 08 2004 10:10  
 FLT\_10\_MACHINE ANGLES

3000  
 2000  
 1000  
 0  
 -1000  
 -2000  
 -3000

SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDHSE INCLUDING PRIOR SCHEDULE

FILE: C:\Interconnection Studies\WorKing\RESULTS\F1\_11.007  
 CHNL # 15: LANG JEFFREY LN CNTR WEPB3

35.000 CHNL # 14: LANG WEST GARDNER CT KCPL1 10.000  
 0.0 CHNL # 5: LANG HAMTHORNE GS KCPL1 -50.000  
 15.000 CHNL # 4: LANG JARVIS G1 KCPL1 -10.000  
 50.000 CHNL # 3: LANG JARVIS G2 KCPL1 0.0  
 50.000 CHNL # 2: LANG RICHMOND 1 KCPL1 0.0



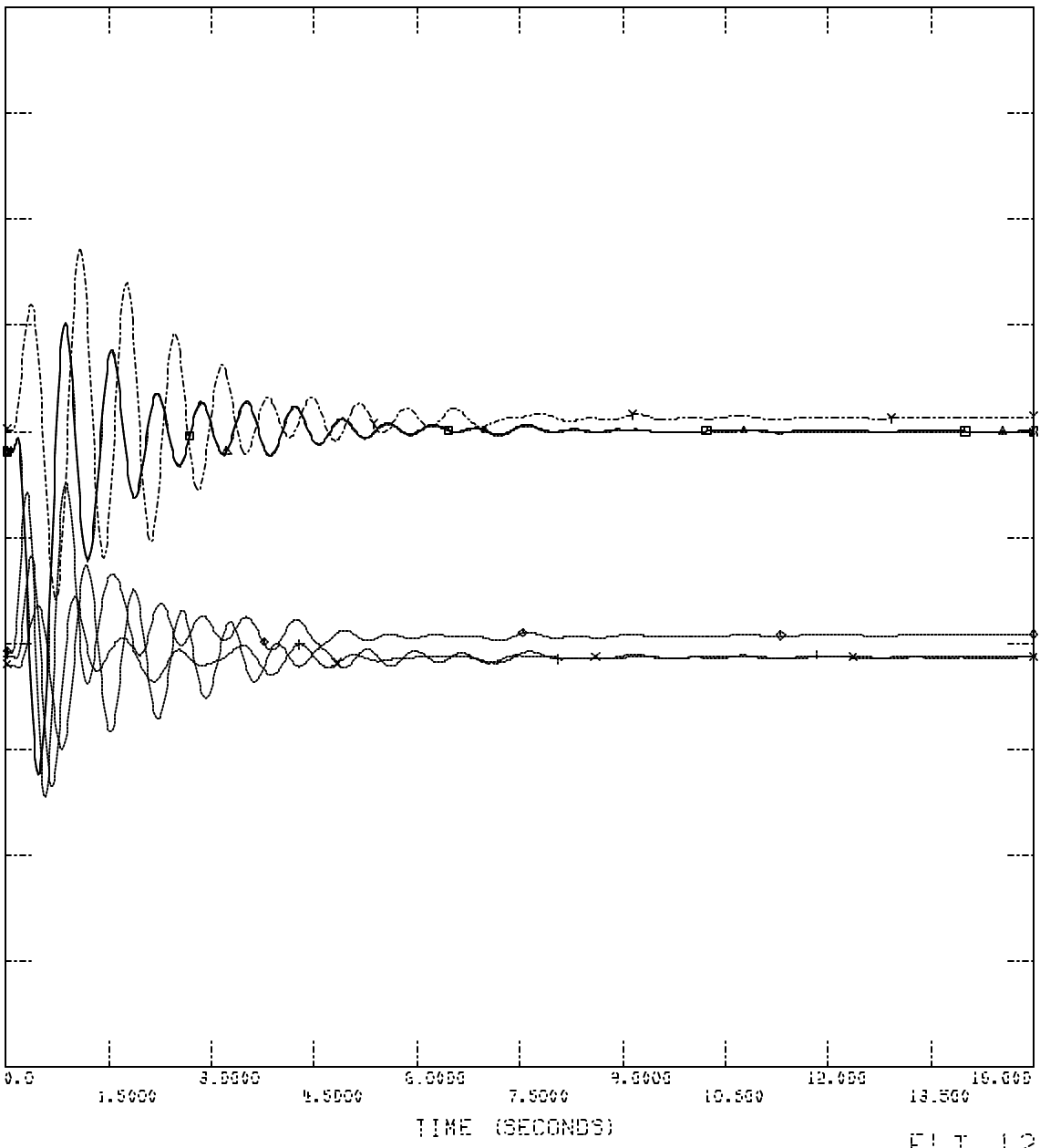
FRI, OCT 08 2004 10:10

FLT\_11\_MACHINE ANGLES

SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSEDHSE INCLUDING PRIOR SUPPLEMENT

FILE: C:\Interconnection Studies\Work\Inq\RESUL TS\FLT\_12\_1PH.OUT  
 CHANNEL # 15: LANG JEFFREY LN CNTR WEDS  
 CHANNEL # 14: LANG WEST GARDNER CT KCPLT

35.000	10.000
0.0	-50.00
15.000	-10.00
50.000	0.0
50.000	0.0
50.000	0.0



FRI, OCT 08 2004 10:56

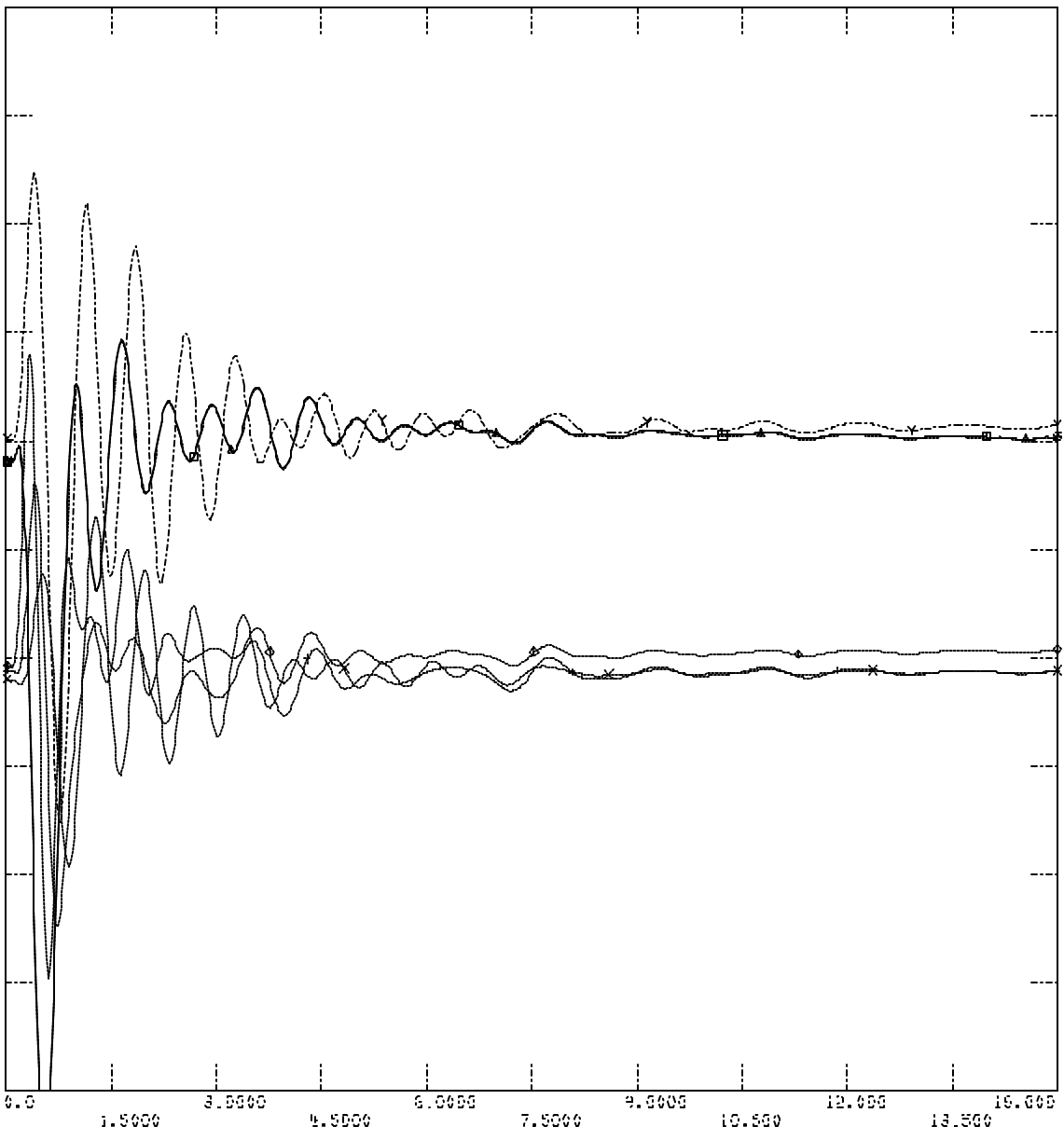
FLT\_12\_1PH\_MACHINE ANGLES

3000000  
 1500000  
 0

SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR QUEUED

FILE: C:\Interconnection Studies\Working\RESU175\FLT\_12\_IPH\_STUCK.OUT  
 CHNL # 15: ERNG JEFFREY LN DATA MERGE

35.000 CHNL # 14: ERNG WEST GARDNER CT KCPLJ 10.000  
 0.0 CHNL # 5: ERNG HAMTHORNE GS KCPLJ -50.000  
 15.000 CHNL # 4: ERNG JARVIS G1 KCPLJ -10.000  
 50.000 CHNL # 3: ERNG JARVIS G2 KCPLJ 0.0  
 50.000 CHNL # 2: ERNG RICHMOND 1 KCPLJ 0.0



FRI, OCT 08 2004 10:56

FLT\_12\_IPH\_STUCK\_MACHINE

3000  
 1500  
 0

SPP MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR QUEUED

FILE: C:\Ninterconnection Studies\Work\Inq\RESUL TS\FLT\_12\_3PH.OUT

CHNL # 15: ERNG JEFFREY LN CNTR MDEB3

35.000 10.000

CHNL # 14: ERNG WEST GARDNER CT KCPL3

0.0 -50.00

CHNL # 5: ERNG HAMTHORNE GS KCPL3

15.000 -10.00

CHNL # 4: ERNG JARVIS G1 KCPL3

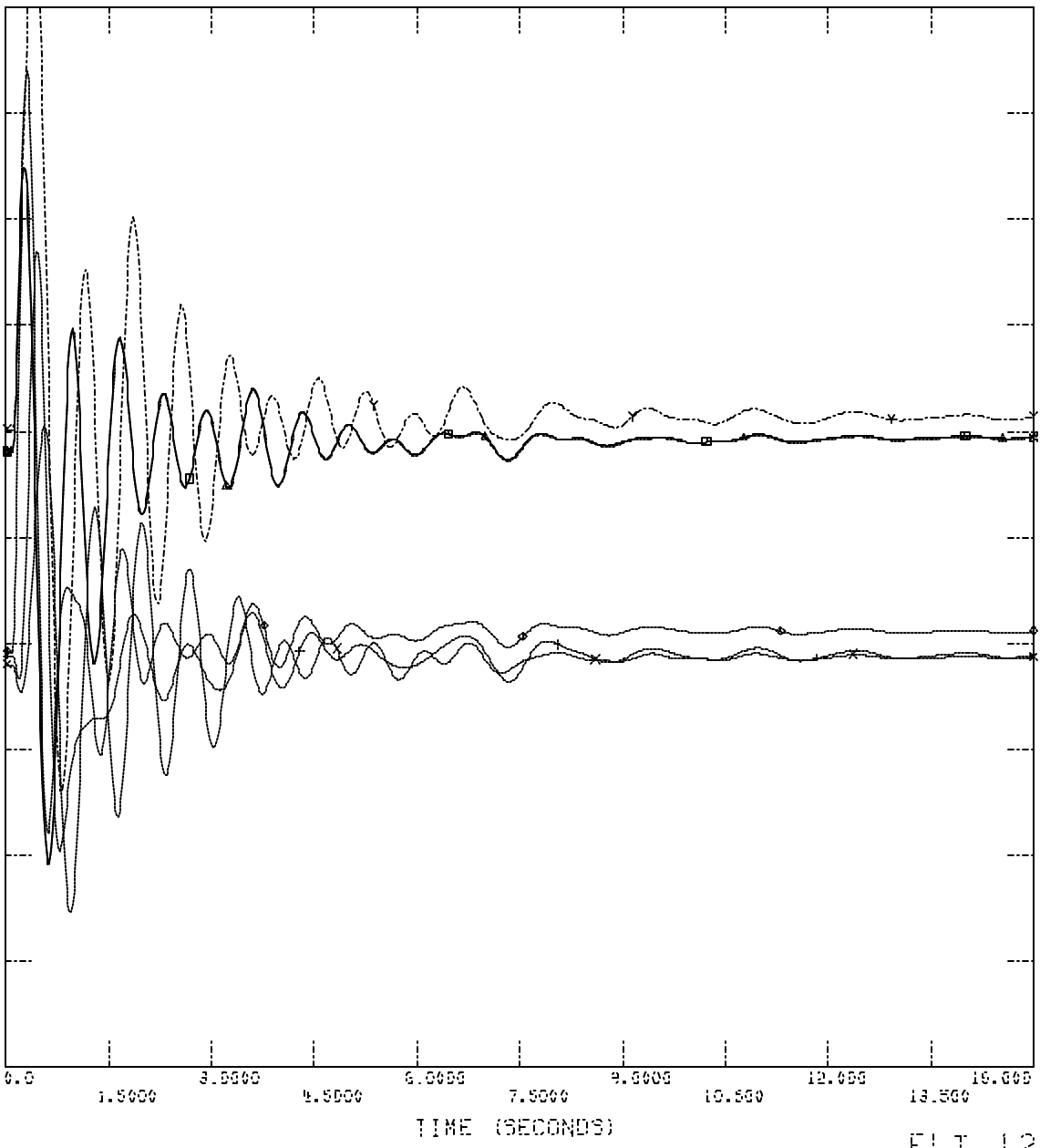
50.000 0.0

CHNL # 3: ERNG JARVIS G2 KCPL3

50.000 0.0

CHNL # 2: ERNG RICHMOND 1 KCPL3

50.000 0.0



FRI, OCT 08 2004 10:56

FLT\_12\_3PH\_MACHINE ANGLES



3000  
1000  
500  
250  
125  
62.5  
31.25  
15.625  
7.8125  
3.90625  
1.953125  
0.9765625

SPP MDMG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSEDRSE INCL UDINO PRIOR SCHEDULE

FILE: C:\Interconnection Studies\Working\RESU175\FLT\_12\_3PH\_STUCK.OUT  
CHNL # 15: LANG JEFFREY LN DATA.WEBC

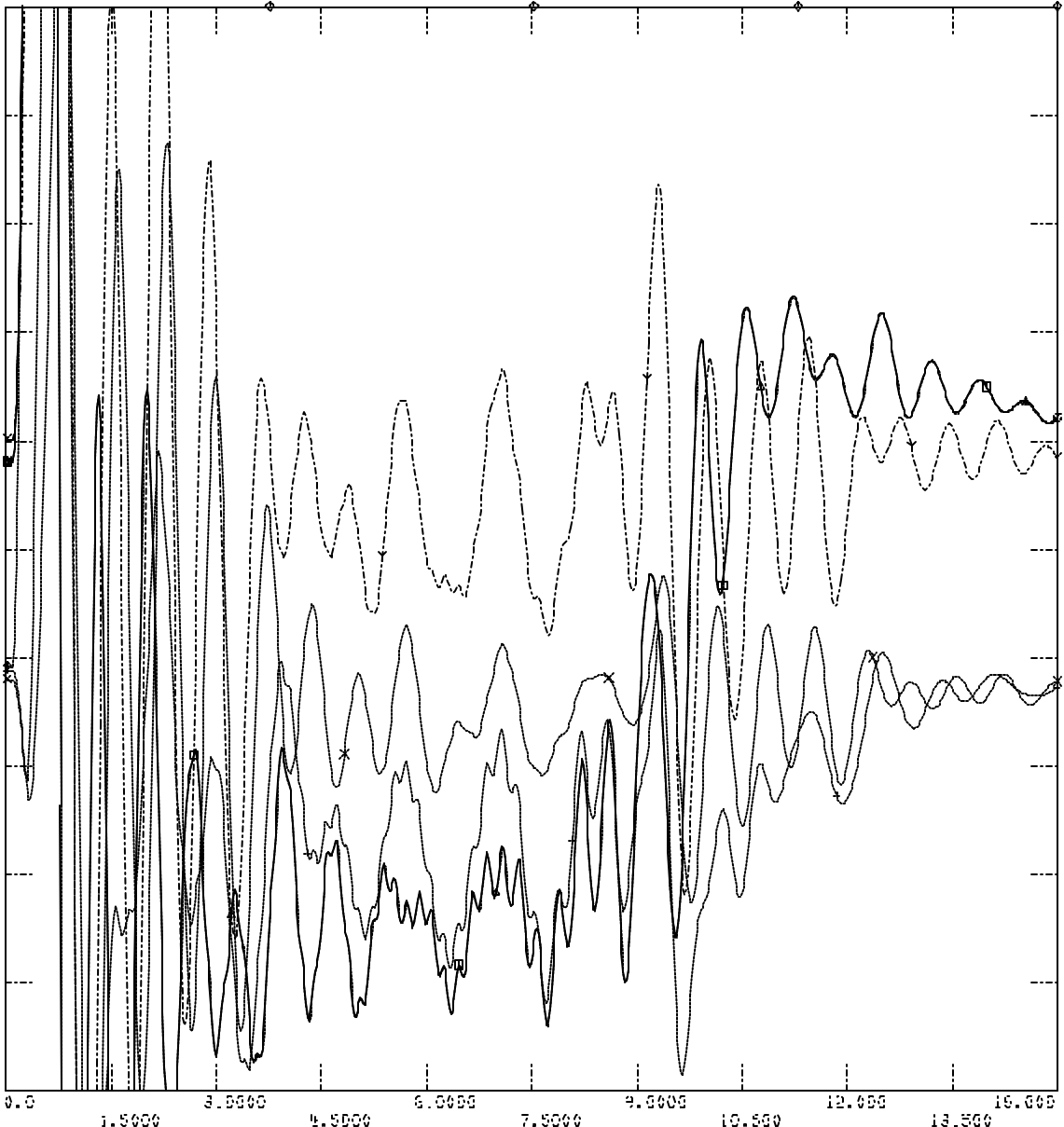
CHNL # 14: LANG WEST GARDNER CT KCPL1

CHNL # 5: LANG HAMTHORNE GS KCPL1

CHNL # 4: LANG JARIN G1 KCPL1

CHNL # 3: LANG JARIN G2 KCPL1

CHNL # 2: LANG RICHMOND 1 KCPL1



FRI, OCT 08 2004 10:56

FLT\_12\_3PH\_STUCK\_MACHINE

## **Appendix B-2**

### **Plots of Fault Simulations**

**Plots of selected bus voltage response during faults**

**Scenario:  
2010 Summer Peak**

**[Customer plant at 900MW]**

FILE: C:\Interconnection Studies\WOLING\RESUL

SPP MDMS ON STABILITY; 2010 SUM PERK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE: C:\Interconnection Studies\WOLING\RESUL FLT\_1\_1PH.OUT  
CHNL # 278: EVOLTAGE BIRNISON\_1\_KOPFL

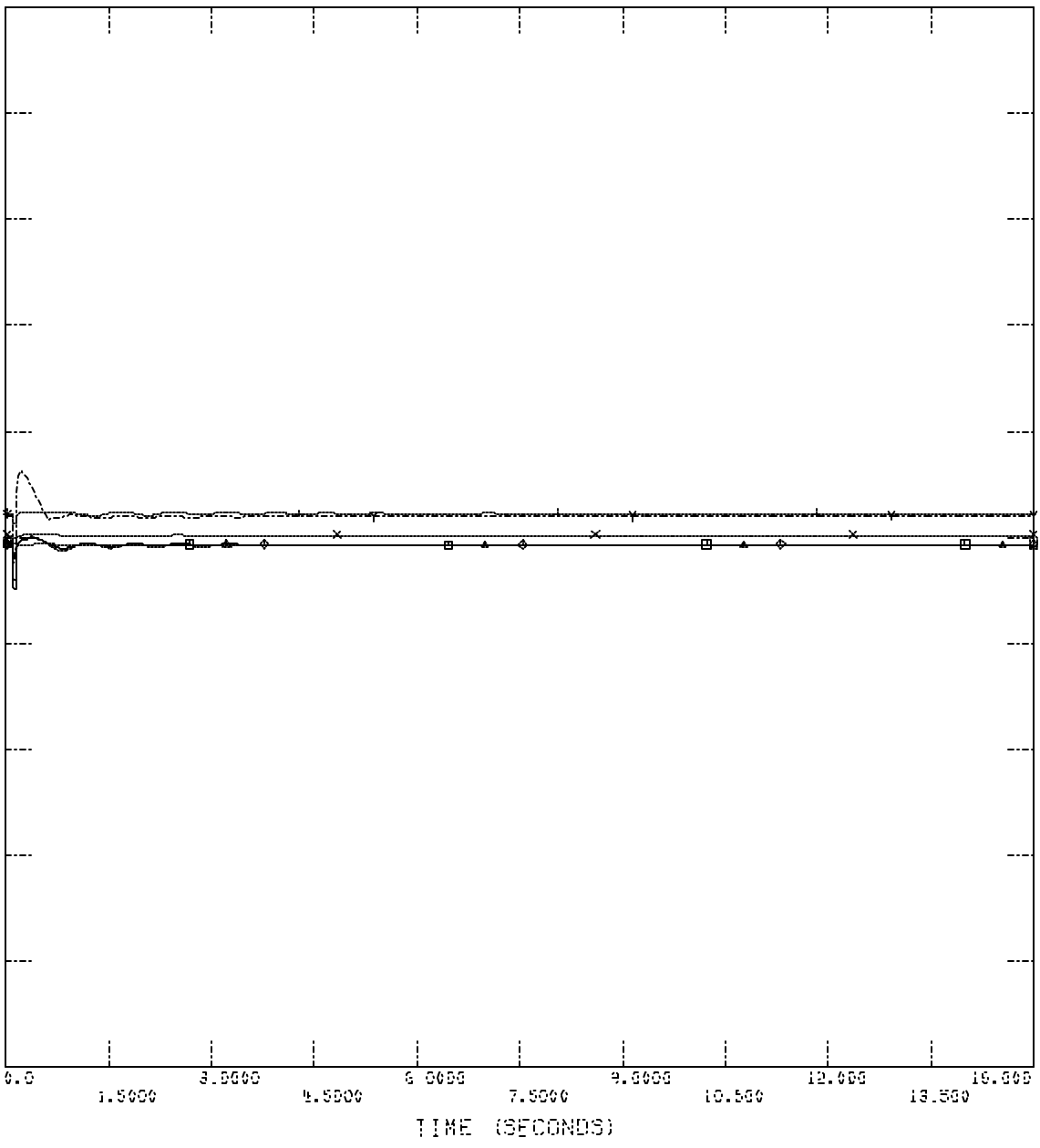
2.0000 CHNL # 293: EVOLTAGE NIOSHO 395KV3 0.0

2.0000 CHNL # 296: EVOLTAGE MOLFCKR 395KV3 0.0

2.0000 CHNL # 292: EVOLTAGE BENTON 395KV3 0.0

2.0000 CHNL # 281: EVOLTAGE HRMTH 395KV3 0.0

2.0000 CHNL # 279: EVOLTAGE W.GORDNR 395KV3 0.0



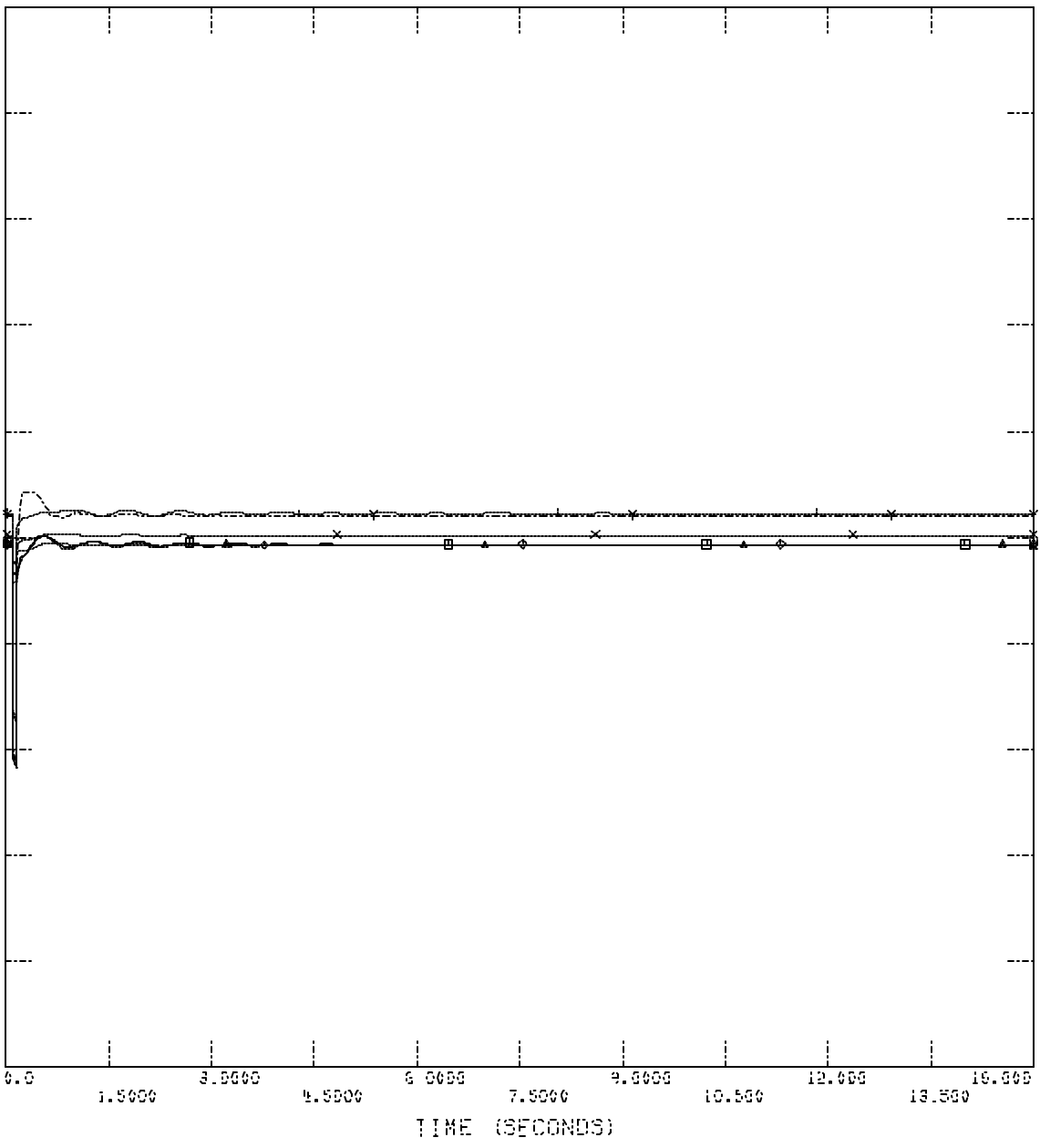
FRI, OCT 08 2004 11:01  
FLT\_1\_1PH\_VOLTAGES

SPR  
GEN-2004-012

SPR MDMS Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GOLFED

FILE: C:\Interconnection Studies\MDT\Inq\RESU175\FLT\_1\_3PH.OUT

CHANNEL	VOLTAGE	SCALE
CHNL # 278	VOLTAGE BIRNISON_1_KOPFL	0.0
CHNL # 293	VOLTAGE NIOSHO_3Y5KV3	0.0
CHNL # 296	VOLTAGE MOLFCKR_3Y5KV3	0.0
CHNL # 292	VOLTAGE BENTON_3Y5KV3	0.0
CHNL # 281	VOLTAGE HRMTH_3Y5KV3	0.0
CHNL # 279	VOLTAGE W.GORDNR_3Y5KV3	0.0



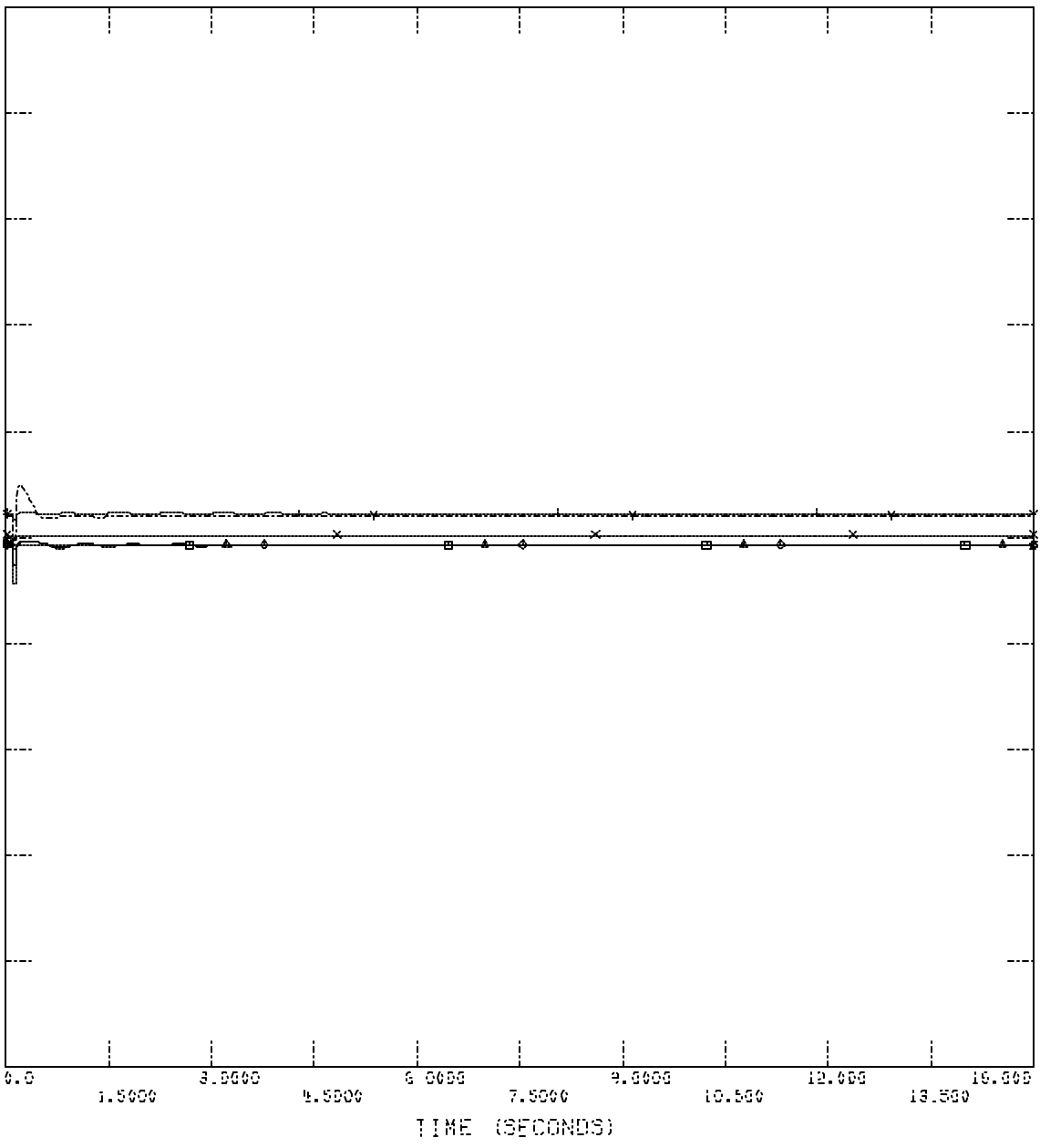
FRI, OCT 08 2004 11:01  
FLT\_1\_3PH\_VOLTAGES

2004-10-08 11:01  
 2004-10-08 11:01  
 2004-10-08 11:01

SPP MDMS Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE: C:\Interconnection Studies\WOLING\RESUL15\FLT\_2\_1PH.OUT

Channel #	Channel Name	Scale
2.0000	CHNL # 278: EVOLTAGE BIRMISSON_1_KOPFL	0.0
2.0000	CHNL # 293: EVOLTAGE NIOSHO_3YSKV1	0.0
2.0000	CHNL # 296: EVOLTAGE MOLFCHK_3YSKV1	0.0
2.0000	CHNL # 292: EVOLTAGE BENTON_3YSKV1	0.0
2.0000	CHNL # 281: EVOLTAGE HAWTH_3YSKV1	0.0
2.0000	CHNL # 279: EVOLTAGE W.GORDNR_3YSKV1	0.0



FRI, OCT 08 2004 11:01  
 FLT\_2\_1PH\_VOLTAGES

3000  
 2000  
 1000  
 0  
 -1000  
 -2000  
 -3000

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE: C:\Interconnection Studies\WOLING\RESUL15\FLT\_2\_3PH.OUT  
 CHNL # 276: CVOLTAGE BIRMISSON\_1\_KOPFL

2.0000 CHNL # 293: CVOLTAGE NIOSHO 345KV3 0.0

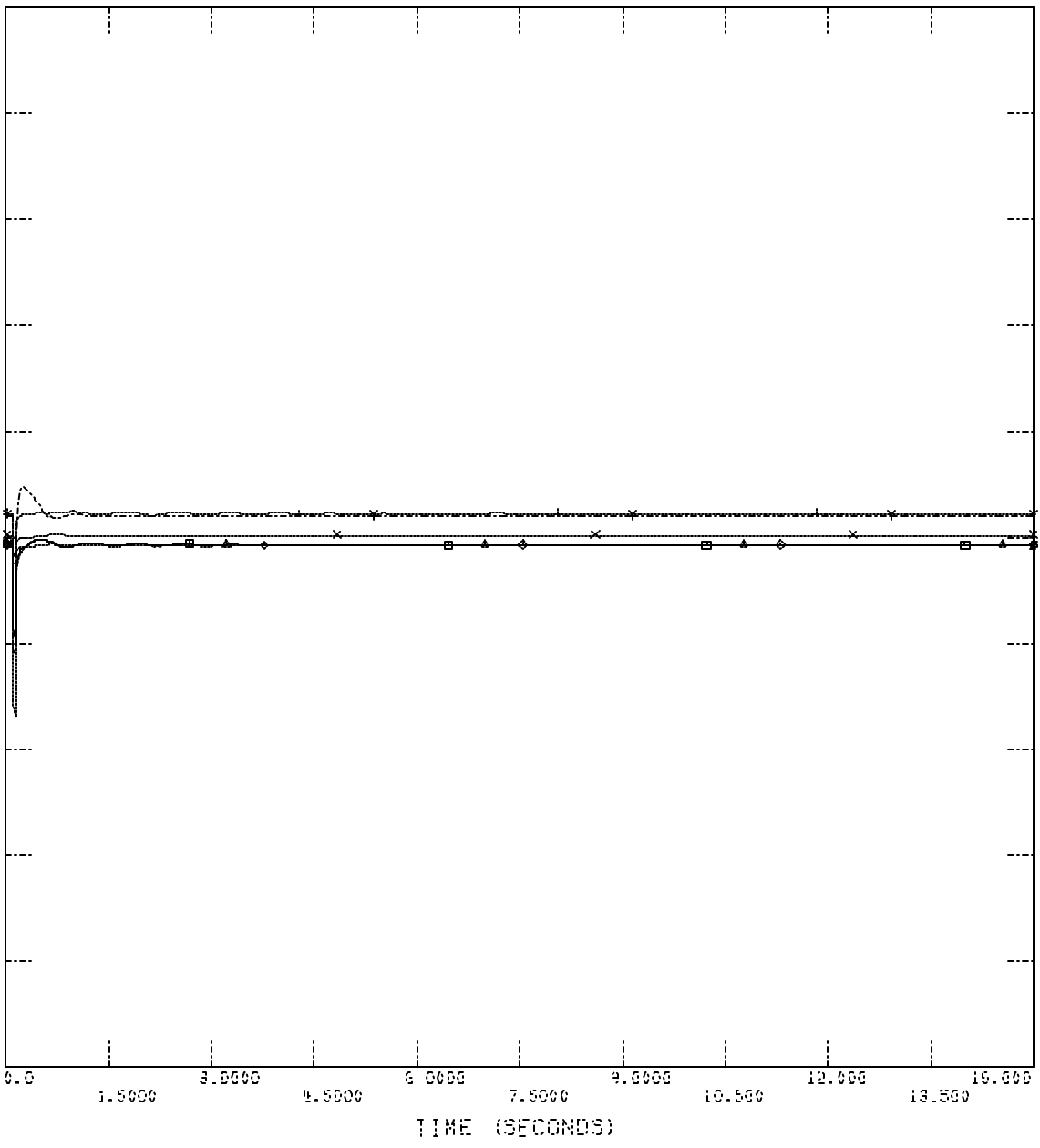
2.0000 CHNL # 296: CVOLTAGE WOLFCRK 345KV3 0.0

2.0000 CHNL # 292: CVOLTAGE BENTON 345KV3 0.0

2.0000 CHNL # 281: CVOLTAGE HAWTH 345KV3 0.0

2.0000 CHNL # 279: CVOLTAGE W.GORDNR 345KV3 0.0

2.0000 0.0



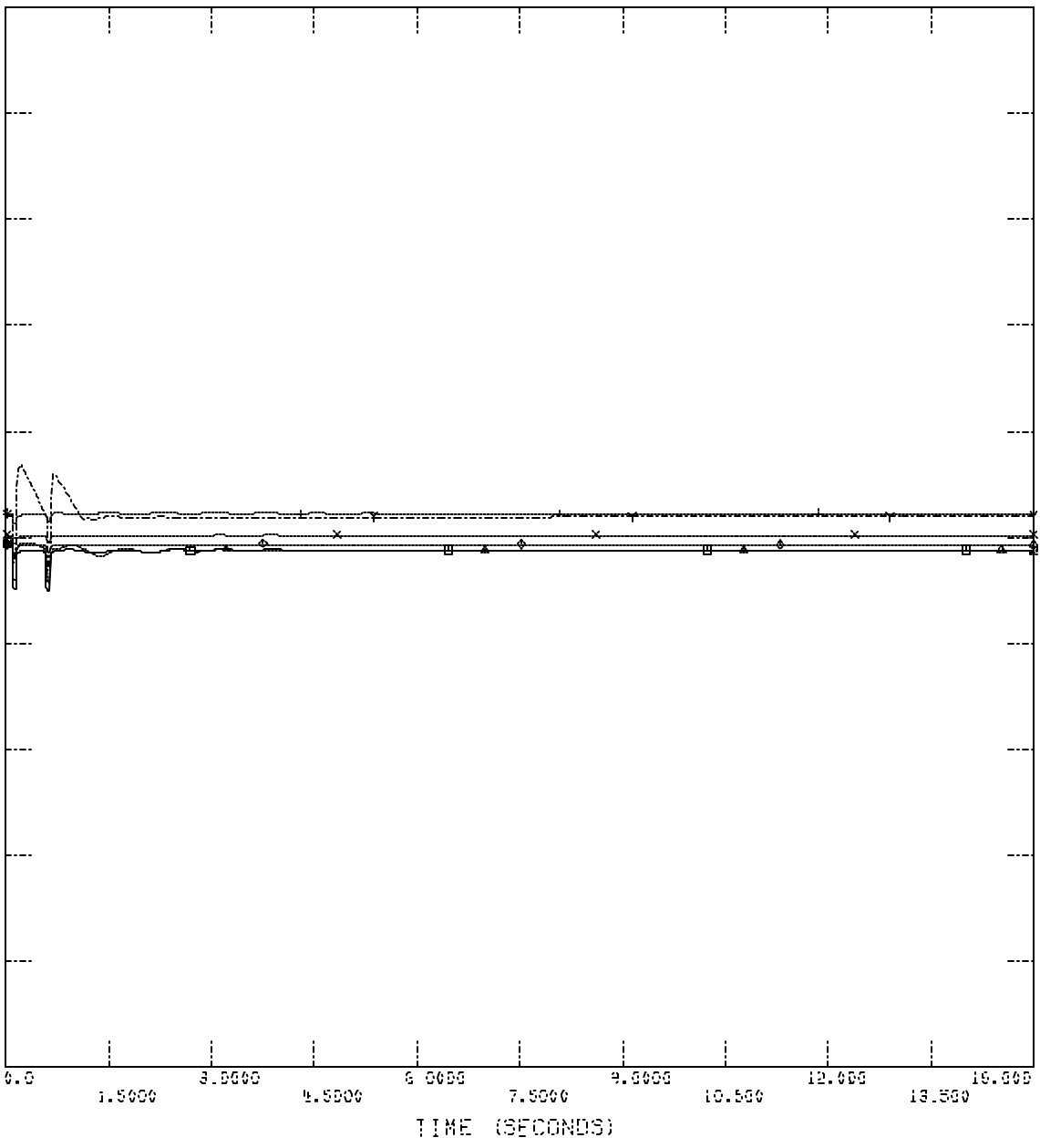
FRI, OCT 08 2004 11:01  
 FLT\_2\_3PH\_VOLTAGES

395KV  
 299KV  
 292KV  
 281KV

SPP MDMS Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE: C:\Interconnection Studies\WOLING\RESUL\3\FLT\_3\_1PH.OUT

2.0000	CHNL # 278: VOLTAGE BIRMISSON_1_KOPFL	0.0
2.0000	CHNL # 293: VOLTAGE NEOSHO_395KV3	0.0
2.0000	CHNL # 296: VOLTAGE WOLFCRK_395KV3	0.0
2.0000	CHNL # 292: VOLTAGE BENTON_395KV3	0.0
2.0000	CHNL # 281: VOLTAGE HAWTH_395KV3	0.0
2.0000	CHNL # 279: VOLTAGE W.GORDNR_395KV3	0.0



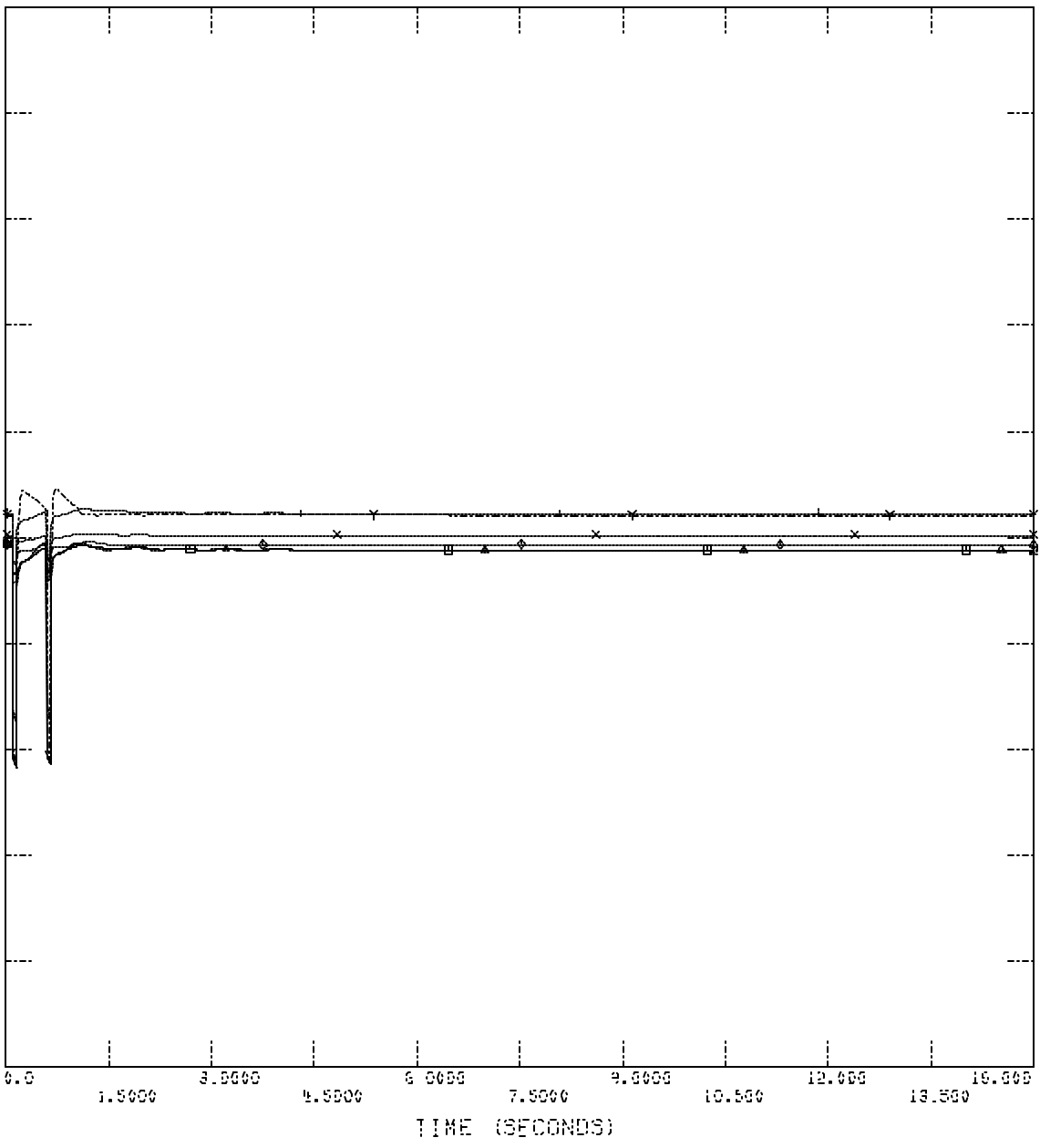
FRI, OCT 08 2004 11:01  
 FLT\_3\_1PH\_VOLTAGES

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLEMENT

FILE # 276  
 DATE 10/08/04

FILE: C:\Interconnection Studies\MDT\Inq\RESUL 15\FLT\_3\_SPH.OUT

CHANNEL #	VOLTAGE	SCALE
2.0000	CHNL # 276: VOLTAGE BIRNISON_1_KOPFL	0.0
2.0000	CHNL # 293: VOLTAGE NEOSHO 345KV3	0.0
2.0000	CHNL # 296: VOLTAGE MOLFCKRK 345KV3	0.0
2.0000	CHNL # 292: VOLTAGE BENTON 345KV3	0.0
2.0000	CHNL # 281: VOLTAGE HAWTH 345KV3	0.0
2.0000	CHNL # 279: VOLTAGE W.GORDNR 345KV3	0.0



FRI, OCT 08 2004 11:01  
 FLT\_3\_SPH\_VOLTAGES

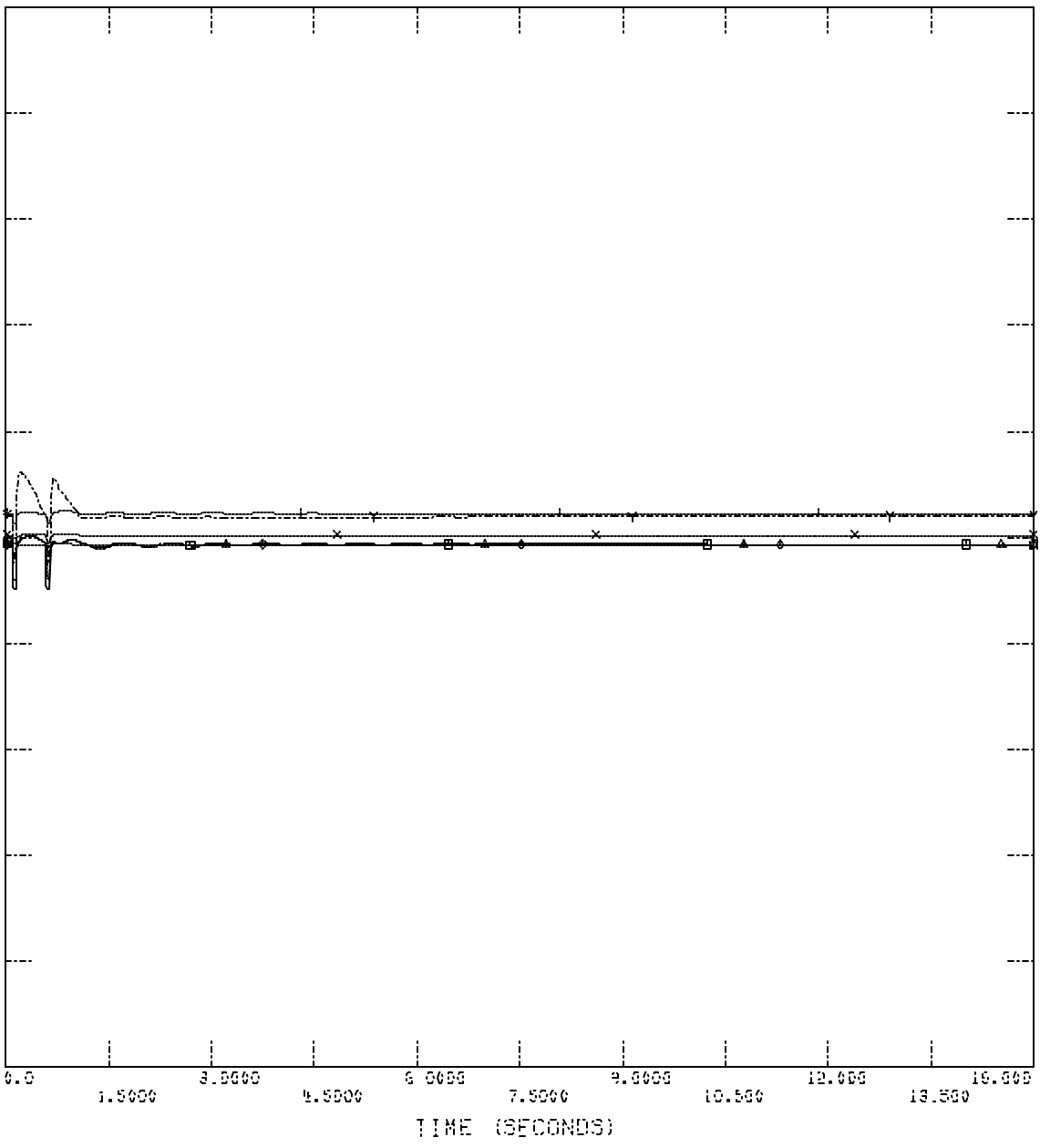


395KVA  
 395KVA  
 395KVA  
 395KVA

SPP MDMS Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPDED

FILE: C:\Interconnection Studies\WOLING\RESUL 15\FLT\_4\_1PH.OUT

Channel #	Channel Name	Scale
2.0000	CHNL # 278: CVOLTAGE BIRMINGM_1.KOPCJ	0.0
2.0000	CHNL # 293: CVOLTAGE NIOSHO 395KVA	0.0
2.0000	CHNL # 296: CVOLTAGE WOLFCRK 395KVA	0.0
2.0000	CHNL # 292: CVOLTAGE BENTON 395KVA	0.0
2.0000	CHNL # 281: CVOLTAGE HRMITH 395KVA	0.0
2.0000	CHNL # 279: CVOLTAGE W.GORDNR 395KVA	0.0



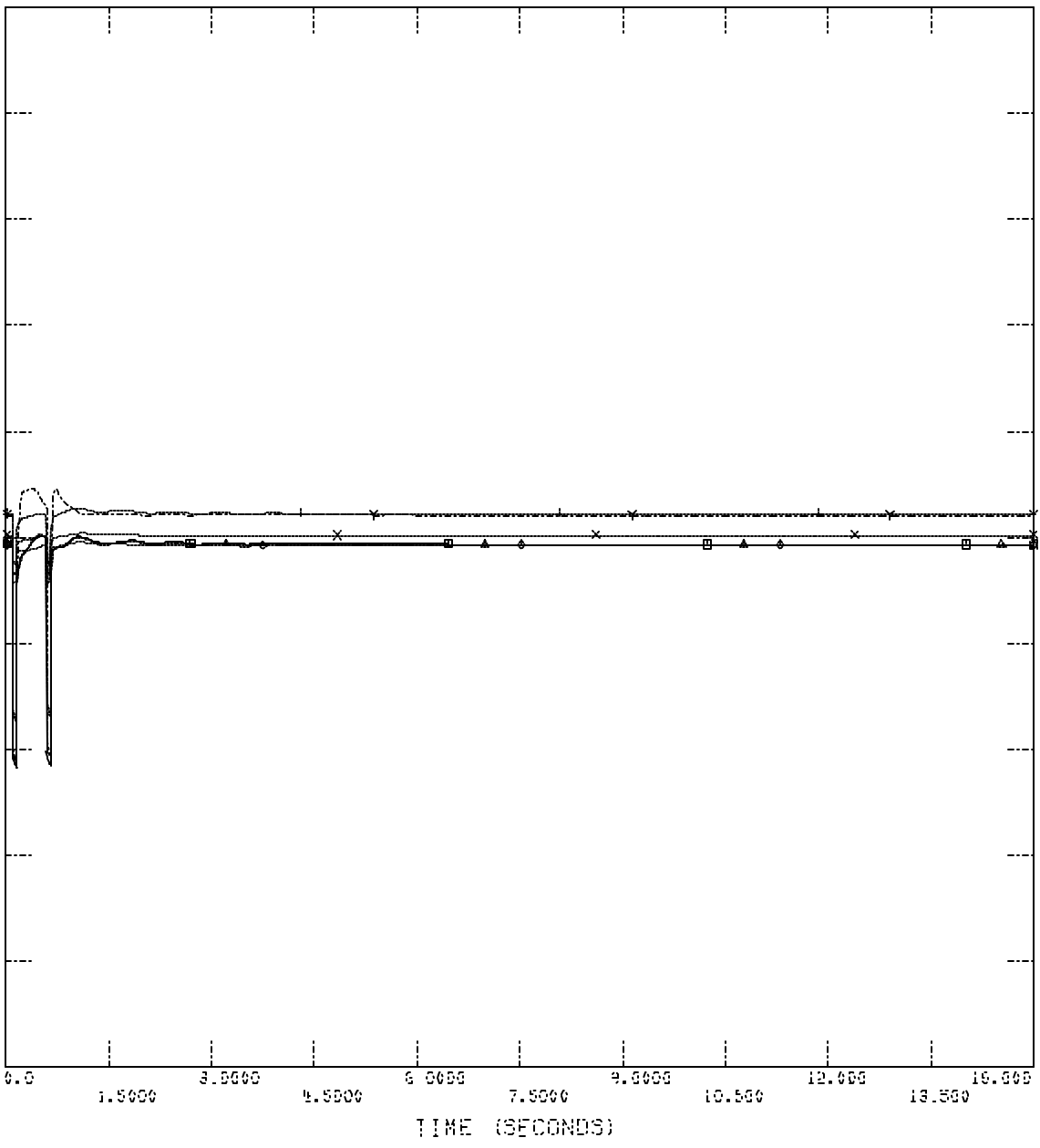
FRI, OCT 08 2004 11:01  
 FLT\_4\_1PH\_VOLTAGES

3000000  
 2000000  
 1000000  
 0  
 -1000000  
 -2000000  
 -3000000

SMP MDMS Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLEMENT

FILE: C:\Interconnection Studies\WOLINA\RESUL15N\FLT\_4\_3PH.OUT  
 CHNL # 278: VOLTAGE BIRNISON\_1\_KOPFL

2.0000	CHNL # 293: VOLTAGE NIOSHO_3Y5KV3	X	X	0.0
2.0000	CHNL # 296: VOLTAGE WOLFCRK_3Y5KV3	+	+	0.0
2.0000	CHNL # 292: VOLTAGE BENTON_3Y5KV3	◇	◇	0.0
2.0000	CHNL # 281: VOLTAGE HAWTH_3Y5KV3	▲	▲	0.0
2.0000	CHNL # 279: VOLTAGE W.GORDNR_3Y5KV3	■	■	0.0



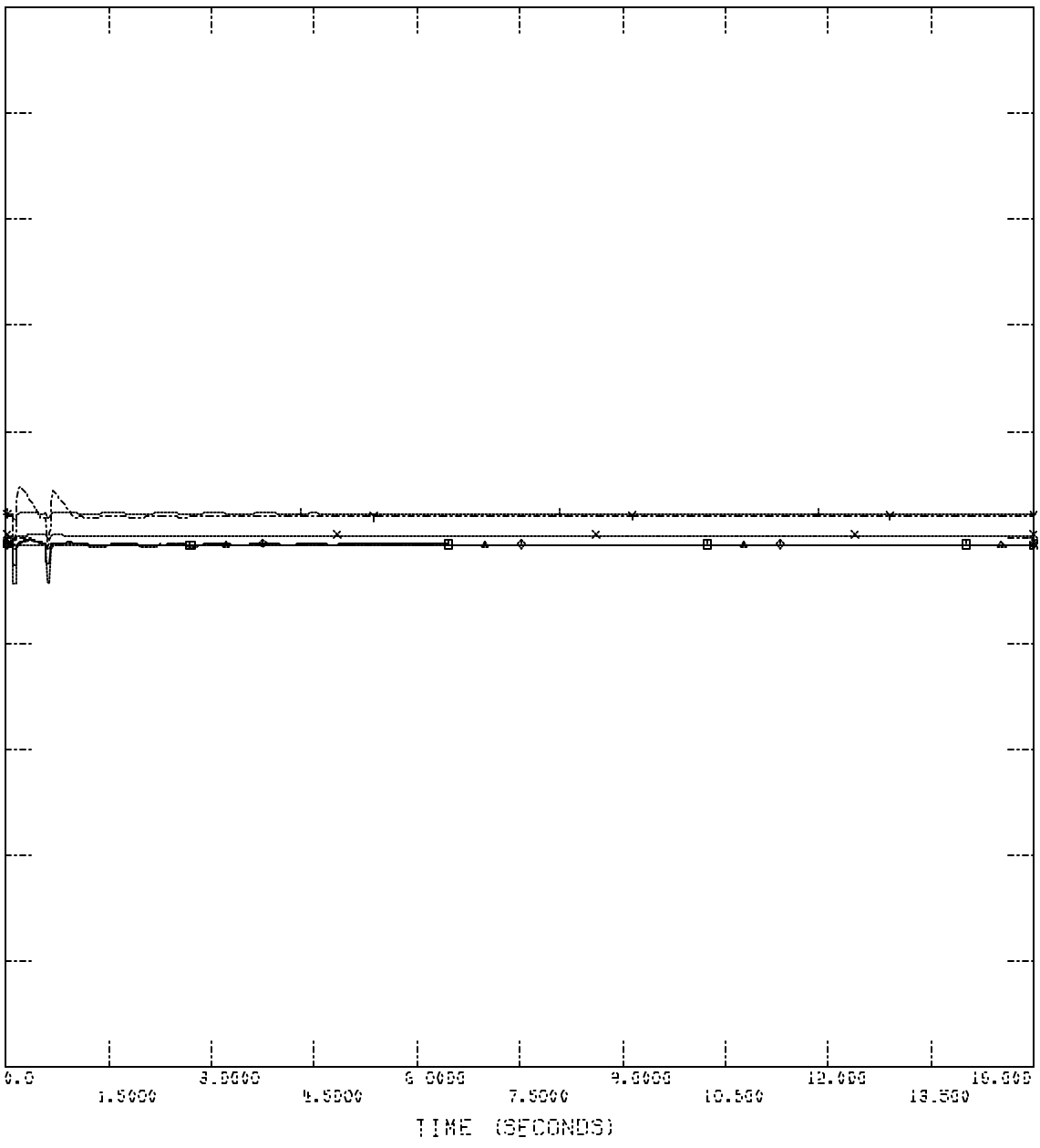
FRI, OCT 08 2004 11:01  
 FLT\_4\_3PH\_VOLTAGES

3000000  
 2000000  
 1000000  
 0  
 -1000000  
 -2000000  
 -3000000

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR GOLFED

FILE: C:\Interconnection Studies\WOLING\RESUL15\FLT\_5\_1PH.OUT  
 CHNL # 278: CVOLTAGE BIRMINGM\_1.KOP.L

2.0000	CHNL # 293: CVOLTAGE NIOSHO_395KV3	0.0
2.0000	CHNL # 296: CVOLTAGE WOLFCRK_395KV3	0.0
2.0000	CHNL # 292: CVOLTAGE BENTON_395KV3	0.0
2.0000	CHNL # 281: CVOLTAGE HAWTH_395KV3	0.0
2.0000	CHNL # 279: CVOLTAGE W.GORDNR_395KV3	0.0



FRI, OCT 08 2004 11:01  
 FLT\_5\_1PH\_VOLTAGES

SPR MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GOLFED

FILE: C:\Interconnection Studies\WOLING\RESUL\5\FLT\_5\_SPH.OUT  
CHNL # 276: CVOLTAGE BIRNISON\_1.KOP.L

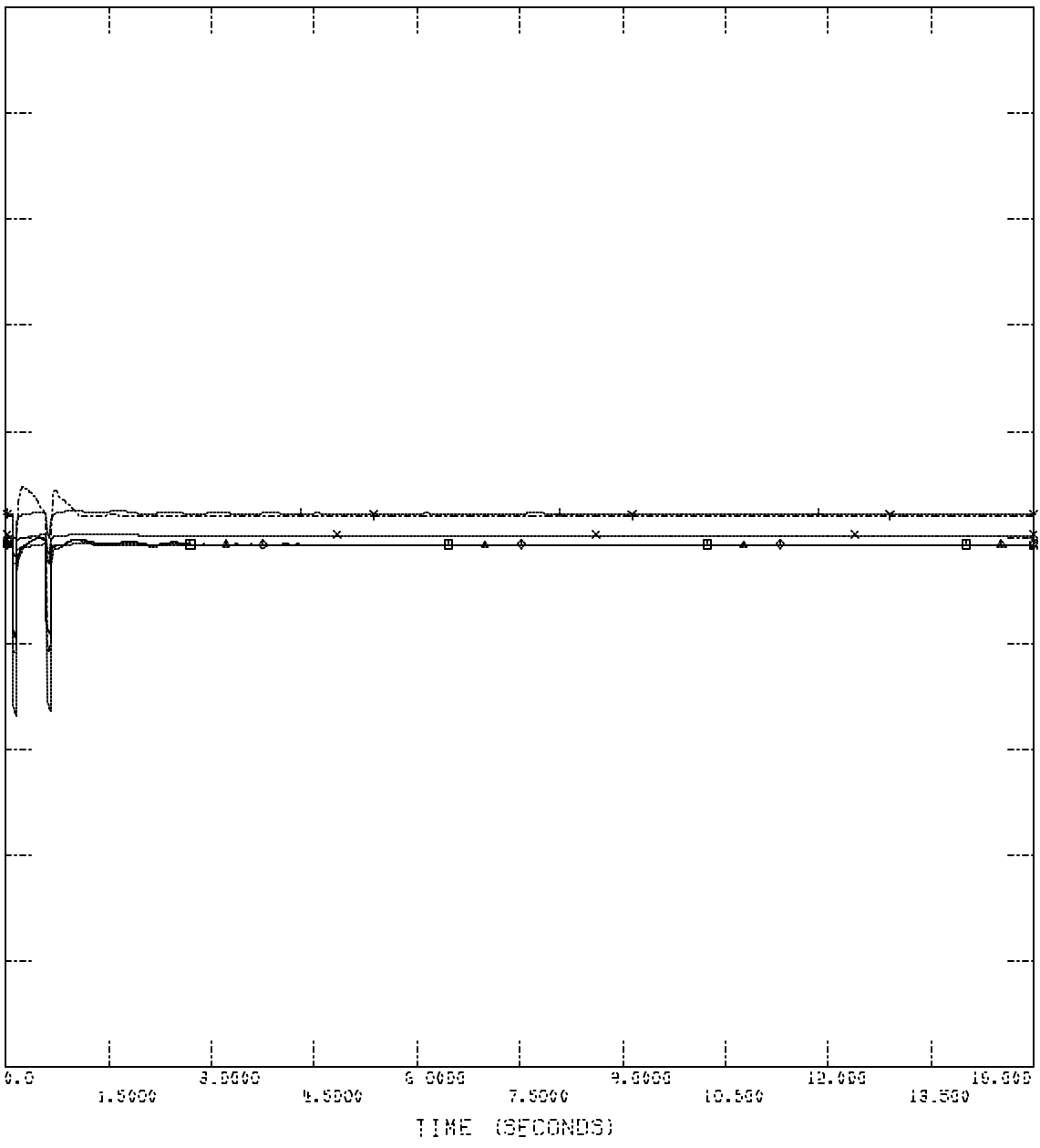
2.0000 CHNL # 293: CVOLTAGE NIOSHO 345KV3 0.0

2.0000 CHNL # 296: CVOLTAGE WOLFCRK 345KV3 0.0

2.0000 CHNL # 292: CVOLTAGE BENTON 345KV3 0.0

2.0000 CHNL # 281: CVOLTAGE HAWTH 345KV3 0.0

2.0000 CHNL # 279: CVOLTAGE W.GORDNR 345KV3 0.0



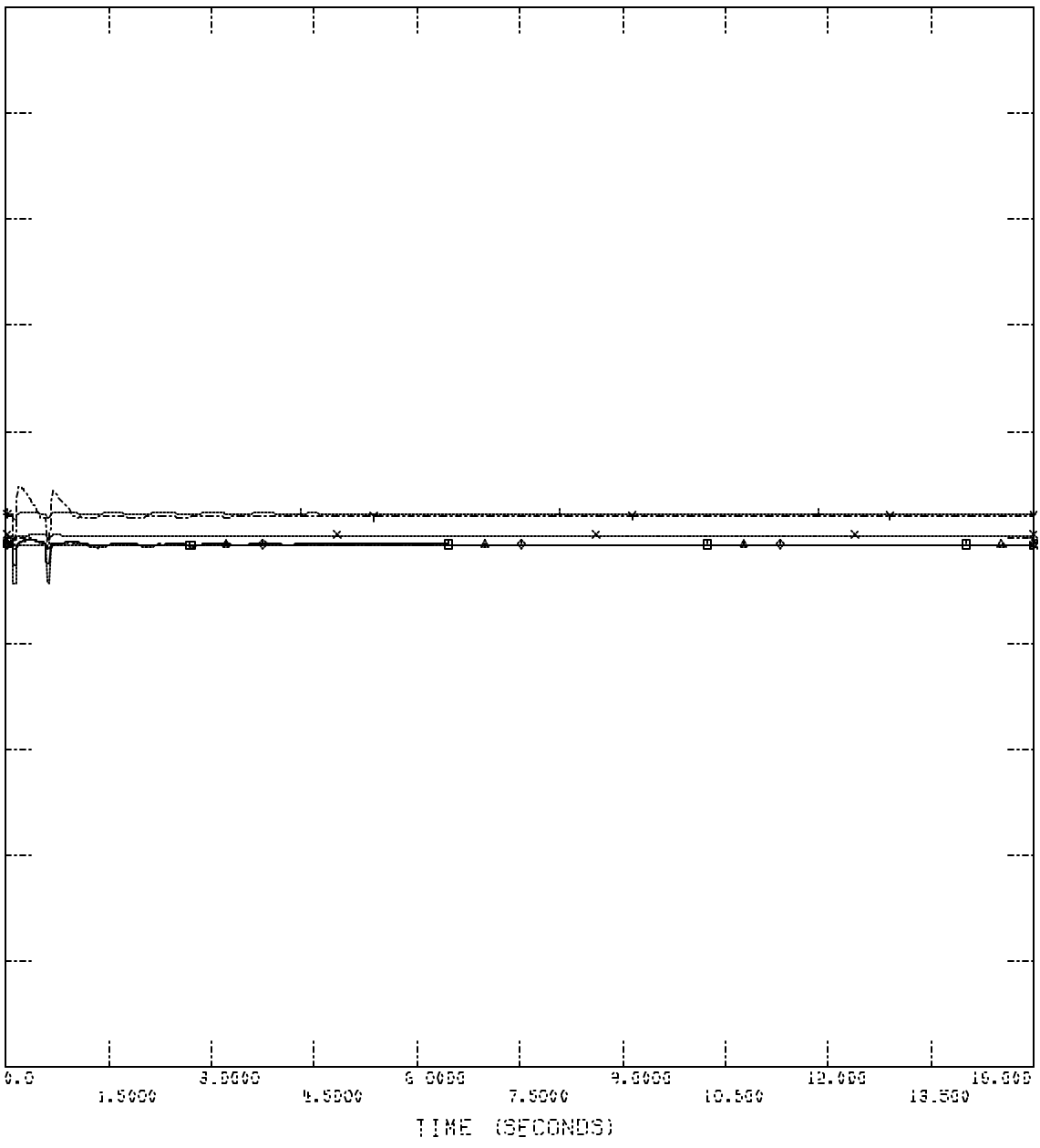
FRI, OCT 08 2004 11:01  
FLT\_5\_SPH\_VOLTAGES

3000000  
 2000000  
 1000000  
 0  
 -1000000  
 -2000000  
 -3000000

SPP MDMS Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE: C:\Interconnection Studies\WOLING\RESUL 15\FLT\_6\_1PH.OUT  
 CHNL # 276: CVOLTAGE BIRMISSON\_1.KOPLO

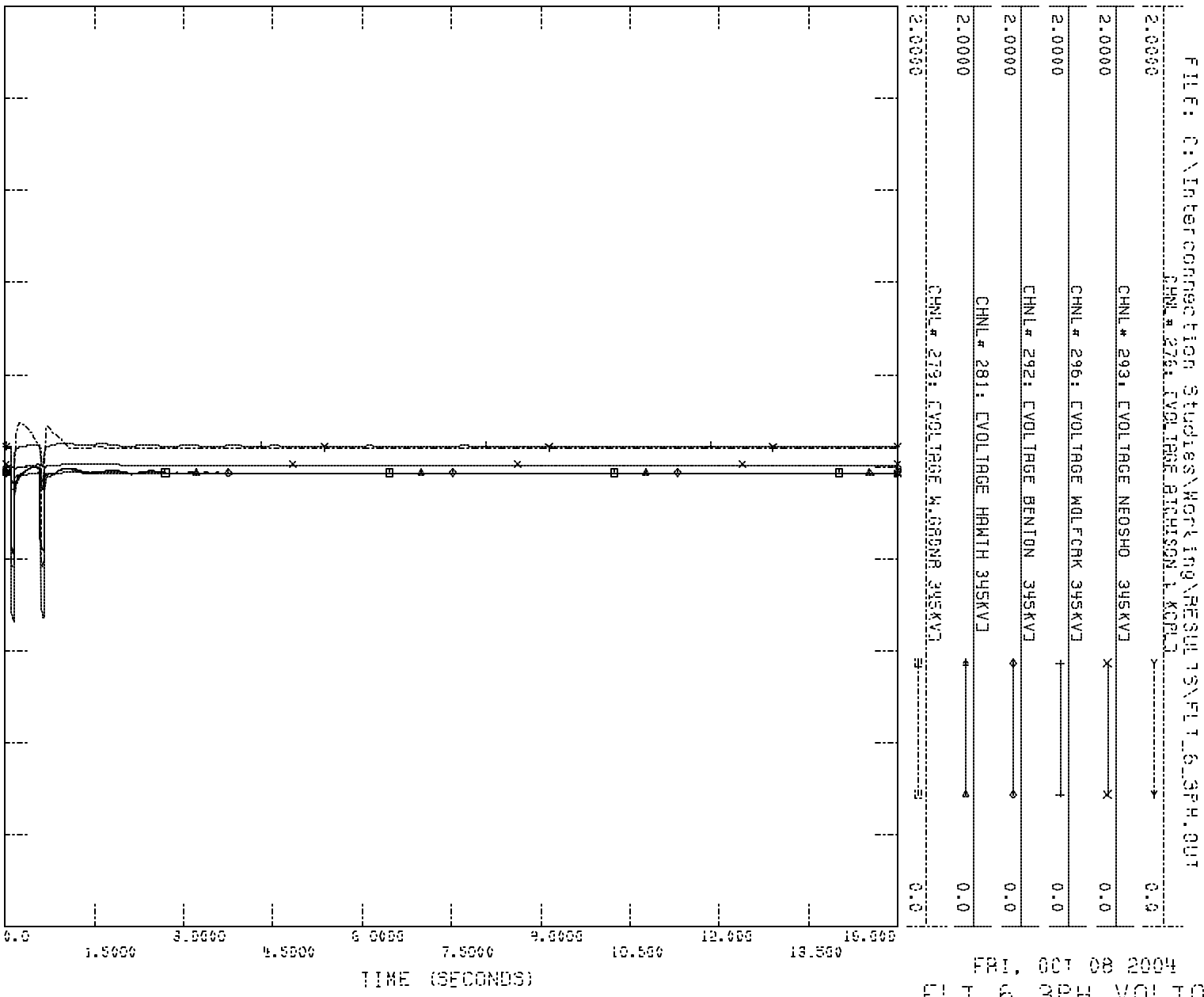
2.0000	CHNL # 293: CVOLTAGE NIOSHO 345KV3	0.0
2.0000	CHNL # 296: CVOLTAGE WOLFCRK 345KV3	0.0
2.0000	CHNL # 292: CVOLTAGE BENTON 345KV3	0.0
2.0000	CHNL # 281: CVOLTAGE HAWTH 345KV3	0.0
2.0000	CHNL # 279: CVOLTAGE W.GORDNR 345KV3	0.0



FRI, OCT 08 2004 11:01  
 FLT\_6\_1PH\_VOLTAGES

SPR MDWG 04 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GOLFED

FILE: C:\Interconnection Studies\WOLING\RESUL 15\FLT\_6\_SPH.OUT  
CHNL # 276: CVOLTAGE BIRMISSON\_1.KOP.L  
CHNL # 293: CVOLTAGE NIOSHO 345KVJ  
CHNL # 296: CVOLTAGE WOLFCRK 345KVJ  
CHNL # 292: CVOLTAGE BENTON 345KVJ  
CHNL # 281: CVOLTAGE HAWTH 345KVJ  
CHNL # 279: CVOLTAGE W.GORDNR 345KVJ



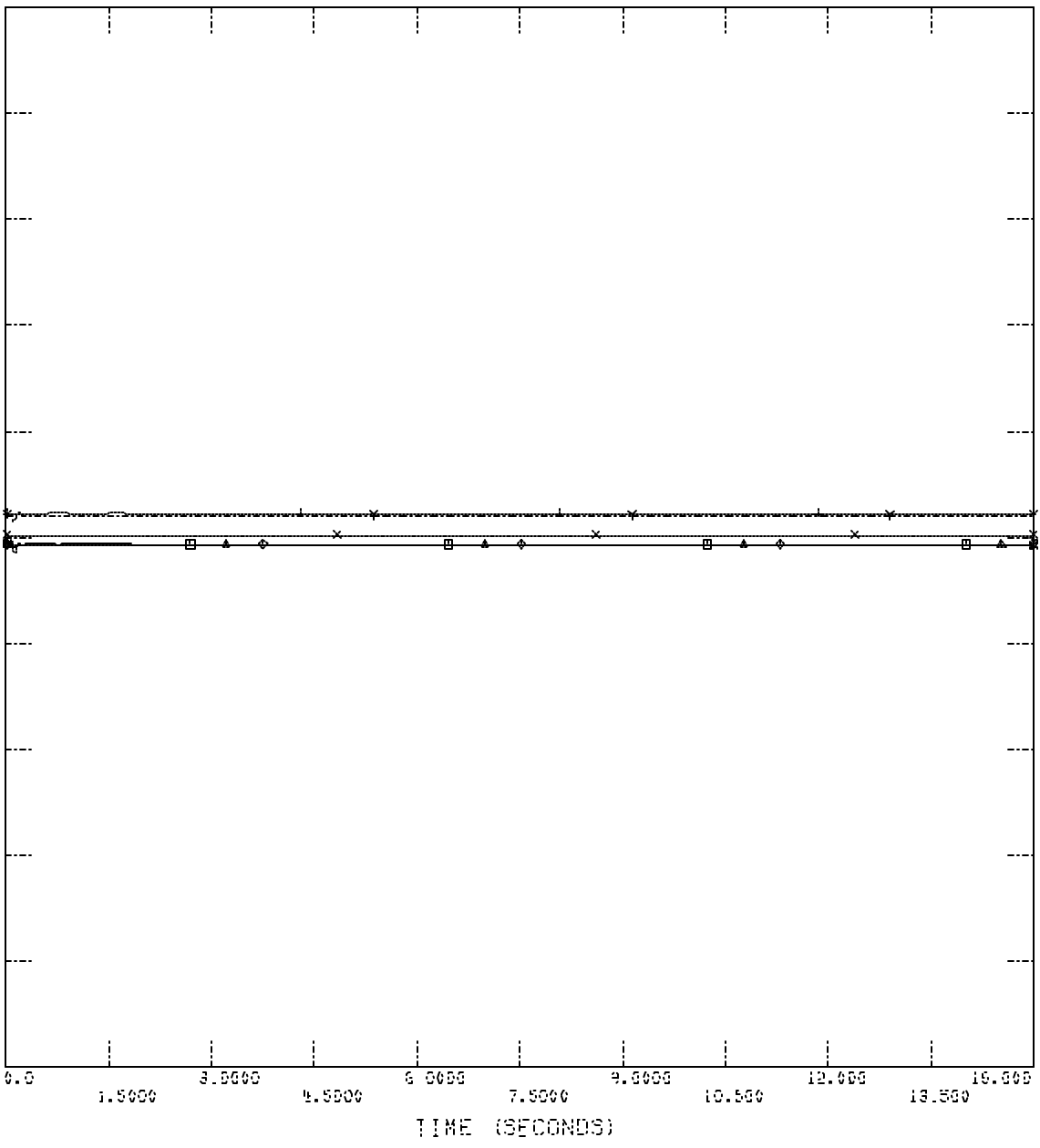
FRI, OCT 08 2004 11:01  
FLT\_6\_SPH\_VOLTAGES

2004-10-08 11:01  
 2004-10-08 11:01  
 2004-10-08 11:01

SPP MDMS Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE: C:\Interconnection Studies\MDL\INQ\RESUL\SNFLT\_7\_1PH.OUT

Channel #	Channel Name	Value
276	CVOLTAGE BIRNISON_1_KOPFL	0.0
293	CVOLTAGE NIOSHO_395KV3	0.0
296	CVOLTAGE MOLFCKR_395KV3	0.0
292	CVOLTAGE BENTON_395KV3	0.0
281	CVOLTAGE HAWTH_395KV3	0.0
279	CVOLTAGE W.GORDNR_395KV3	0.0



FRI, OCT 08 2004 11:01  
 FLT\_7\_1PH\_VOLTAGES

SPP MDMS Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSEDRSE INCLUDING PRIOR SUPPERS

395KVA  
272  
279

FILE: C:\Interconnection Studies\MDT\Inq\RESUL 15\FLT\_7\_3PH.OUT

CHNL # 272: CVOLTAGE BIRMINGHAM\_1\_KOPFL

2.0000 0.0

CHNL # 293: CVOLTAGE NIOSHO 395KV3

2.0000 0.0

CHNL # 296: CVOLTAGE MOLFORK 395KV3

2.0000 0.0

CHNL # 292: CVOLTAGE BENTON 395KV3

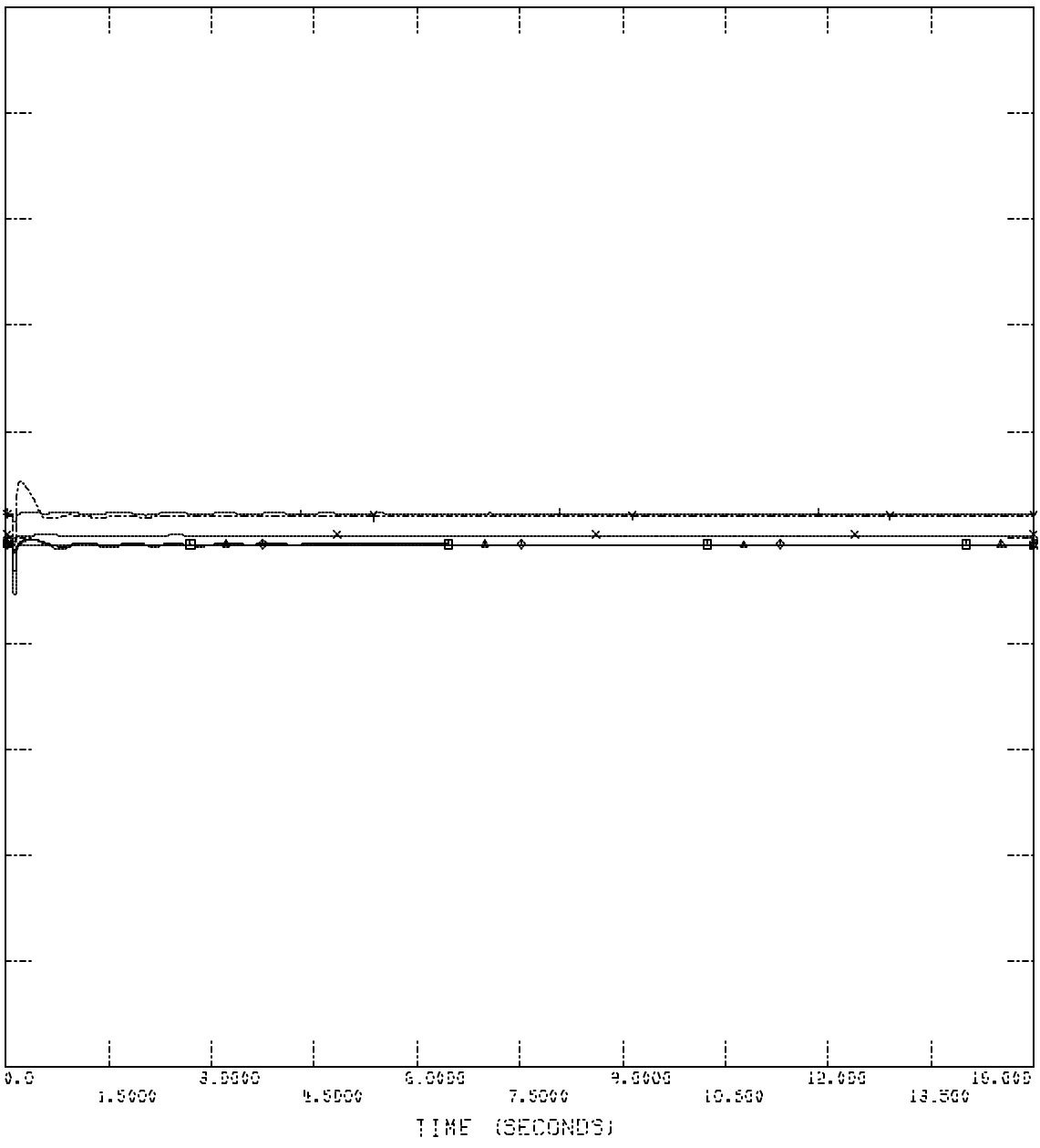
2.0000 0.0

CHNL # 281: CVOLTAGE HAMTH 395KV3

2.0000 0.0

CHNL # 279: CVOLTAGE W.GARDNER 395KV3

2.0000 0.0



FRI, OCT 08 2004 11:01  
FLT\_7\_3PH\_VOLTAGES



FILE: C:\Interconnection Studies\WOLTRNG\RESUL

SPP MDMS ON STABILITY; 2010 SUM PERK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE: C:\Interconnection Studies\WOLTRNG\RESUL FLT\_0\_1PH.OUT  
CHNL # 278: CVOLTAGE BIRMINGHAM\_1\_KOPFL

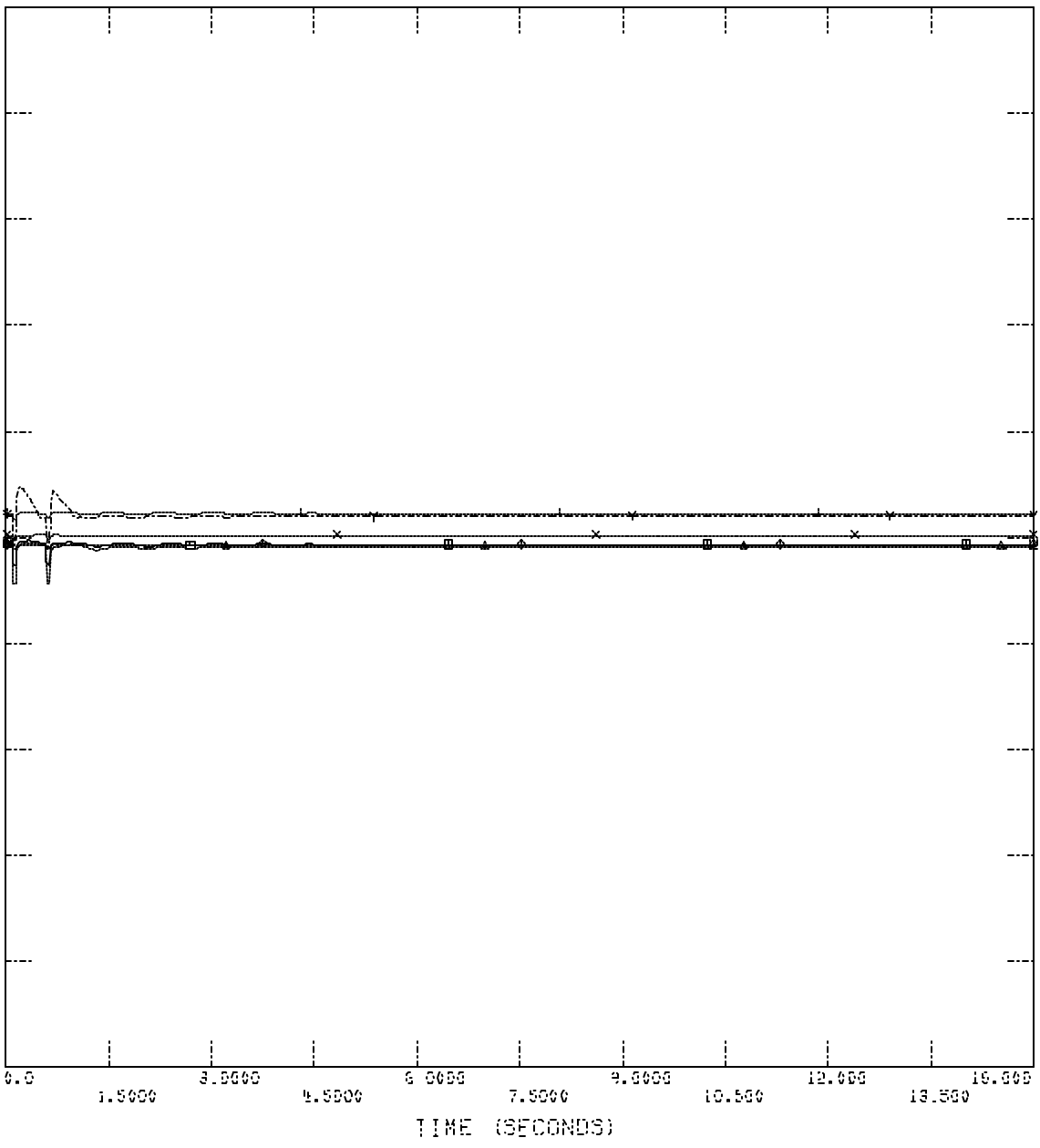
2.0000 CHNL # 293: CVOLTAGE NIOSHO 345KV3 0.0

2.0000 CHNL # 296: CVOLTAGE WOLFCRK 345KV3 0.0

2.0000 CHNL # 292: CVOLTAGE BENTON 345KV3 0.0

2.0000 CHNL # 281: CVOLTAGE HAMTH 345KV3 0.0

2.0000 CHNL # 279: CVOLTAGE W.GORDNR 345KV3 0.0



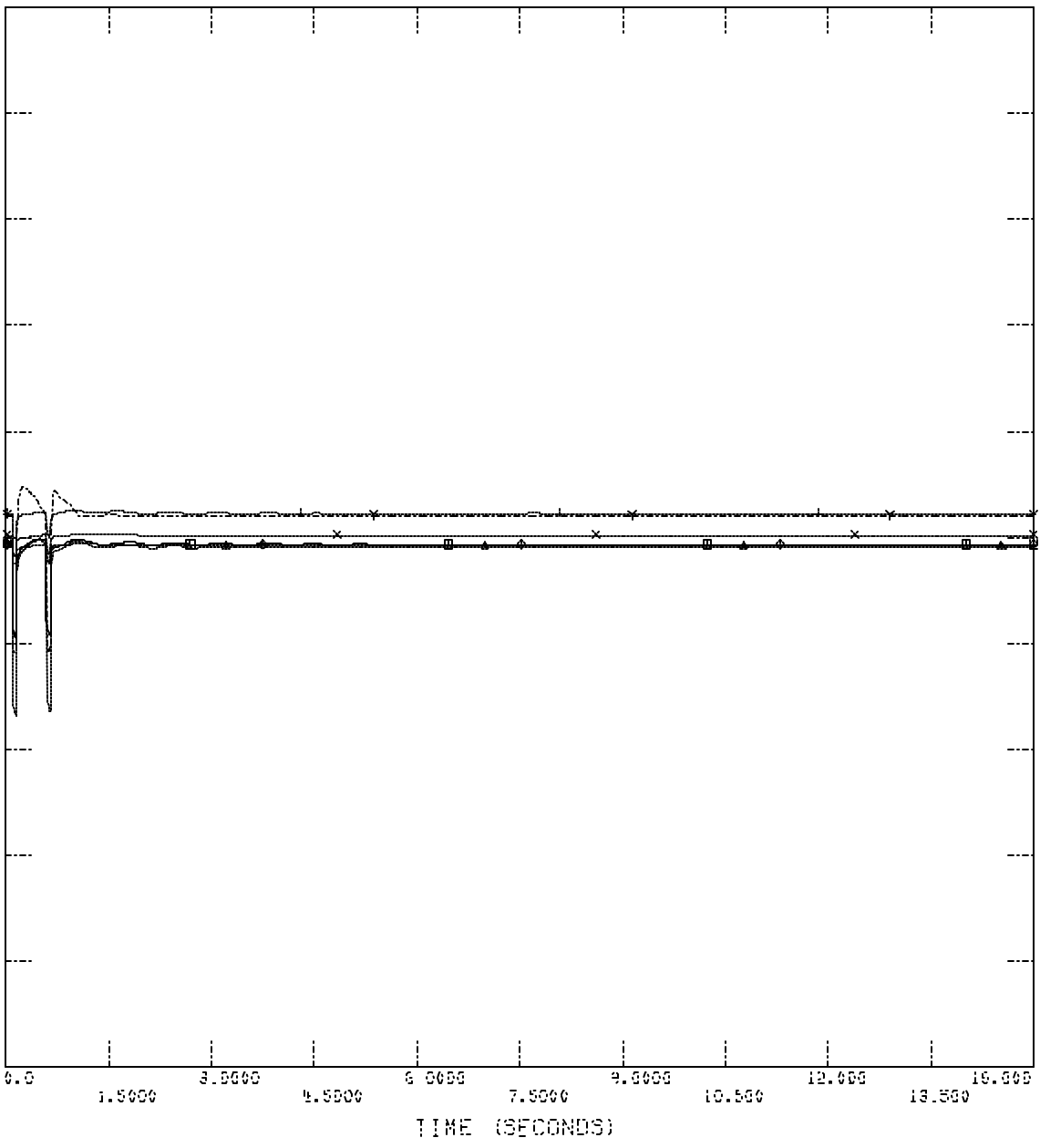
FRI, OCT 08 2004 11:01  
FLT\_0\_1PH\_VOLTAGES

3000000  
 2000000  
 1000000  
 0  
 -1000000  
 -2000000  
 -3000000

SMP MDMS Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR GOLFED

FILE: C:\Interconnection Studies\WOLTRNG\RESUL15N\FLT\_0\_3PH.OUT  
 CHNL # 278: CVOLTAGE BIRMINGHAM\_1\_KOPFL

2.0000	CHNL # 293: CVOLTAGE NIOSHO 345KV3	0.0
2.0000	CHNL # 296: CVOLTAGE WOLFCRK 345KV3	0.0
2.0000	CHNL # 292: CVOLTAGE BENTON 345KV3	0.0
2.0000	CHNL # 281: CVOLTAGE HAWTH 345KV3	0.0
2.0000	CHNL # 279: CVOLTAGE W.GORDNR 345KV3	0.0

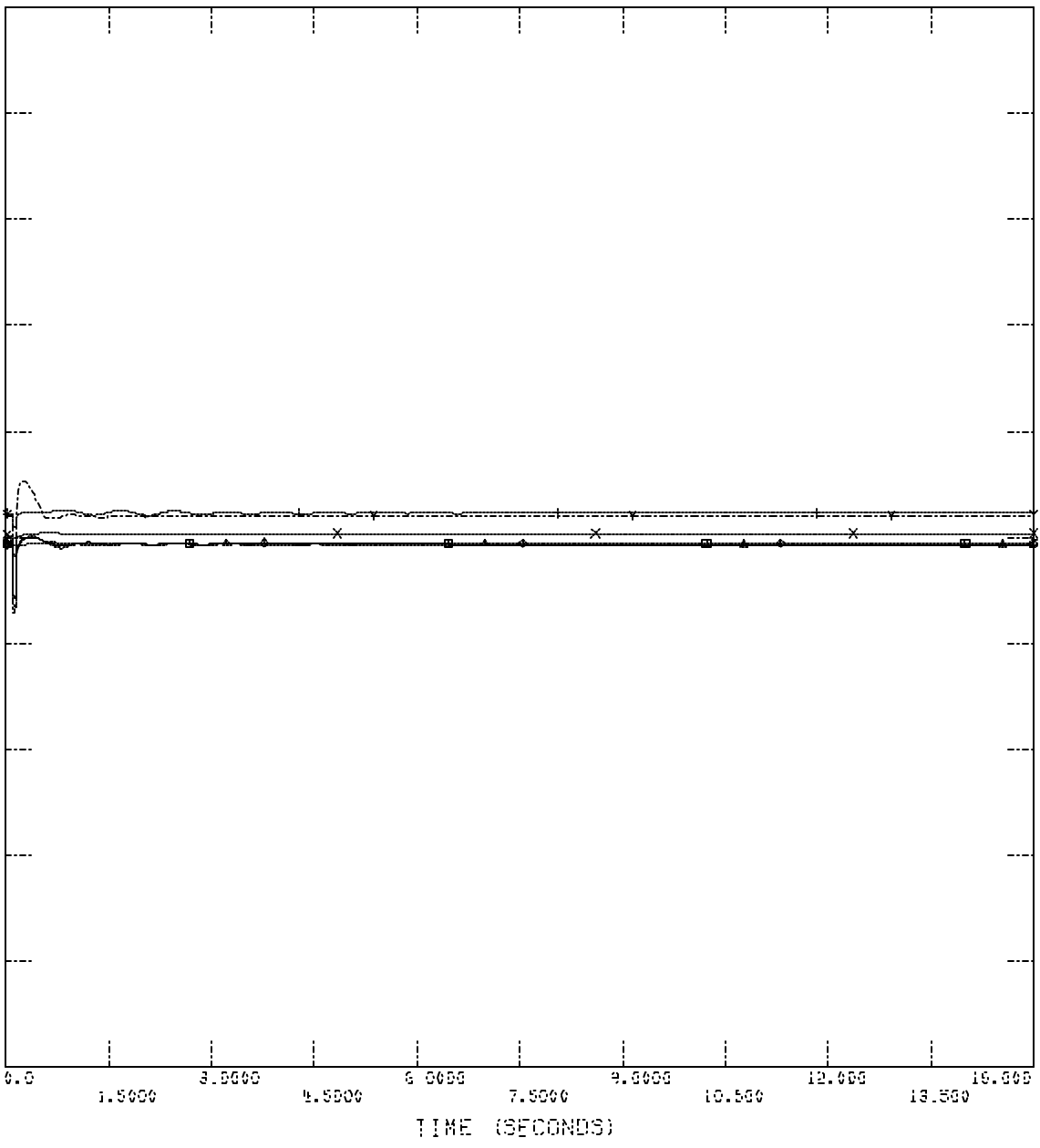


FRI, OCT 08 2004 11:01  
 FLT\_0\_3PH\_VOLTAGES

SPP MDMS Q4 STABILITY; 2010 SUM PERK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLEMENT

FILE: C:\Interconnection Studies\Marketing\RESUL TS\F11\_9\_001

2.0000	CHNL # 276: EVOLTAGE BIRMINGM 1 ACPL3	0.0
2.0000	CHNL # 293: EVOLTAGE NIOSHO 3YSKV3	0.0
2.0000	CHNL # 296: EVOLTAGE MOLFCHK 3YSKV3	0.0
2.0000	CHNL # 292: EVOLTAGE BENTON 3YSKV3	0.0
2.0000	CHNL # 281: EVOLTAGE HRMTH 3YSKV3	0.0
2.0000	CHNL # 279: EVOLTAGE W.GRDNB 3YSKV3	0.0



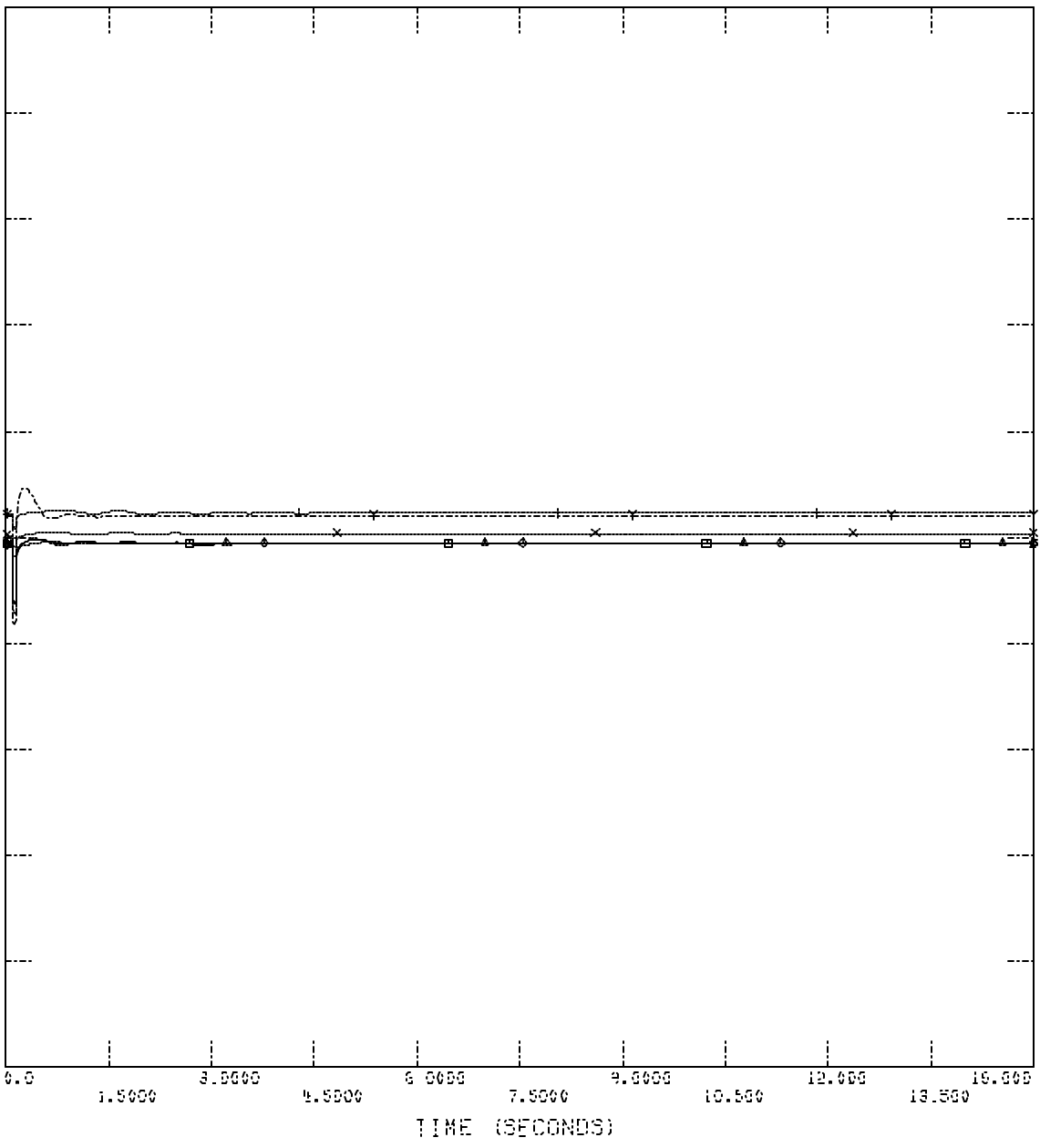
FRI, OCT 08 2004 11:01  
FLT\_9\_VOLTAGES

SPP MDMS ON STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE # 2761  
DATE 10/08/04

FILE: C:\Interconnection Studies\MDR\ING\RESUL\TSVPL\_1\_10\_007  
CHNL # 2761: VOLTAGE BIRNISON\_1\_KOPFL

2.0000	CHNL # 2931: VOLTAGE NIOSHO_395KV3	0.0
2.0000	CHNL # 2966: VOLTAGE MOLFCHK_395KV3	0.0
2.0000	CHNL # 2922: VOLTAGE BENTON_395KV3	0.0
2.0000	CHNL # 2811: VOLTAGE HAWTH_395KV3	0.0
2.0000	CHNL # 2791: VOLTAGE W.GORDNR_395KV3	0.0



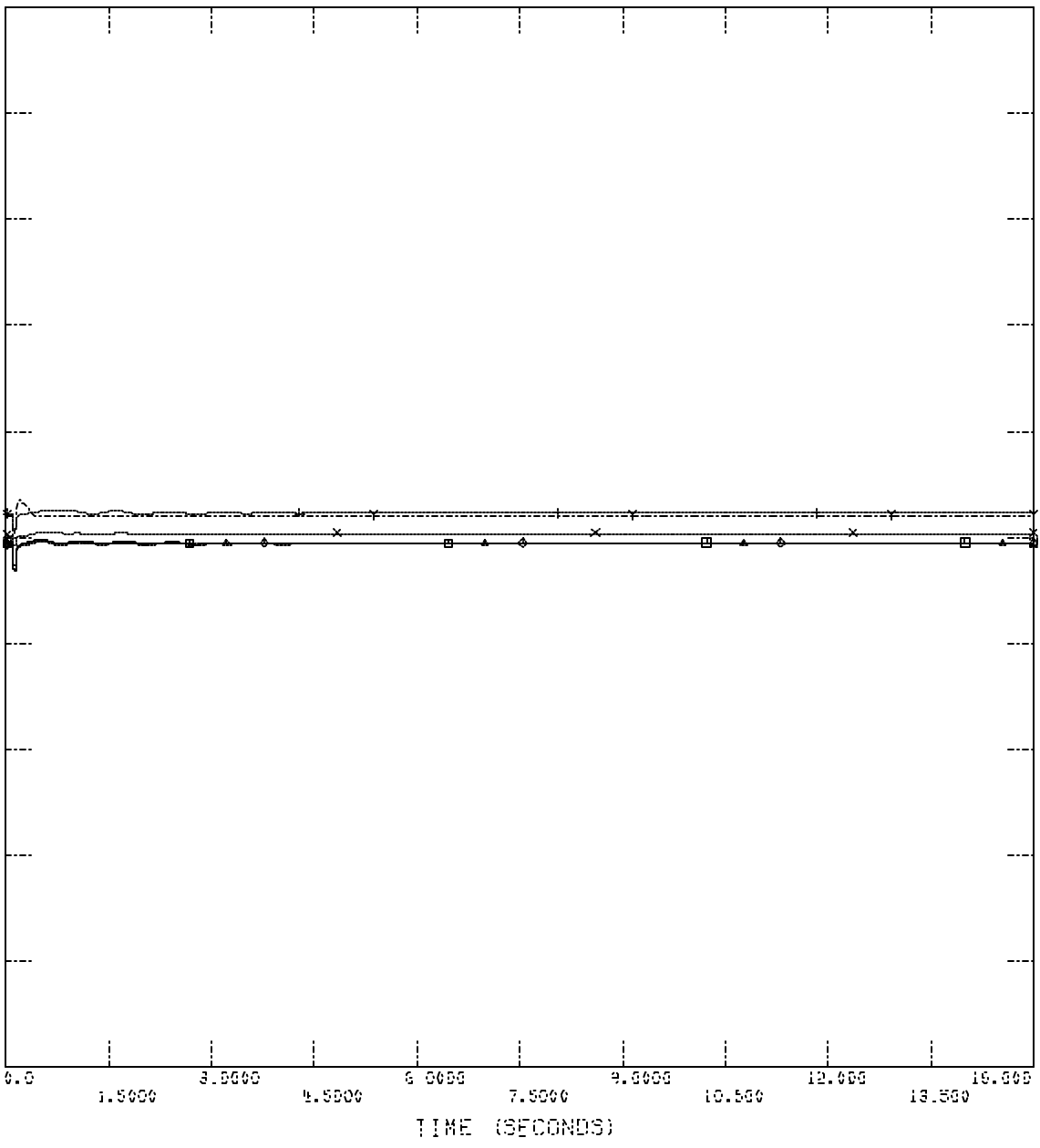
FRI, OCT 08 2004 11:01  
FLT\_10\_VOLTAGES

FILE # 276  
DATE 01/08/04

SPP MDMS ON STABILITY; 2010 SUM PEAK; MODIFIED  
GEN-2004-012 BRSECHSE INCLUDING PRIOR GDFEED

FILE: C:\Interconnection Studies\MDR\ING\RESUL\TSVPL\_1\_11\_007

CHANNEL #	VOLTAGE	MIN	MAX	DIFF
293	EVOLTA GE NEOSHO 345KV	1.9999	2.0001	0.0
296	EVOLTA GE MOLFCKR 345KV	1.9999	2.0001	0.0
292	EVOLTA GE BENTON 345KV	1.9999	2.0001	0.0
281	EVOLTA GE HAWTH 345KV	1.9999	2.0001	0.0
279	EVOLTA GE W.GORDNR 345KV	1.9999	2.0001	0.0



FRI, 01/08/2004 11:01  
FLT\_11\_VOLTAGES

2004-10-08 11:01  
 2004-10-08 11:01  
 2004-10-08 11:01

SPP MDMS Q4 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR QUEUED

FILE: C:\Interconnection Studies\Work\Inq\RESULTS\FLT\_12\_1PH.OUT  
 CHNL # 276: VOLTAGE BIRMISSON\_1\_KOPFL

2.0000

0.0

CHNL # 293: VOLTAGE NEOSHO\_395KV3

2.0000

0.0

CHNL # 296: VOLTAGE MOLFCKRK\_395KV3

2.0000

0.0

CHNL # 292: VOLTAGE BENTON\_395KV3

2.0000

0.0

CHNL # 281: VOLTAGE HAMTH\_395KV3

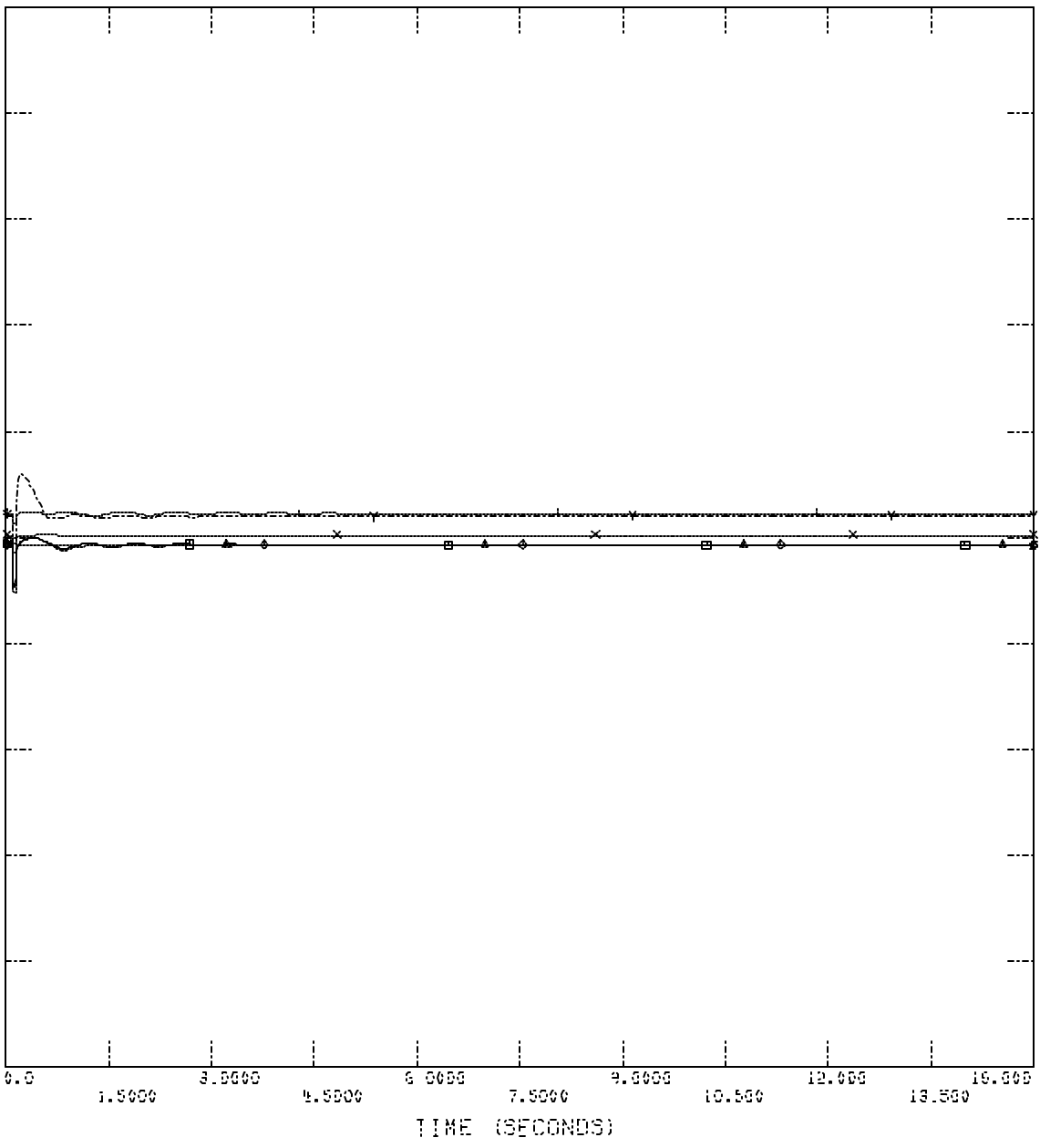
2.0000

0.0

CHNL # 279: VOLTAGE W.GORNB\_395KV3

2.0000

0.0



FRI, OCT 08 2004 11:01  
 FLT\_12\_1PH\_VOLTAGES

A:\www  
 2004/10/08  
 11:01

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR QUEUED

FILE: C:\Interconnection Studies\Working\RESU1\SYFLT\_12\_1PH\_STUCK.OUT  
 CHNL # 276: CVOLTAGE BIRNISON\_1.KOPCJ

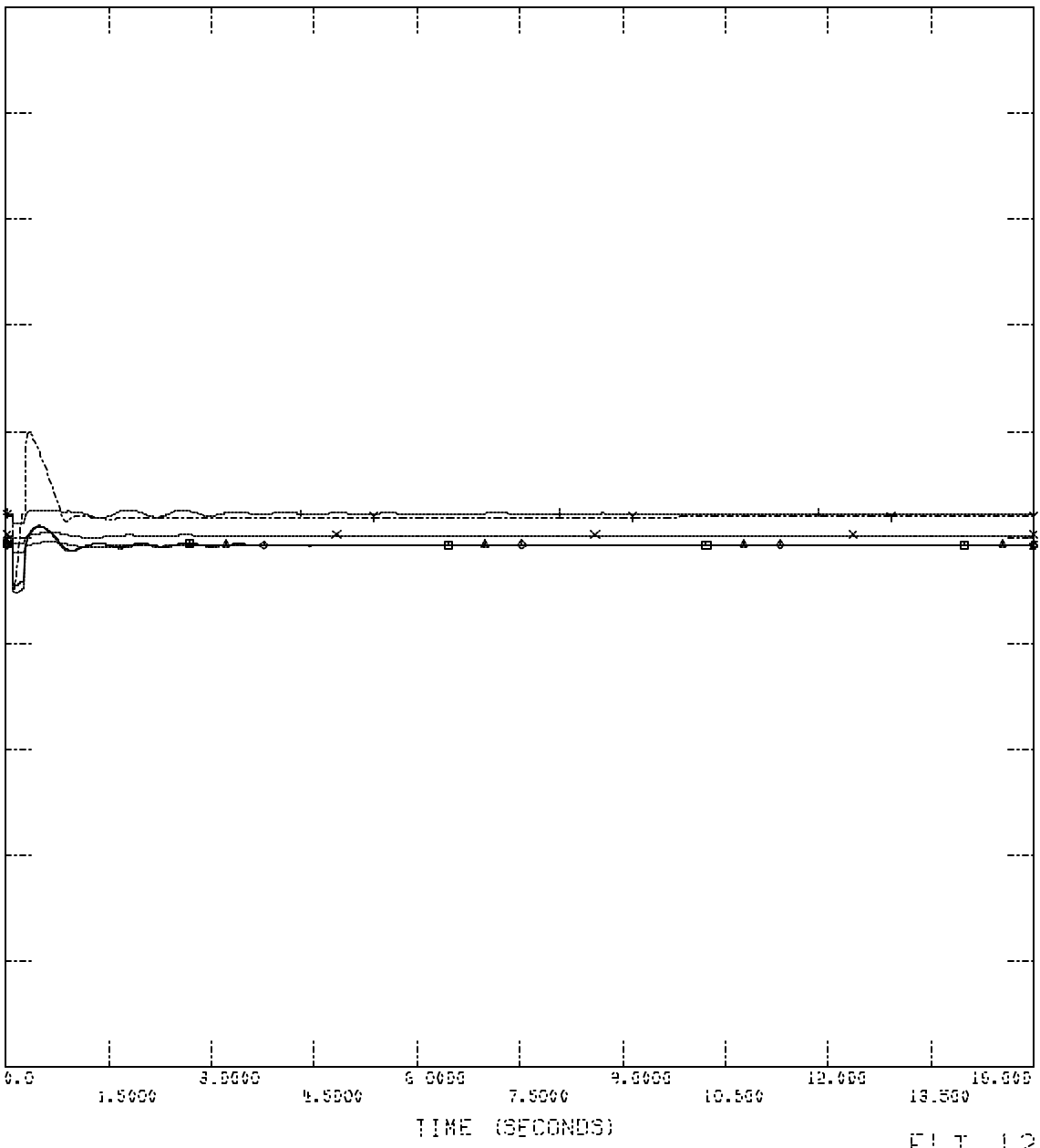
2.0000 CHNL # 293: CVOLTAGE NIOSHO\_395KVJ 0.0

2.0000 CHNL # 296: CVOLTAGE MOLFCHK\_395KVJ 0.0

2.0000 CHNL # 292: CVOLTAGE BENTON\_395KVJ 0.0

2.0000 CHNL # 281: CVOLTAGE HAWTH\_395KVJ 0.0

2.0000 CHNL # 279: CVOLTAGE W.GORDNR\_395KVJ 0.0



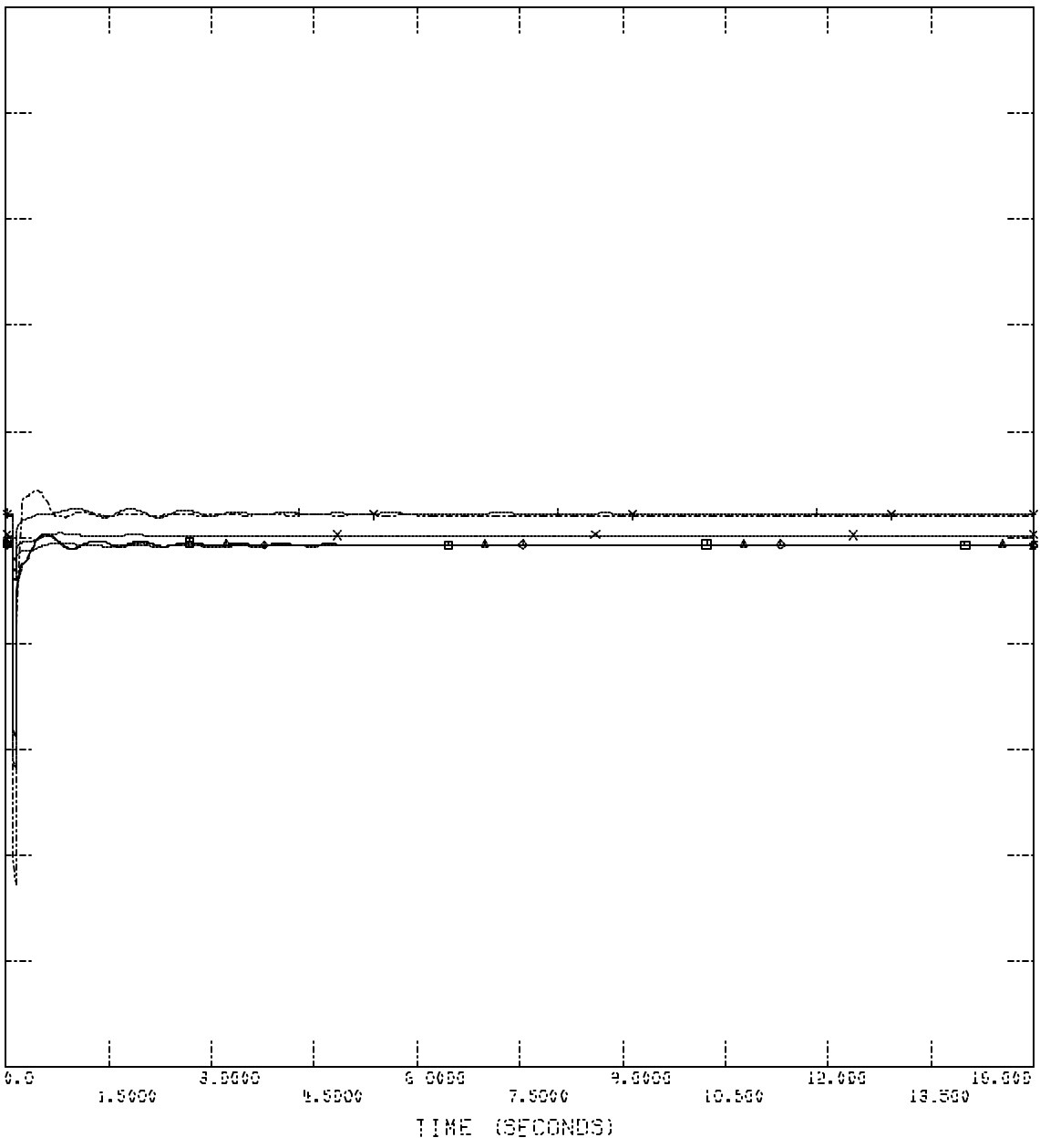
FRI, OCT 08 2004 11:01  
 FLT\_12\_1PH\_STUCK\_VOLTAGES

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 2004/10/08  
 11:01

SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLEMENT

FILE: C:\Interconnection Studies\Work\Inq\RESULTS\FLT\_12\_3PH.OUT  
 CHNL # 276: VOLTAGE BIRMISSON\_1\_KOPFL

2.0000	CHNL # 293: VOLTAGE NIOSHO_3Y5KV3	0.0
2.0000	CHNL # 296: VOLTAGE MOLFCHK_3Y5KV3	0.0
2.0000	CHNL # 292: VOLTAGE BENTON_3Y5KV3	0.0
2.0000	CHNL # 281: VOLTAGE HAWTH_3Y5KV3	0.0
2.0000	CHNL # 279: VOLTAGE W.GORNB_3Y5KV3	0.0



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 FLT\_12\_3PH\_VOLTAGES



30000000  
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SPP MDMS 04 STABILITY; 2010 SUM PEAK; MODIFIED  
 GEN-2004-012 BRSECHSE INCLUDING PRIOR SUPPLEMENT

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 CHANNEL # 278: VOLTAGE BIRNISON\_1\_KVPL3

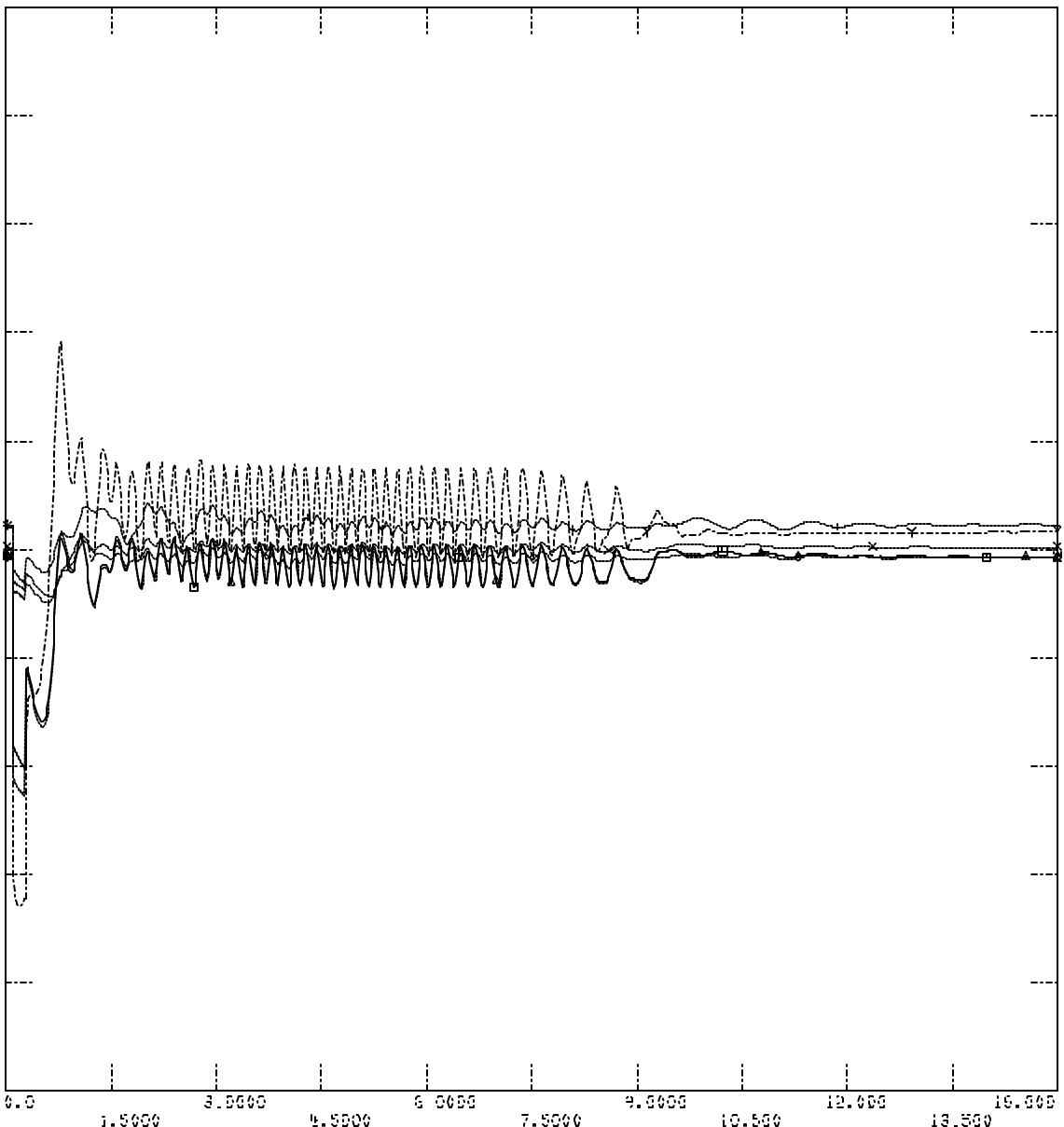
2.0000 CHANNEL # 293: VOLTAGE NEOSHO\_345KV3 0.0

2.0000 CHANNEL # 296: VOLTAGE WOLFCRK\_345KV3 0.0

2.0000 CHANNEL # 292: VOLTAGE BENTON\_345KV3 0.0

2.0000 CHANNEL # 281: VOLTAGE HAWTH\_345KV3 0.0

2.0000 CHANNEL # 279: VOLTAGE W.GORDNR\_345KV3 0.0



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FLT\_12\_3PH\_STUCK\_VOLTAGES