Southwest Power Pool

Impact Re-study For Generation Interconnection Request GEN-2007-002

SPP Tariff Studies

(#GEN-2007-002)

June 2008

Executive Summary

<OMITTED TEXT> This document is a report on the restudy of the Impact Study for GEN-2007-002 (dated August 2007) and first re-study (dated December 2007). This restudy was conducted to determine the effects due to the new generator parameters submitted by the Customer.

Generation Interconnection Request GEN-2007-002 is a request for interconnecting 160 MW of generation within the control area of Southwestern Public Service (SPS) located in Gray County, Texas. The method and proposed point of interconnection is to add a 115 kV line terminal at the Grapevine 230/115 kV Interchange owned by SPS. The proposed in-service date is September 1, 2009.

The results of the stability analysis indicate that GEN-2007-002 and the transmission system remain stable for all the analyzed contingencies.

As discussed in the original Impact Study, the Customer will need to purchase the equipment with stabilizers to dampen oscillations observed in the analysis.

The costs for implementing this project are shown in the Facility Study for GEN-2007-002 posted in January 2008.

Nothing in this study should be construed as a guarantee of transmission service. If the customer wishes to sell power from the facility, a separate request for transmission service shall be requested on Southwest Power Pool’s OASIS by the Customer.

1.0 Introduction

<OMITTED TEXT> (Customer) requested interconnection of 160 MW of generation within the control area of Southwestern Public Service (SPS) located in Gray County, Texas. The method and proposed point of interconnection is to add a 115 kV line terminal at the Grapevine 230/115 kV Interchange owned by SPS. The proposed in-service date is September 1, 2009.

2.0 Purpose

The purpose of this study is to re-evaluate the impact of the proposed interconnection on the reliability of the Transmission System due to the change in generator parameters submitted by the Customer.

3.0 Facilities

The Interconnect Facility is described in the Facility Study for GEN-2007-002 posted in January 2008.

4.0 Stability Analysis

The following stability definition was applied in this study:

> "Power system stability is defined as that condition in which the differences of the angular positions of synchronous machine rotors become constant following normally an aperiodic system disturbance."

Additionally, the new coal generator is required to stay on-line following normally cleared faults at the Point of Interconnection (POI).

The stability analysis was performed by using PSS/E Power System Simulator Version 30.2.1. Both three-phase and single-phase line faults were simulated. The synchronous machine rotor angles were monitored as well as the stability of the asynchronous machines.

4.1 Modeling of the Coal Plant Generator in the Power Flow

The Customer generation facility consists of one round rotor generator capable of producing up to 160 MW. The generator will be connected to the Grapevine 115 kV Interchange through a 15.75/115 kV transformer. Further details are found in the original Impact Study.

Note that the Grapevine 230/115 kV autotransformer currently controls the Grapevine 115 kV bus voltage with an on-load tap changer. When the GEN-2007-002 generator connects to the Grapevine 115 kV bus, the voltage controls of the 230/115 kV autotransformer and the new generator will need to be coordinated to avoid conflicts.

4.2 Modeling of the Coal Plant Generator in Dynamics

The Customer generator was modeled as a round rotor generator "GENROU" with governor model "IEEESGO" and exciter model "ESAC1A". Certain parameters of the generator were changed from the original Impact Study, as well as a new exciter and governor model.

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PLANT MODELS

 REPORT FOR ALL MODELS                    BUS 1000 [G07-02      15.750] MODELS


 ** GENROU **  BUS X-- NAME --X BASEKV MC    C O N S     S T A T E S
          1000 G07-02       15.750 1  107239-107252  41771-41776

         MBASE     Z S O R C E        X T R A N      GENTAP
         200.0  0.00000+J 0.12800  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
 11.00 0.047  1.23 0.089   3.99  0.00 1.6800 1.6400 0.1700 0.3180 0.1280 0.0940

                        S(1.0)  S(1.2)
                        0.1860  0.7690


 ** ESAC1A **  BUS X-- NAME --X BASEKV MC    C O N S     S T A T E S
          1000 G07-02       15.750 1  107270-107288  41784-41788

     TR     TB      TC      KA      TA    VAMAX   VAMIN     TE      KF
   0.004   2.520   0.910   165.0   0.004  15.000 -15.000   0.094   0.000

   TF     KC     KD     KE     E1     S(E1)    E2     S(E2)   VRMAX   VRMIN
  1.000  0.340  0.730  1.000  0.7500  0.0000  1.0000  0.0200   5.320  -3.300


 ** IEESGO **  BUS X-- NAME --X BASEKV MC    C O N S     S T A T E S     VAR
          1000 G07-02       15.750 1  107372-107382  41810-41814    9906

      T1    T2     T3    T4    T5    T6    K1    K2    K3   PMAX  PMIN
    0.220 0.120  1.000 1.000  1.00  1.00  20.0  0.00  0.00  0.93  0.00
```

4.3 Contingencies Simulated

Sixteen (16) contingencies were considered for the transient stability simulations. These contingencies are shown in Table 3.

The single phase faults were simulated by applying the fault impedance to the positive sequence network to represent the effect of the negative and zero sequence networks on the positive sequence network. The fault impedance was determined by using PSS/E to give a positive sequence voltage at the fault location of approximately 60% of the pre-fault value.

4.4 Results

The results of the stability analysis are summarized in Table 4. The results indicate that for all contingencies simulated, GEN-2007-002 and the transmission system remained stable for both seasons. None of the prior queued wind farms tripped off-line during the simulations. Selected stability plots are shown in the appendices. All plots are available on request.

Note that the GEN-2007-002 power and speed oscillations do not damp out until around 10 seconds for faults on the Grapevine 230/115 kV transformer (faults 5, 6, 15, and 16). While these responses are ultimately stable, it is recommended that a properly tuned power system stabilizer (PSS) be applied to the GEN-2007-002 excitation system to ensure a well damped response.

Table 3: Contingencies Evaluated

Cont. No.	Cont. Name	Description
1	FLT_1_3PH	Three phase fault on the Grapevine (523770) to Kirby (524088), 115 kV line, near Grapevine. a. Apply fault at the Grapevine (523770) b. Clear Fault after 5 cycles by removing the line from Grapevine (523770) to Kirby (524088). c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
2	FLT_2_1PH	Single phase fault and sequence like Cont. No. 1
3	FLT_3_3PH	Three phase fault on the Grapevine (523770) to Bowers (523748), 115 kV line, near Grapevine. a. Apply Fault at the Grapevine (523770). b. Clear fault after 5 cycles by removing the line from Grapevine (523770) to Bowers (523748) c. Wait 20 cycles, and then re-close the line in (b) into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
4	FLT_4_1PH	Single phase fault and sequence like Cont. No. 3
5	FLT_5_3PH	Three phase fault on the Grapevine 230/115 kV autotransformer a. Apply fault at the Grapevine 230 kV bus (523771) b. Clear fault after 5 cycles by removing the autotransformer from service.
6	FLT_6_1PH	Single phase fault and sequence like Cont. No. 5
7	FLT_7_3PH	Three phase fault on the Elk City (511490) to Wind Farm Tap (560012) 230 kV line, near Elk City. a. Apply fault at Elk City (511490). b. Clear fault after 5 cycles by removing the line from Elk City (511490) to the Wind Farm tap (560012).
8	FLT_8_1PH	Single phase fault and sequence like Cont. No.7 but with reclose and lockout
9	FLT_9_3PH	Three phase fault on the Nichols (524044) to Grapevine (523771), 230 kV line near Grapevine. a. Apply Fault at the Grapevine bus (523771) b. Clear Fault after 5 cycles by removing the line from Nichols (524044) to Grapevine (523771).
10	FLT_10_1PH	Single phase fault and sequence like Cont. No.9 but with reclose and lockout
11	FLT_11_3PH	Three phase fault on the Grapevine (523771) to Wind Farm Tap (560012) 230 kV line, near Grapevine. a. Apply fault at the Grapevine (523771). b. Clear fault after 5 cycles by removing the line from Grapevine (523771) to the Wind Farm tap (560012). c. Wait 20 cycles, and then re-close the line in (b) into the fault. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
12	FLT_12_1PH	Single phase fault and sequence like Cont. No.11
13	FLT_13_3PH	Three phase fault on the Kirby (524088) to McLelln3 (523804), 115 kV line, near McLelln3 a. Apply fault at the Mclelln3 bus (523804) b. Clear fault after 5 cycles by removing the line from Kirby (524088) to McLelln3 (523804). c. Wait 20 cycles, and then re-close the line in (b) into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
14	FLT_14_1PH	Single phase fault and sequence like Cont. No.13
15	FLT_15_3PH	Three phase fault on the Grapevine 230/115 kV autotransformer a. Apply fault at the Grapevine 115 kV bus (523770) b. Clear fault after 9 cycles by removing the autotransformer from service.
16	FLT_16_1PH	Single phase fault on the Grapevine 230/115 kV autotransformer a. Apply fault at the Grapevine 115 kV bus (523770) b. Clear fault after 30 cycles by removing the autotransformer from service.

Table 3: Contingencies Evaluated (continued)

Contingency Name	2008 Winter Peak	2012 Summer Peak
FLT_1_3PH	STABLE	STABLE
FLT_2_1PH	STABLE	STABLE
FLT_3_3PH	STABLE	STABLE
FLT_4_1PH	STABLE	STABLE
FLT_5_3PH	STABLE*	STABLE*
FLT_6_1PH	STABLE*	STABLE*
FLT_7_3PH	STABLE	STABLE
FLT_8_1PH	STABLE	STABLE
FLT_9_3PH	STABLE	STABLE
FLT_10_1PH	STABLE	STABLE
FLT_11_3PH	STABLE	STABLE
FLT_12_1PH	STABLE	STABLE
FLT_13_3PH	STABLE	STABLE
FLT_14_1PH	STABLE	STABLE
FLT_15_3PH	STABLE	STABLE
FLT_16_1PH	STABLE	STABLE

*Oscillations observed that dampen out after 10 seconds

Table 4: Results of Simulation

5.0 <u>Conclusion</u>

The results of a restudy of the GEN-2007-002 are presented in this report. The restudy was conducted to determine the effects due to the change in machine parameters submitted by the Customer.

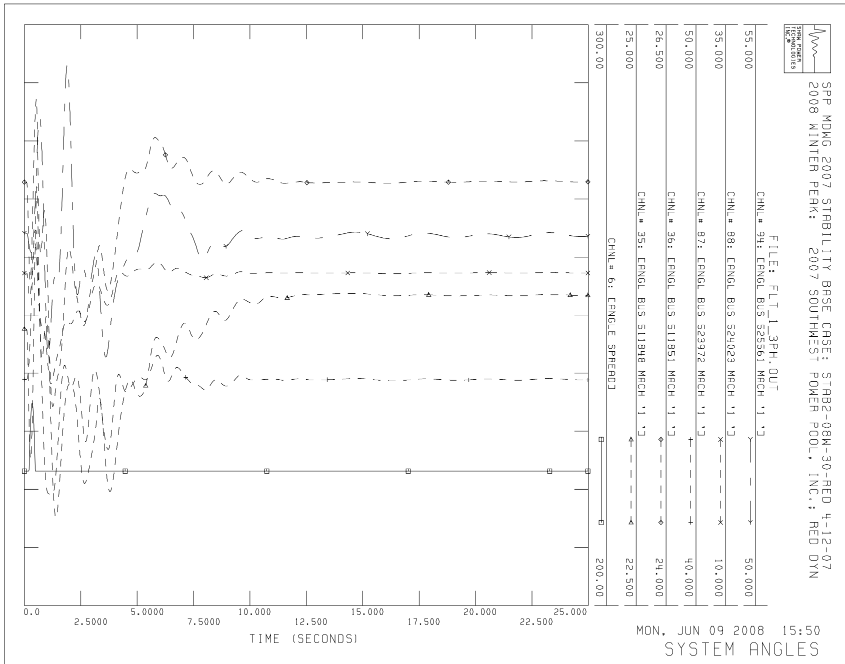
The results of the stability analysis indicate that for the analyzed contingencies GEN-2007-002 and the transmission system remains stable.

Any costs shown in this document 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. It should be noted that the models used for simulation do not contain all SPP transmission service.

APPENDIX A.

SELECTED STABILITY PLOTS – 2008 Winter Peak

All plots available on request.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CHNL# 94: CANGL BUS 525561 MACH '1 '
CHNL# 88: CANGL BUS 524023 MACH '1 '
CHNL# 87: CANGL BUS 523972 MACH '1 '
CHNL# 36: CANGL BUS 511851 MACH '1 '
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CHNL# 6: CANGLE SPREAD
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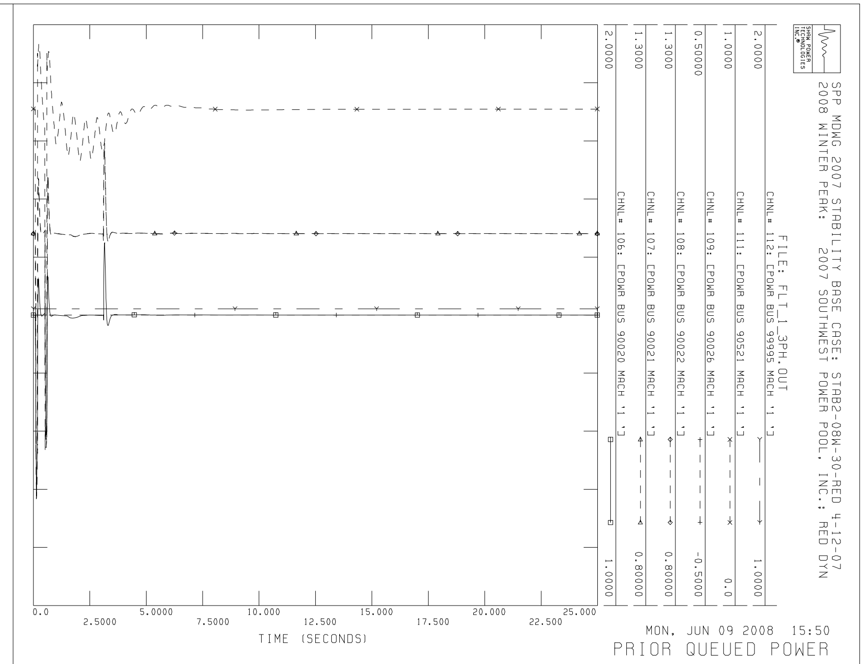
MON, JUN 09 2008 15:50
SYSTEM ANGLES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CHNL# 108: CPOWR BUS 90022 MACH '1 '
CHNL# 107: CPOWR BUS 90021 MACH '1 '
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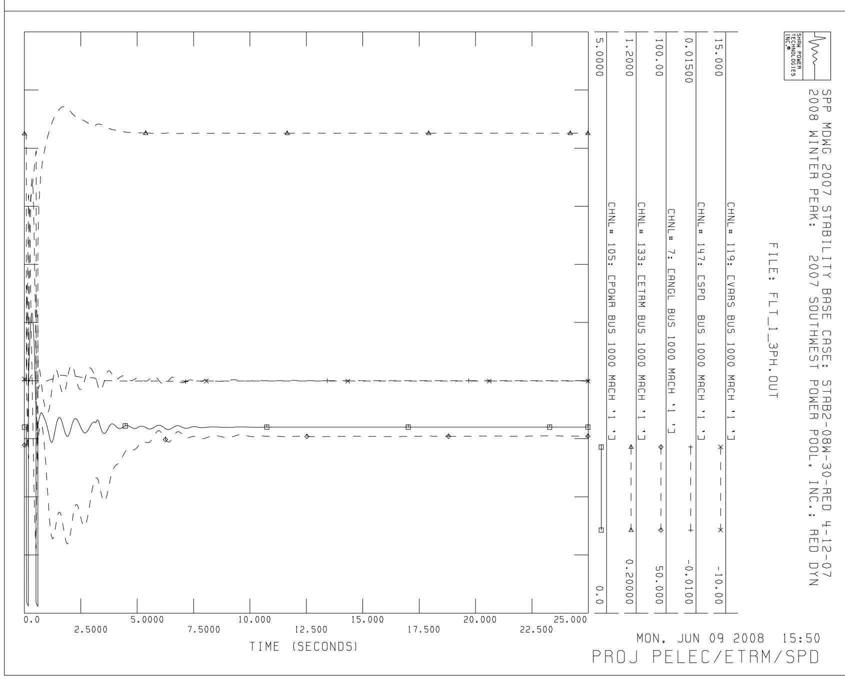
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CHNL# 133: CETRM BUS 1000 MACH '1 '
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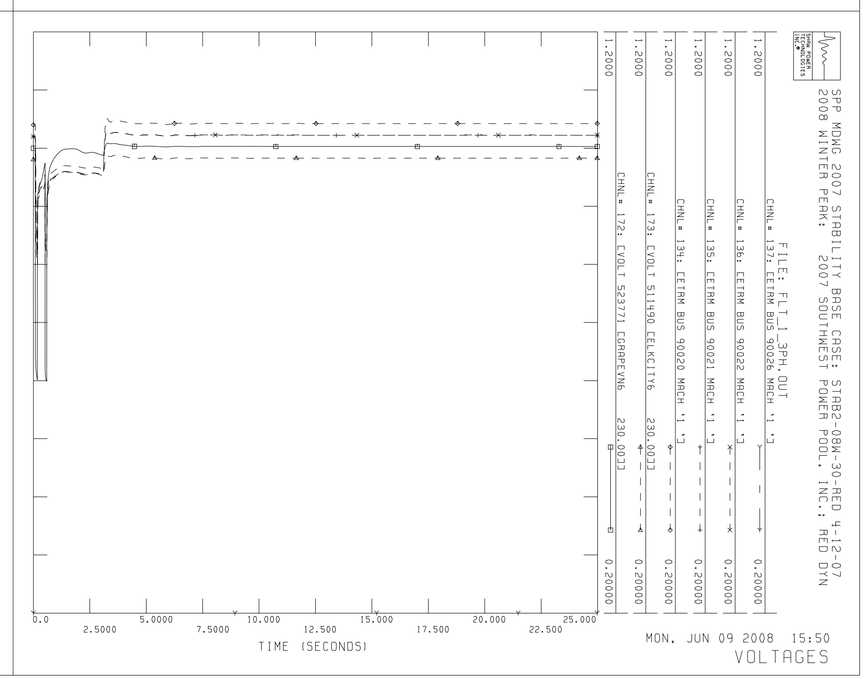
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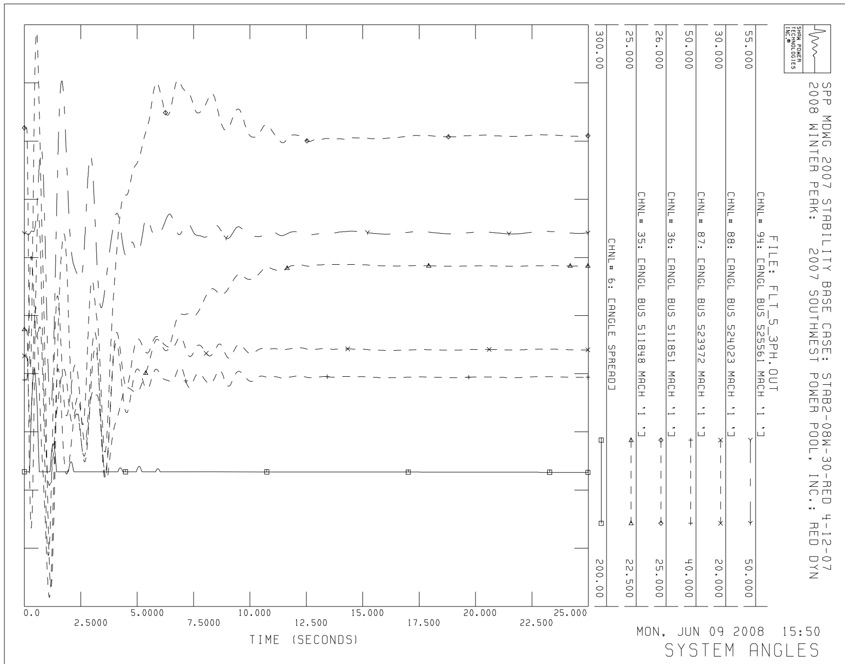
VOLTAGES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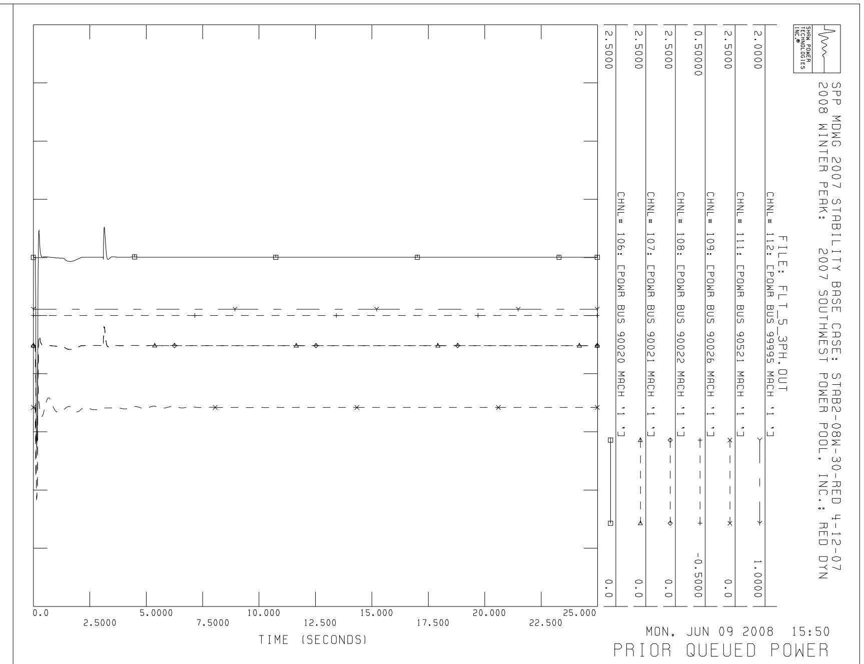
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CHNL# 108: CPOWR BUS 90022 MACH '1 '
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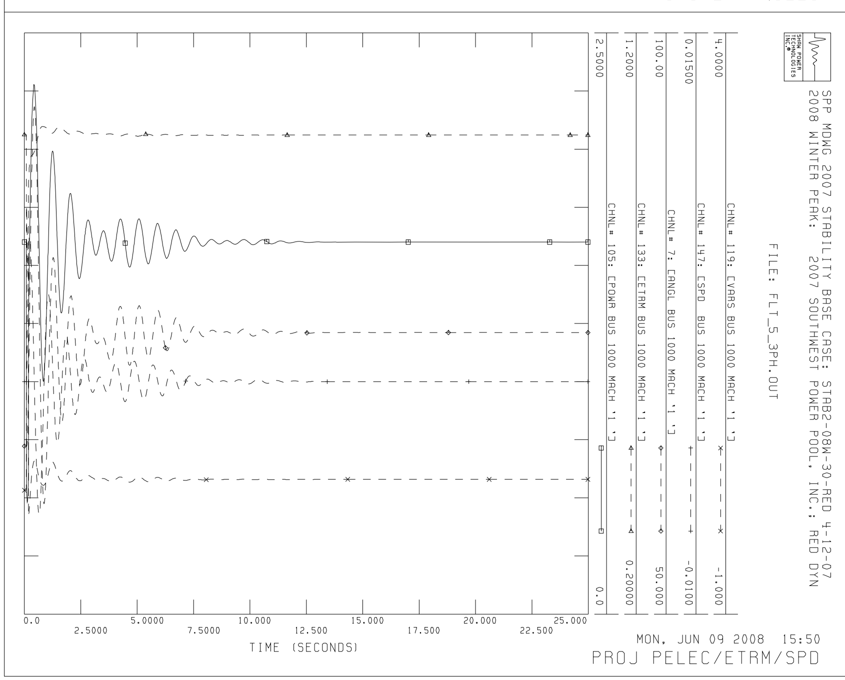
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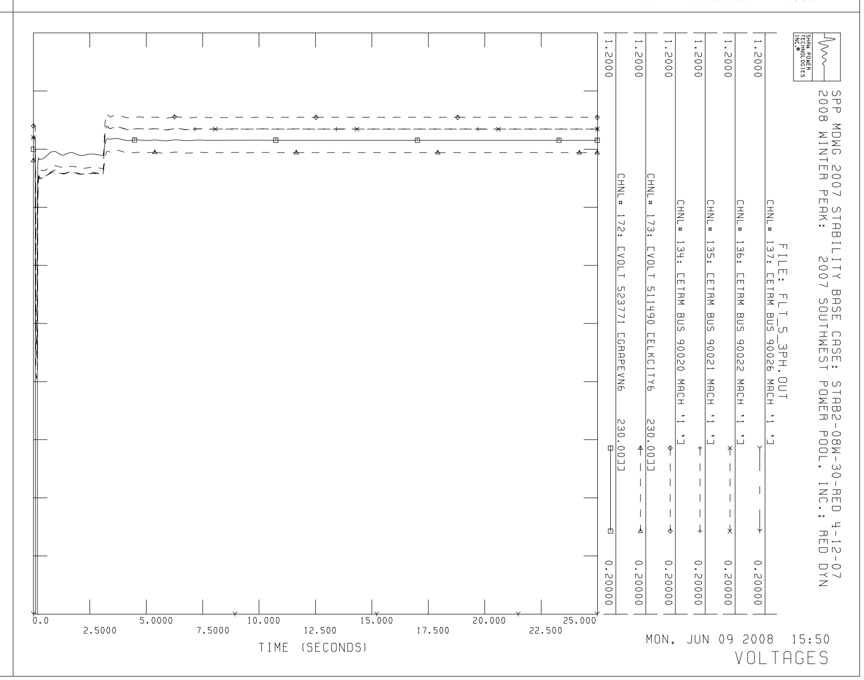
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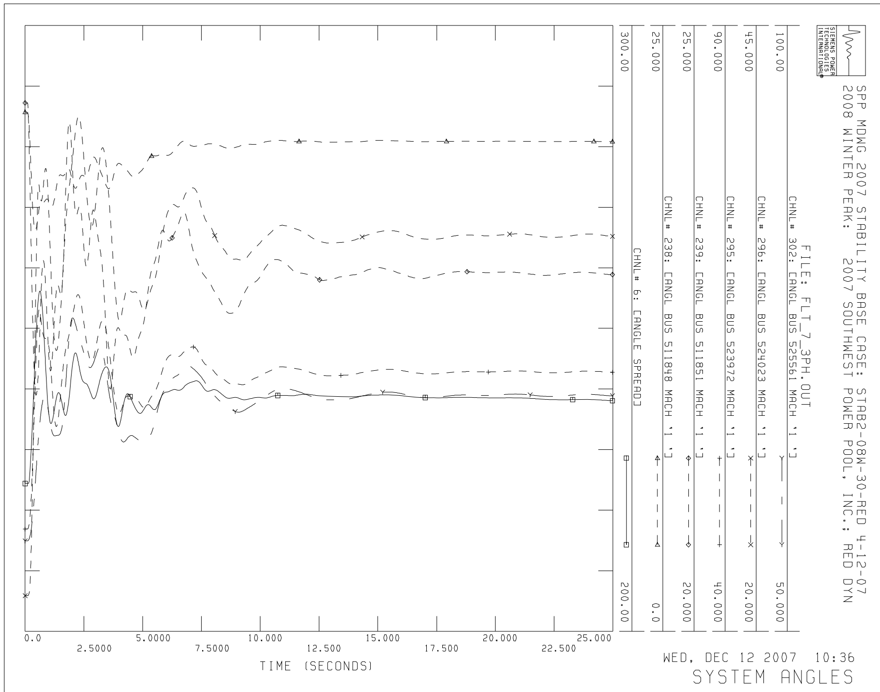
VOLTAGES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CHNL# 295: [ANGL BUS 523972 MACH '1 '] 90.000 40.000
CHNL# 239: [ANGL BUS 511851 MACH '1 '] 25.000 20.000
CHNL# 238: [ANGL BUS 511848 MACH '1 '] 25.000 0.0
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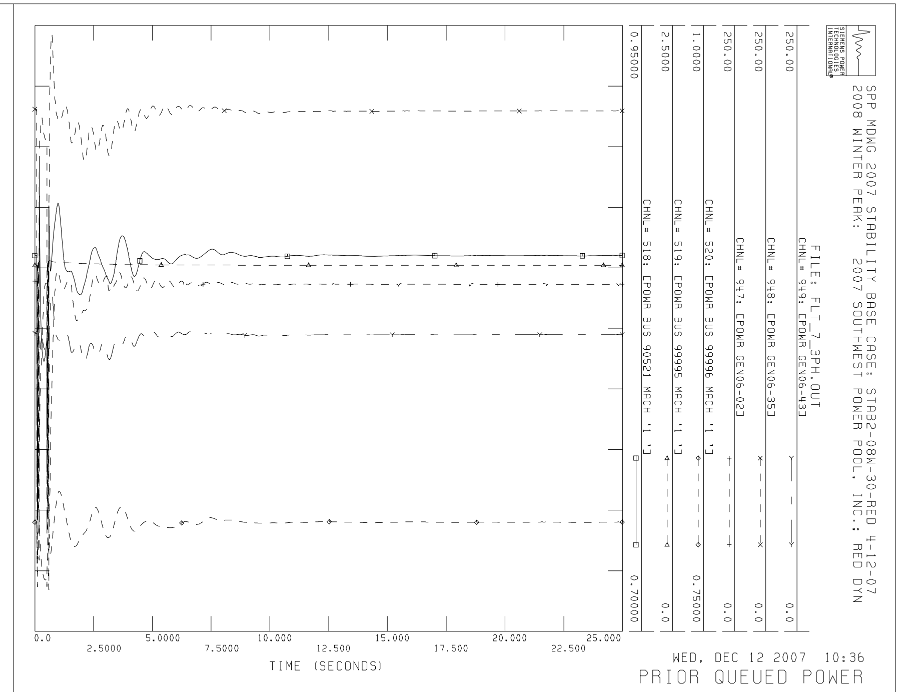
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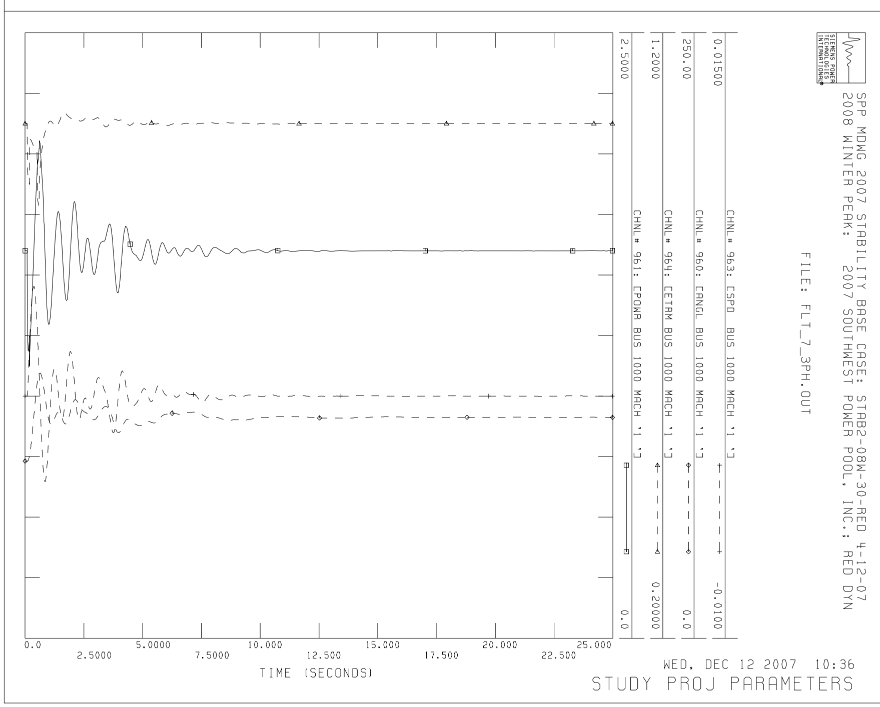
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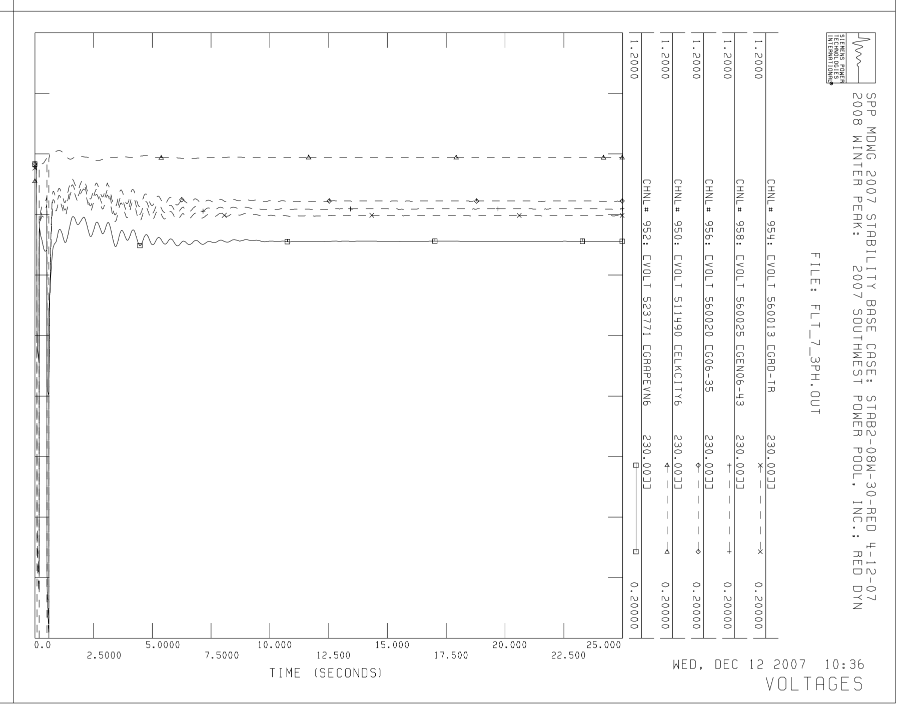
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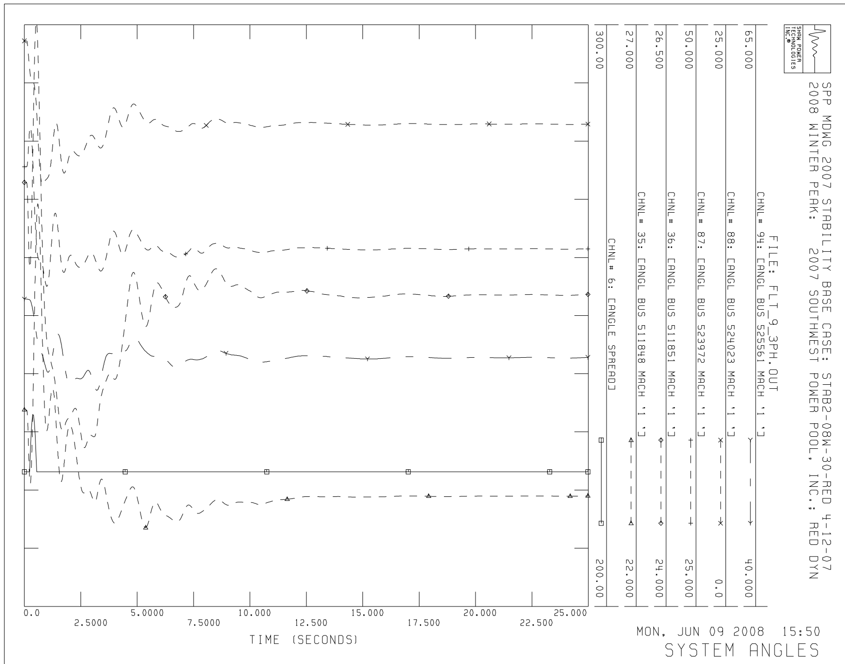
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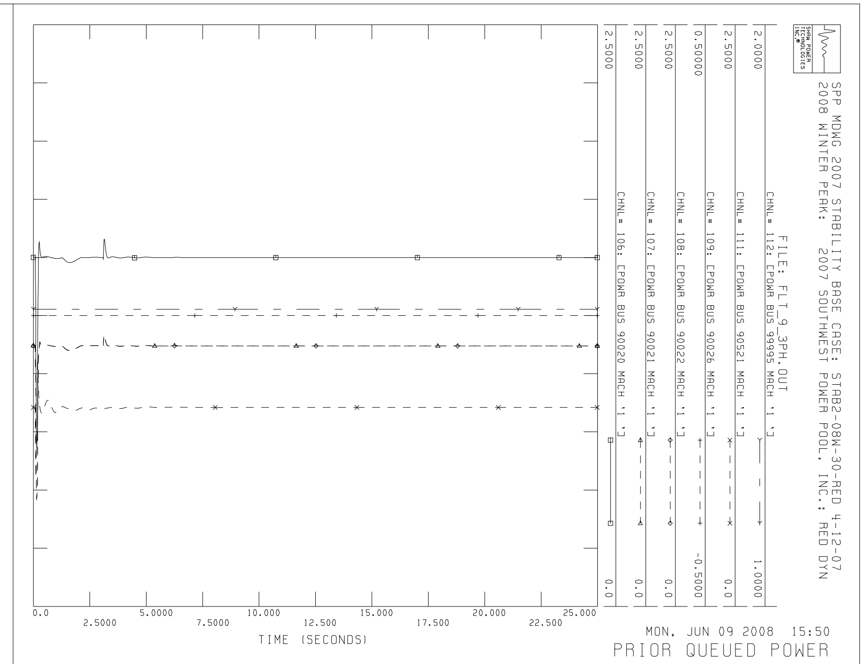
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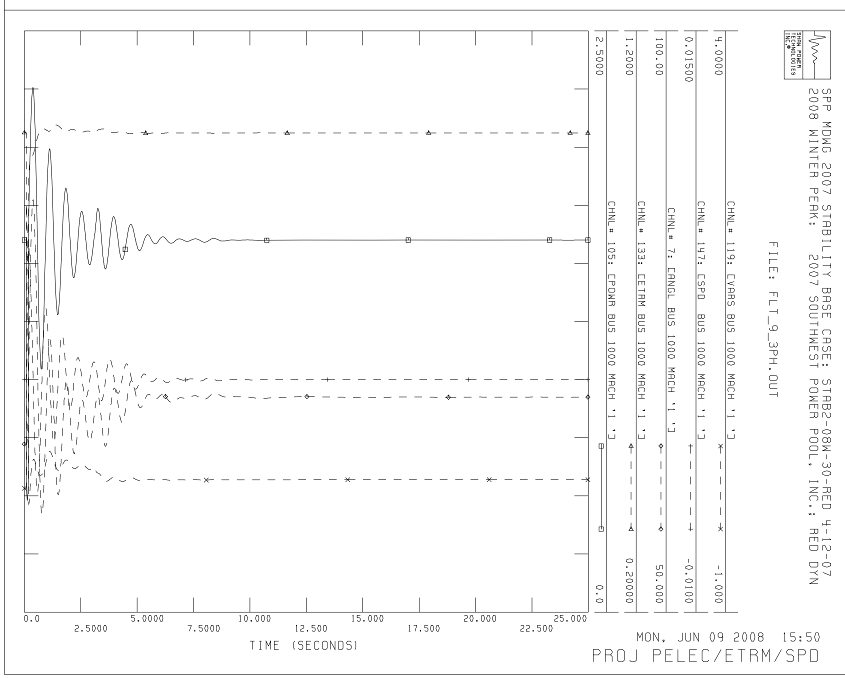
PRIOR QUEUED POWER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CHNL# 147: CSPD BUS 1000 MACH '1 ' 0.01500 -0.0100
CHNL# 7: CANGL BUS 1000 MACH '1 ' 100.00 50.000
CHNL# 133: CETRM BUS 1000 MACH '1 ' 1.2000 0.20000
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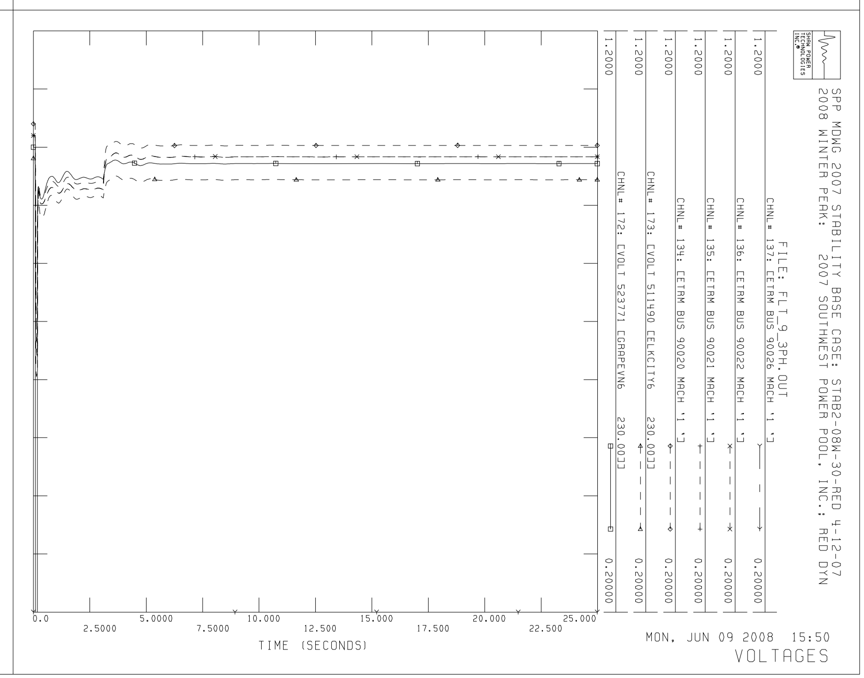
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CHNL# 136: CETRM BUS 90022 MACH '1 ' 1.2000 0.20000
CHNL# 135: CETRM BUS 90021 MACH '1 ' 1.2000 0.20000
CHNL# 134: CETRM BUS 90020 MACH '1 ' 1.2000 0.20000
CHNL# 173: CVOLT 511490 CELKCITY6 230.00 1.2000 0.20000
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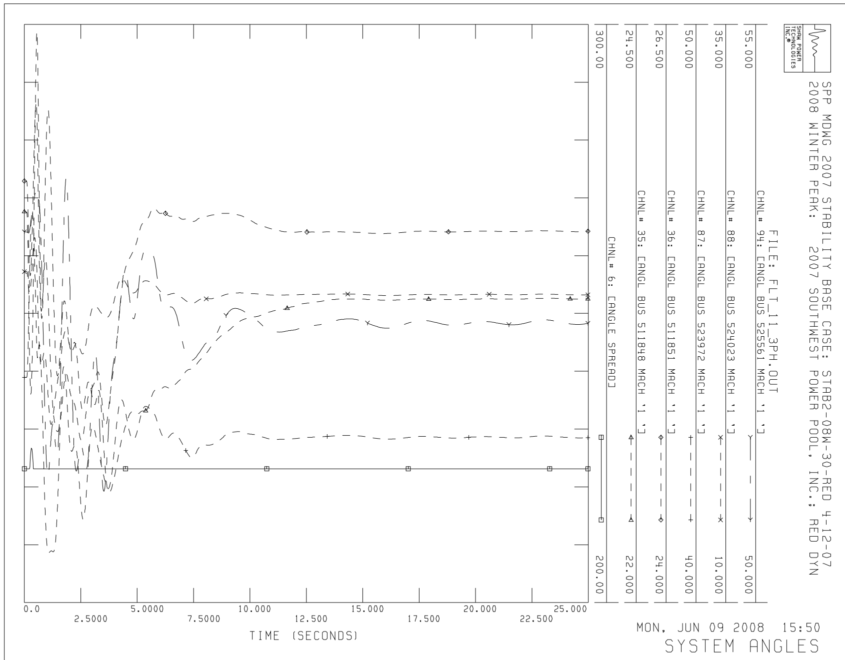
TIME (SECONDS)
MON, JUN 09 2008 15:50
VOLTAGES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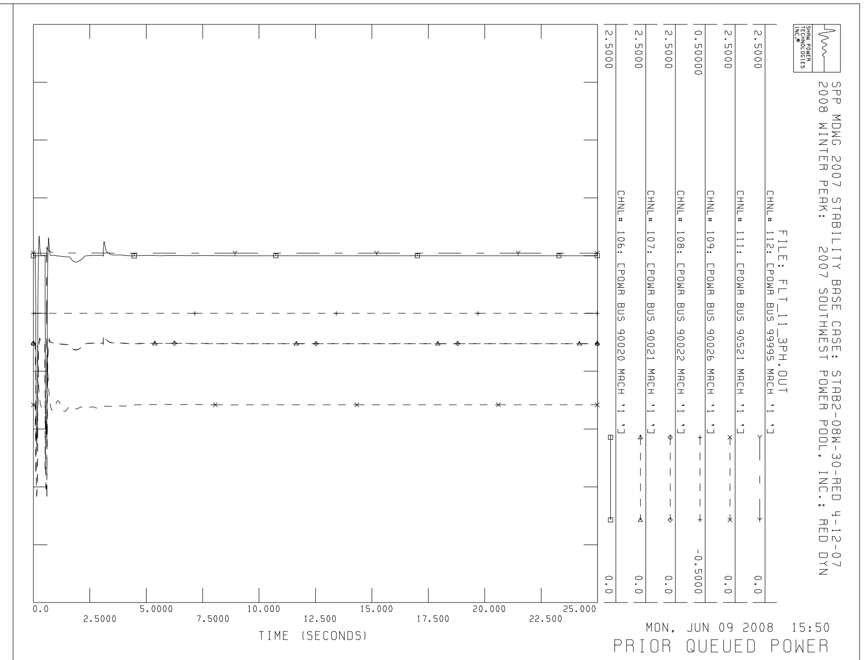
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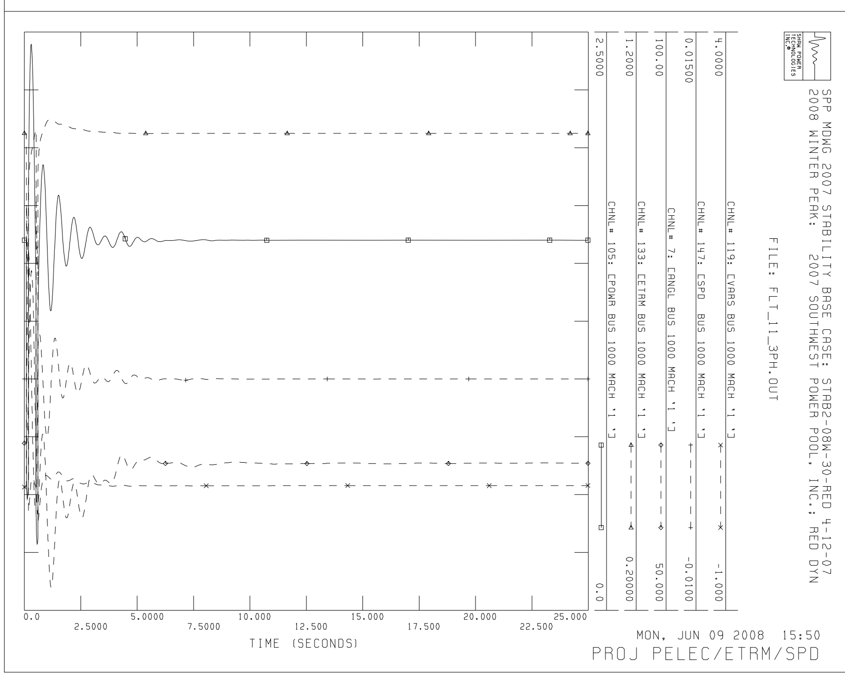
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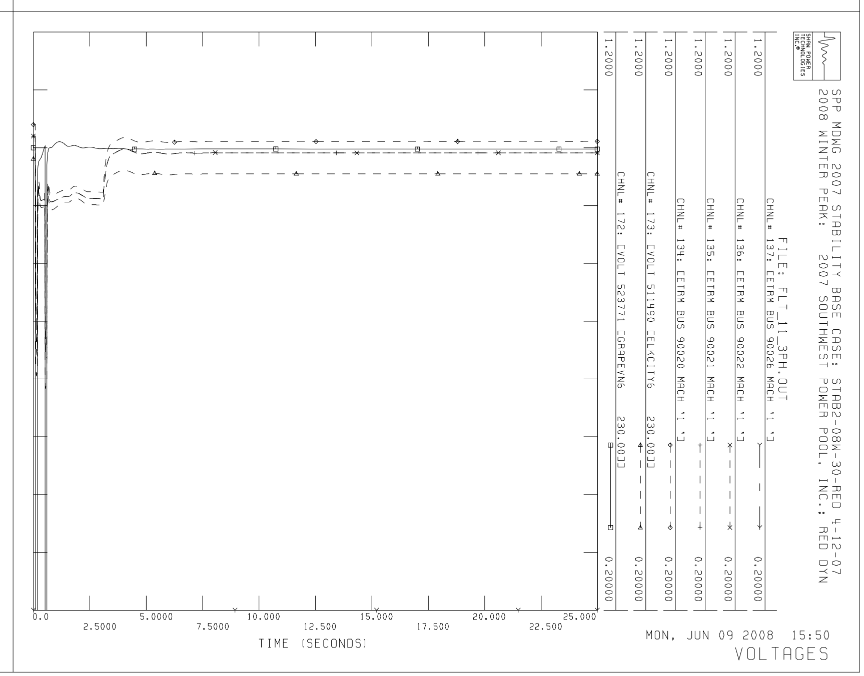
PROJ PELEC/ETRM/SPD

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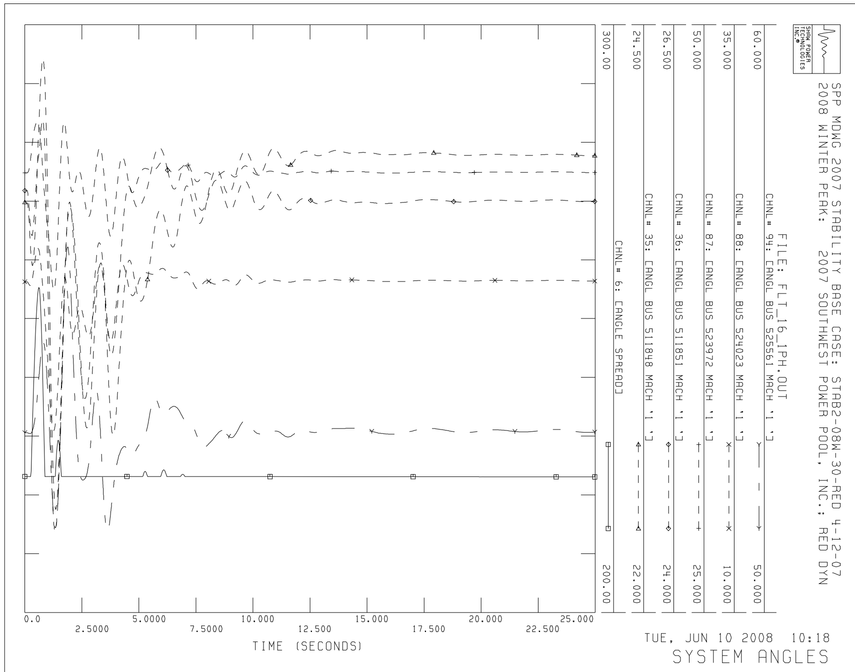
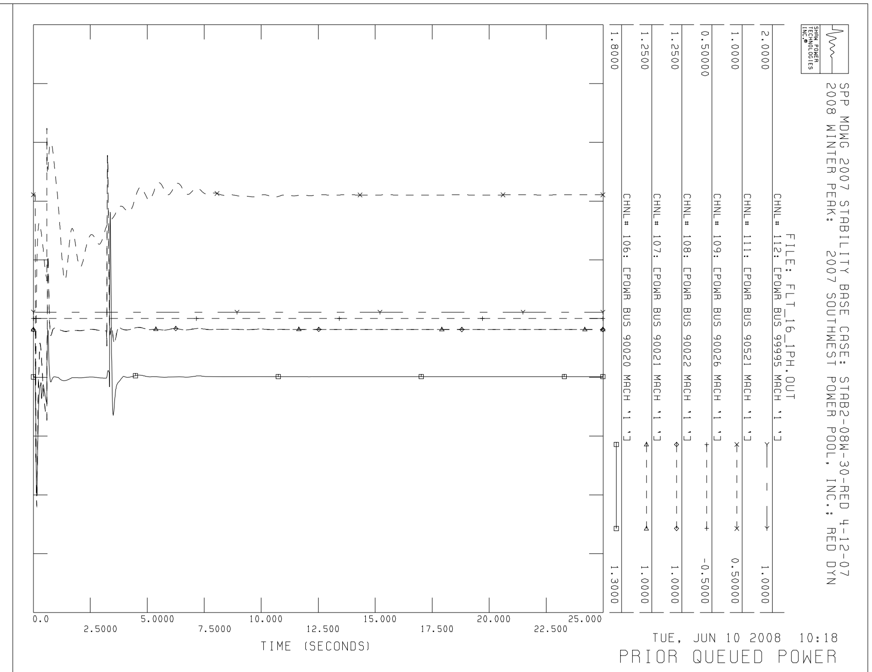
VOLTAGES


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_16_1PH.OUT
CHNL# 94: [ANGL BUS 525561 MACH '1 '] 60.000 50.000
CHNL# 88: [ANGL BUS 524023 MACH '1 '] 35.000 10.000
CHNL# 87: [ANGL BUS 523972 MACH '1 '] 50.000 25.000
CHNL# 36: [ANGL BUS 511851 MACH '1 '] 26.500 24.000
CHNL# 35: [ANGL BUS 511848 MACH '1 '] 24.500 22.000
CHNL# 6: [ANGLE SPREAD] 300.00 200.00
0.0 2.5000 5.0000 7.5000 10.000 12.500 15.000 17.500 20.000 22.500 25.000
TIME (SECONDS)
TUE, JUN 10 2008 10:18
SYSTEM ANGLES


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
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CHNL# 111: [POWR BUS 90521 MACH '1 '] 1.0000 0.50000
CHNL# 109: [POWR BUS 90026 MACH '1 '] 0.50000 -0.5000
CHNL# 108: [POWR BUS 90022 MACH '1 '] 1.2500 1.0000
CHNL# 107: [POWR BUS 90021 MACH '1 '] 1.2500 1.0000
CHNL# 106: [POWR BUS 90020 MACH '1 '] 1.8000 1.3000
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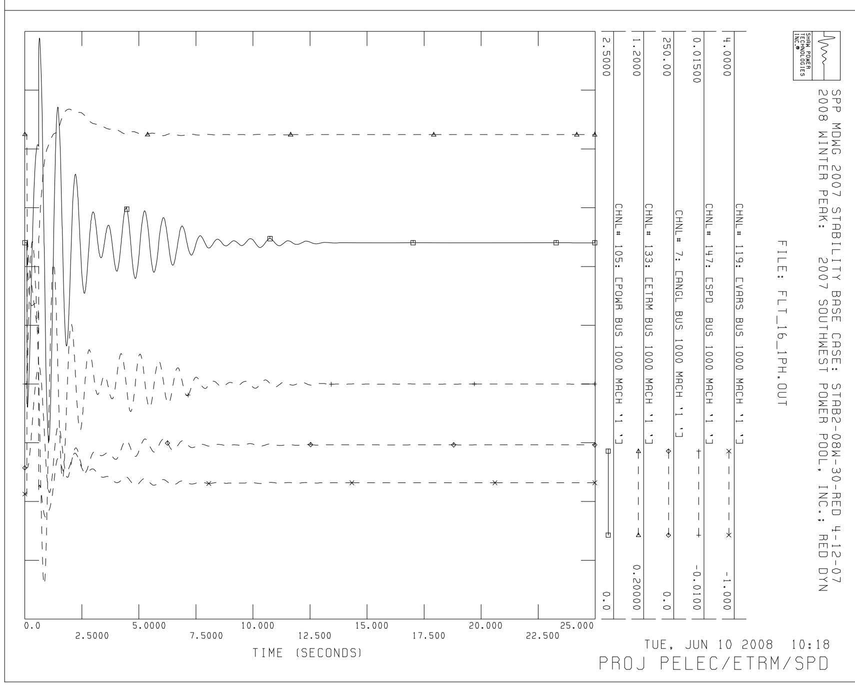
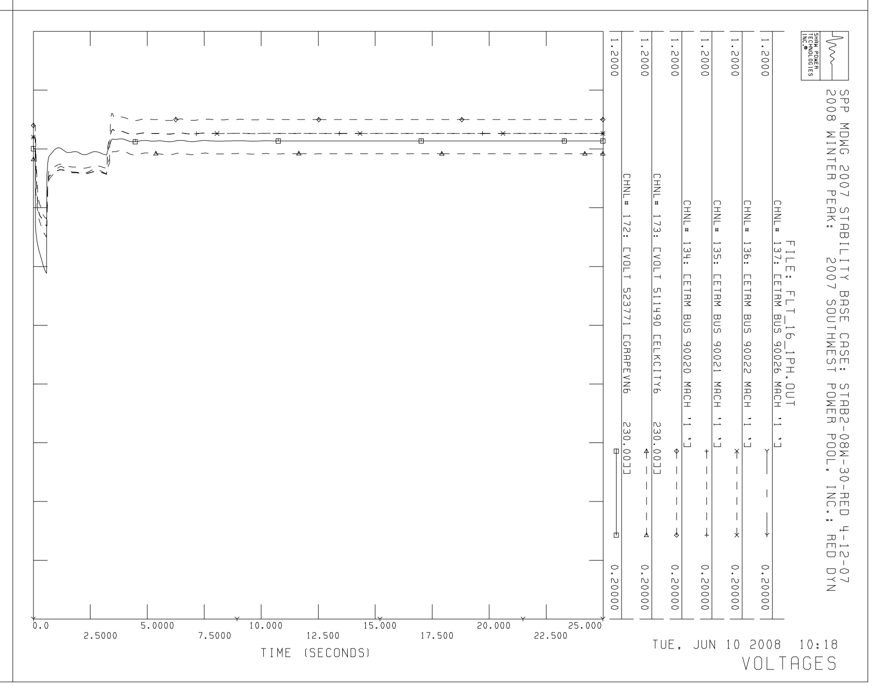
TIME (SECONDS)
TUE, JUN 10 2008 10:18
PRIOR QUEUED POWER

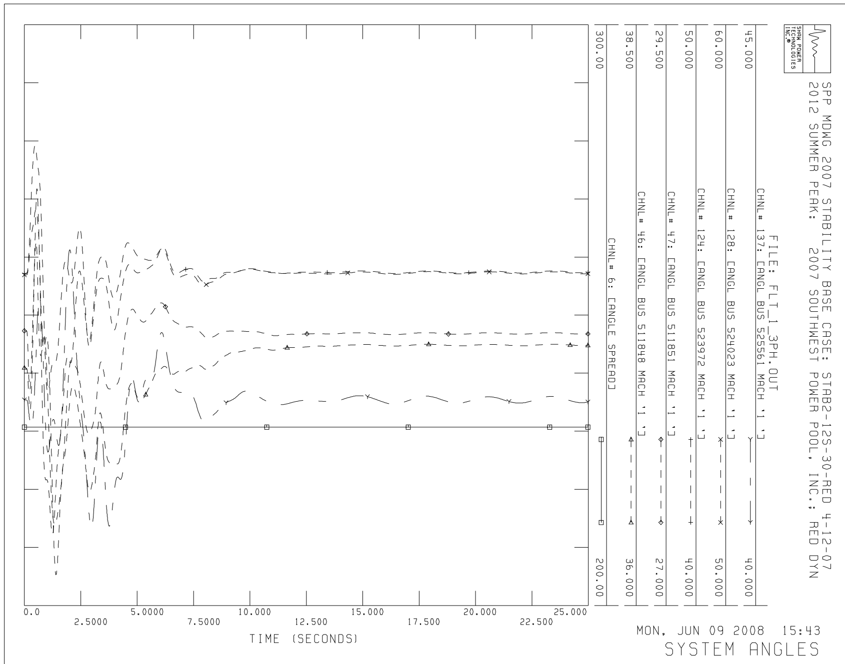

SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_16_1PH.OUT
CHNL# 119: [VARS BUS 1000 MACH '1 '] 4.0000 -1.000
CHNL# 147: [SPD BUS 1000 MACH '1 '] 0.01500 -0.0100
CHNL# 7: [ANGL BUS 1000 MACH '1 '] 250.00 0.0
CHNL# 133: [ETRM BUS 1000 MACH '1 '] 1.2000 0.20000
CHNL# 105: [POWR BUS 1000 MACH '1 '] 2.5000 0.0
0.0 2.5000 5.0000 7.5000 10.000 12.500 15.000 17.500 20.000 22.500 25.000
TIME (SECONDS)
TUE, JUN 10 2008 10:18
PROJ PELEC/ETRM/SPD


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_16_1PH.OUT
CHNL# 137: [ETRM BUS 90026 MACH '1 '] 1.2000 0.20000
CHNL# 136: [ETRM BUS 90022 MACH '1 '] 1.2000 0.20000
CHNL# 135: [ETRM BUS 90021 MACH '1 '] 1.2000 0.20000
CHNL# 134: [ETRM BUS 90020 MACH '1 '] 1.2000 0.20000
CHNL# 173: [VOLT 511490 [ELKCITY6 230.00]] 1.2000 0.20000
CHNL# 172: [VOLT 523771 [GRAPEVN6 230.00]] 1.2000 0.20000
0.0 2.5000 5.0000 7.5000 10.000 12.500 15.000 17.500 20.000 22.500 25.000
TIME (SECONDS)
TUE, JUN 10 2008 10:18
VOLTAGES

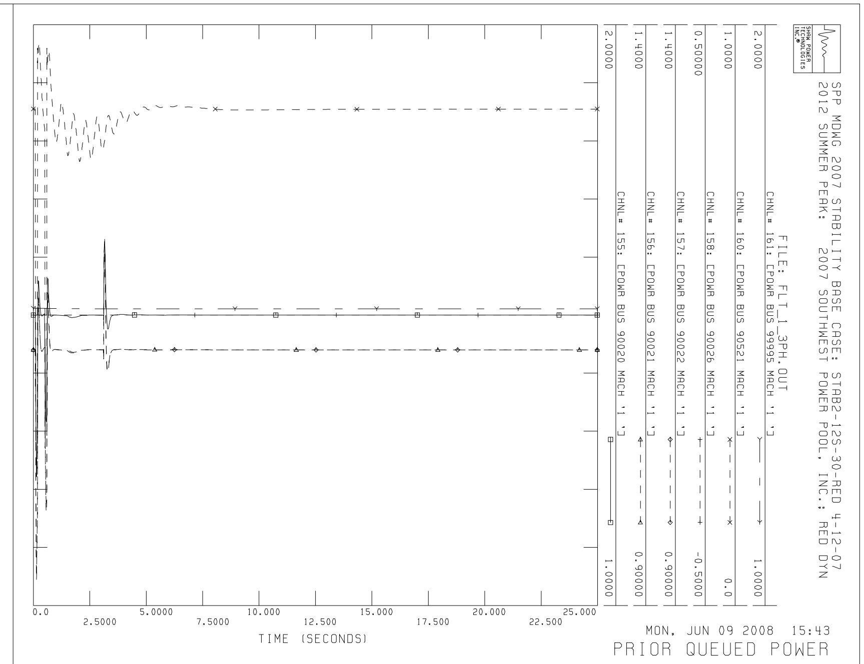
APPENDIX B.

SELECTED STABILITY PLOTS – 2012 Summer Peak

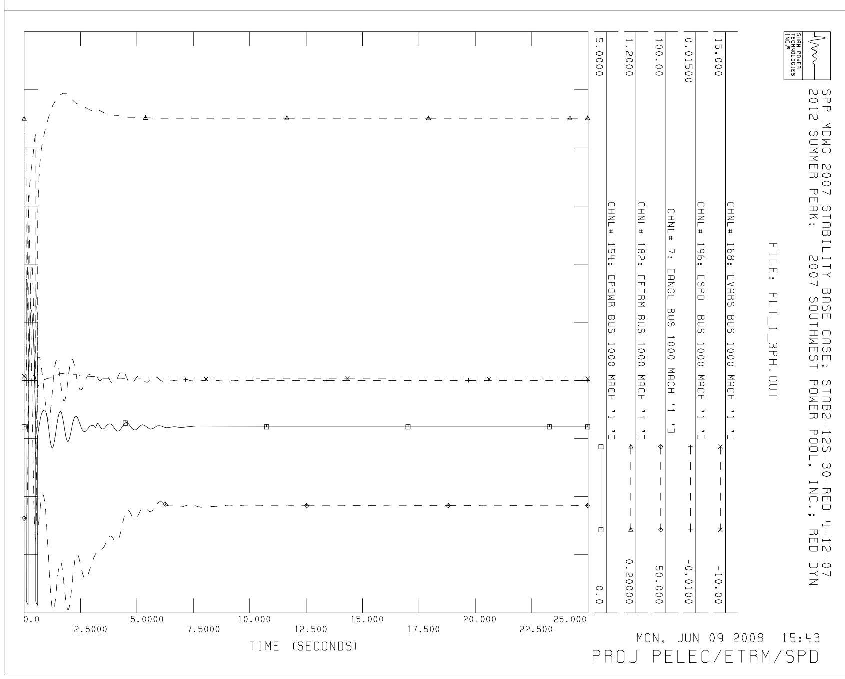
All plots available on request.



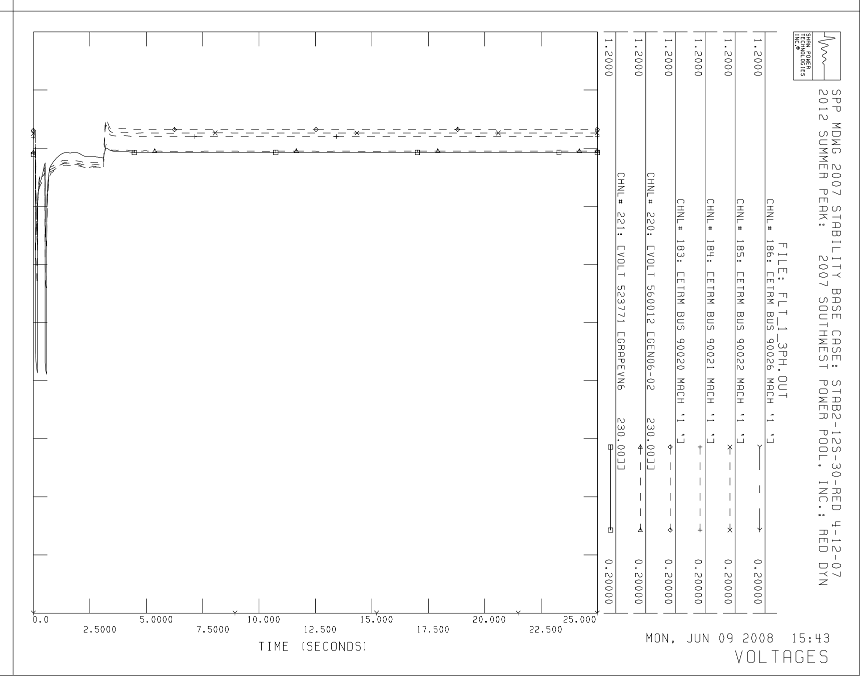
SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_1_3PH.OUT
CHNL# 137: [ANGL BUS 525561 MACH '1 ']
CHNL# 128: [ANGL BUS 524023 MACH '1 ']
CHNL# 124: [ANGL BUS 523972 MACH '1 ']
CHNL# 47: [ANGL BUS 511851 MACH '1 ']
CHNL# 46: [ANGL BUS 511848 MACH '1 ']
CHNL# 6: [ANGLE SPREAD]
TIME (SECONDS)
MON, JUN 09 2008 15:43
SYSTEM ANGLES



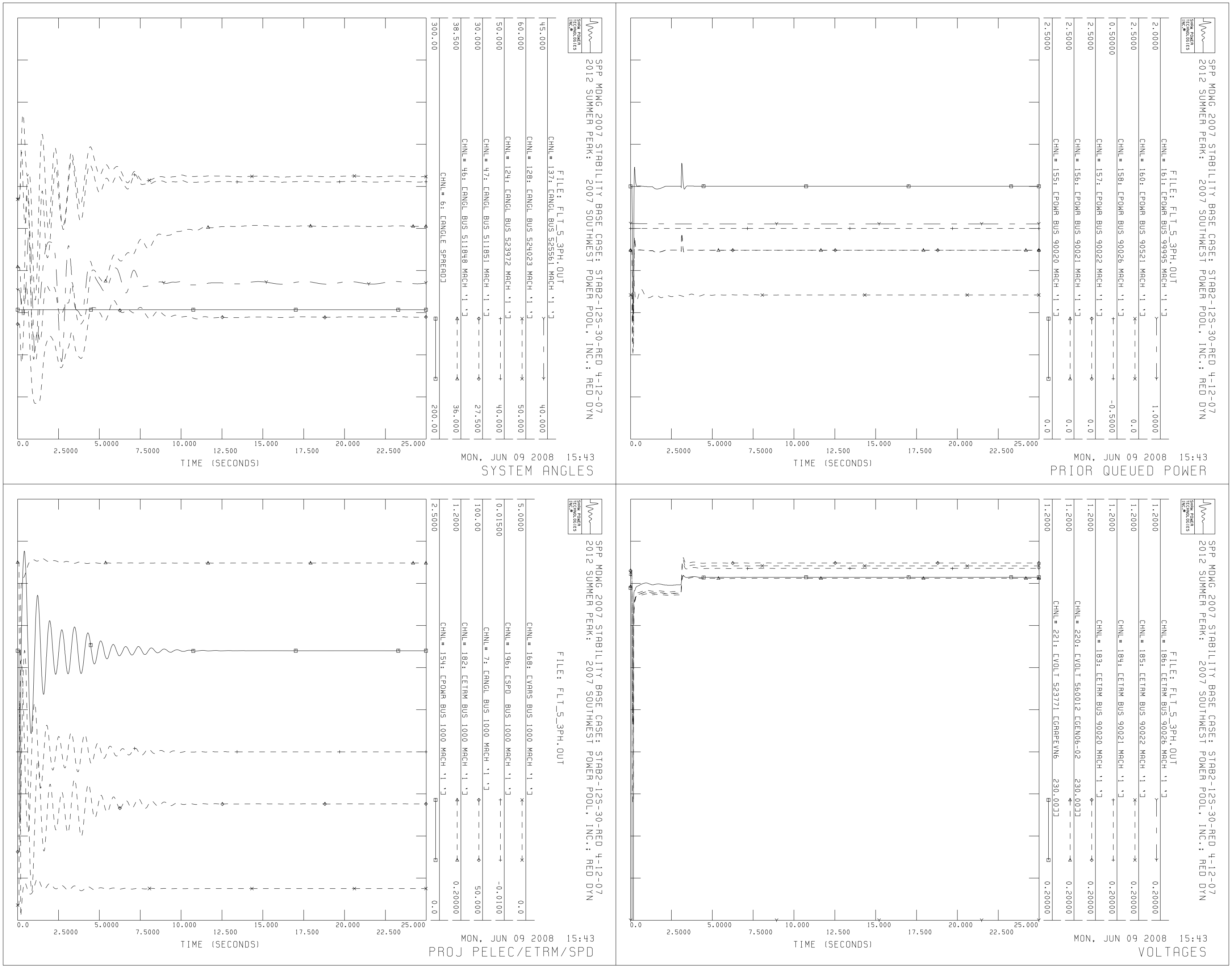
SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_1_3PH.OUT
CHNL# 161: [POWR BUS 99995 MACH '1 ']
CHNL# 160: [POWR BUS 90521 MACH '1 ']
CHNL# 158: [POWR BUS 90026 MACH '1 ']
CHNL# 157: [POWR BUS 90022 MACH '1 ']
CHNL# 156: [POWR BUS 90021 MACH '1 ']
CHNL# 155: [POWR BUS 90020 MACH '1 ']
TIME (SECONDS)
MON, JUN 09 2008 15:43
PRIOR QUEUED POWER



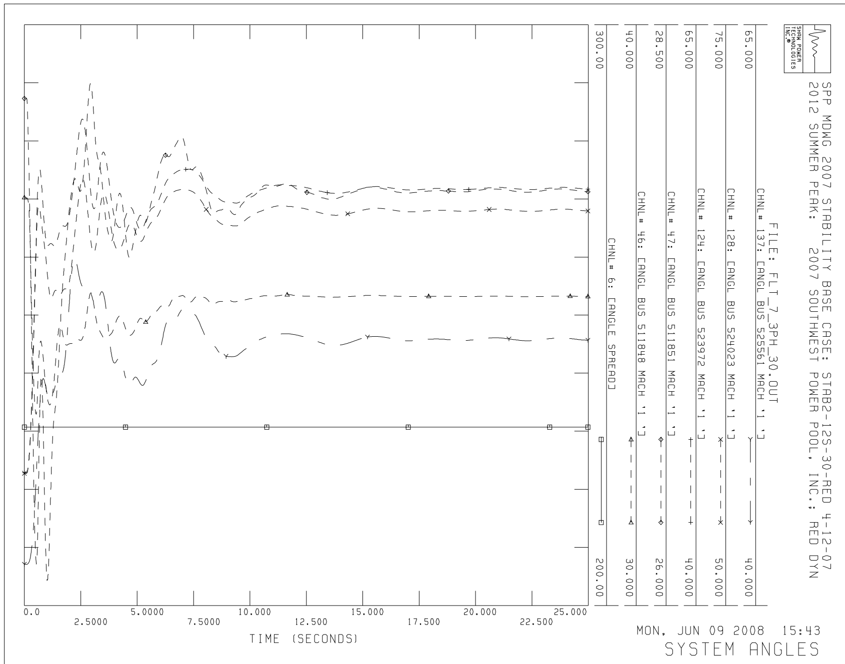
SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_1_3PH.OUT
CHNL# 168: [VARS BUS 1000 MACH '1 ']
CHNL# 196: [SPD BUS 1000 MACH '1 ']
CHNL# 7: [ANGL BUS 1000 MACH '1 ']
CHNL# 182: [ETRM BUS 1000 MACH '1 ']
CHNL# 154: [POWR BUS 1000 MACH '1 ']
TIME (SECONDS)
MON, JUN 09 2008 15:43
PROJ PELEC/ETRM/SPD

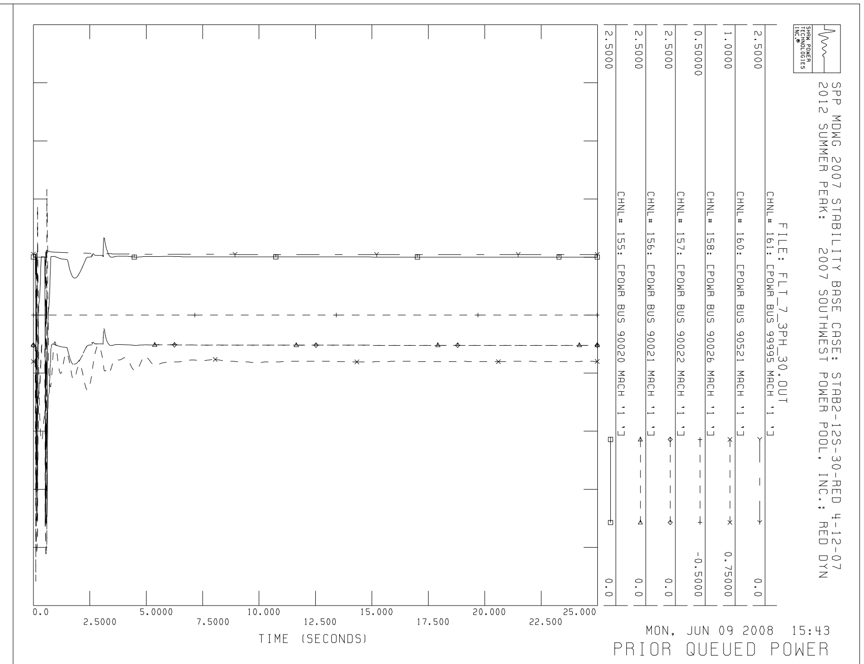


SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_1_3PH.OUT
CHNL# 186: [ETRM BUS 90026 MACH '1 ']
CHNL# 185: [ETRM BUS 90022 MACH '1 ']
CHNL# 184: [ETRM BUS 90021 MACH '1 ']
CHNL# 183: [ETRM BUS 90020 MACH '1 ']
CHNL# 220: [VOLT 56012 [GEN06-02 230.00]]
CHNL# 221: [VOLT 523771 [GRAPEVN6 230.00]]
TIME (SECONDS)
MON, JUN 09 2008 15:43
VOLTAGES



SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_5_3PH.OUT
TIME (SECONDS)
MON, JUN 09 2008 15:43
SYSTEM ANGLES
PRIOR QUEUED POWER
PROJ PELEC/ETRM/SPD
VOLTAGES


SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_7_3PH_30.OUT
CHNL# 137: CANGL BUS 525561 MACH '1 ' 65.000 40.000
CHNL# 128: CANGL BUS 524023 MACH '1 ' 75.000 50.000
CHNL# 124: CANGL BUS 523972 MACH '1 ' 65.000 40.000
CHNL# 47: CANGL BUS 511851 MACH '1 ' 28.500 26.000
CHNL# 46: CANGL BUS 511848 MACH '1 ' 40.000 30.000
CHNL# 6: CANGLE SPREAD 300.00 200.00
TIME (SECONDS)
MON, JUN 09 2008 15:43
SYSTEM ANGLES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2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_7_3PH_30.OUT
CHNL# 161: CPOWR BUS 99995 MACH '1 ' 2.5000 0.0
CHNL# 160: CPOWR BUS 90521 MACH '1 ' 1.0000 0.75000
CHNL# 158: CPOWR BUS 90026 MACH '1 ' 0.50000 -0.5000
CHNL# 157: CPOWR BUS 90022 MACH '1 ' 2.5000 0.0
CHNL# 156: CPOWR BUS 90021 MACH '1 ' 2.5000 0.0
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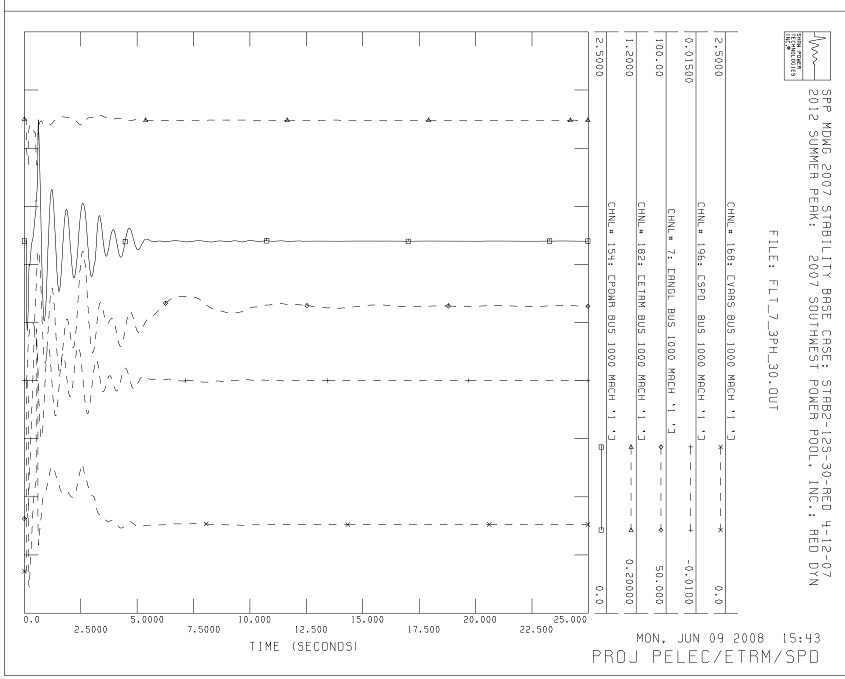
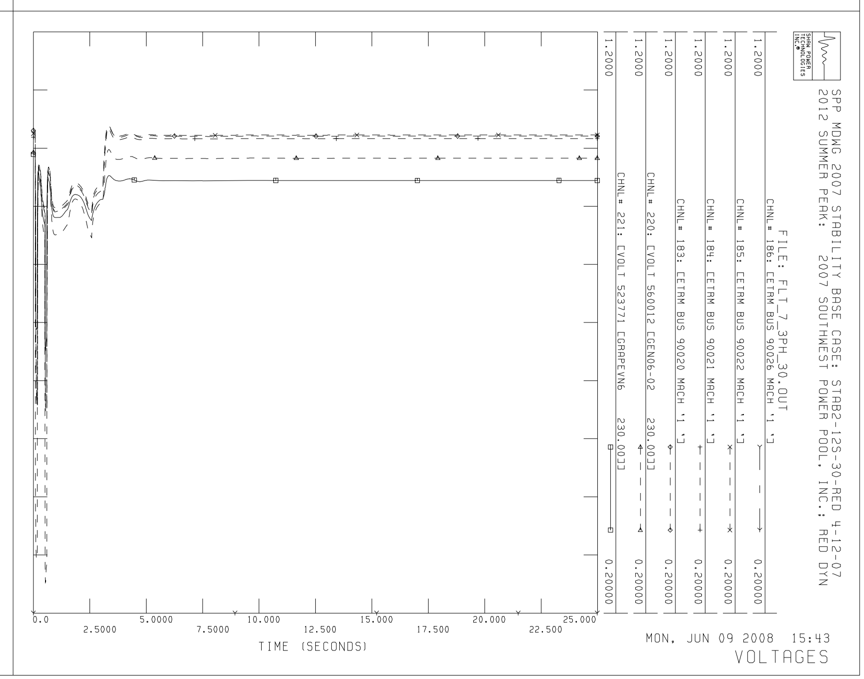
TIME (SECONDS)
MON, JUN 09 2008 15:43
PRIOR QUEUED POWER


SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_7_3PH_30.OUT
CHNL# 168: CVARS BUS 1000 MACH '1 ' 2.5000 0.0
CHNL# 196: CSPD BUS 1000 MACH '1 ' 0.01500 -0.0100
CHNL# 7: CANGL BUS 1000 MACH '1 ' 100.00 50.000
CHNL# 182: CETRM BUS 1000 MACH '1 ' 1.2000 0.20000
CHNL# 154: CPOWR BUS 1000 MACH '1 ' 2.5000 0.0
TIME (SECONDS)
MON, JUN 09 2008 15:43
PROJ PELEC/ETRM/SPD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CHNL# 184: CETRM BUS 90021 MACH '1 ' 1.2000 0.20000
CHNL# 183: CETRM BUS 90020 MACH '1 ' 1.2000 0.20000
CHNL# 220: CVOLT 56012 [GEN06-02 230.00] 1.2000 0.20000
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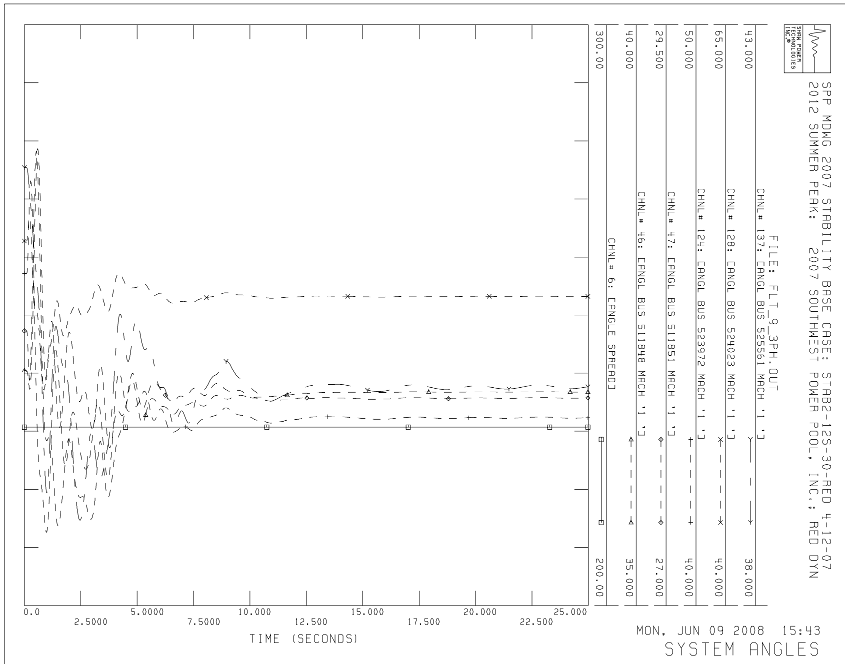
TIME (SECONDS)
MON, JUN 09 2008 15:43
VOLTAGES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2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_9_3PH.OUT
CHNL# 137: CANGL BUS 525561 MACH '1 '
CHNL# 128: CANGL BUS 524023 MACH '1 '
CHNL# 124: CANGL BUS 523972 MACH '1 '
CHNL# 47: CANGL BUS 511851 MACH '1 '
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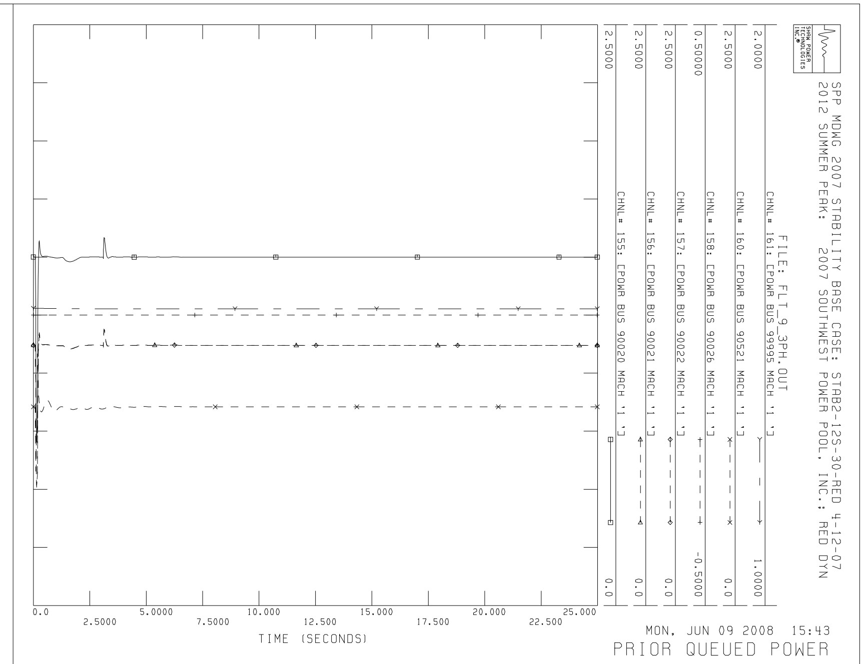
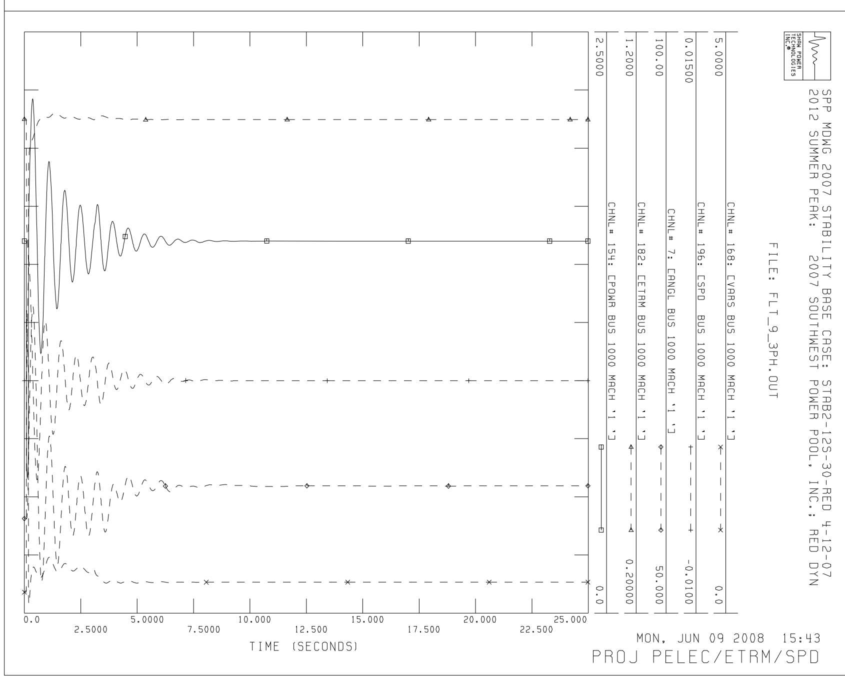
CHNL# 6: CANGLE SPREAD
TIME (SECONDS)
MON, JUN 09 2008 15:43
SYSTEM ANGLES


SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_9_3PH.OUT
CHNL# 161: CPOWR BUS 99995 MACH '1 '
CHNL# 160: CPOWR BUS 90521 MACH '1 '
CHNL# 158: CPOWR BUS 90026 MACH '1 '
CHNL# 157: CPOWR BUS 90022 MACH '1 '
CHNL# 156: CPOWR BUS 90021 MACH '1 '
CHNL# 155: CPOWR BUS 90020 MACH '1 '
TIME (SECONDS)
MON, JUN 09 2008 15:43
PRIOR QUEUED POWER


SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_9_3PH.OUT
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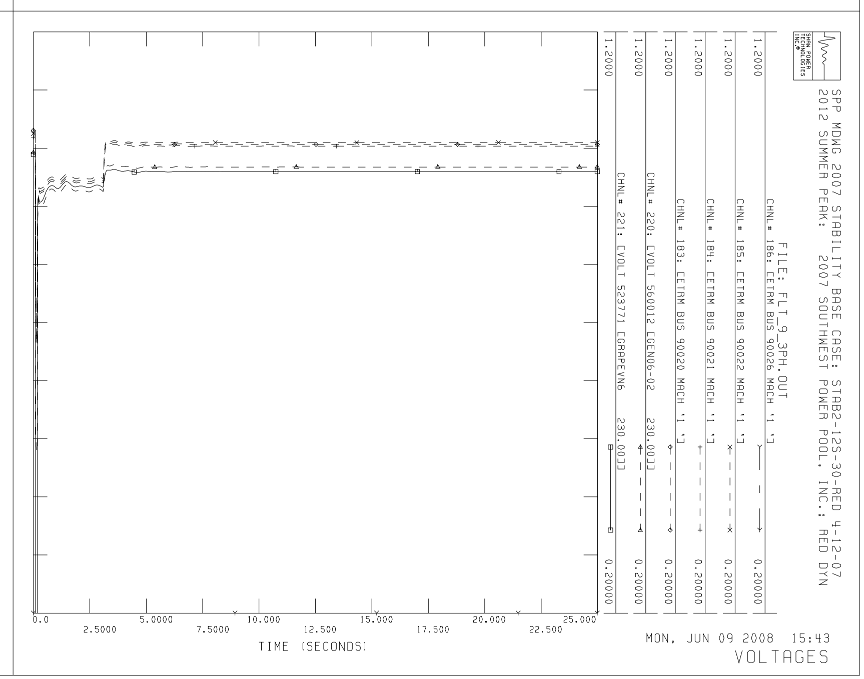
CHNL# 196: CSPD BUS 1000 MACH '1 '
CHNL# 7: CANGL BUS 1000 MACH '1 '
CHNL# 182: CETRM BUS 1000 MACH '1 '
CHNL# 154: CPOWR BUS 1000 MACH '1 '
TIME (SECONDS)
MON, JUN 09 2008 15:43
PROJ PELEC/ETRM/SPD


SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
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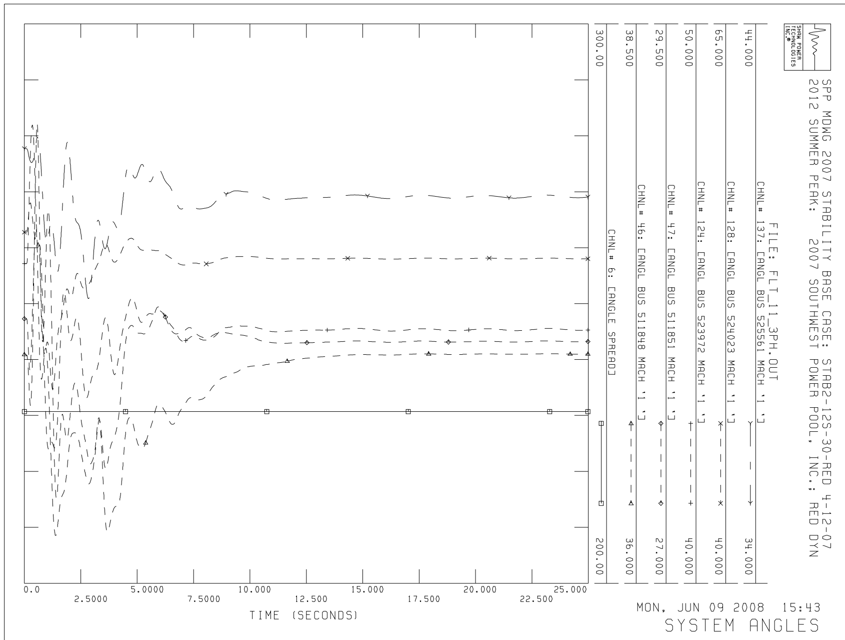
CHNL# 185: CETRM BUS 90022 MACH '1 '
CHNL# 184: CETRM BUS 90021 MACH '1 '
CHNL# 183: CETRM BUS 90020 MACH '1 '
CHNL# 220: CVOLT 56012 CGEN06-02 230.00]
CHNL# 221: CVOLT 523771 CGRAPEVN6 230.00]
TIME (SECONDS)
MON, JUN 09 2008 15:43
VOLTAGES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2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_11_3PH.OUT
CHNL# 137: [ANGL BUS 525561 MACH '1 '] 44.000 34.000
CHNL# 128: [ANGL BUS 524023 MACH '1 '] 65.000 40.000
CHNL# 124: [ANGL BUS 523972 MACH '1 '] 50.000 40.000
CHNL# 47: [ANGL BUS 511851 MACH '1 '] 29.500 27.000
CHNL# 46: [ANGL BUS 511848 MACH '1 '] 38.500 36.000
CHNL# 6: [ANGLE SPREAD] 300.00 200.00
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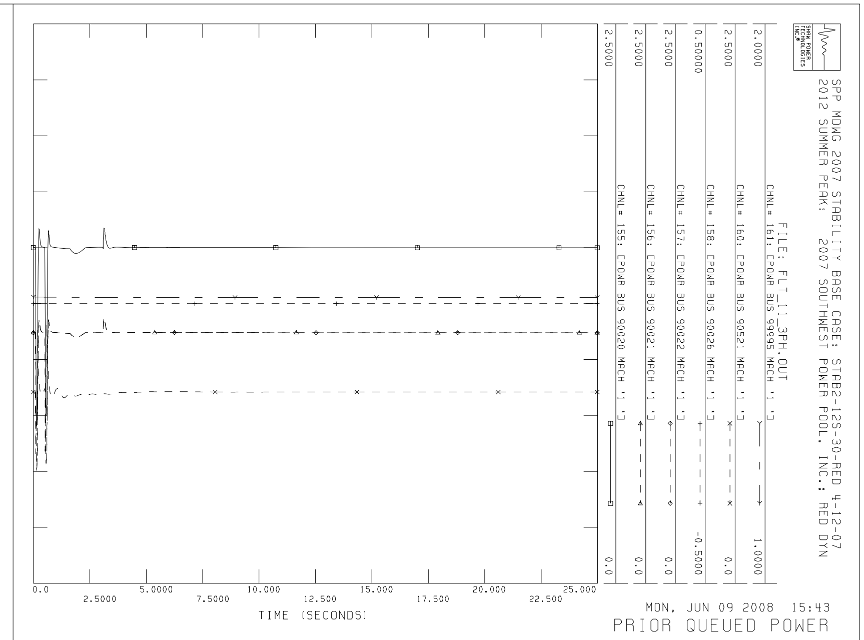
TIME (SECONDS)
MON, JUN 09 2008 15:43
SYSTEM ANGLES


SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_11_3PH.OUT
CHNL# 161: [POWR BUS 99995 MACH '1 '] 2.0000 1.0000
CHNL# 160: [POWR BUS 90521 MACH '1 '] 2.5000 0.0
CHNL# 158: [POWR BUS 90026 MACH '1 '] 0.50000 -0.5000
CHNL# 157: [POWR BUS 90022 MACH '1 '] 2.5000 0.0
CHNL# 156: [POWR BUS 90021 MACH '1 '] 2.5000 0.0
CHNL# 155: [POWR BUS 90020 MACH '1 '] 2.5000 0.0
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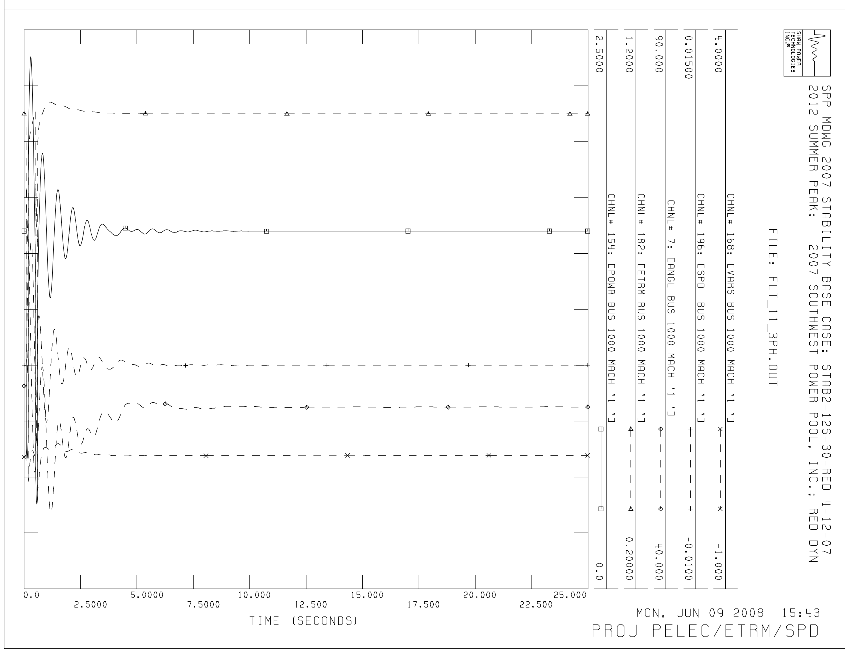
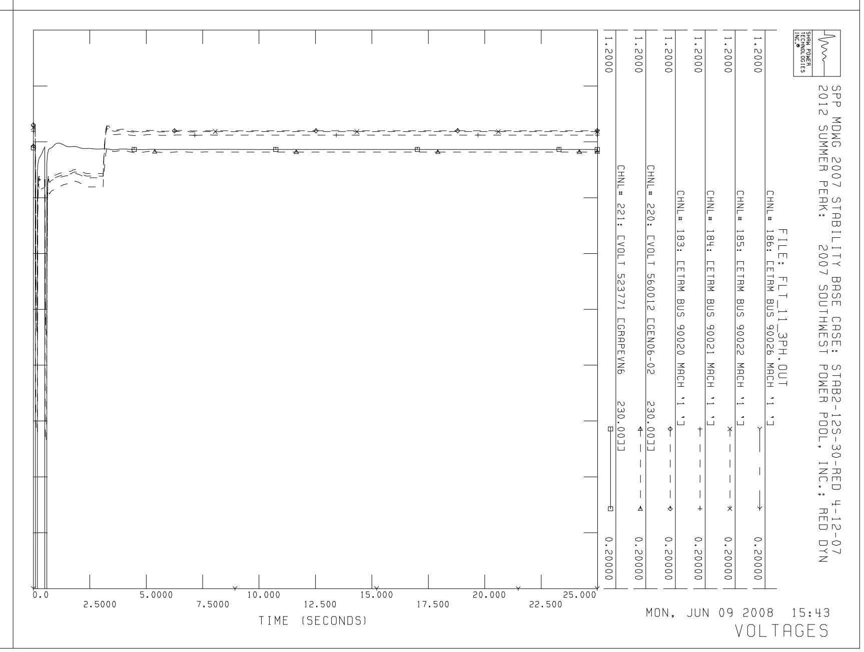
TIME (SECONDS)
MON, JUN 09 2008 15:43
PRIOR QUEUED POWER


SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_11_3PH.OUT
CHNL# 168: [VARS BUS 1000 MACH '1 '] 4.0000 -1.000
CHNL# 196: [SPD BUS 1000 MACH '1 '] 0.01500 -0.0100
CHNL# 7: [ANGL BUS 1000 MACH '1 '] 90.000 40.000
CHNL# 182: [ETRM BUS 1000 MACH '1 '] 1.2000 0.20000
CHNL# 154: [POWR BUS 1000 MACH '1 '] 2.5000 0.0
0.0 2.5000 5.0000 7.5000 10.000 12.500 15.000 17.500 20.000 22.500 25.000
TIME (SECONDS)
MON, JUN 09 2008 15:43
PROJ PELEC/ETRM/SPD


SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_11_3PH.OUT
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CHNL# 185: [ETRM BUS 90022 MACH '1 '] 1.2000 0.20000
CHNL# 184: [ETRM BUS 90021 MACH '1 '] 1.2000 0.20000
CHNL# 183: [ETRM BUS 90020 MACH '1 '] 1.2000 0.20000
CHNL# 220: [VOLT 56012 [GEN06-02 230.00]] 1.2000 0.20000
CHNL# 221: [VOLT 523771 [GRAPEVN6 230.00]] 1.2000 0.20000
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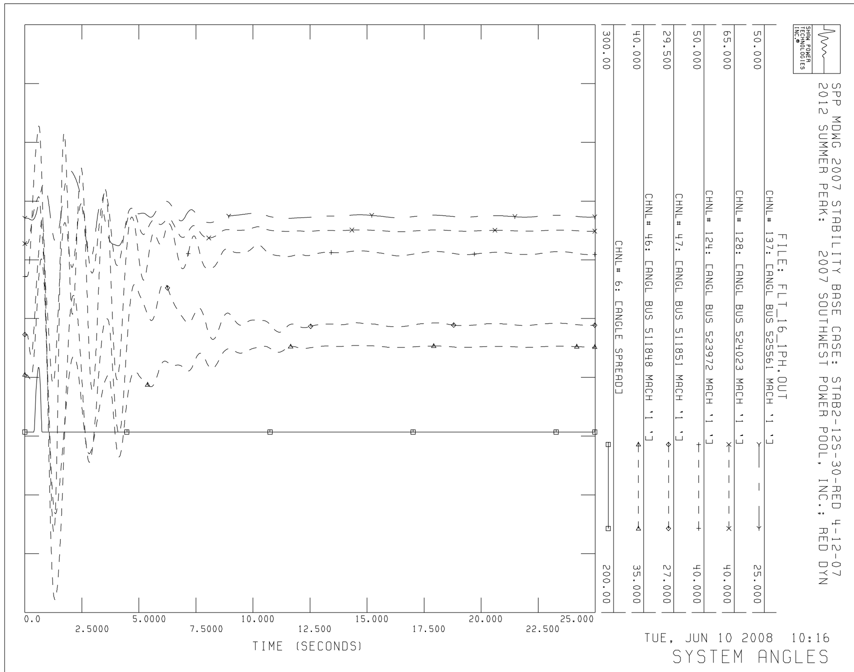
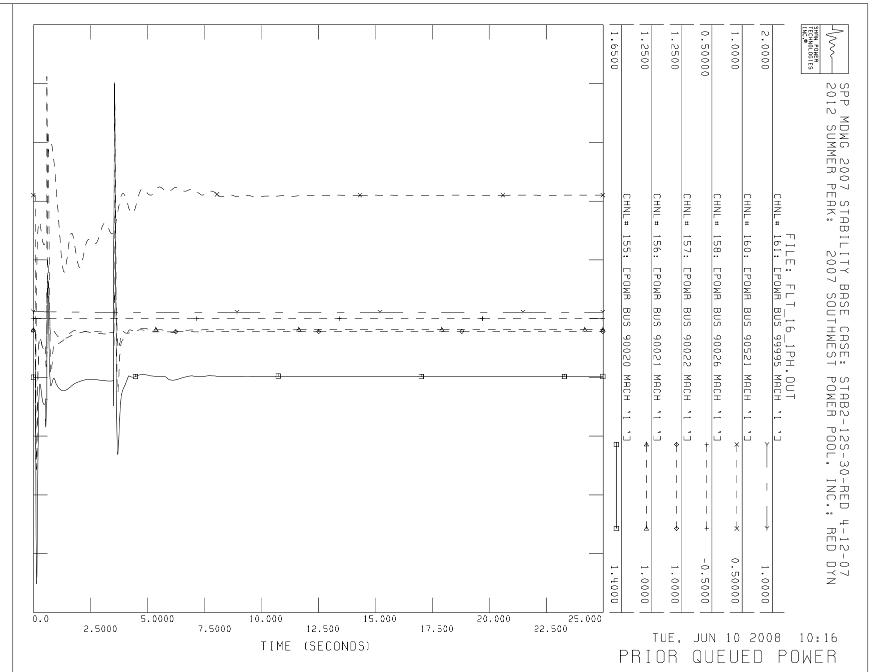
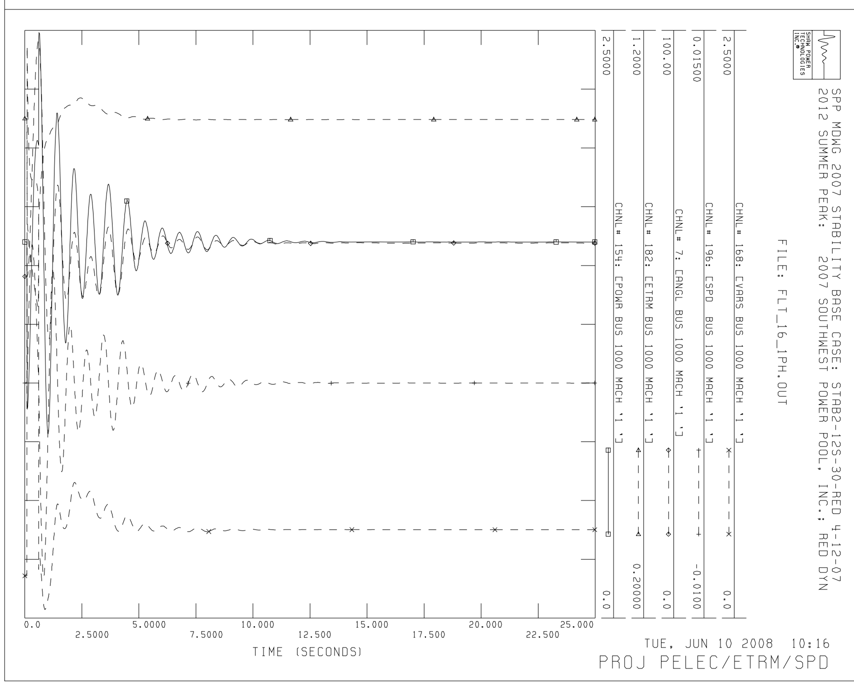
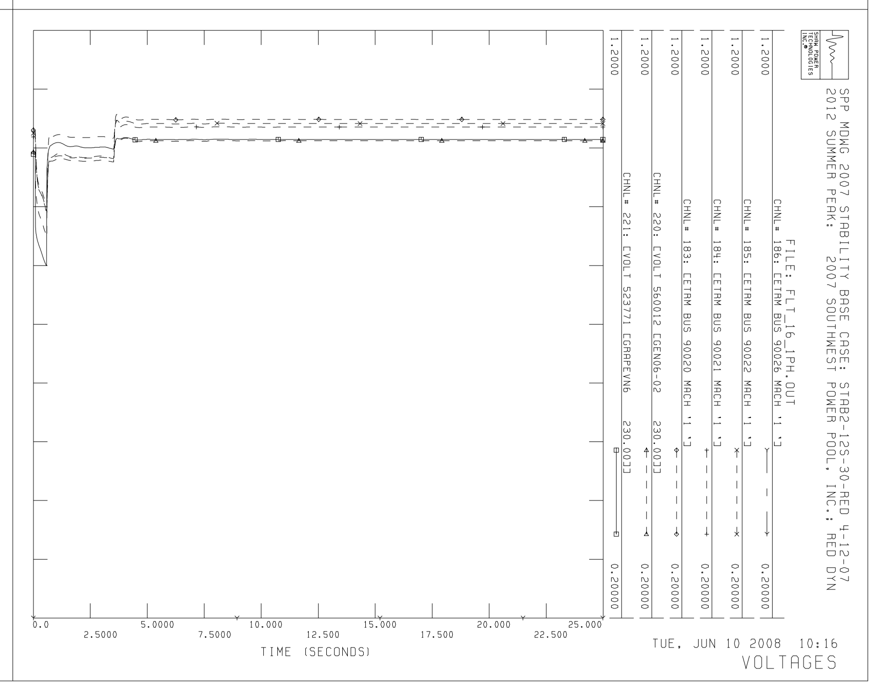
TIME (SECONDS)
MON, JUN 09 2008 15:43
VOLTAGES


SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_16_1PH.OUT
CHNL# 137: [ANGL BUS 525561 MACH '1 ']
CHNL# 128: [ANGL BUS 524023 MACH '1 ']
CHNL# 124: [ANGL BUS 523972 MACH '1 ']
CHNL# 47: [ANGL BUS 511851 MACH '1 ']
CHNL# 46: [ANGL BUS 511848 MACH '1 ']
CHNL# 6: [ANGLE SPREAD]
TIME (SECONDS)
TUE, JUN 10 2008 10:16
SYSTEM ANGLES


SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_16_1PH.OUT
CHNL# 161: [POWR BUS 99995 MACH '1 ']
CHNL# 160: [POWR BUS 90521 MACH '1 ']
CHNL# 158: [POWR BUS 90026 MACH '1 ']
CHNL# 157: [POWR BUS 90022 MACH '1 ']
CHNL# 156: [POWR BUS 90021 MACH '1 ']
CHNL# 155: [POWR BUS 90020 MACH '1 ']
TIME (SECONDS)
TUE, JUN 10 2008 10:16
PRIOR QUEUED POWER


SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_16_1PH.OUT
CHNL# 168: [VARS BUS 1000 MACH '1 ']
CHNL# 196: [SPD BUS 1000 MACH '1 ']
CHNL# 7: [ANGL BUS 1000 MACH '1 ']
CHNL# 182: [ETRM BUS 1000 MACH '1 ']
CHNL# 154: [POWR BUS 1000 MACH '1 ']
TIME (SECONDS)
TUE, JUN 10 2008 10:16
PROJ PELEC/ETRM/SPD


SPP MDWG 2007 STABILITY BASE CASE: STAB2-12S-30-RED 4-12-07
2012 SUMMER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT_16_1PH.OUT
CHNL# 186: [ETRM BUS 90026 MACH '1 ']
CHNL# 185: [ETRM BUS 90022 MACH '1 ']
CHNL# 184: [ETRM BUS 90021 MACH '1 ']
CHNL# 183: [ETRM BUS 90020 MACH '1 ']
CHNL# 220: [VOLT 56012 [GEN06-02 230.00]]
CHNL# 221: [VOLT 523771 [GRAPEVN6 230.00]]
TIME (SECONDS)
TUE, JUN 10 2008 10:16
VOLTAGES