Southwest Power Pool

Impact Study For Generation Interconnection Request GEN-2006-039

SPP Tariff Studies

(#GEN-2006-039)

August 2007

Executive Summary

<OMITTED TEXT> (Customer) has requested an Impact Study under the Southwest Power Pool Open Access Transmission Tariff (OATT) for interconnection of 400MW of wind generation within the control area of Southwestern Public Service (SPS) (d/b/a Xcel Energy) in Randall County, Texas. The wind powered generation facility was studied with one hundred sixty (160) individual Clipper 2.5MW wind turbines. The requested in-service date for the 400MW facility is October 1, 2008. This Impact study addresses the dynamic stability effects of interconnecting the plant to the rest of the SPS transmission system as well as addressing the need for reactive compensation required by the wind farm because of the use of the Clipper wind turbines.

The requirements to interconnect the 400MW of generation at a new switching station on the Potter – Plant X 230kV transmission line will consist of building a new 230kV three breaker ring bus substation. The substation will consist of line terminals to Potter, Plant X and the generating facility. The total minimum cost for building the three breaker 230kV ring bus substation required for stand alone interconnection is $3,000,000.

From the new switching station, the Customer will build a 230 kV line to two of its 230/34.5 kV collector substations. The customer substation will provide terminations for the wind turbine collection circuits.

Two seasonal base cases were used in the study to analyze the stability impacts of the proposed generation facility. The cases studied were the 2008 winter peak and 2012 summer peak. Each case was modified to include prior queued projects that are listed in the body of the report. Twenty-two contingencies were simulated in each case. The Clipper wind turbines were modeled using information provided by the manufacturer.

Due to the reactive power losses on the collector system including the substation transformers, the Customer will be required to install in its substation a total of at least 80 Mvars of capacitor banks in their two 230/34.5kV buses. It is anticipated that at least a 20Mvar capacitor bank will be required on each of the Customer's 230/34.5kV transformers.

Stability study results show the transmission system may not remain stable for all simulated contingencies. The stability study shows that there is a limit to the amount of energy that can be exported from the SPS control area. If the Customer's generation and all previous queued generation is on-line and exporting outside of SPS, the loss of a tie line could result in the SPS transmission system losing synchronism with the rest of the Eastern Interconnection. The remedy for this issue is a new 345kV or higher voltage tie line from SPS into Oklahoma or Kansas. However, at this time, Customer has not indicated that the Customer generation will be exported outside of SPS. When the generation is delivered into SPS, loss of synchronism does not occur. This stability issue will need to be analyzed when the Customer requests transmission service (TSR) from SPP.

Further Stability study results show that with the Clipper 2.5MW wind turbines and the required capacitor banks in service, the wind farm will meet FERC Order #661A's Low Voltage Ride Through (LVRT) provisions. At the time of this analysis, it does not appear that the addition of a dynamic reactive power source is required. If the Customer changes from the Clipper turbine, this need will be re-evaluated in an Impact re-study.

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) has requested an Impact Study under the Southwest Power Pool Open Access Transmission Tariff (OATT) for interconnection of 400MW of wind generation within the control area of Southwestern Public Service (SPS) (d/b/a Xcel Energy) in Randall County, Texas. The wind powered generation facility was studied with one hundred sixty (160) individual Clipper 2.5M W wind turbines. The requested in-service date for the 400MW facility is October 1, 2008. This Impact study addresses the dynamic stability effects of interconnecting the plant to the rest of the SPS transmission system as well as addressing the need for reactive compensation required by the wind farm because of the use of the Clipper wind turbines.

2.0 Purpose

The purpose of the Interconnection System Impact Study is to evaluate the impact of the proposed interconnection on the reliability of the Transmission System. The Impact Study considers the Base Case as well as all Generating Facilities (and with respect to (b) below, any identified Network Upgrades associated with such higher queued interconnection) that, on the date the Interconnection System Impact Study is commenced:

a) are directly interconnected to the Transmission System;
b) are interconnected to Affected Systems and may have an impact on the Interconnection Request;
c) have a pending higher queued Interconnection Request to interconnect to the Transmission System; or
d) have no Queue Position but have executed an LGIA or requested that an unexecuted LGIA be filed with FERC.

Any changes to these assumptions, for example, one or more of the previously queued projects not included in this study signing an interconnection agreement, may require a re-study of this request at the expense of the customer.

Nothing in this System Impact Study constitutes a request for transmission service or confers upon the Interconnection Customer any right to receive transmission service.

3.0 Facilities

3.1 Generating Facility

The generating facility was studied with the assumption that it would be using 160 Clipper 2.5 MW wind turbines. The nameplate rating of each turbine is 2.5MW with a machine base of 2.5MVA. The turbine output voltage is 690V. The Clipper wind turbines consist of four separate 625kW generators with rectifiers and inverters in parallel. The power converter allows the generator to produce power at a power factor of unity.

This study was performed using the voltage and frequency settings that are included in the Clipper PSS/E user model provided by the Customer.

Each wind turbine will feed into a 0.690/34.5 kV GSU rated at 2500 kVA. Impedance for the GSU is 5.75%.

The 160 wind turbines are divided among sixteen (16) collector circuits that feed into four (4) 34.5/230 kV transformers divided between two Customer 230/34.5kV substations. Each transformer collects the energy from forty wind turbines. Each circuit collects the energy from ten wind turbines.

The impedance for each of the 34.5/230 kV transformers is 9.0% on a 66 MVA OA Base with a top rating of 110 MVA.

3.2 Interconnection Facility

The Customer has proposed the point of interconnection (POI) to be the SPS transmission system via a new substation located in Randall County, Texas on the existing Potter – Plant X 230kV line. See Figure 1 for one-line diagram of the interconnection facility.

The requirements to interconnect the 400MW of generation at the new switching station on the Potter – Plant X 230kV line will consist of building a new 230kV three breaker ring bus substation. The method to interconnect the request would consist of a three breaker ring bus substation with terminals to Potter, Plant X, and the generating facility. The total minimum cost for building the three breaker 230kV ring bus substation required for stand alone interconnection is $3,000,000. These costs are shown in Table 1 and Table 2.

From the new switching station, the Customer will build a 230 kV line to its 230/34.5 kV collector substation. The customer substation will provide terminations for the wind turbine collection circuits.

Analysis of the reactive compensation requirements of the wind farm indicated the need for a 34.5 kV, 20 Mvar capacitor bank to be located on the secondary side of each of the four substation transformers (see Figure 1). These capacitor banks are necessary for reactive compensation for the wind farm (turbine and collector system losses).

Table 1: Direct Assignment Facilities

FACILITY	ESTIMATED COST (2007 DOLLARS)
Customer – 230/34.5 kV Substation facilities.	*
Customer – 230kV transmission line facilities between Customer facilities and SPS 230kV switching station.	*
Customer - Right-of-Way for Customer facilities.	*
Customer – Four 34.5 kV, 20 Mvar capacitor bank(s) in Customer substation (80 Mvar total)	*
Total	*

Note: * Estimates of cost to be determined by Customer.

Table 2: Required Interconnection Network Upgrade Facilities

FACILITY	ESTIMATED COST (2007 DOLLARS)
SPS – Build 230kV, 3-breaker ring bus switching station. Station to include breakers, switches, control relaying, high speed communications, all structures, and metering and other related equipment.	$3,000,000
Total	**$3,000,000**

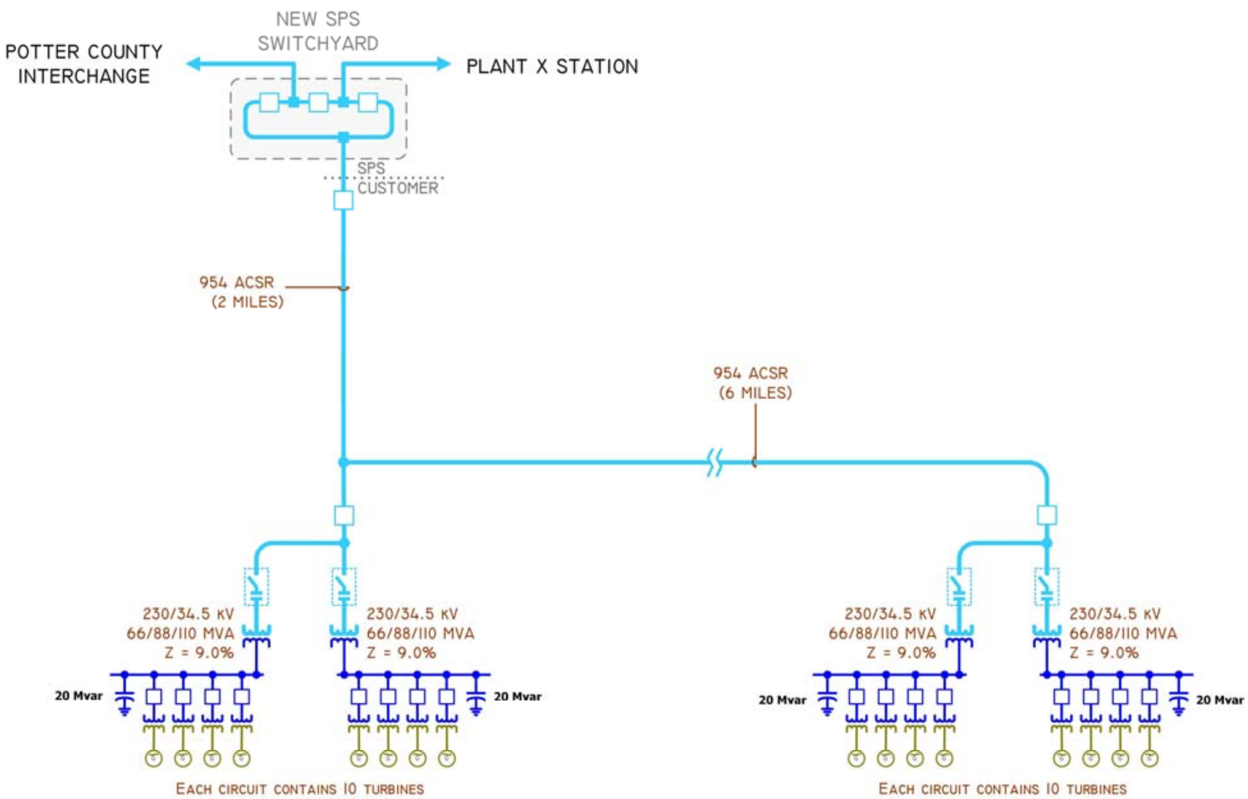


Figure 1: Proposed Interconnection Configuration and Customer Facilities

4.0 Stability Analysis

4.1 Criteria

Using Planning Standards approved by NERC, the following stability definition was applied in the Transient Stability Analysis:

"Power system stability is defined as that condition in which the difference of the angular positions of synchronous machine rotor becomes constant following an aperiodic system disturbance."

Disturbances such as three phase and single phase line faults were simulated for a specified duration and the synchronous machine rotor angles were monitored for their synchronism following the fault removal.

The ability of the wind generators to stay connected to the grid during the disturbances and during the fault recovery was also monitored.

4.2 Modeling of the Wind Turbines in the Power Flow

The Customer supplied a collector system layout for the 160 wind turbines that make up the Customer wind farm. In order to simplify the model of the wind farm while capturing the effect of the different impedances of cables (due to change of the conductor size and length), the wind turbines and associated impedances connected to the same 34.5 kV collector lines were aggregated into several equivalent units. The 160 wind turbines were reduced to 136 equivalent units in the powerflow model.

4.3 Modeling of the Wind Turbines in Dynamics

The Clipper 2.5MW wind turbine generators have four separate output shafts, each feeding a 650 kW permanent magnet synchronous generator. Each generator has a separate rectifier and inverter which then are connected to a common 690V bus. The generator is able to generate at a unity power factor.

The Customer provided a modeling package to be used in PSS/E simulation software for the simulation of the electrical characteristics of the Clipper 2.5 MW wind turbines. The version of PSS/E used for this study was 30.2.1.

For the simulations, the wind farm was dispatched directly by the user to the level specified (100% rated power). It was assumed the turbines would operate at 1.0 unity power factor.

4.3.1 Turbine Protection Schemes

The Clipper turbines utilize an undervoltage/overvoltage protection scheme protection scheme. The protection schemes are designed to protect the wind turbines in the case of system disturbances that can cause damage to the mechanical systems or power electronics on board the turbine. Generally, the protection schemes will disconnect the generator from the electric grid if the sampled voltage is outside of a specified band for a specified amount of time.

FERC Order #661A places specific requirements on wind farms through its Low Voltage Ride Through (LVRT) provisions. For Interconnection Agreements signed after December 31, 2006, wind farms shall stay on line for faults at the POI (in this case, the 230 kV bus at the SPS switching station) that draw the voltage down at the POI to 0.0 pu.

The Clipper wind turbine has undervoltage settings shown in Table 3.

Voltage	Time Limit
1.30000pu - +	0 cycles
1.20000 – 1.3.0000pu	30 cycles
1.10000 – 1.20000pu	5 seconds
0.90000 - 1.10000pu	Continuous operation
0.9000pu – 0.1000pu	3.0 seconds
0.100pu – 0.0000pu	6 cycles

Table 3: Clipper Turbine Voltage Protection

The frequency protection scheme for the Clipper turbines is outlined in Table 4 below:

Frequency	Time Limit
63.000Hz – +	0 cycles
57.000 – 63.000 Hz	Continuous operation
0.000 – 57.000 Hz	0 cycles

Table 4: Clipper Turbine Frequency Protection

4.4 Contingencies Simulated

Twenty-two (22) contingencies were considered for the transient stability simulations. These contingencies included three phase faults, single phase line faults, and a breaker failure fault at locations defined by SPP. Single-phase line faults were simulated by applying a fault impedance to the positive sequence network at the fault location to represent the effect of the negative and zero sequence networks on the positive sequence network. The fault impedance was computed to give a positive sequence voltage at the specified fault location of approximately 60% of pre-fault voltage. This method is in agreement with SPP current practice.

The faults that were defined and simulated are listed in Table 5.

Table 5: Contingencies Evaluated

Cont. No.	*Cont. Name*	*Description*
1	*FLT13PH*	3 phase fault on the Wind Farm (560109) to Potter (523959) 230 kV line, near the Wind Farm. a. Apply fault at the Wind Farm 230kV bus. b. Clear fault after 5 cycles by tripping the line from the Wind Farm-Potter. 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	FLT21PH	*Single phase fault and sequence like Cont. No. 1*
3	FLT33PH	3 phase fault on the Wind Farm (560109) to Plant X (525481) 230 kV line, near the Wind Farm. a. Apply fault at the Wind Farm 230kV bus. b. Clear fault after 5 cycles by tripping the line from the Wind Farm-Plant X. 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.
4	FLT41PH	*Single phase fault and sequence like Cont. No. 3*
5	FLT53PH	3 phase fault on the Bushland (524267) – Deaf Smith (524623) 230kV line, near Deaf Smith. a. Apply fault at the Deaf Smith 230kV bus. b. Clear fault after 5 cycles by tripping the line from Bushland – Deaf Smith 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.
6	FLT61PH	*Single phase fault and sequence like Cont. No. 5*
7	FLT73PH	3 phase fault on the Potter (523961) – Finney (523853) 345kV line, near Potter. a. . Apply fault at the Potter 345kV bus. b. Clear fault after 4 cycles by tripping the line from the Potter - Finney
8	FLT81PH	*Single phase fault and sequence like Cont. No.7*
9	FLT93PH	3 phase fault on the GEN-2005-015 (560040) – Oklaunion (511456) 345kV line, near Oklaunion. a. . Apply fault at the Oklaunion 345kV bus. b. Clear fault after 5 cycles by tripping the line from the Oklaunion – Gen-2005-015 c. Wait 20 cycles, and reclose the line in (b) into the fault.. d. Leave fault on for 5 cycles and trip line and remove fault.
10	FLT101PH	*Single phase fault and sequence like Cont. No.9*
11	FLT113PH	3 phase fault on the Potter (523959) – Moore (523309) 230kV line near Moore. a. Apply fault at the Moore bus. b. Clear fault after 5 cycles by tripping the line Potter - Moore 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.
12	FLT121PH	*Single phase fault and sequence like Cont. No.11*
13	FLT133PH	3 phase fault on the Potter – Harrington 230kV line near Potter a. Apply fault at the Potter 230kV bus. b. Clear fault after 5 cycles by tripping the line c. No reclose
14	FLT141PH	*Single phase fault and sequence like Cont. No.13*
15	FLT153PH	3 phase fault on the Conway (524079)-Kirby 115kV line near Kirby a. Apply fault at the Kirby bus. b. Clear fault after 5 cycles by tripping the line Conway-Kirby 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
16	FLT161PH	*Single phase fault and sequence like Cont. No.15*
17	FLT173PH	3 phase fault on the Nichols (524044)-Grapevine (523771) 230kV line near Grapevine a. Apply fault at the Grapevine bus.

Cont. No.	*Cont. Name*	*Description*
		b. Clear fault after 5 cycles by tripping the line Nichols - Grapevine 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
18	FLT181PH	*Single phase fault and sequence like Cont. No.17*
19	FLT193PH	3 phase fault on the Tolk (525549)-Eddy (527802) 345kV line near Tolk a. Apply fault at the Tolk bus. b. Clear fault after 5 cycles by tripping the line Tolk - Eddy 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
20	FLT201PH	*Single phase fault and sequence like Cont. No.19*
21	FLT213PH	3 phase fault on the Plant X (525481)- Deaf Smith (524623) 230kV line near Deaf Smith a. Apply fault at the Deaf Smith bus. b. Clear fault after 5 cycles by tripping the Deaf Smith – Plant X 230kV line
22	FLT221PH	*Single phase fault and sequence like Cont. No.21*

Table 5: Contingencies Evaluated (continued)

4.5 Further Model Preparation

The two base cases contain prior queued projects as shown in Table 6.

The wind farm generation from the study customer and previously queued customers is dispatched into the SPP footprint.

Initial simulations were carried out on both base cases and cases with the added generation for a no-disturbance run of 20 seconds to verify the numerical stability of the model. All cases were confirmed to be stable.

Project	MW
GEN-2002-022	240
GEN-2004-003	240
GEN-2005-010	160
GEN-2005-015	150
GEN-2006-018	160
GEN-2006-025	150
Total	1100

Table 6: Prior Queued Projects

5.0 <u>Results</u>

Results of the stability analysis are summarized in Table 7. The results indicate that when the GEN-2006-039 wind farm and the previous queued wind farms are dispatched across the SPP footprint, stability problems exist. All generators within SPS were found to lose synchronism with the rest of the Eastern interconnection for contingency FLT73PH and FLT81PH in the 2008 winter peak model. Please see Figure 2 below. This contingency simulates the loss of the Potter-Finney 345kV line, a major tie line from SPS to the rest of the Eastern interconnection. Examination of the study model indicates that with all prior queued wind farms in service, an export of approximately 1100MW from SPS is in the model.

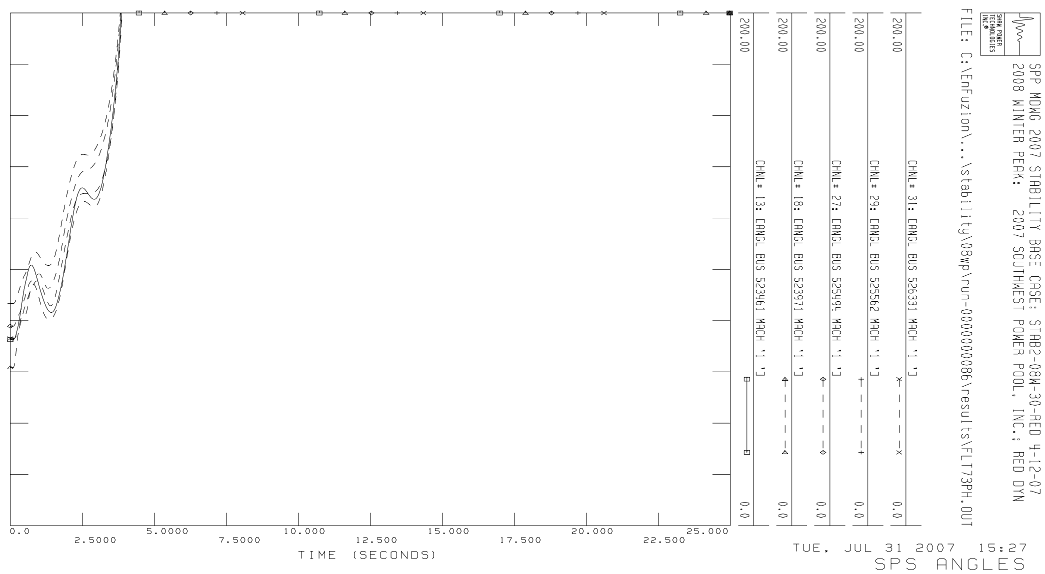


Figure 2. SPS Generator Angles during fault FLT73PH

This scenario would not be acceptable if it were known for sure that GEN-2006-039 and all previous queued projects are exporting generation outside of SPS. The remedy to this situation would be a new 345kV tie line from SPS into Kansas or Oklahoma. However, at this time, the exact delivery point of the energy from GEN-2006-039 is unknown. Therefore it could be possible that either the energy from GEN-2006-039 or any previous queued projects could be delivered within SPS.

Therefore, the study model was re-dispatched in order to sink at least 400MW of the prior queued generation within the SPS balancing authority area. Contingencies FLT73PH and FLT81PH were simulated again. The results are a stable transmission system. Please see Figure 3.

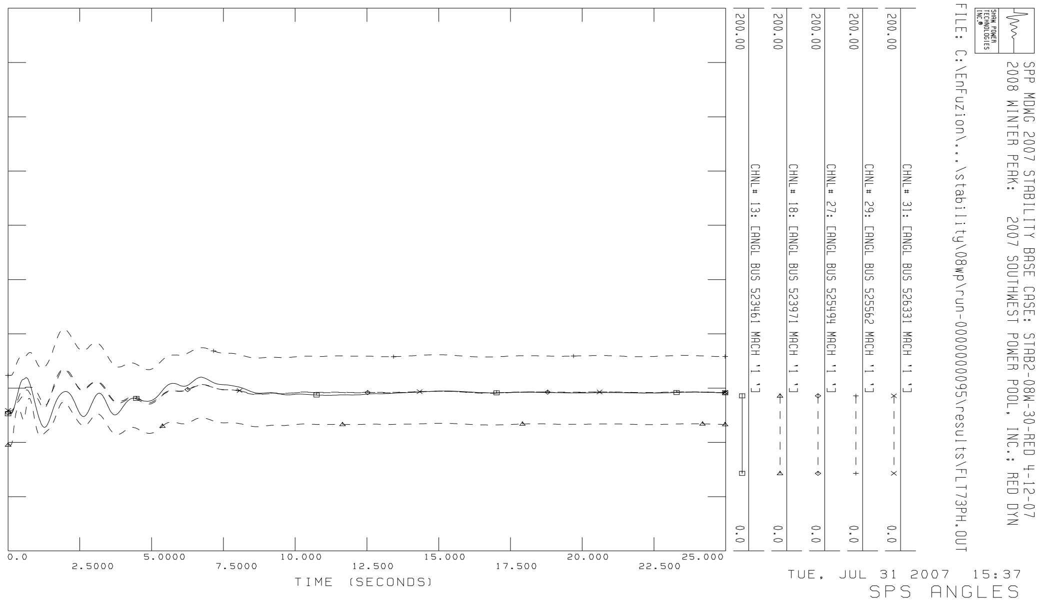


Figure 3. SPS Generator Angles during fault FLT73PH (400MW delivered into SPS)

The wind farm was also tested for compliance with FERC Order #661A Low Voltage Ride Through Requirements. Contingencies FLT13PH and FLT33PH are the contingencies that test for FERC Order #661A. The simulations found that without the 80Mvar of capacitors that the wind farm will trip off line for under-voltage relay actuation for contingency FLT13PH. With the 80Mvar of capacitors in service, the wind farm will meet FERC Order #661A.

Table 7: Summary of Fault Simulation Results

Cont. No.	Cont. Name	Description	08wp (No Capacitors at W.F)	08wp	08wp (Energy sunk in SPS)	12sp
1	*FLT13PH*	3 phase fault on the Wind Farm (560109) to Potter (523959) 230 kV line, near the Wind Farm.	Trip*	Stable	Stable	Stable
2	FLT21PH	*Single phase fault and sequence like Cont. No. 1*	*n/a*	Stable	Stable	Stable
3	FLT33PH	3 phase fault on the Wind Farm (560109) to Plant X (525481) 230 kV line, near the Wind Farm.	*n/a*	Stable	Stable	Stable
4	FLT41PH	*Single phase fault and sequence like Cont. No. 3*	*n/a*	Stable	Stable	Stable
5	FLT53PH	3 phase fault on the Bushland (524267) – Deaf Smith (524623) 230kV line, near Deaf Smith.	*n/a*	Stable	Stable	Stable
6	FLT61PH	*Single phase fault and sequence like Cont. No. 5*	*n/a*	Stable	Stable	Stable
7	FLT73PH	3 phase fault on the Potter (523961) – Finney (523853) 345kV line, near Potter.	*n/a*	**Unstable**	Stable	Stable
8	FLT81PH	*Single phase fault and sequence like Cont. No.7*	*n/a*	**Unstable**	Stable	Stable
9	FLT93PH	3 phase fault on the GEN-2005-015 (560040) – Oklaunion (511456) 345kV line, near Oklaunion.	*n/a*	Stable	Stable	Stable
10	FLT101PH	*Single phase fault and sequence like Cont. No.9*	*n/a*	Stable	Stable	Stable
11	FLT113PH	3 phase fault on the Potter (523959) – Moore (523309) 230kV line near Moore. a. Apply fault at the Moore bus.	*n/a*	Stable	Stable	Stable
12	FLT101PH	*Single phase fault and sequence like Cont. No.11*	*n/a*	Stable	Stable	Stable
13	FLT133PH	3 phase fault on the Potter – Harrington 230kV line near Potter	*n/a*	Stable	Stable	Stable
14	FLT141PH	*Single phase fault and sequence like Cont. No.13*	*n/a*	Stable	Stable	Stable
15	FLT153PH	3 phase fault on the Conway (524079)-Kirby 115kV line near Kirby	*n/a*	Stable	Stable	Stable
16	FLT161PH	*Single phase fault and sequence like Cont. No.15*	*n/a*	Stable	Stable	Stable
17	FLT173PH	3 phase fault on the Nichols (524044)-Grapevine (523771) 230kV line near Grapevine	*n/a*	Stable	Stable	Stable
18	FLT181PH	*Single phase fault and sequence like Cont. No.17*	*n/a*	Stable	Stable	Stable
19	FLT193PH	3 phase fault on the Tolk (525549)-Eddy (527802) 345kV line near Tolk	*n/a*	Stable	Stable	Stable
20	FLT201PH	*Single phase fault and sequence like Cont. No.19*	*n/a*	Stable	Stable	Stable
21	FLT213PH	3 phase fault on the Plant X (525481)- Deaf Smith (524623) 230kV line near Deaf Smith	*n/a*	Stable	Stable	Stable
22	FLT221PH	*Single phase fault and sequence like Cont. No.20*	*n/a*	Stable	Stable	Stable

* Wind Farm Tripped off making it non-compliant with FERC Order #661A. Therefore, the capacitors are required for Order #661A

6.0 Conclusion

Stability concerns presently exist for the GEN-2006-039 wind farm as proposed and studied using one hundred sixty (160) Clipper 2.5 MW wind turbines. When the GEN-2006-039 generation and previous queued generation are in service, the SPS transmission system will lose synchronism with the rest of the Eastern Interconnection for an outage of the Potter – Finney 345kV transmission line. The remedy for this situation is a new 345kV tie line from SPS into Kansas or Oklahoma.

The total minimum network upgrade cost for building the three breaker 230kV ring bus substation required for stand alone interconnection is $3,000,000. These estimates do not address the cost of the Customer substation, the Customer 34.5 kV, 80 Mvar of capacitor banks, or the transmission line between the Customer substation and the proposed SPS switching substation located on the Potter – Plant X 230 kV line.

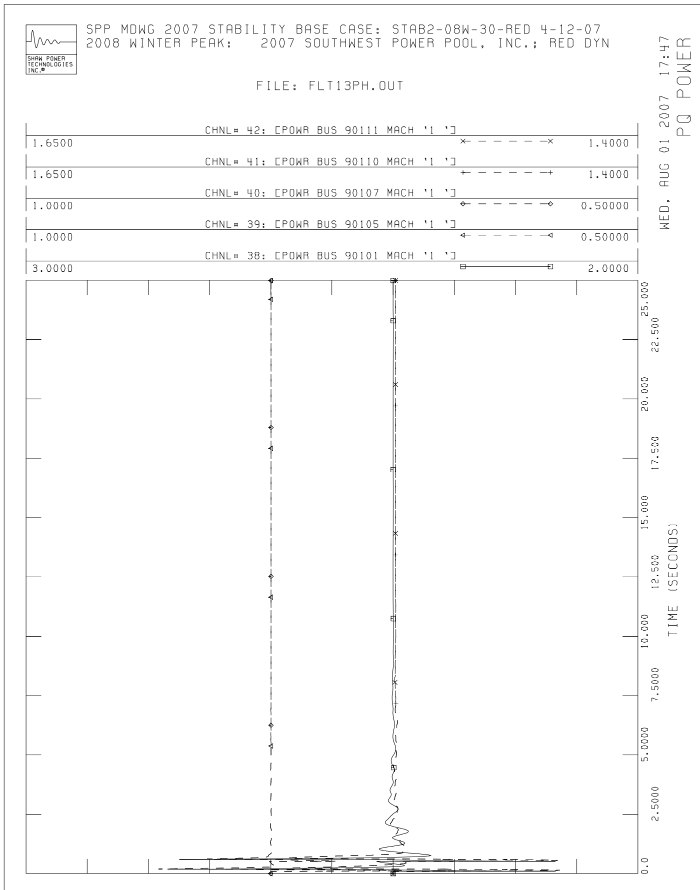
In order for the wind farm equipped with Clipper wind turbines to meet the LVRT provisions of FERC Order #661A, the 80Mvar of capacitor banks must be in service.

The costs do not include any costs associated with the deliverability of the energy to final customers. These costs are determined by separate studies if 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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1.6500 1.4000
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CHNL= 39: [POWR BUS 90105 MACH '1 ']
1.0000 0.50000
CHNL= 38: [POWR BUS 90101 MACH '1 ']
3.0000 2.0000
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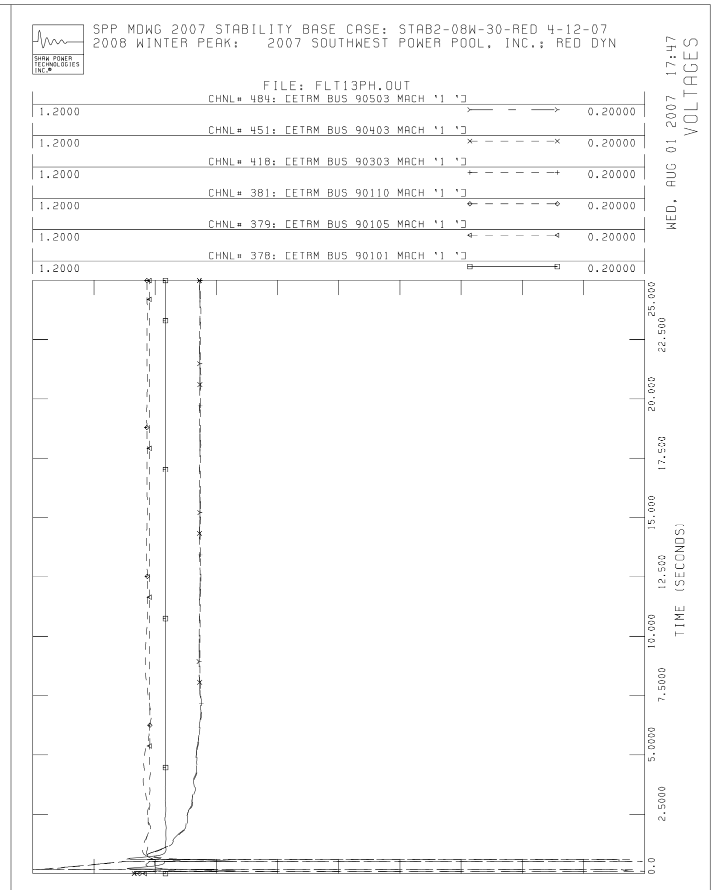
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2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
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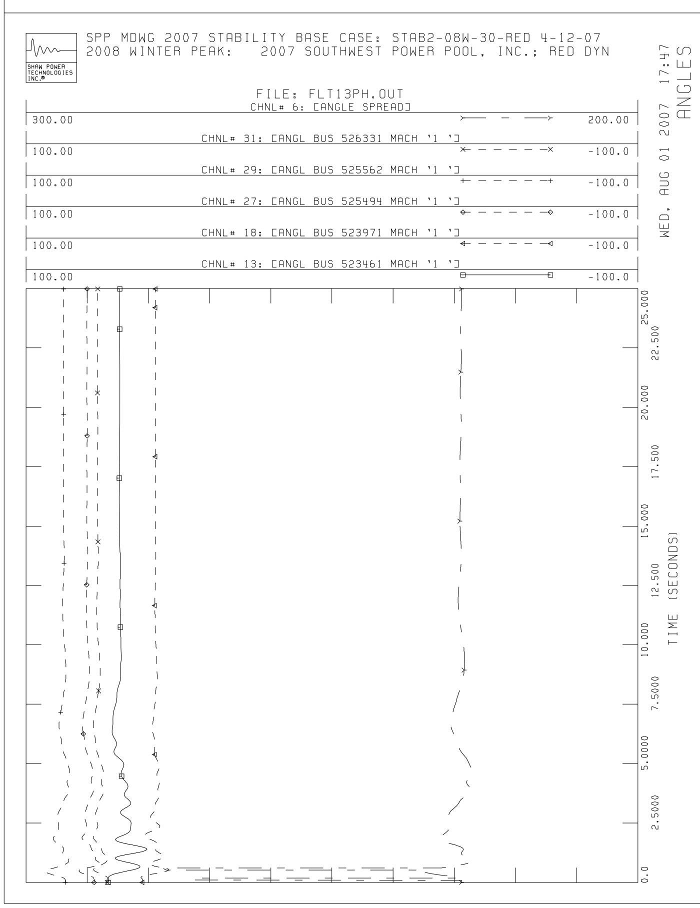
SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
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300.00 200.00
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CHNL= 29: [ANGL BUS 525562 MACH '1 ']
100.00 -100.0
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100.00 -100.0
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100.00 -100.0
CHNL= 13: [ANGL BUS 523461 MACH '1 ']
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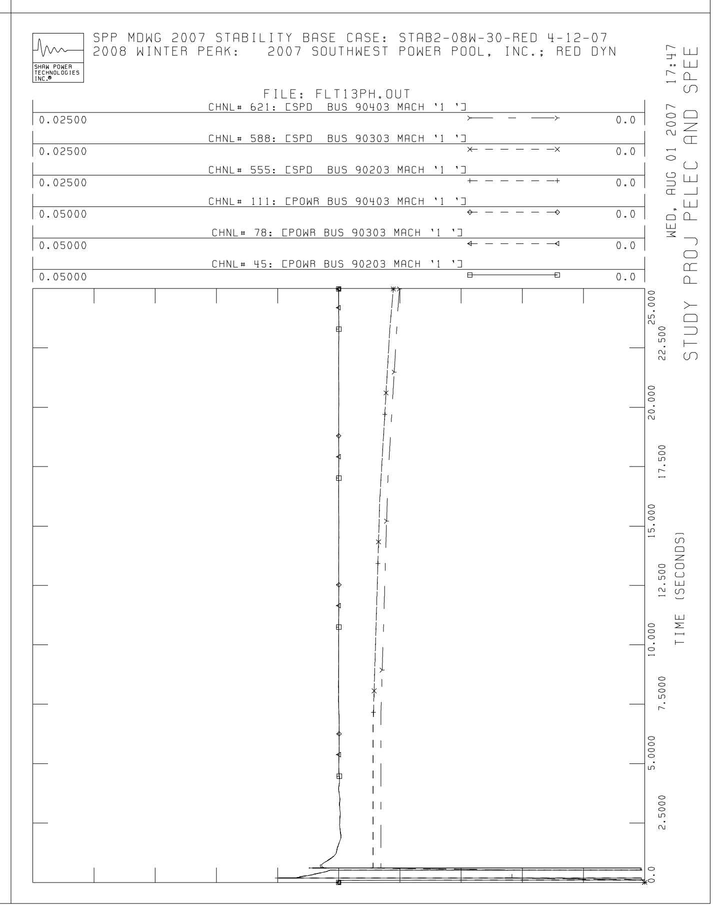
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2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
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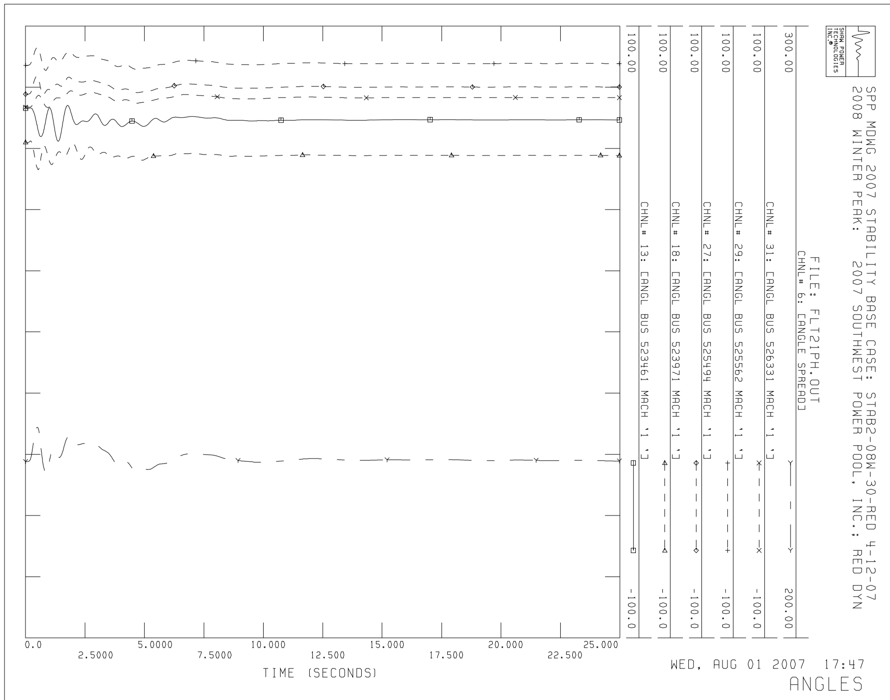
0.05000 0.0
0.0 2.5000 5.0000 7.5000 10.000 12.500 15.000 17.500 20.000 22.500 25.000
TIME (SECONDS)
WED, AUG 01 2007 17:47
STUDY PROJ PELEC AND SPEE


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT21PH.OUT
CHNL# 6: [ANGLE SPREAD] 300.00 200.00
CHNL# 31: [ANGL BUS 526331 MACH '1 '] 100.00 -100.0
CHNL# 29: [ANGL BUS 525562 MACH '1 '] 100.00 -100.0
CHNL# 27: [ANGL BUS 525494 MACH '1 '] 100.00 -100.0
CHNL# 18: [ANGL BUS 523971 MACH '1 '] 100.00 -100.0
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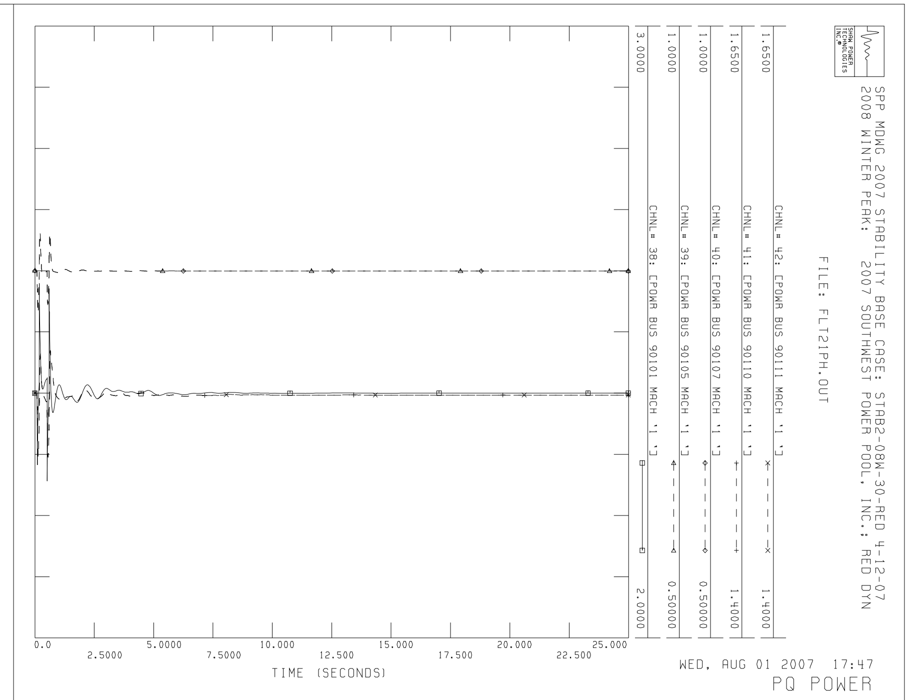
WED, AUG 01 2007 17:47
ANGLES


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT21PH.OUT
CHNL# 42: [POWR BUS 90111 MACH '1 '] 1.6500 1.4000
CHNL# 41: [POWR BUS 90110 MACH '1 '] 1.6500 1.4000
CHNL# 40: [POWR BUS 90107 MACH '1 '] 1.0000 0.50000
CHNL# 39: [POWR BUS 90105 MACH '1 '] 1.0000 0.50000
CHNL# 38: [POWR BUS 90101 MACH '1 '] 3.0000 2.0000
TIME (SECONDS)
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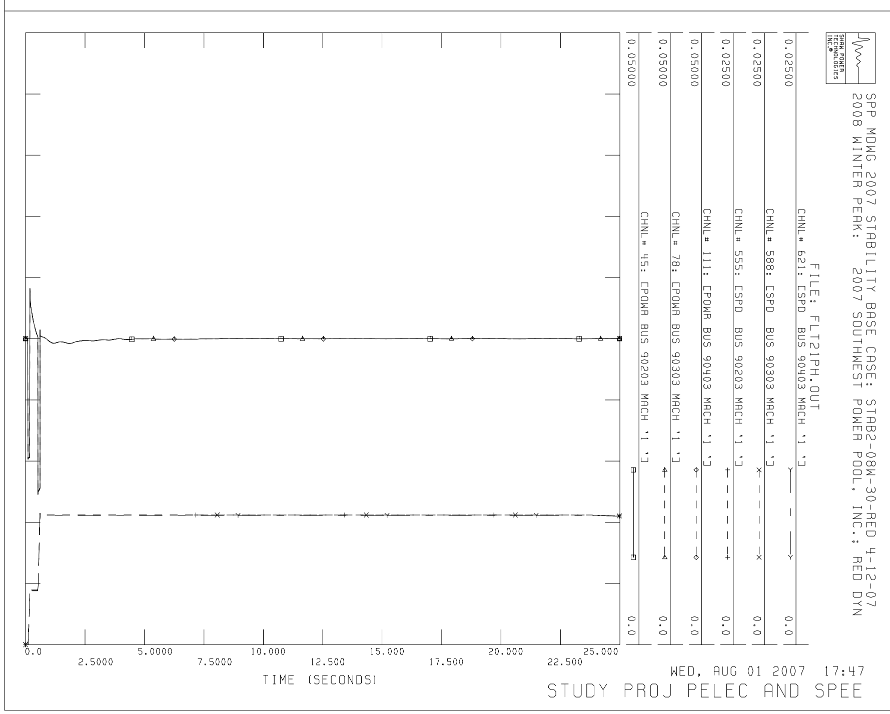
PQ POWER


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT21PH.OUT
CHNL# 621: [SPD BUS 90403 MACH '1 '] 0.02500 0.0
CHNL# 588: [SPD BUS 90303 MACH '1 '] 0.02500 0.0
CHNL# 555: [SPD BUS 90203 MACH '1 '] 0.02500 0.0
CHNL# 111: [POWR BUS 90403 MACH '1 '] 0.05000 0.0
CHNL# 78: [POWR BUS 90303 MACH '1 '] 0.05000 0.0
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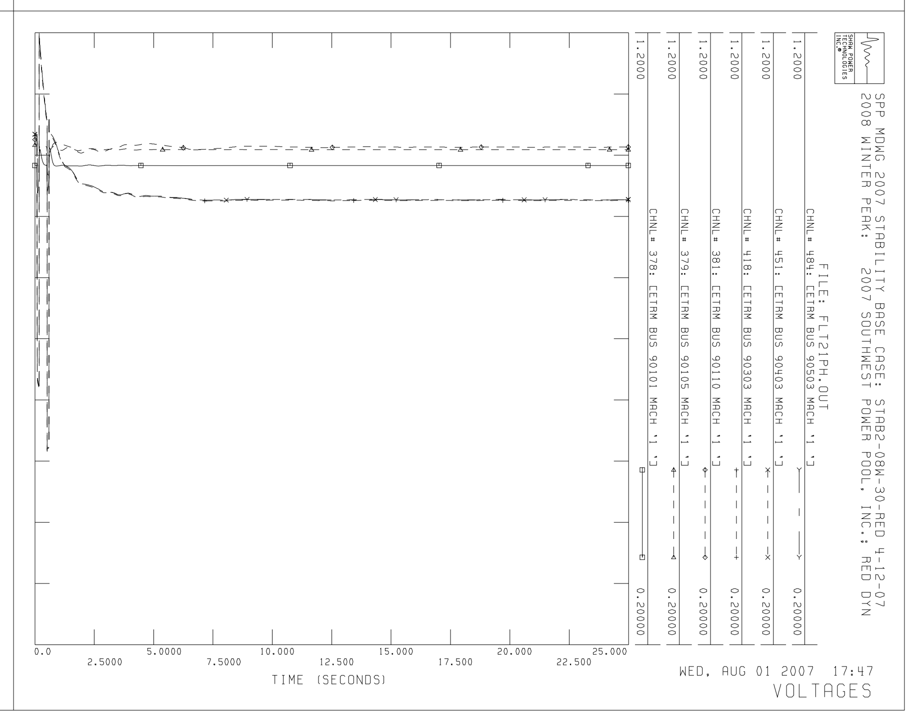
TIME (SECONDS)
WED, AUG 01 2007 17:47
STUDY PROJ PELEC AND SPEE


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT21PH.OUT
CHNL# 484: [ETRM BUS 90503 MACH '1 '] 1.2000 0.20000
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CHNL# 418: [ETRM BUS 90303 MACH '1 '] 1.2000 0.20000
CHNL# 381: [ETRM BUS 90110 MACH '1 '] 1.2000 0.20000
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TIME (SECONDS)
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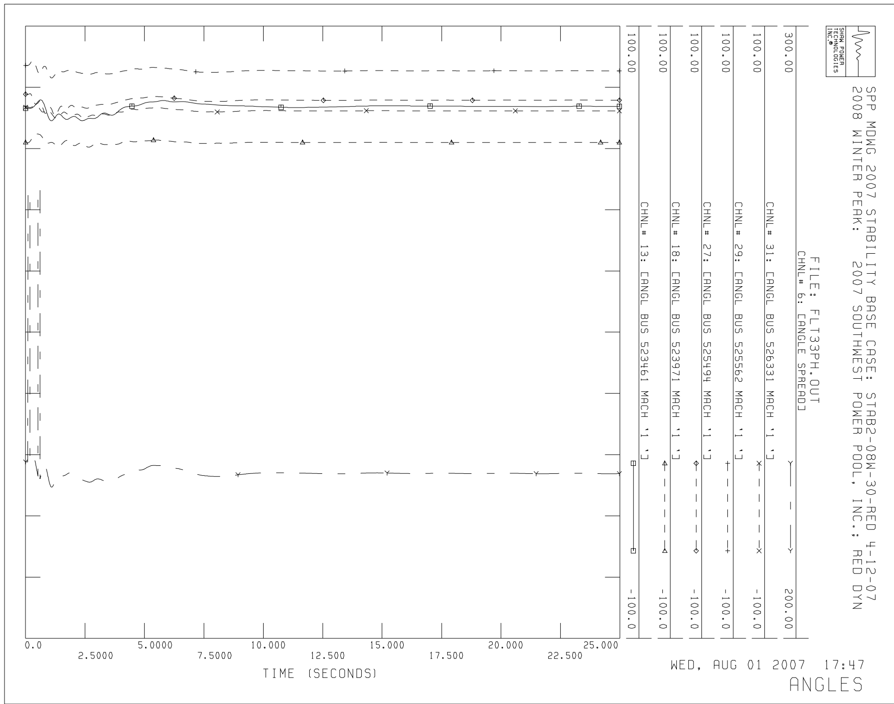
VOLTAGES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2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
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CHNL# 29: CANGL BUS 525562 MACH '1 ' 100.00 -100.0
CHNL# 27: CANGL BUS 525494 MACH '1 ' 100.00 -100.0
CHNL# 18: CANGL BUS 523971 MACH '1 ' 100.00 -100.0
CHNL# 13: CANGL BUS 523461 MACH '1 ' 100.00 -100.0
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TIME (SECONDS)
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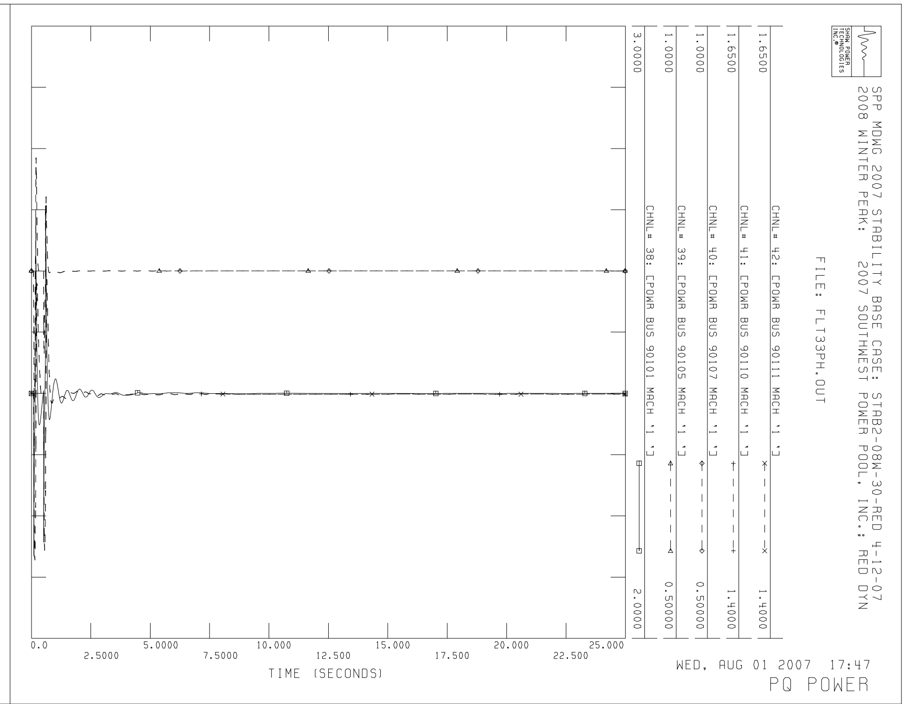
ANGLES

SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT33PH.OUT
CHNL# 42: CPOWR BUS 90111 MACH '1 ' 1.6500 1.4000
CHNL# 41: CPOWR BUS 90110 MACH '1 ' 1.6500 1.4000
CHNL# 40: CPOWR BUS 90107 MACH '1 ' 1.0000 0.50000
CHNL# 39: CPOWR BUS 90105 MACH '1 ' 1.0000 0.50000
CHNL# 38: CPOWR BUS 90101 MACH '1 ' 3.0000 2.0000
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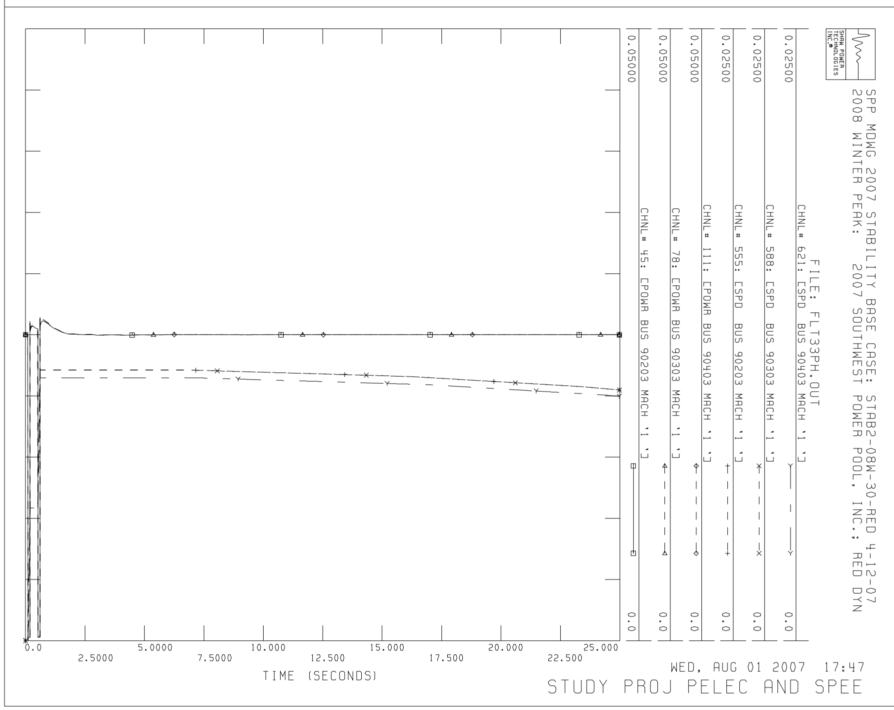
TIME (SECONDS)
WED, AUG 01 2007 17:47
PQ POWER

SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT33PH.OUT
CHNL# 621: CSPD BUS 90403 MACH '1 ' 0.02500 0.0
CHNL# 588: CSPD BUS 90303 MACH '1 ' 0.02500 0.0
CHNL# 555: CSPD BUS 90203 MACH '1 ' 0.02500 0.0
CHNL# 111: CPOWR BUS 90403 MACH '1 ' 0.05000 0.0
CHNL# 78: CPOWR BUS 90303 MACH '1 ' 0.05000 0.0
CHNL# 45: CPOWR BUS 90203 MACH '1 ' 0.05000 0.0
0.0 2.5000 5.0000 7.5000 10.000 12.500 15.000 17.500 20.000 22.500 25.000
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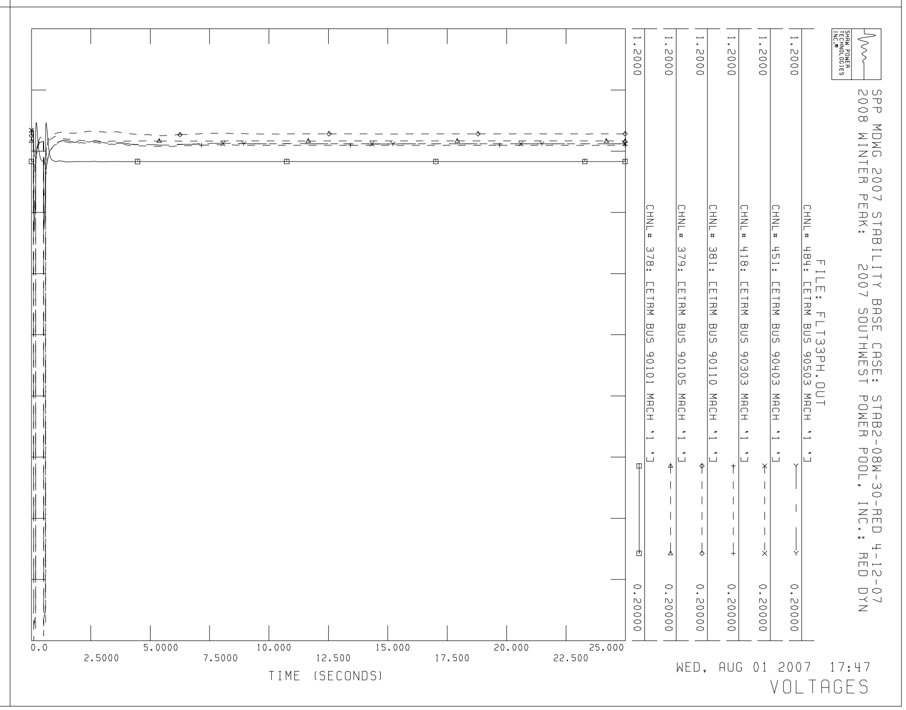
WED, AUG 01 2007 17:47
STUDY PROJ PELEC AND SPEE

SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT33PH.OUT
CHNL# 484: CETAM BUS 90503 MACH '1 ' 1.2000 0.20000
CHNL# 451: CETAM BUS 90403 MACH '1 ' 1.2000 0.20000
CHNL# 418: CETAM BUS 90303 MACH '1 ' 1.2000 0.20000
CHNL# 381: CETAM BUS 90110 MACH '1 ' 1.2000 0.20000
CHNL# 379: CETAM BUS 90105 MACH '1 ' 1.2000 0.20000
CHNL# 378: CETAM BUS 90101 MACH '1 ' 1.2000 0.20000
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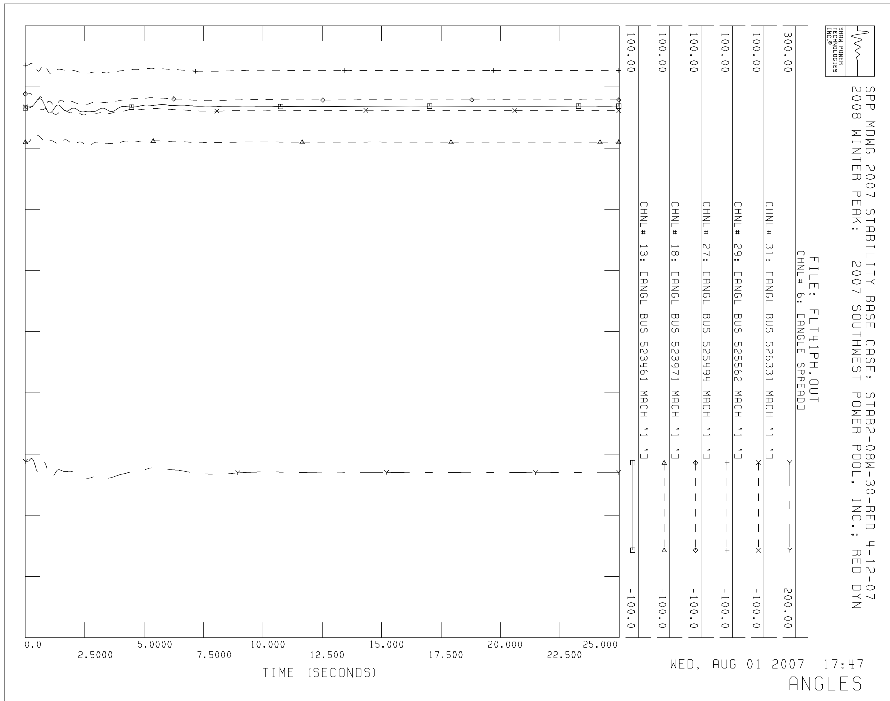
WED, AUG 01 2007 17:47
VOLTAGES


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.: RED DYN
FILE: FLT41PH.OUT
CHNL# 6: [ANGLE SPREAD] 300.00 200.00
CHNL# 31: [ANGL BUS 526331 MACH '1 '] 100.00 -100.0
CHNL# 29: [ANGL BUS 525562 MACH '1 '] 100.00 -100.0
CHNL# 27: [ANGL BUS 525494 MACH '1 '] 100.00 -100.0
CHNL# 18: [ANGL BUS 523971 MACH '1 '] 100.00 -100.0
CHNL# 13: [ANGL BUS 523461 MACH '1 '] 100.00 -100.0
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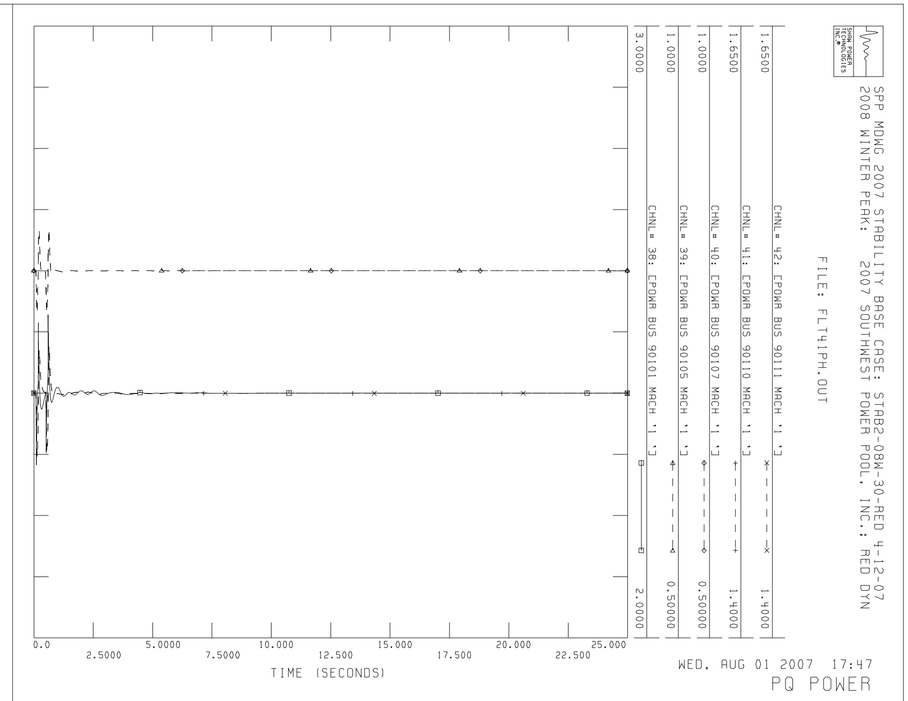
TIME (SECONDS)
WED, AUG 01 2007 17:47
ANGLES


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.: RED DYN
FILE: FLT41PH.OUT
CHNL# 42: [POWR BUS 90111 MACH '1 '] 1.6500 1.4000
CHNL# 41: [POWR BUS 90110 MACH '1 '] 1.6500 1.4000
CHNL# 40: [POWR BUS 90107 MACH '1 '] 1.0000 0.50000
CHNL# 39: [POWR BUS 90105 MACH '1 '] 1.0000 0.50000
CHNL# 38: [POWR BUS 90101 MACH '1 '] 3.0000 2.0000
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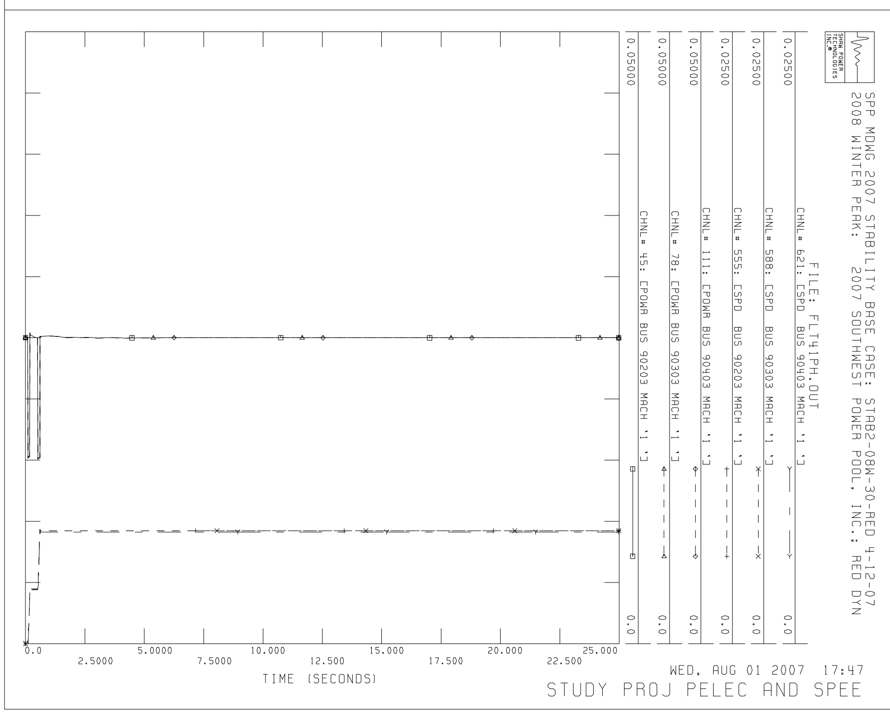
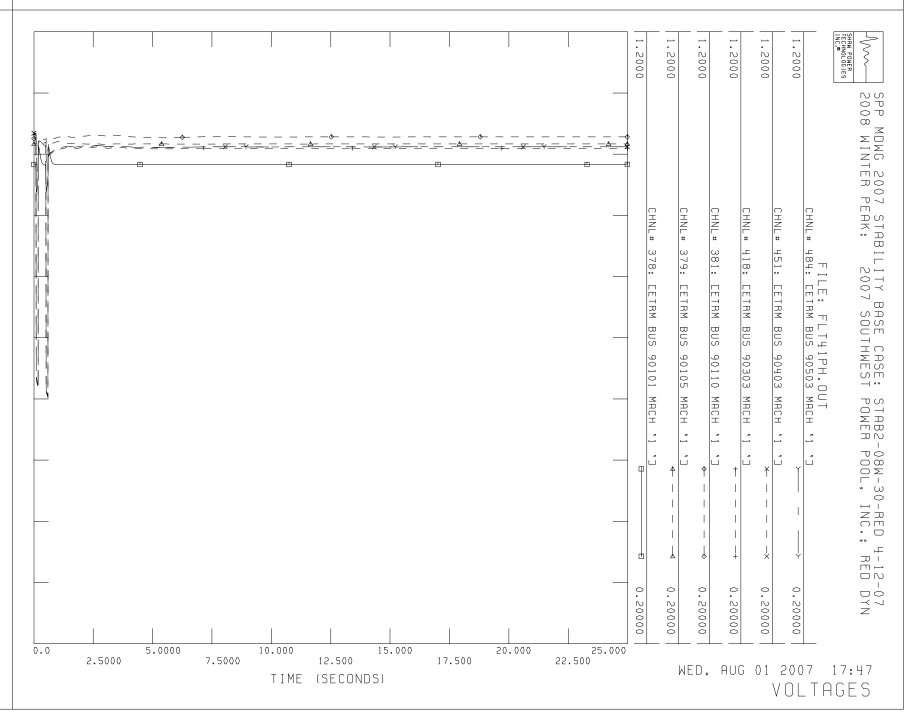
TIME (SECONDS)
WED, AUG 01 2007 17:47
PQ POWER


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.: RED DYN
FILE: FLT41PH.OUT
CHNL# 621: [SPD BUS 90403 MACH '1 '] 0.02500 0.0
CHNL# 588: [SPD BUS 90303 MACH '1 '] 0.02500 0.0
CHNL# 555: [SPD BUS 90203 MACH '1 '] 0.02500 0.0
CHNL# 111: [POWR BUS 90403 MACH '1 '] 0.05000 0.0
CHNL# 78: [POWR BUS 90303 MACH '1 '] 0.05000 0.0
CHNL# 45: [POWR BUS 90203 MACH '1 '] 0.05000 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)
WED, AUG 01 2007 17:47
STUDY PROJ PELEC AND SPEE


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.: RED DYN
FILE: FLT41PH.OUT
CHNL# 484: [ETRM BUS 90503 MACH '1 '] 1.2000 0.20000
CHNL# 451: [ETRM BUS 90403 MACH '1 '] 1.2000 0.20000
CHNL# 418: [ETRM BUS 90303 MACH '1 '] 1.2000 0.20000
CHNL# 381: [ETRM BUS 90110 MACH '1 '] 1.2000 0.20000
CHNL# 379: [ETRM BUS 90105 MACH '1 '] 1.2000 0.20000
CHNL# 378: [ETRM BUS 90101 MACH '1 '] 1.2000 0.20000
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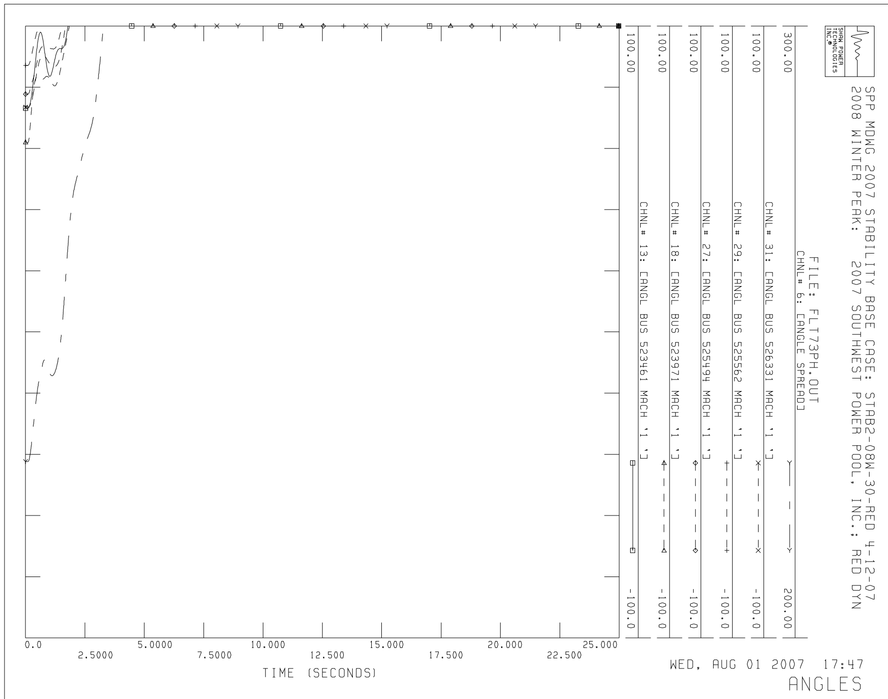
TIME (SECONDS)
WED, AUG 01 2007 17:47
VOLTAGES


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT73PH.OUT
CHNL# 6: [ANGLE SPREAD] 300.00 200.00
CHNL# 31: [ANGL BUS 526331 MACH '1 '] 100.00 -100.0
CHNL# 29: [ANGL BUS 525562 MACH '1 '] 100.00 -100.0
CHNL# 27: [ANGL BUS 525494 MACH '1 '] 100.00 -100.0
CHNL# 18: [ANGL BUS 523971 MACH '1 '] 100.00 -100.0
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TIME (SECONDS)
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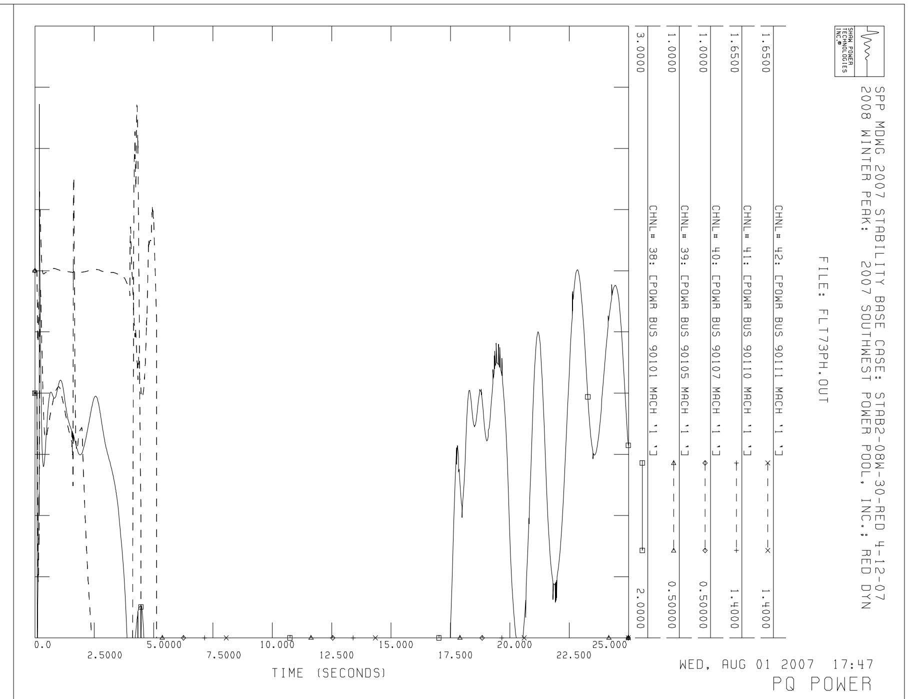
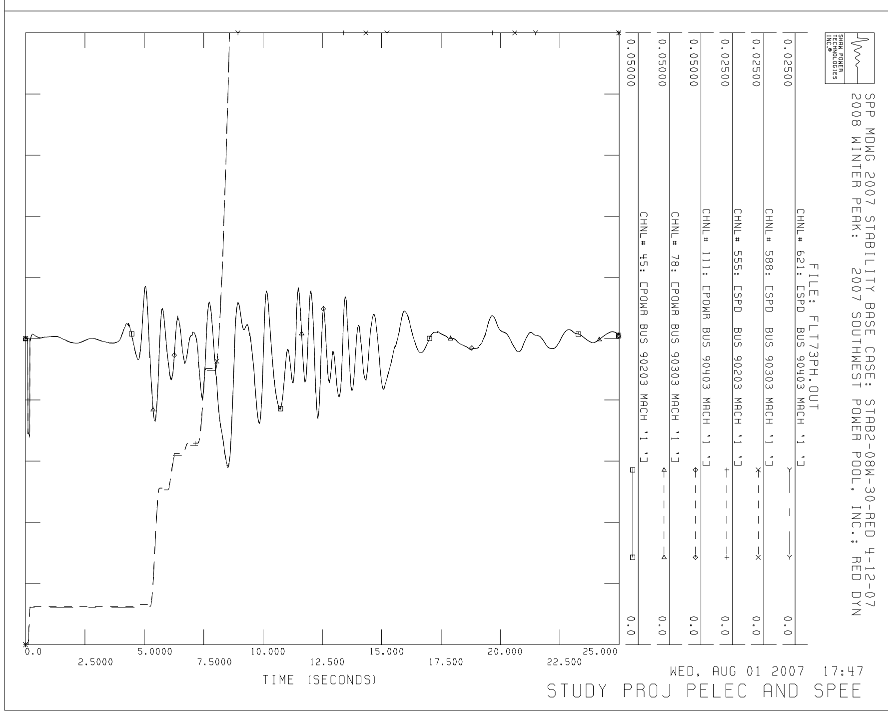
ANGLES

SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT73PH.OUT
CHNL# 42: [POWR BUS 90111 MACH '1 '] 1.6500 1.4000
CHNL# 41: [POWR BUS 90110 MACH '1 '] 1.6500 1.4000
CHNL# 40: [POWR BUS 90107 MACH '1 '] 1.0000 0.50000
CHNL# 39: [POWR BUS 90105 MACH '1 '] 1.0000 0.50000
CHNL# 38: [POWR BUS 90101 MACH '1 '] 3.0000 2.0000
TIME (SECONDS)
WED, AUG 01 2007 17:47
PQ 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: FLT73PH.OUT
CHNL# 621: [SPD BUS 90403 MACH '1 '] 0.02500 0.0
CHNL# 588: [SPD BUS 90303 MACH '1 '] 0.02500 0.0
CHNL# 555: [SPD BUS 90203 MACH '1 '] 0.02500 0.0
CHNL# 111: [POWR BUS 90403 MACH '1 '] 0.05000 0.0
CHNL# 78: [POWR BUS 90303 MACH '1 '] 0.05000 0.0
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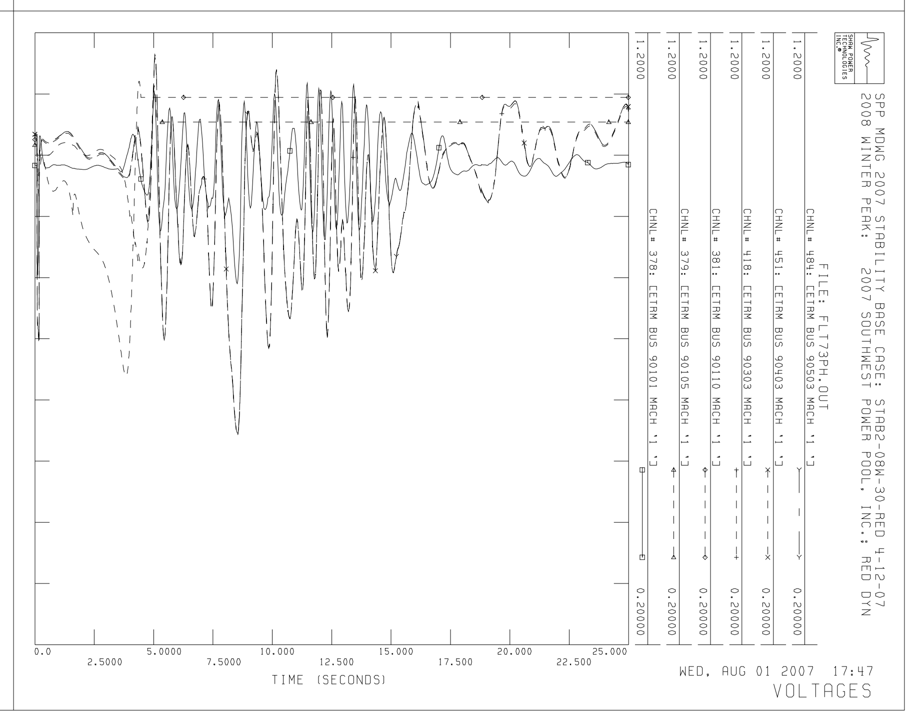
TIME (SECONDS)
WED, AUG 01 2007 17:47
STUDY PROJ PELEC AND SPEE

SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT73PH.OUT
CHNL# 484: [ETRM BUS 90503 MACH '1 '] 1.2000 0.20000
CHNL# 451: [ETRM BUS 90403 MACH '1 '] 1.2000 0.20000
CHNL# 418: [ETRM BUS 90303 MACH '1 '] 1.2000 0.20000
CHNL# 381: [ETRM BUS 90110 MACH '1 '] 1.2000 0.20000
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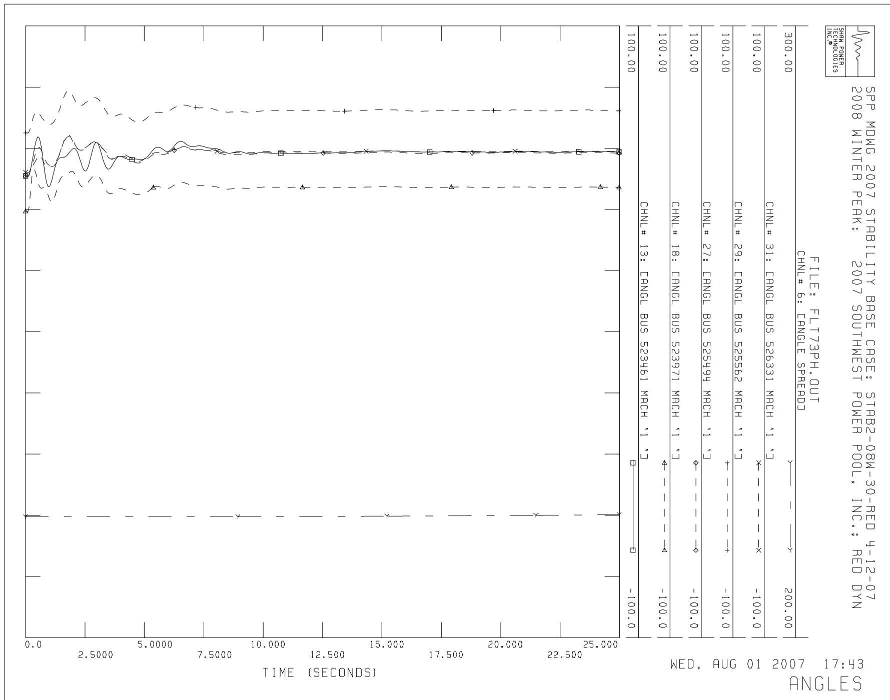
TIME (SECONDS)
WED, AUG 01 2007 17:47
VOLTAGES


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT73PH.OUT
CHNL# 6: [ANGLE SPREAD] 300.00 200.00
CHNL# 31: CANGL BUS 526331 MACH '1 '] 100.00 -100.0
CHNL# 29: CANGL BUS 525562 MACH '1 '] 100.00 -100.0
CHNL# 27: CANGL BUS 525494 MACH '1 '] 100.00 -100.0
CHNL# 18: CANGL BUS 523971 MACH '1 '] 100.00 -100.0
CHNL# 13: CANGL BUS 523461 MACH '1 '] 100.00 -100.0
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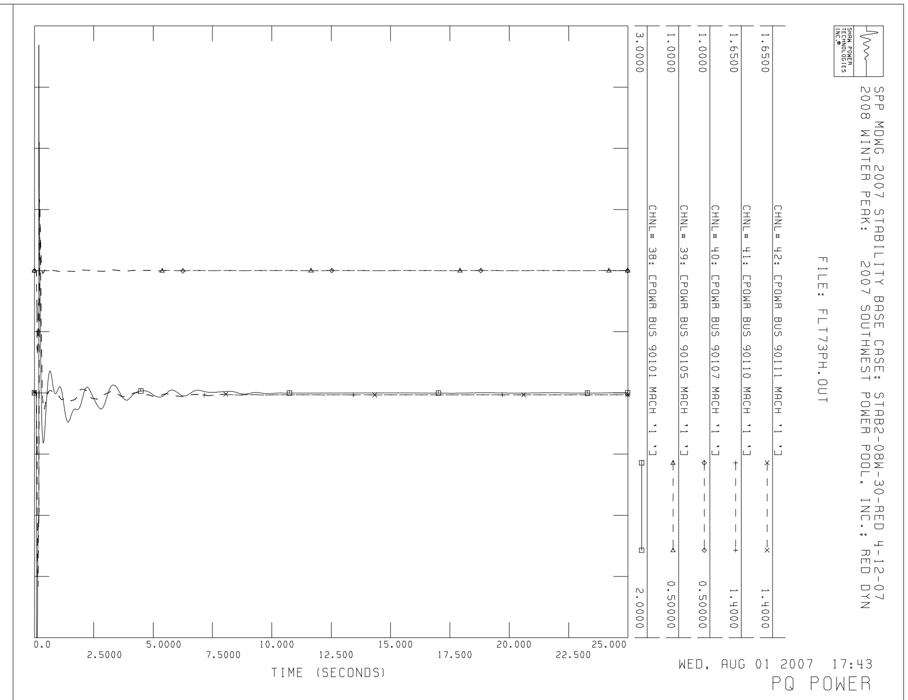
ANGLES


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT73PH.OUT
CHNL# 42: CPOWR BUS 90111 MACH '1 '] 1.6500 1.4000
CHNL# 41: CPOWR BUS 90110 MACH '1 '] 1.6500 1.4000
CHNL# 40: CPOWR BUS 90107 MACH '1 '] 1.0000 0.50000
CHNL# 39: CPOWR BUS 90105 MACH '1 '] 1.0000 0.50000
CHNL# 38: CPOWR BUS 90101 MACH '1 '] 3.0000 2.0000
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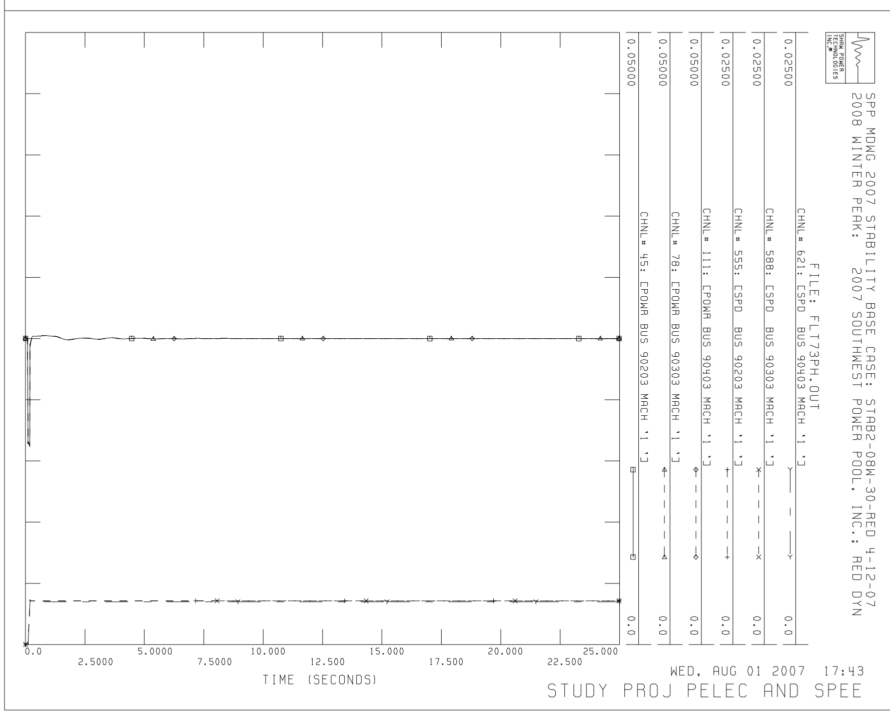
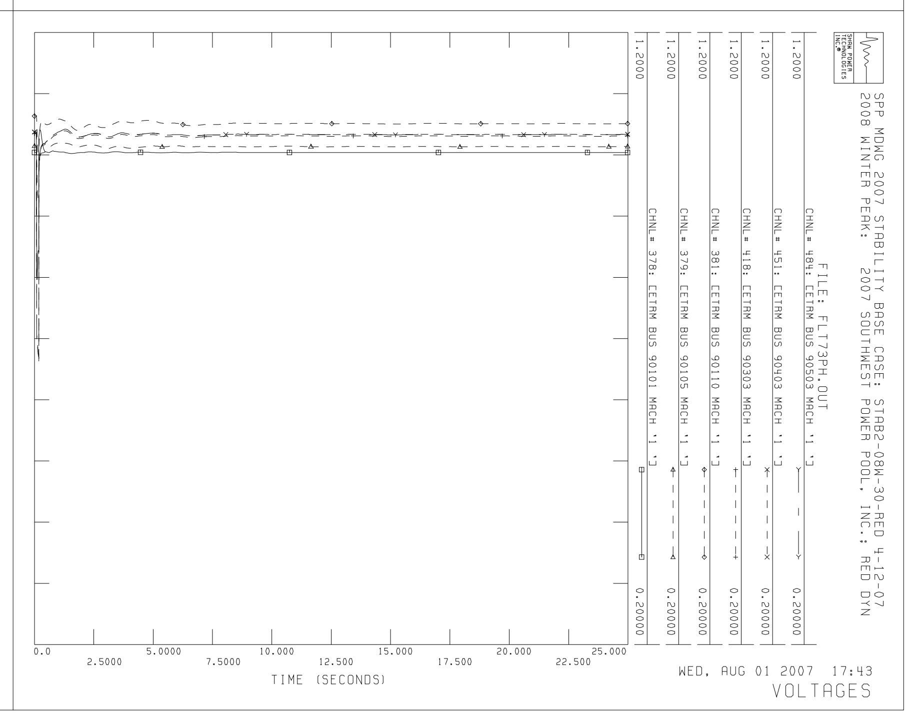
TIME (SECONDS)
WED, AUG 01 2007 17:43
PQ POWER


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT73PH.OUT
CHNL# 621: CSPD BUS 90403 MACH '1 '] 0.02500 0.0
CHNL# 588: CSPD BUS 90303 MACH '1 '] 0.02500 0.0
CHNL# 555: CSPD BUS 90203 MACH '1 '] 0.02500 0.0
CHNL# 111: CPOWR BUS 90403 MACH '1 '] 0.05000 0.0
CHNL# 78: CPOWR BUS 90303 MACH '1 '] 0.05000 0.0
CHNL# 45: CPOWR BUS 90203 MACH '1 '] 0.05000 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)
WED, AUG 01 2007 17:43
STUDY PROJ PELEC AND SPEE


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT73PH.OUT
CHNL# 484: CETRM BUS 90503 MACH '1 '] 1.2000 0.20000
CHNL# 451: CETRM BUS 90403 MACH '1 '] 1.2000 0.20000
CHNL# 418: CETRM BUS 90303 MACH '1 '] 1.2000 0.20000
CHNL# 381: CETRM BUS 90110 MACH '1 '] 1.2000 0.20000
CHNL# 379: CETRM BUS 90105 MACH '1 '] 1.2000 0.20000
CHNL# 378: CETRM BUS 90101 MACH '1 '] 1.2000 0.20000
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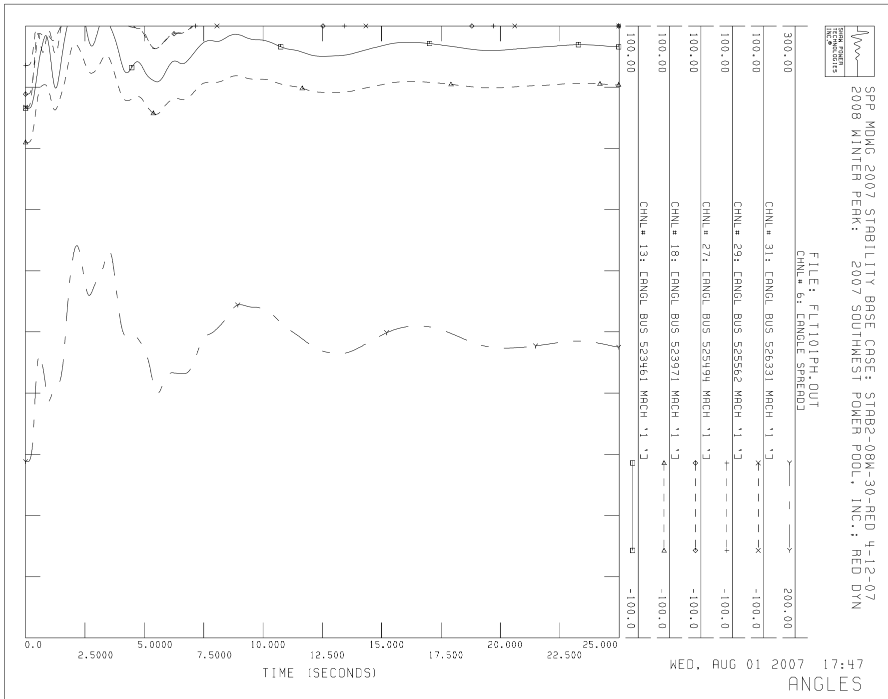
VOLTAGES


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
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CHNL# 6: [ANGLE SPREAD]
CHNL# 31: [ANGL BUS 526331 MACH '1 ']
CHNL# 29: [ANGL BUS 525562 MACH '1 ']
CHNL# 27: [ANGL BUS 525494 MACH '1 ']
CHNL# 18: [ANGL BUS 523971 MACH '1 ']
CHNL# 13: [ANGL BUS 523461 MACH '1 ']
300.00 200.00
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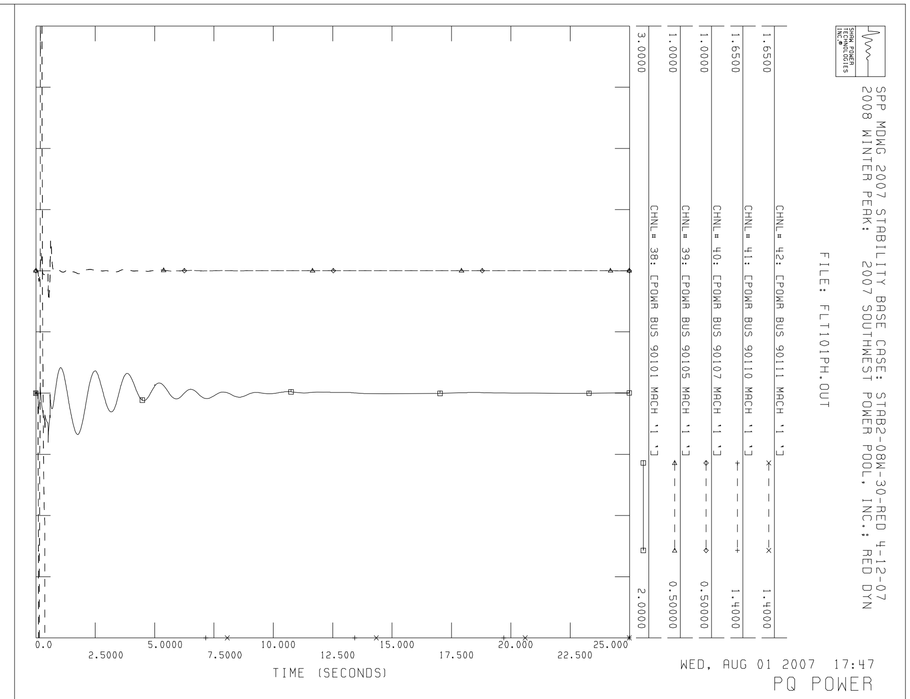
TIME (SECONDS)
WED, AUG 01 2007 17:47
ANGLES

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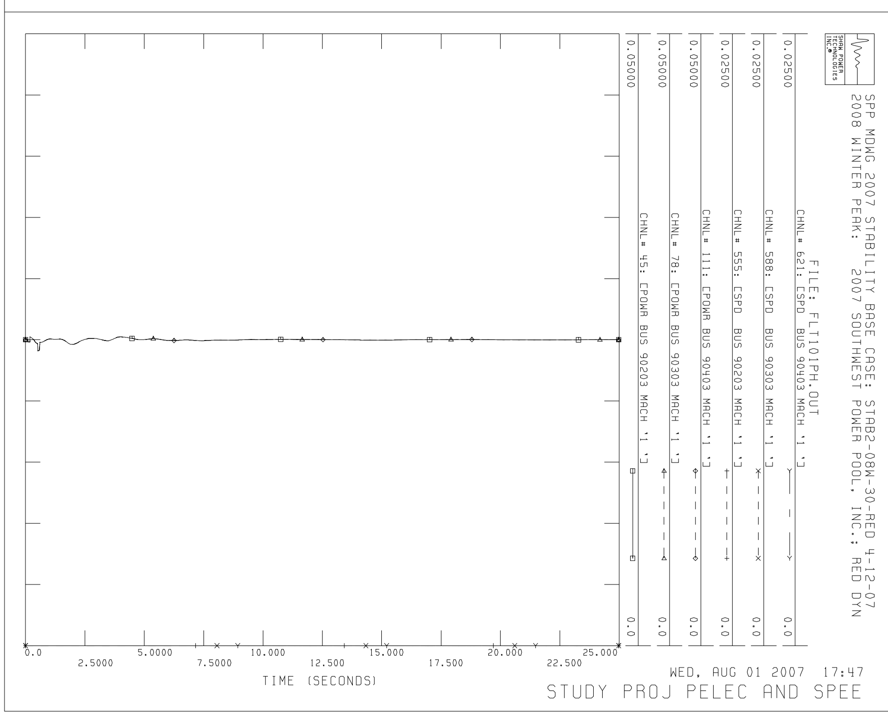
CHNL# 41: [POWR BUS 90110 MACH '1 ']
CHNL# 40: [POWR BUS 90107 MACH '1 ']
CHNL# 39: [POWR BUS 90105 MACH '1 ']
CHNL# 38: [POWR BUS 90101 MACH '1 ']
1.6500 1.4000
1.0000 0.50000
3.0000 2.0000
TIME (SECONDS)
WED, AUG 01 2007 17:47
PQ POWER

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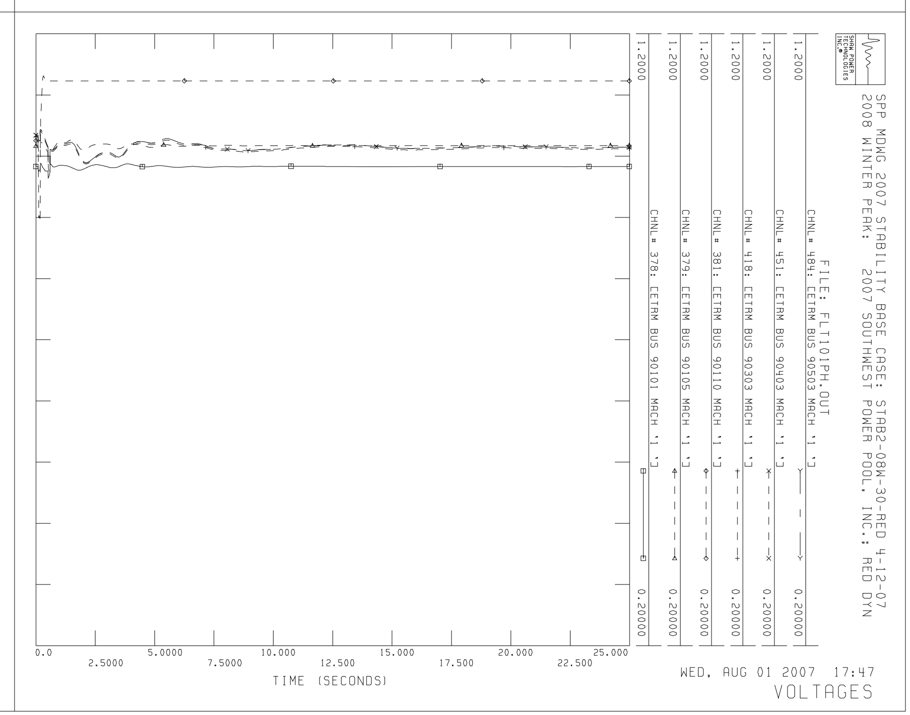
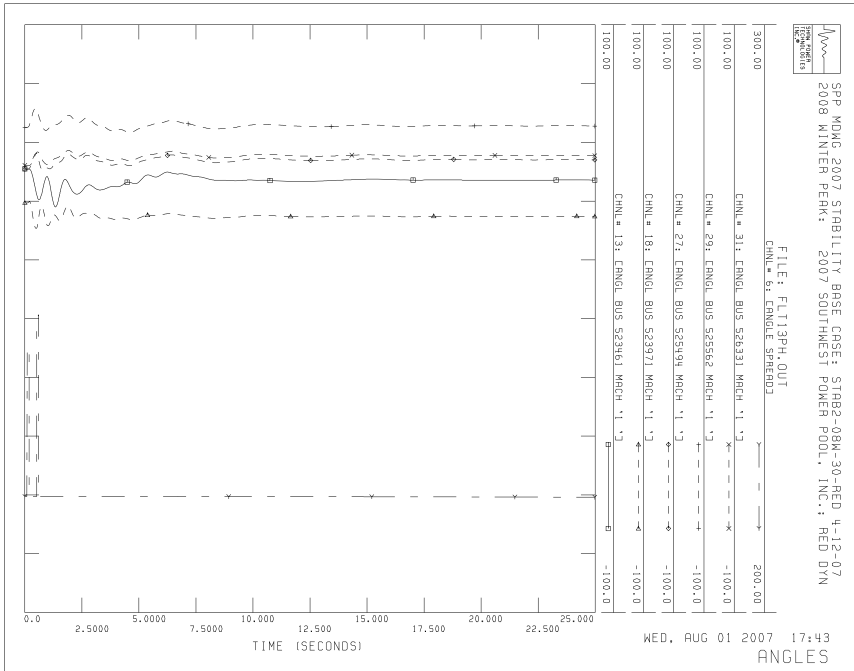
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.: RED DYN
FILE: FLT101PH.OUT
CHNL# 621: [SPD BUS 90403 MACH '1 ']
CHNL# 588: [SPD BUS 90303 MACH '1 ']
CHNL# 555: [SPD BUS 90203 MACH '1 ']
CHNL# 111: [POWR BUS 90403 MACH '1 ']
CHNL# 78: [POWR BUS 90303 MACH '1 ']
CHNL# 45: [POWR BUS 90203 MACH '1 ']
0.02500 0.05000 0.0
TIME (SECONDS)
WED, AUG 01 2007 17:47
STUDY PROJ PELEC AND SPEE

SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.: RED DYN
FILE: FLT101PH.OUT
CHNL# 484: [ETRM BUS 90503 MACH '1 ']
CHNL# 451: [ETRM BUS 90403 MACH '1 ']
CHNL# 418: [ETRM BUS 90303 MACH '1 ']
CHNL# 381: [ETRM BUS 90110 MACH '1 ']
CHNL# 379: [ETRM BUS 90105 MACH '1 ']
CHNL# 378: [ETRM BUS 90101 MACH '1 ']
1.2000 0.20000
TIME (SECONDS)
WED, AUG 01 2007 17:47
VOLTAGES

APPENDIX B.

SELECTED STABILITY PLOTS -- 2012 SUMMER PEAK

All plots available on request.


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT13PH.OUT
CHNL# 6: [ANGLE SPREAD]
CHNL# 13: [ANGL BUS 523461 MACH '1 ']
CHNL# 18: [ANGL BUS 523971 MACH '1 ']
CHNL# 27: [ANGL BUS 525494 MACH '1 ']
CHNL# 29: [ANGL BUS 525562 MACH '1 ']
CHNL# 31: [ANGL BUS 526331 MACH '1 ']
TIME (SECONDS)
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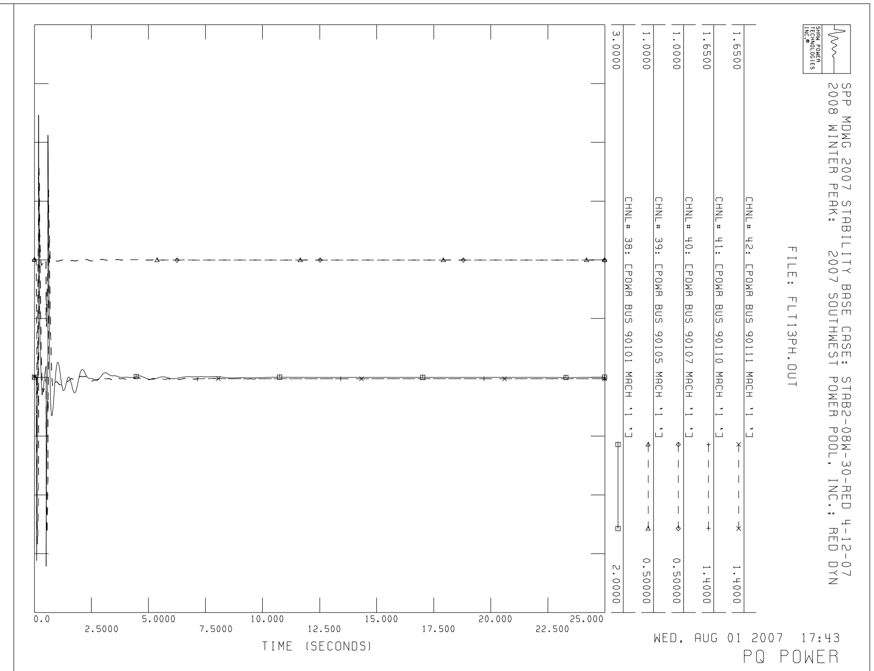
ANGLES

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2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT13PH.OUT
CHNL# 38: [POWR BUS 90101 MACH '1 ']
CHNL# 39: [POWR BUS 90105 MACH '1 ']
CHNL# 40: [POWR BUS 90107 MACH '1 ']
CHNL# 41: [POWR BUS 90110 MACH '1 ']
CHNL# 42: [POWR BUS 90111 MACH '1 ']
TIME (SECONDS)
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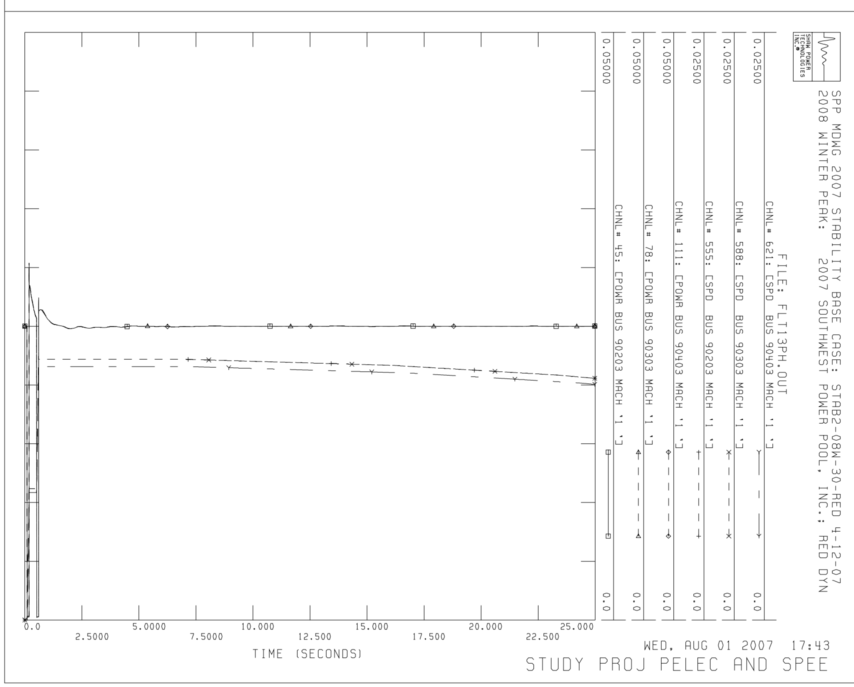
PQ POWER

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FILE: FLT13PH.OUT
CHNL# 45: [POWR BUS 90203 MACH '1 ']
CHNL# 78: [POWR BUS 90303 MACH '1 ']
CHNL# 111: [POWR BUS 90403 MACH '1 ']
CHNL# 555: [SPD BUS 90203 MACH '1 ']
CHNL# 588: [SPD BUS 90303 MACH '1 ']
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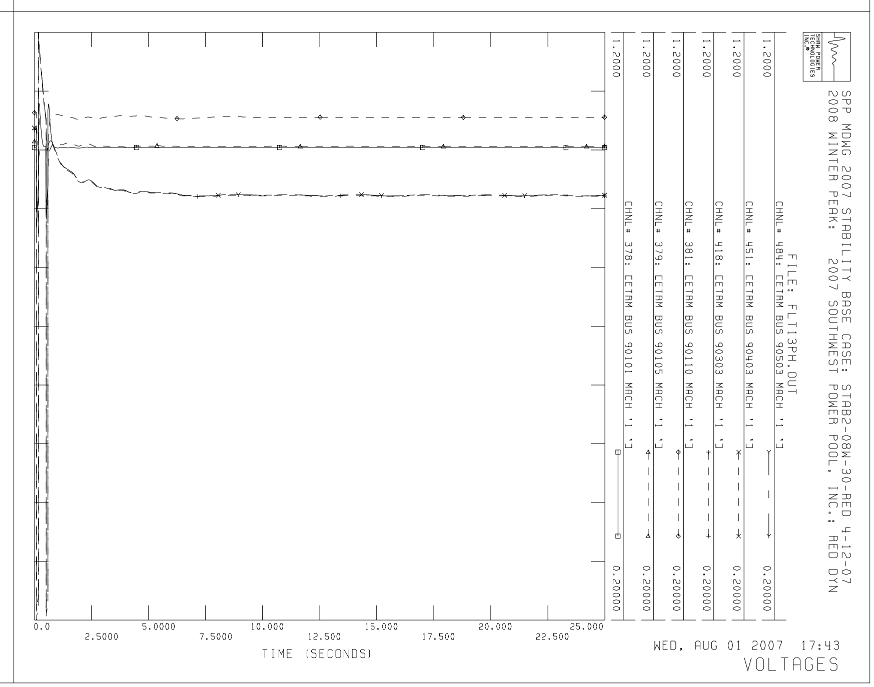
TIME (SECONDS)
WED, AUG 01 2007 17:43
STUDY PROJ PELEC AND SPEE

SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT13PH.OUT
CHNL# 378: [ETRM BUS 90101 MACH '1 ']
CHNL# 379: [ETRM BUS 90105 MACH '1 ']
CHNL# 381: [ETRM BUS 90110 MACH '1 ']
CHNL# 418: [ETRM BUS 90303 MACH '1 ']
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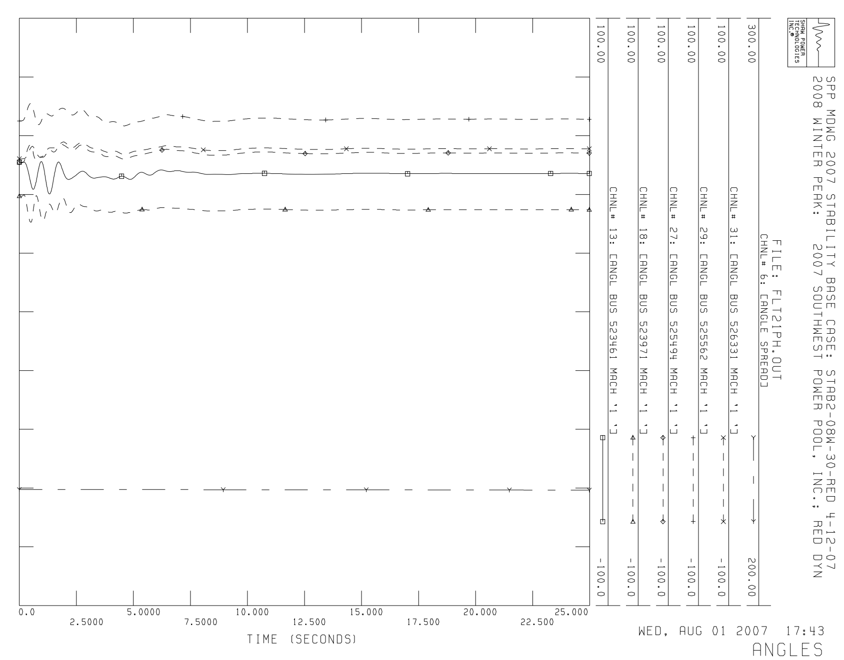
WED, AUG 01 2007 17:43
VOLTAGES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FILE: FLT21PH.OUT
CHNL# 6: [ANGLE SPREAD]
300.00
200.00
CHNL# 31: [ANGL BUS 526311 MACH '1 ']
100.00
-100.0
CHNL# 29: [ANGL BUS 525562 MACH '1 ']
100.00
-100.0
CHNL# 27: [ANGL BUS 525494 MACH '1 ']
100.00
-100.0
CHNL# 18: [ANGL BUS 523971 MACH '1 ']
100.00
-100.0
CHNL# 13: [ANGL BUS 523461 MACH '1 ']
100.00
-100.0
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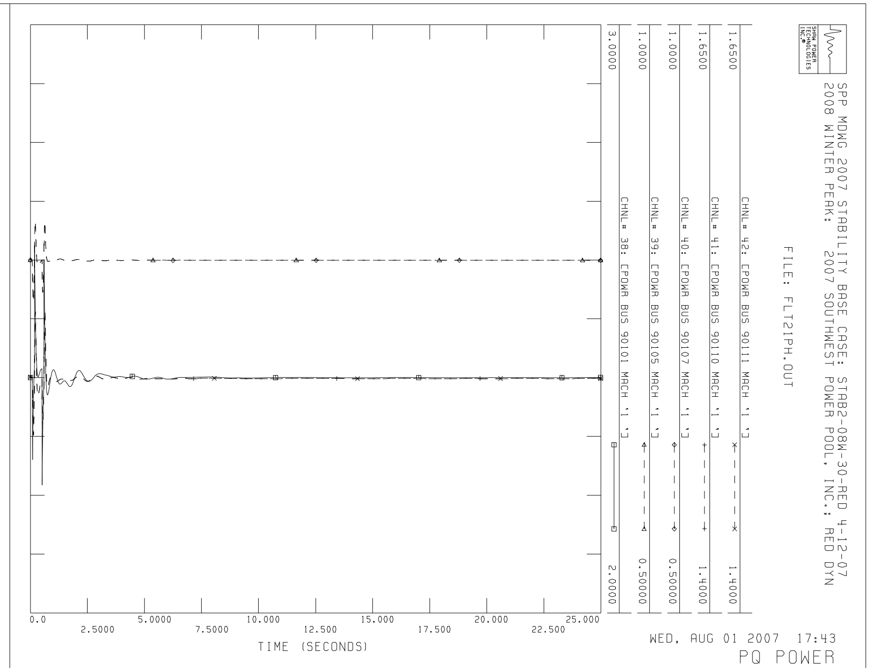
TIME (SECONDS)
WED, AUG 01 2007 17:43
ANGLES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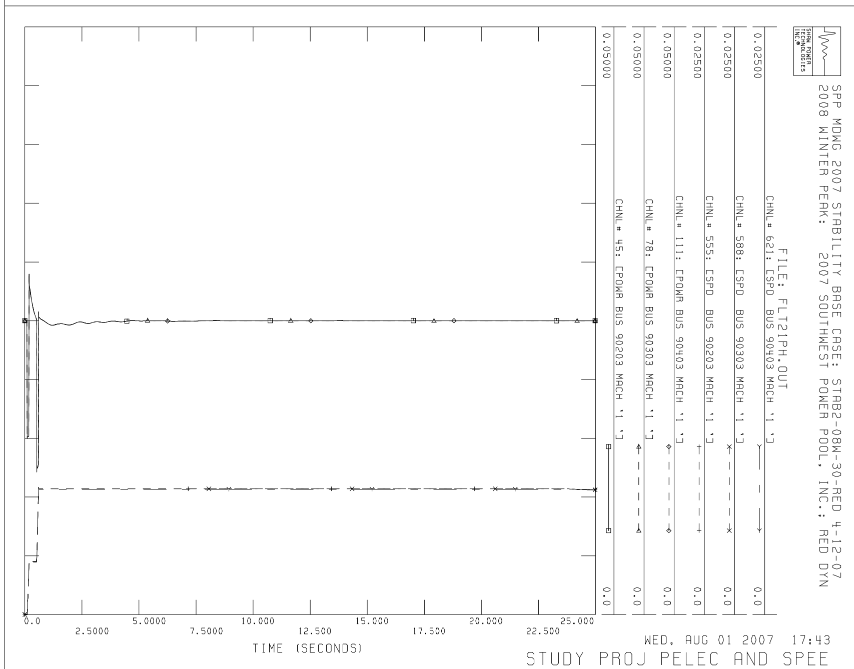
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT21PH.OUT
CHNL# 42: [POWR BUS 90111 MACH '1 ']
1.6500
1.4000
CHNL# 41: [POWR BUS 90110 MACH '1 ']
1.6500
1.4000
CHNL# 40: [POWR BUS 90107 MACH '1 ']
1.0000
0.50000
CHNL# 39: [POWR BUS 90105 MACH '1 ']
1.0000
0.50000
CHNL# 38: [POWR BUS 90101 MACH '1 ']
3.0000
2.0000
0.0 2.5000 5.0000 7.5000 10.000 12.500 15.000 17.500 20.000 22.500 25.000
TIME (SECONDS)
WED, AUG 01 2007 17:43
PQ POWER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FILE: FLT21PH.OUT
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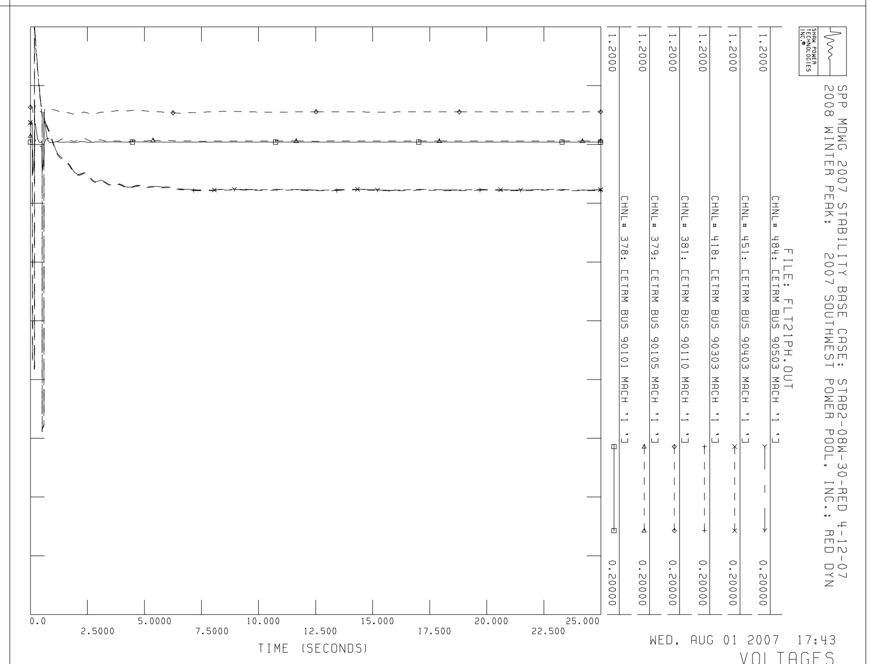
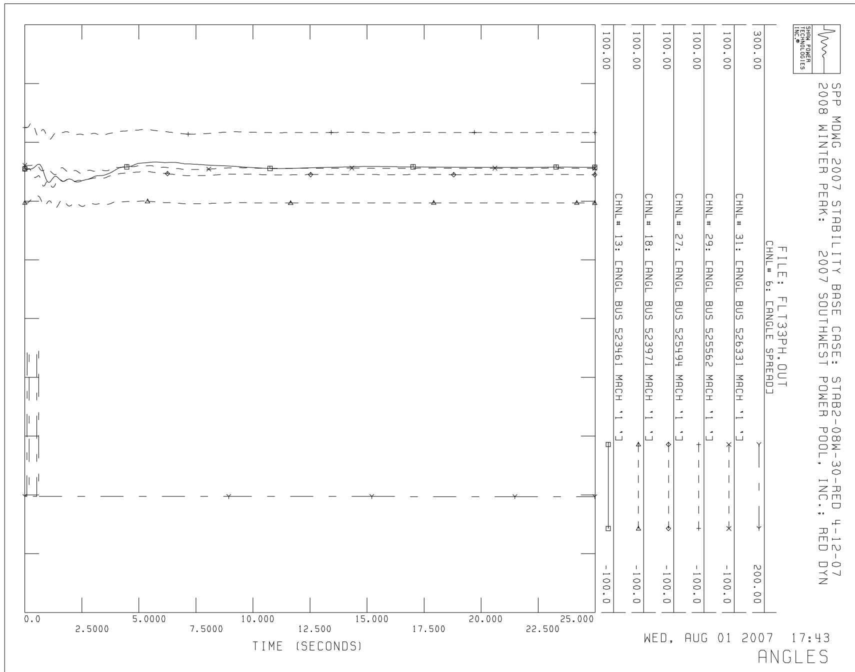
0.0
CHNL# 588: [SPD BUS 90303 MACH '1 ']
0.02500
0.0
CHNL# 555: [SPD BUS 90203 MACH '1 ']
0.02500
0.0
CHNL# 111: [POWR BUS 90403 MACH '1 ']
0.05000
0.0
CHNL# 78: [POWR BUS 90303 MACH '1 ']
0.05000
0.0
CHNL# 45: [POWR BUS 90203 MACH '1 ']
0.05000
0.0
0.0 2.5000 5.0000 7.5000 10.000 12.500 15.000 17.500 20.000 22.500 25.000
TIME (SECONDS)
WED, AUG 01 2007 17:43
STUDY PROJ PELEC AND SPEE


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT21PH.OUT
CHNL# 484: [ETRM BUS 90503 MACH '1 ']
1.2000
0.20000
CHNL# 451: [ETRM BUS 90403 MACH '1 ']
1.2000
0.20000
CHNL# 418: [ETRM BUS 90303 MACH '1 ']
1.2000
0.20000
CHNL# 381: [ETRM BUS 90110 MACH '1 ']
1.2000
0.20000
CHNL# 379: [ETRM BUS 90105 MACH '1 ']
1.2000
0.20000
CHNL# 378: [ETRM BUS 90101 MACH '1 ']
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)
WED, AUG 01 2007 17:43
VOLTAGES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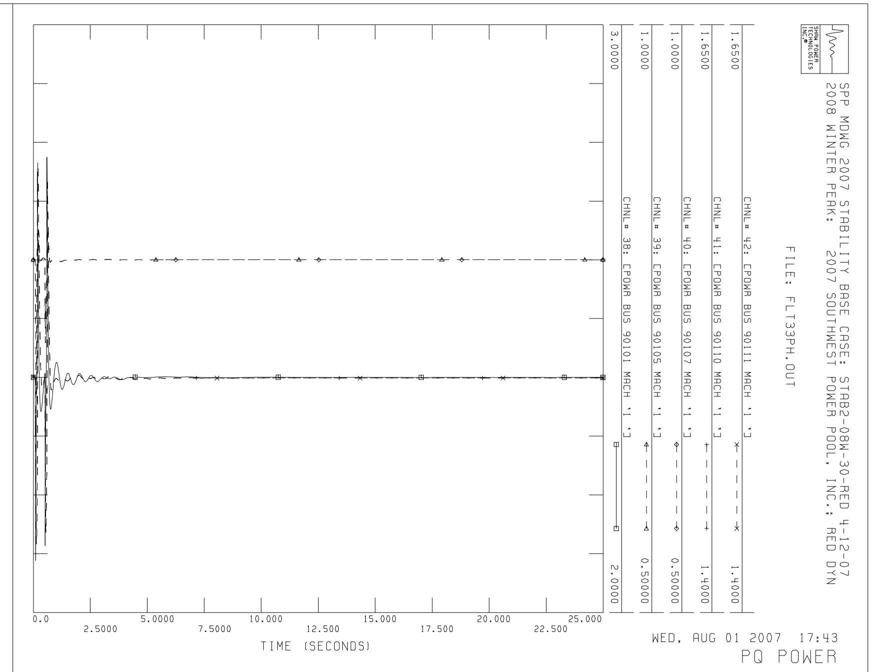
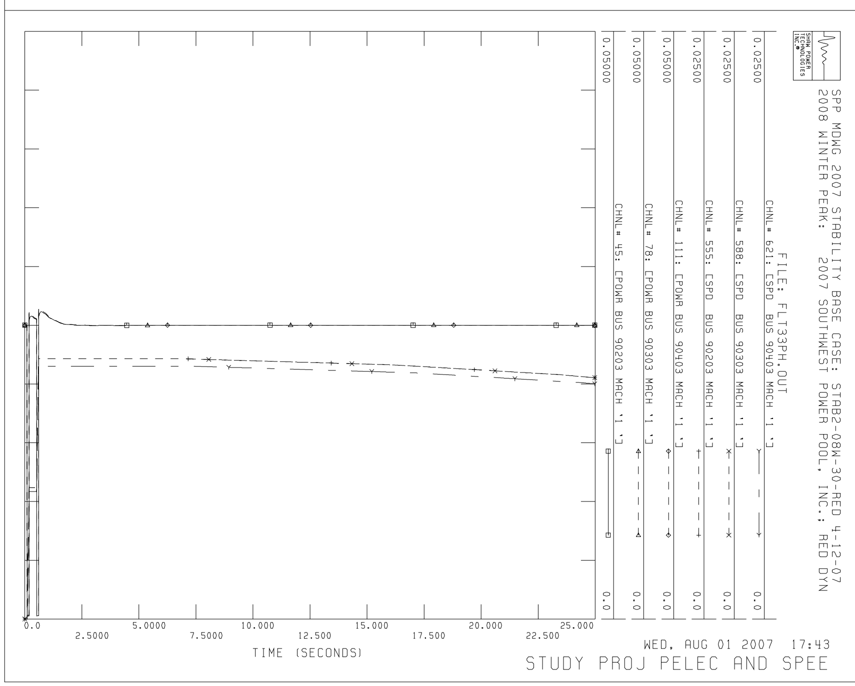
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT33PH.OUT
CHNL# 6: [ANGLE SPREAD] 300.00 200.00
CHNL# 31: [ANGL BUS 526331 MACH '1 '] 100.00 -100.0
CHNL# 29: [ANGL BUS 525562 MACH '1 '] 100.00 -100.0
CHNL# 27: [ANGL BUS 525494 MACH '1 '] 100.00 -100.0
CHNL# 18: [ANGL BUS 523971 MACH '1 '] 100.00 -100.0
CHNL# 13: [ANGL BUS 523461 MACH '1 '] 100.00 -100.0
TIME (SECONDS)
WED, AUG 01 2007 17:43
ANGLES


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT33PH.OUT
CHNL# 42: [POWR BUS 90111 MACH '1 '] 1.6500 1.4000
CHNL# 41: [POWR BUS 90110 MACH '1 '] 1.6500 1.4000
CHNL# 40: [POWR BUS 90107 MACH '1 '] 1.0000 0.50000
CHNL# 39: [POWR BUS 90105 MACH '1 '] 1.0000 0.50000
CHNL# 38: [POWR BUS 90101 MACH '1 '] 3.0000 2.0000
TIME (SECONDS)
WED, AUG 01 2007 17:43
PQ POWER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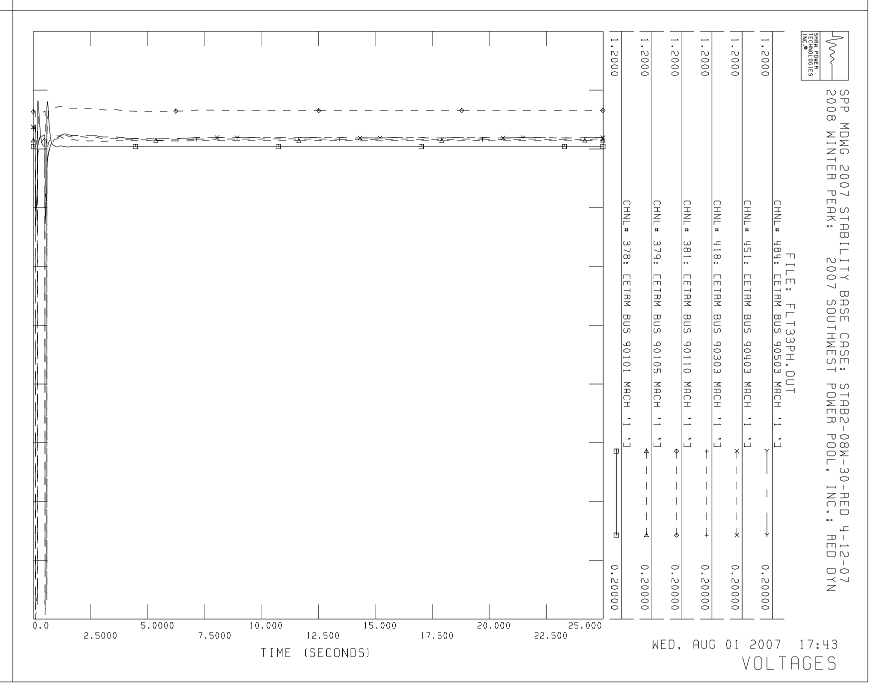
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT33PH.OUT
CHNL# 621: [SPD BUS 90403 MACH '1 '] 0.02500 0.0
CHNL# 588: [SPD BUS 90303 MACH '1 '] 0.02500 0.0
CHNL# 555: [SPD BUS 90203 MACH '1 '] 0.02500 0.0
CHNL# 111: [POWR BUS 90403 MACH '1 '] 0.05000 0.0
CHNL# 78: [POWR BUS 90303 MACH '1 '] 0.05000 0.0
CHNL# 45: [POWR BUS 90203 MACH '1 '] 0.05000 0.0
TIME (SECONDS)
WED, AUG 01 2007 17:43
STUDY PROJ PELEC AND SPEE


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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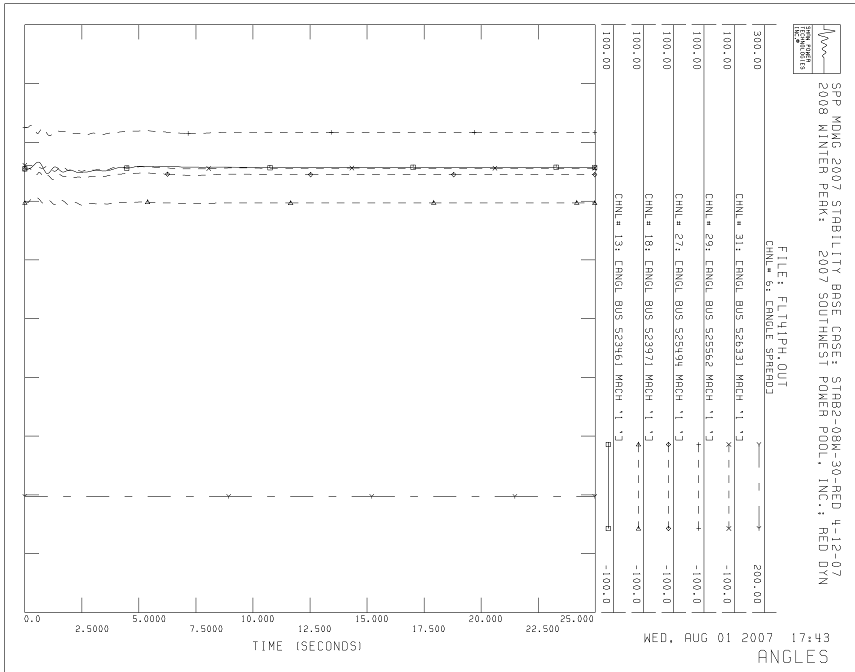
CHNL# 451: [ETRM BUS 90403 MACH '1 '] 1.2000 0.20000
CHNL# 418: [ETRM BUS 90303 MACH '1 '] 1.2000 0.20000
CHNL# 381: [ETRM BUS 90110 MACH '1 '] 1.2000 0.20000
CHNL# 379: [ETRM BUS 90105 MACH '1 '] 1.2000 0.20000
CHNL# 378: [ETRM BUS 90101 MACH '1 '] 1.2000 0.20000
TIME (SECONDS)
WED, AUG 01 2007 17:43
VOLTAGES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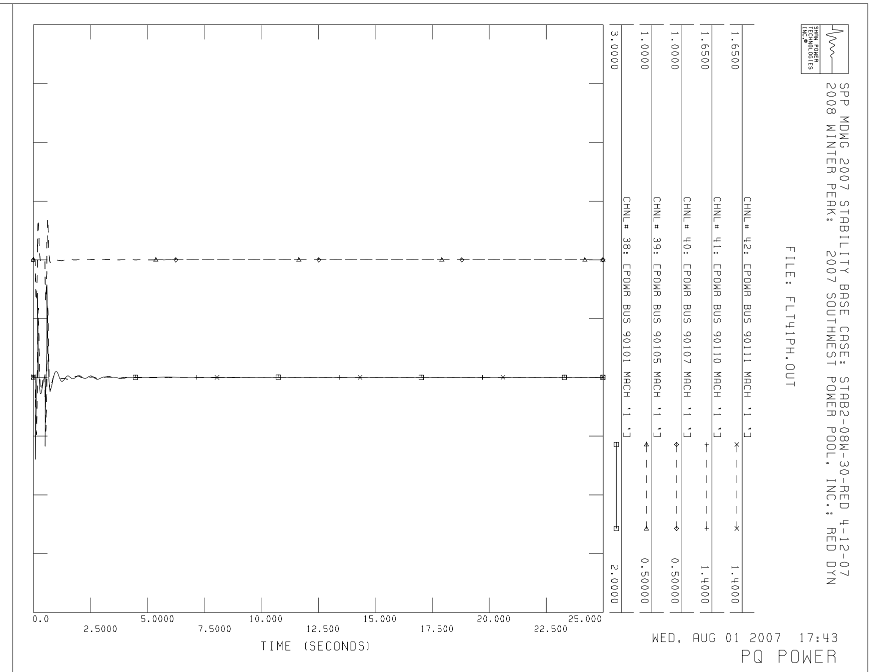
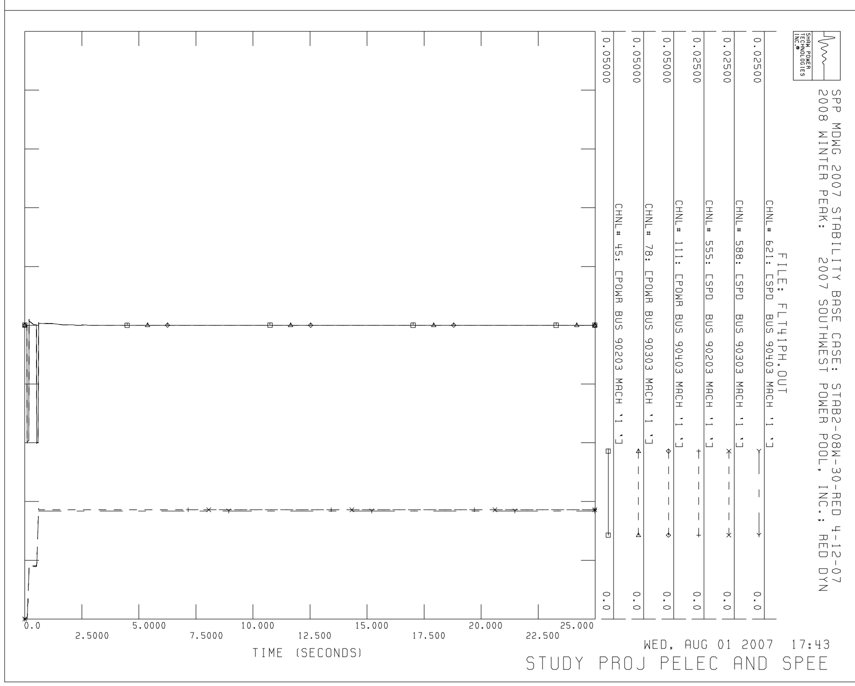
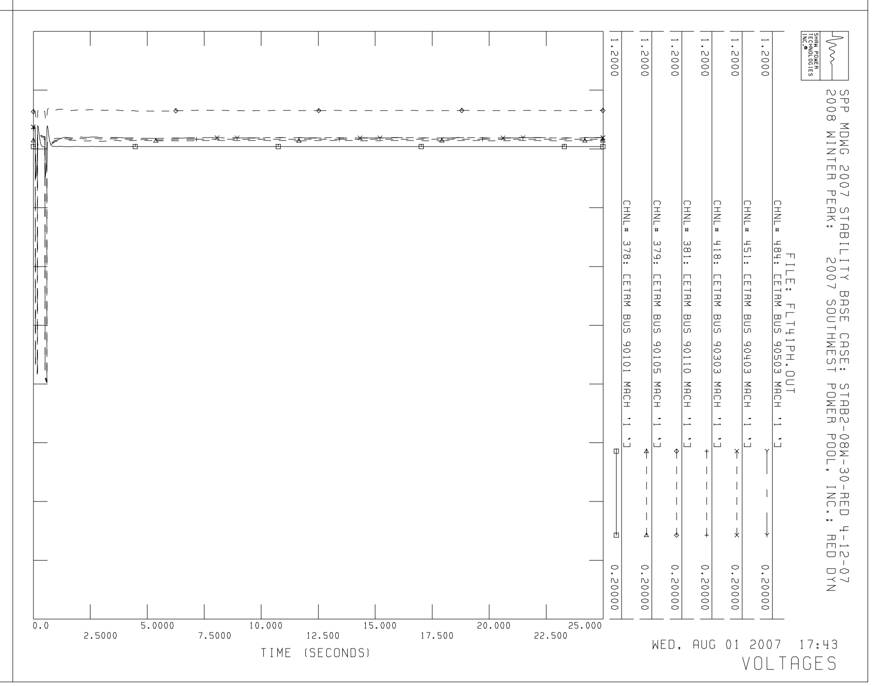
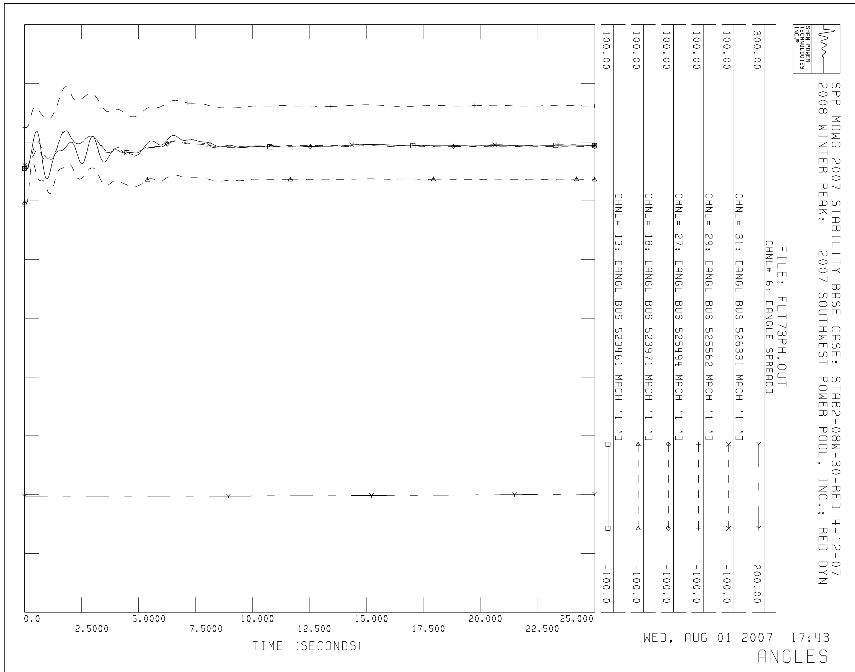
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT41PH.OUT
CHNL# 6: [ANGLE SPREAD]
CHNL# 31: [ANGL BUS 526331 MACH '1 ']
CHNL# 29: [ANGL BUS 525562 MACH '1 ']
CHNL# 27: [ANGL BUS 525494 MACH '1 ']
CHNL# 18: [ANGL BUS 523971 MACH '1 ']
CHNL# 13: [ANGL BUS 523461 MACH '1 ']
TIME (SECONDS)
WED, AUG 01 2007 17:43
ANGLES

SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT41PH.OUT
CHNL# 42: [POWR BUS 90111 MACH '1 ']
CHNL# 41: [POWR BUS 90110 MACH '1 ']
CHNL# 40: [POWR BUS 90107 MACH '1 ']
CHNL# 39: [POWR BUS 90105 MACH '1 ']
CHNL# 38: [POWR BUS 90101 MACH '1 ']
TIME (SECONDS)
WED, AUG 01 2007 17:43
PQ 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: FLT41PH.OUT
CHNL# 621: [SPD BUS 90403 MACH '1 ']
CHNL# 588: [SPD BUS 90303 MACH '1 ']
CHNL# 555: [SPD BUS 90203 MACH '1 ']
CHNL# 111: [POWR BUS 90403 MACH '1 ']
CHNL# 78: [POWR BUS 90303 MACH '1 ']
CHNL# 45: [POWR BUS 90203 MACH '1 ']
TIME (SECONDS)
WED, AUG 01 2007 17:43
STUDY PROJ PELEC AND SPEE

SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT41PH.OUT
CHNL# 484: [ETRM BUS 90503 MACH '1 ']
CHNL# 451: [ETRM BUS 90403 MACH '1 ']
CHNL# 418: [ETRM BUS 90303 MACH '1 ']
CHNL# 381: [ETRM BUS 90110 MACH '1 ']
CHNL# 379: [ETRM BUS 90105 MACH '1 ']
CHNL# 378: [ETRM BUS 90101 MACH '1 ']
TIME (SECONDS)
WED, AUG 01 2007 17:43
VOLTAGES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2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT73PH.OUT
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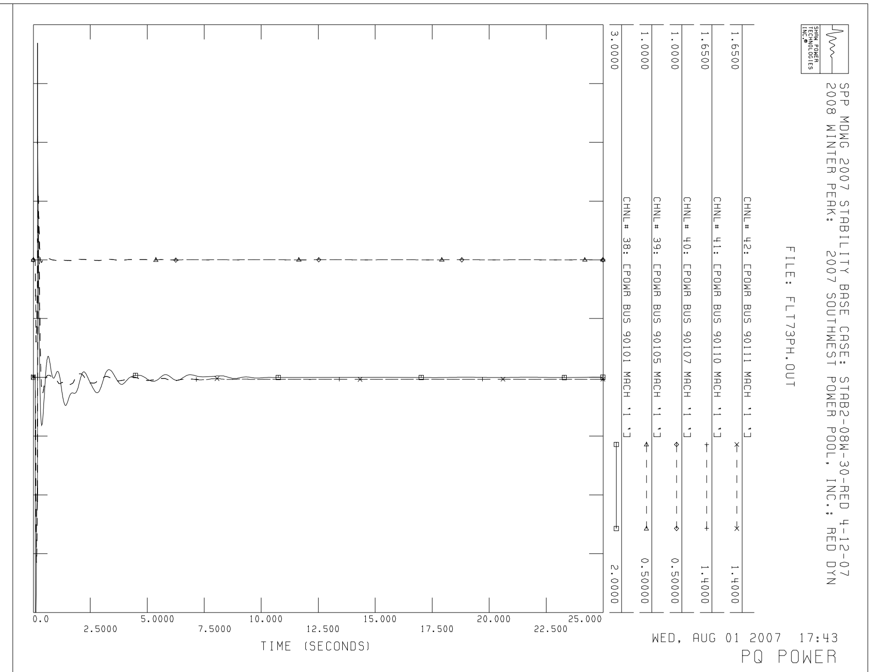
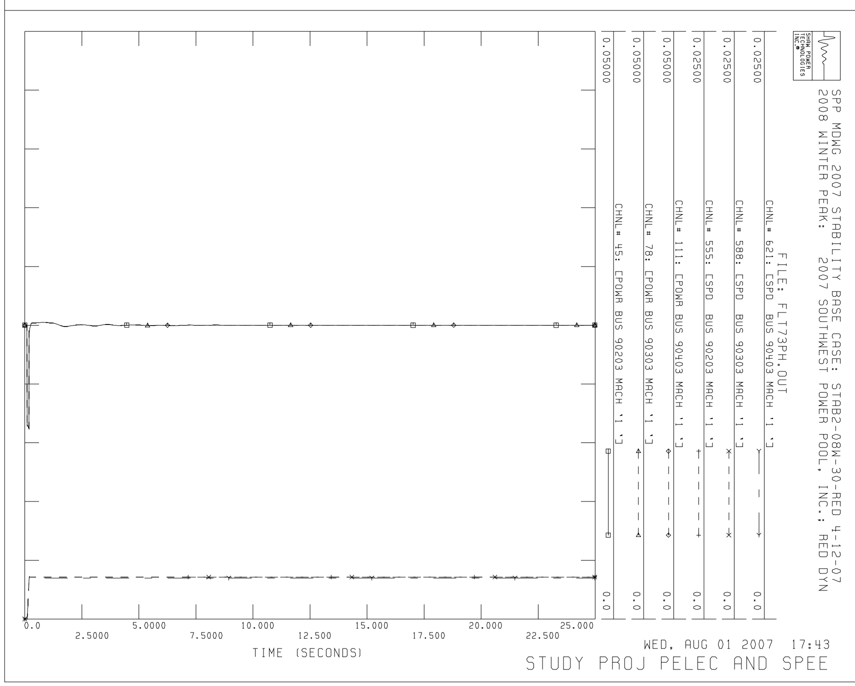
CHNL# 31: [ANGL BUS 526331 MACH '1 ']
CHNL# 29: [ANGL BUS 525562 MACH '1 ']
CHNL# 27: [ANGL BUS 525494 MACH '1 ']
CHNL# 18: [ANGL BUS 523971 MACH '1 ']
CHNL# 13: [ANGL BUS 523461 MACH '1 ']
TIME (SECONDS)
WED, AUG 01 2007 17:43
ANGLES


SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT73PH.OUT
CHNL# 42: [POWR BUS 90111 MACH '1 ']
CHNL# 41: [POWR BUS 90110 MACH '1 ']
CHNL# 40: [POWR BUS 90107 MACH '1 ']
CHNL# 39: [POWR BUS 90105 MACH '1 ']
CHNL# 38: [POWR BUS 90101 MACH '1 ']
TIME (SECONDS)
WED, AUG 01 2007 17:43
PQ 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: FLT73PH.OUT
CHNL# 621: [SPD BUS 90403 MACH '1 ']
CHNL# 588: [SPD BUS 90303 MACH '1 ']
CHNL# 555: [SPD BUS 90203 MACH '1 ']
CHNL# 111: [POWR BUS 90403 MACH '1 ']
CHNL# 78: [POWR BUS 90303 MACH '1 ']
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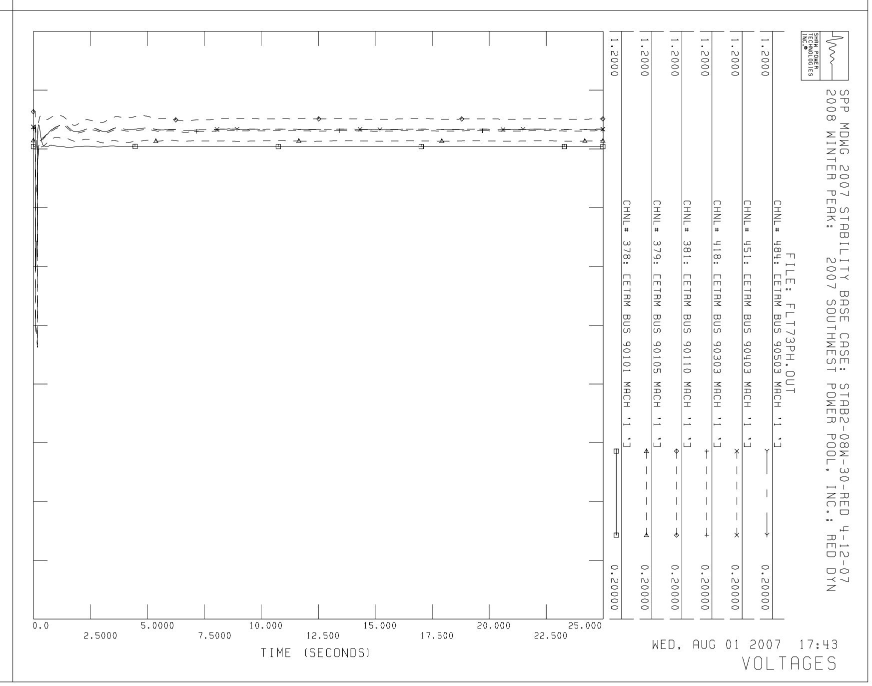
TIME (SECONDS)
WED, AUG 01 2007 17:43
STUDY PROJ PELEC AND SPEE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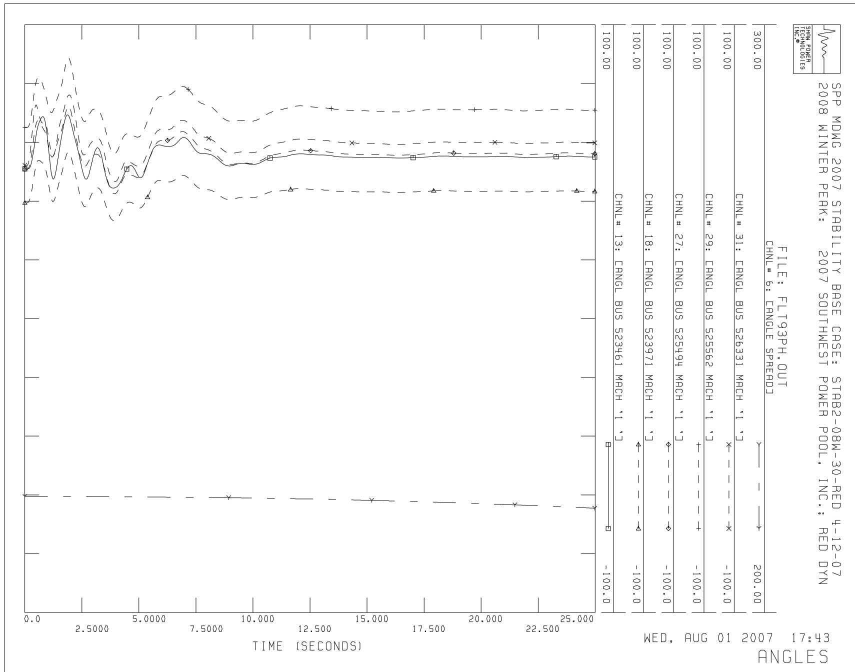
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT73PH.OUT
CHNL# 484: [ETRM BUS 90503 MACH '1 ']
CHNL# 451: [ETRM BUS 90403 MACH '1 ']
CHNL# 418: [ETRM BUS 90303 MACH '1 ']
CHNL# 381: [ETRM BUS 90110 MACH '1 ']
CHNL# 379: [ETRM BUS 90105 MACH '1 ']
CHNL# 378: [ETRM BUS 90101 MACH '1 ']
TIME (SECONDS)
WED, AUG 01 2007 17:43
VOLTAGES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2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT93PH.OUT
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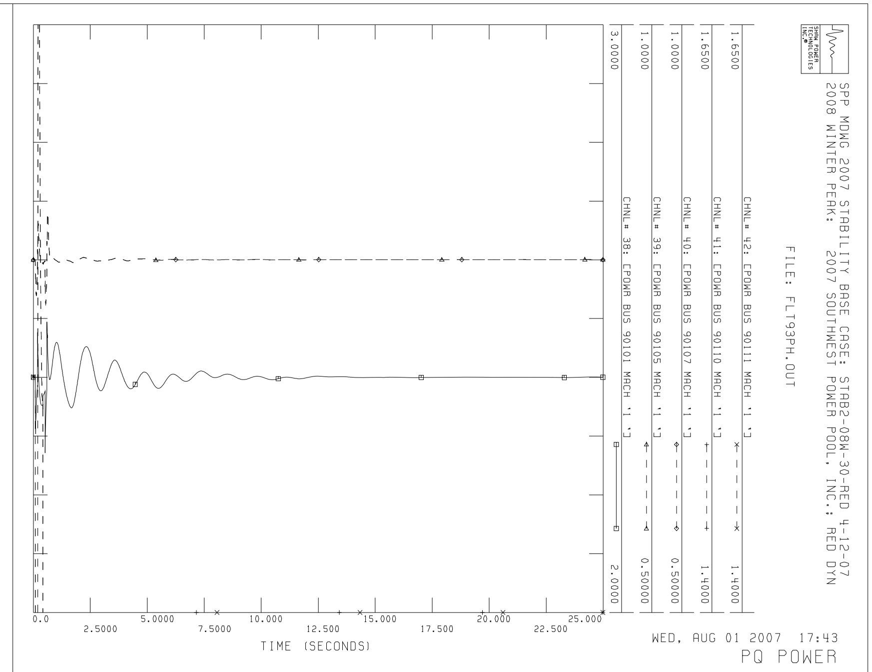
CHNL# 31: [ANGL BUS 526331 MACH '1 '] 100.00 -100.0
CHNL# 29: [ANGL BUS 525562 MACH '1 '] 100.00 -100.0
CHNL# 27: [ANGL BUS 525494 MACH '1 '] 100.00 -100.0
CHNL# 18: [ANGL BUS 523971 MACH '1 '] 100.00 -100.0
CHNL# 13: [ANGL BUS 523461 MACH '1 '] 100.00 -100.0
0.0 2.5000 5.0000 7.5000 10.000 12.500 15.000 17.500 20.000 22.500 25.000
TIME (SECONDS)
WED, AUG 01 2007 17:43
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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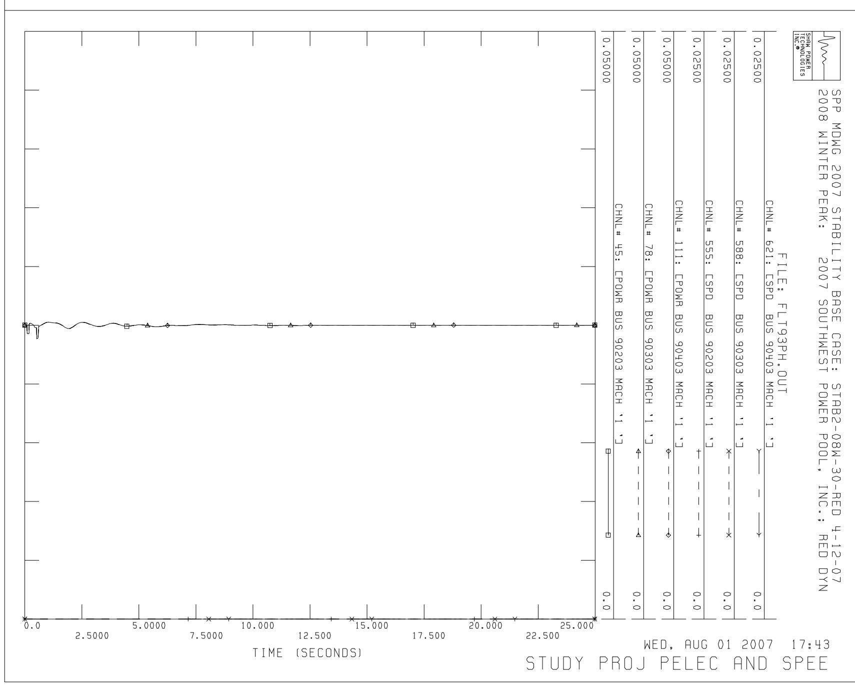
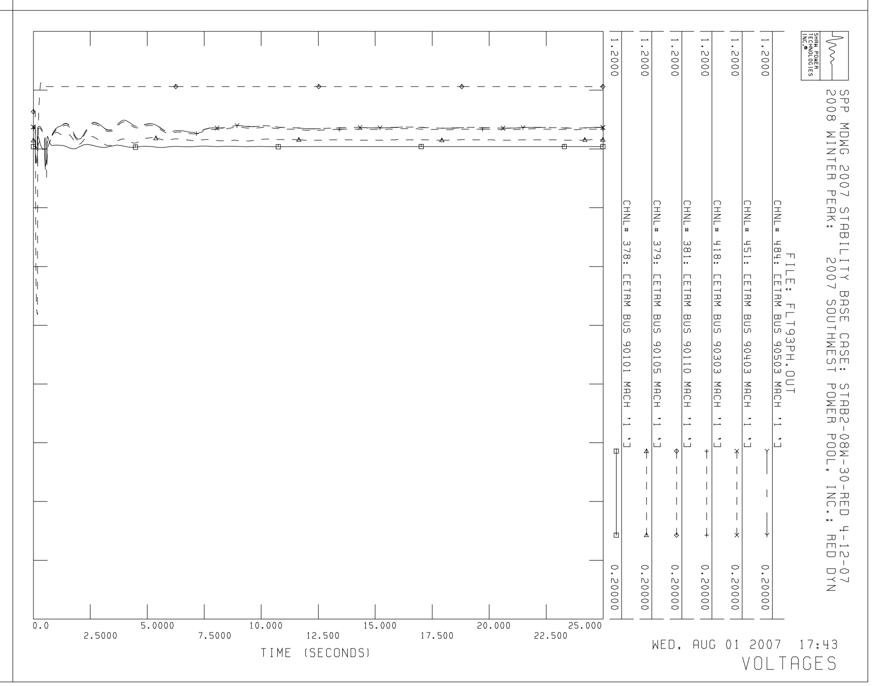
CHNL# 41: [POWR BUS 90110 MACH '1 '] 1.6500 1.4000
CHNL# 40: [POWR BUS 90107 MACH '1 '] 1.0000 0.50000
CHNL# 39: [POWR BUS 90105 MACH '1 '] 1.0000 0.50000
CHNL# 38: [POWR BUS 90101 MACH '1 '] 3.0000 2.0000
0.0 2.5000 5.0000 7.5000 10.000 12.500 15.000 17.500 20.000 22.500 25.000
TIME (SECONDS)
WED, AUG 01 2007 17:43
PQ 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: FLT93PH.OUT
CHNL# 621: [SPD BUS 90403 MACH '1 '] 0.02500 0.0
CHNL# 588: [SPD BUS 90303 MACH '1 '] 0.02500 0.0
CHNL# 555: [SPD BUS 90203 MACH '1 '] 0.02500 0.0
CHNL# 111: [POWR BUS 90403 MACH '1 '] 0.05000 0.0
CHNL# 78: [POWR BUS 90303 MACH '1 '] 0.05000 0.0
CHNL# 45: [POWR BUS 90203 MACH '1 '] 0.05000 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)
WED, AUG 01 2007 17:43
STUDY PROJ PELEC AND SPEE

SPP MDWG 2007 STABILITY BASE CASE: STAB2-08W-30-RED 4-12-07
2008 WINTER PEAK: 2007 SOUTHWEST POWER POOL, INC.; RED DYN
FILE: FLT93PH.OUT
CHNL# 484: [ETRM BUS 90503 MACH '1 '] 1.2000 0.20000
CHNL# 451: [ETRM BUS 90403 MACH '1 '] 1.2000 0.20000
CHNL# 418: [ETRM BUS 90303 MACH '1 '] 1.2000 0.20000
CHNL# 381: [ETRM BUS 90110 MACH '1 '] 1.2000 0.20000
CHNL# 379: [ETRM BUS 90105 MACH '1 '] 1.2000 0.20000
CHNL# 378: [ETRM BUS 90101 MACH '1 '] 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)
WED, AUG 01 2007 17:43
VOLTAGES