Design Analysis

Ginna Station

4525-2

Adequacy of Electric System Voltages

Rochester Gas and Electric Corporation

89 East Avenue

Rochester, New York 14649

EWR 4525

Revision 1

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Prepared by: W C Roy 8/13/90
DATE

Electrical Engineer

Reviewed by: Paul M. Swift Theodore H. Miller 8-14-90
DATE

Electrical Engineer

Approved by: Charles A. Forbell Jr 8·15·90
DATE

Manager, Electrical Engineering

REVISION STATUS SHEET

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Design Analysis

1.0 Objective

1.1 This analysis supersedes the original design analysis titled "Offsite Power Reconfiguration, Adequacy of Offsite Power Sources for System Voltage Regulation", EWR 4525, Rev. 0, dated March 16, 1989. This analysis incorporates and updates the results of the first analysis, and includes additional case studies on the adequacy of the proposed reconfiguration.

1.2 The primary objective of this analysis is to demonstrate that the reconfiguration of the Ginna offsite power supply will be capable of maintaining adequate voltage regulation for all required operating conditions.

1.3 The offsite power reconfiguration will allow dedicated use of line 751 and/or line 767 as the offsite power sources. The normal 50/50 configuration will have circuit 751 supplying power to bus 12A via Transformer 12A and circuit 767 supplying power to bus 12B via Transformer 12B. This study will also demonstrate the ability of each offsite source to supply Bus 12A and 12B simultaneously.

1.4 The Ginna Station offsite power sources and onsite power distribution system, including all electrical loads, have been modeled using the PSS/U (Power System Simulator) computer software program. The program and model are used to simulate the operating conditions of the system. For variations in load, supply voltage, and switching configuration, the program calculates bus voltages and power flows throughout the system. This study will utilize the Ginna models and this program to determine bus voltages for expected normal and "worst case" system conditions. These results will be analyzed to show voltage regulation for all operating conditions at Ginna Station.

1.5 Many cases were run to analyze station voltages for various operating conditions. The cases used in this analysis are representative of the range of conditions that could potentially occur at Ginna Station. The objective is to show that the offsite system is adequate for the most extreme voltage and load conditions, with the conclusion that it is then appropriate for all other operating conditions.

1.6 Cases analyzed to demonstrate the possible range of bus voltages for all operating conditions follows:

Line 767 (100/0) as a preferred power source: Highest voltage conditions (high grid, light load), lowest voltage conditions (low grid, heavy load), safety injection pump start (shutdown), reactor coolant pump (RCP) start, and Feedwater Pump start are simulated. A Loss of Coolant Accident (LOCA) scenario was also simulated.

Line 751 (0/100) as a preferred power source:Same cases as with Line 767 as source.

Normal (50/50) Configuration. Highest voltage conditions only (high grid, light load). The 50/50 mode is the more limiting case for high voltage conditions while the 100/0 and 0/100 modes are more limiting for the low voltage conditions. This 50/50 configuration is modeled with two separate cases, 1 for each offsite source.

1.7 Based on the results, these analyses will determine and recommend tap settings for the 12A and 12B transformers that will provide the optimum voltage regulation for all conditions, as well as recommend the setting of the voltage regulator at Station 204.

1.8 Worst case load conditions will also be analyzed to assure that current and power ratings of new equipment is sufficient to carry the heaviest loads modelled.

2.0 <u>Design Inputs</u>

2.1 Design Criteria, EWR 4525, Offsite Power Reconfiguration, Revision 4, December 8, 1989.

2.2 NUREG-0800, USNRC Standard Review Plan, Section 8.2 Offsite Power

2.3 R.E. Ginna Nuclear Power Plant, Updated Final Safety Analysis Report, Chapter 8, Electric Power

2.4 Design Analysis 1444-2, EWR 1444, Class 1E Bus Voltage Profile, Rev. 1, April 15, 1989.

2.5 Design Analysis, 4525-3, EWR 4525, PSS/U Load Flow Model Validation, Rev. 0, May 5, 1989.

3.0 Referenced Documents

3.1 PSS/U Users Manual, Rev. 3.1 and Rev 4.0, Power Technologies, Inc.

3.2 Letter, L.D. White, RG&E to D.M. Crutchfield, NRC, Subject: Adequacy of System Electric Distribution System Voltages, December 6, 1979

3.3 Letter L.D. White of RG&E to D. Crutchfield of USNRC Commission dated September 30, 1981, Adequacy of Station Electric Distribution Systems Voltages

3.4 I/O Correspondence D. Shields to Paul Swift, April 11, 1989 "SCADA Voltage Limits for Stations 13A and 204"

3.5 I/O Correspondence, D. Shields to B. Hunn, May 23, 1988, "115 kv voltages at Station 13A and 34.5 kv voltages at Station 204 for the year 1987 from the SCADA database"

3.6 I/O Correspondence, P. Callahan to G. Link, "Ginna Offsite Power Voltage Regulation", November 9, 1988

3.7 R.E. Ginna Nuclear Power Plant Technical Specifications

3.8 Westinghouse Instruction and Operating Book - Controlled Leakage Seal Reactor Coolant Pump, Rev. 2, September 1978, Westinghouse Drawing No. 618J708 - Shaft Seal Pump.

3.9 EWR 2810 File - Electric Recording Instrumentation Test - Strip Chart tabulations of data recorded at Ginna Station, during 1980.

3.10 I/O Correspondence, J. Bass to Paul Swift, "Circuits 751 and 767 Rating Sheets", November 16, 1989.

3.11 Reactor Coolant Pump Operation Procedure S-2.1

3.12 Design Analysis, 4525-3B, EWR 4525, PSS/U Load Flow Model Validation, Rev. 0, August 15, 1990.

4.0 Assumptions

4.1 The model of the Ginna Station power supply being used has been developed over time and verified to be an accurate representation of the power system. The system is modeled as designed by the offsite power reconfiguration option 5, as shown in the sketch in attachment 1. Line 767 supplies transformer 12B, and line 751 supplies transformer 12A as the offsite power

sources. The system components, including transformers, cables, machines and loads have all been modeled based on actual system data. Ginna Station's power system was modeled from two sources - Station 204 (line 751) and Station 13A (line 767). These are modeled as two separate base cases depending on which source is being used. The Ginna model was built using real system data, including nameplates, manufacturer's test reports, and actual field test data. Where actual data was not available, typical values were used. Separate design analysis (Ref. 2.5 and 3.12) demonstrate the validity of the models and the results produced by PSS/U using this model. Comparisons and past operating experience show the results of this program to be accurate for the input conditions.

4.2 To more accurately utilize the PSS/U program for modeling the offsite sources, the power system is broken into two separate models, one for each source. The "E" cases are modeled to Station 13A (115KV), and the "D" cases to Station 204 (34.5KV). This provides the most accurate representation as all system data is known from these stations to the Ginna loads, and the data used to model these stations as sources is known. This eliminates having to model an outside equivalent transmission system tieing the stations together, which would have less known data as a basis. Since this study is only concerned with the adequacy of the offsite sources, the Ginna generator and Transformer 11 (UAT) are also removed from the case. The offsite source data is modified to accurately reflect the status and operating conditions of Ginna for each case.

4.3 Representations of worst case conditions were simulated for the various studies to maintain conservatism in the model. Because plant loads can vary from moment to moment, representative loads were selected based on past modeling experience, daily log sheets, and actual test data.

4.4 The adequacy of the sources will be determined for each solved case by checking the system bus voltages. The Design Criteria steady state voltage limits are as follows: (See Ref. 2.1, section 17.4.2.1)

Aux. Feedwater Pumps	396v - 484v
Service Water Pumps	396v - 515v
All other 1E motors	414v - 528v
460v Non-1E motors	414v - 506v
440v Non-1E motors	396v - 484v
4160 volt system	3600v - 4400v

Design Analysis 1444-2 (Ref. 2.4) shows the technical basis for these numbers, and they are again verified in Ref. 3.2. However, Ref. 2.4 recommends a high voltage limit of 505 volts, and for the operator to take corrective action above this point to preclude approaching high voltage limits. This analysis will use 414 as the lowest acceptable voltage level for steady state operation, and 505 volts will be used as a desirable high level to preclude operator action. Any voltages above 505 volts will be evaluated to ensure that the level of overvoltage and the operating circumstances will not cause any equipment problems in the short time it would be maintained until the operator's action reduced it to below 505 volts.

The only two motor types that have voltage limitations that will not be adequate for the 414v-505v criteria are the Aux. Feed pumps (250 hp motors fed from busses 14 and 16) and the 440v Non-1E motors. These motors have high voltage limits below 505v (484v). This high limit can be discounted for the Aux. Feedwater Pumps because they will not typically be on during a high voltage condition (they would only be online in a contingency condition where the 480v safety buses would have other loads on reducing the system voltage). Likewise, the Non-1E motors are on Non-1E buses 13 &. 15, which would not be supplied by the offsite source during a high voltage condition. Also, the cases in Section 6 show that the 1E buses are always most limiting, so the non-1E buses need not be considered most limiting. Therefore, the 414v - 505v range will be the standard acceptance criteria for steady state voltages.

The Ginna Technical Specification (Ref. 3.7) allows temporary degraded voltages to 368 volts. At Ginna, the 480 volt loss-of-voltage relays are set at 372 volts on a 0.5 second time delay. Therefore, transient voltages will only be able to dip below this level momentarily before a trip. If any motor start transient voltages are shown by this study to go below 372 volts (.775 p.u. on a 480 volt base), they will be further analyzed to ensure that the voltages recover before a loss-of-voltage trip is actuated. On the 4160 volt system, the reactor coolant pumps (RCPs) must maintain 80% of nameplate voltage during startup (See Ref. 3.8). Rated voltage is 4000 volts, so 80% is 3200 volts. On the 4160 volt base, 3200 volts equals .77 p.u. Therefore, on an RCP motor start, the lower voltage limit will be .77 p.u. at the RCP motor terminals.

4.5 For each of the cases to be analyzed, system conditions have been defined. "Worst case" conditions are simulated for the extreme cases. The range of grid voltages are based on the alarm levels used by power control for maintaining station voltages, independent of the status of Ginna (Ref. 3.4).

Station 13A - Highest grid voltage - 123KV (1.07 p.u.)
Lowest grid voltage - 116KV (1.01 p.u.)

Station 204 - Highest grid voltage - 37.0KV (1.07 p.u.)
Lowest grid voltage - 33.0KV (.96 p.u.)

Station loading - Heavy Load online - 25.1 MW
Light Load Cases - 1.6 MW total load on offsite power

The voltage history (ref 3.5) shows that Station 204 voltages are greater than or equal to 35kv more than 95% of the time, with a mean value of 35.7kv. Similarly, station 13A voltages are greater than or equal to 118kv more than 95% of the time.

The loads have varying power factors, which were based on test data (Ref. 3.9) taken at the plant, and typical motor power factors based on motor sizes and loading. All 4kv motors were assumed to have a 0.90 power factor except the synchronous circulating water pumps which were assumed to have a power factor of 1.0.

Motor control centers - many small motors, on and off intermittently, produces a low pf (Constant Impedance).	p.f. = .70
Unidentified loads - Test data (Ref. 3.9) showed load that had a low power factor on some buses, so a constant load has been assigned to these buses.	p.f. = .75

The starting power factor for the RCPs and Steam Generator Feedwater Pumps was assumed to be 0.30. The starting power factor for the 440 volt SI pumps was also assumed to be 0.30 per unit.

Almost all of the load was represented as constant P and Q loads. The only exception was the MCC loads and some of the bus 13 and 15 loads which were modeled as constant impedance loads.

For this study, solved cases show typical VAR loads of approximately 11.4 MVAR for the heavy load (25.1 MW)

cases, and approximately 1.1 MVAR for the light load (1.6 MW) cases, supplied by offsite power. Total VAR loads for each case can be found in Attachment 2.

4.6 The voltage regulator installed at Station 204 will regulate the voltage on line 751 with ±10% regulation. Station 204 is held to a voltage range of 33KV to 37KV by power control (Ref. 3.4).

5.0 Computer Codes

5.1 Power System Simulator (PSS/U) by Power Technologies, Inc.

This program allows modeling of a power system, and allows running of an interactive load flow. The program calculates system voltages, currents, and power flows at any point in the system for any user defined source voltage, load, and power factor conditions.

5.2 Each PSS/U Loadflow is saved as an individual case with a unique case name. A coding convention was adopted to help identify each case by its name, as follows:

Character 1 - E designates 767 as the offsite source
- D designates 751 as the offsite source

Character 2 and 3 - Ginna status - ON or OF(F) or special cases - MS = RCP start
SI = Safety injection pump start
SS = Steady state recovery after a motor start

Character 4 - Load Conditions:

L = Light
N = Normal
H = Heavy
Y = Steam Generator Feedwater Pump Start

Character 5 - Grid voltage magnitudes, as noted in the description of each case.

Character 6 - 8 - Other operating conditions:

T = Transformer 12 tap boosted 1 position
C = A-A & B-B tie breakers closed
F = Final run

6.0 Analysis

6.1 All results of computer simulations are shown in attachment 2. These results show the system grid voltage, total system load, and bus voltages for each case. Summaries are shown in Section 6.5.

6.1.1 The "worst case" low voltage conditions used for the acceptance cases are defined as the following conditions:

- Grid voltages are the lowest specified by power control for each source station.
- Heavy station loading for online operation
- The A-A and B-B bus tie breakers are closed so that all load is supplied by the offsite power source This is possible for loss of Transformer 11 (UAT) or on a turbine trip.

6.1.2 The worst case high voltage conditions occurs for:

- Grid voltages are highest at each source
- Station loading is light for online conditions
- The A-A and B-B breakers are open as normal, so that offsite power only supplies the 12A and 12B loads
- In the 50/50 configuration cases, each offsite source only supplies one 4KV bus.

6.1.3 Start-up cases simulate the start up of reactor coolant pump 1A (RCP 1A). RCPs are the largest 4kv motors (6000 hp) and 1A was chosen as the A train had a lower voltage, so represented the worst case. These RCP start ups do not assume all other load is already running prior to the start because that would be overly conservative and inconsistent with operating procedures. The maximum RCP prestart load results from the case where the plant is ready to go online and RCP1A trips out and is restarted. The details associated with the prestart load for this case were derived from the Ginna Simulator and are given in attachment 3.

The startup of the second largest 4kv motor load (4500 hp steam generator feedwater pump) was also simulated. This simulation assumed that all other 4kv motors were already on and fully loaded.

6.1.4 Shutdown cases simulate a safety injection pump start on bus 14 under full load conditions. SI pumps were selected as they are the largest 480 volt load (350 hp).

6.2 Adequacy of 767 as a preferred power source - 100/0 configuration.

6.2.1 For worst case high voltage conditions, demonstrate ability of 480 volt bus voltages to stay below 505 volts and 4160 volt busses to stay below 4400 volts. The results for the 50/50 operating mode will be more limiting and these results are shown in Section 6.4.1.

Case EONL9
Online - A-A & B-B open
Light Load - 1.6 MW + 1.1 MVAR (pf = .82)
High Grid - 123KV Transformer 12B Tap - 1.0 pu

Case EONL9T
Same conditions as EONL9 with 12B tap at +2.5%

With the unity tap position, 480 bus voltages are maintained at 493 volts and below. The 4160 volt bus voltages are maintained at 4322 volts. With the tap boosting +2.5%, 480 bus voltages are shown to go as high as 506 volts, which is marginally above the acceptance criteria. The 4160 volt bus voltages go to 4430 volts which is also slightly above the 4400 volt criteria. Even though these voltage levels are only slightly above the criteria, it would be best to have a larger margin as the normal on-line operating conditions are near the load and grid levels of this case. This will help to preclude a condition where the operator would have to take action to reduce voltage during normal operations. Because the cases below show that a 1.0 setting is adequate for low voltage cases, it will be used as the assumed setting for this study. 1.0 p.u. has been the setting on the transformer for the life of the plant to date and has proved adequate, so a boost is not recommended at this time.

6.2.2 For the lowest voltage conditions during steady state operation, a low grid, heavy load case is modeled.

Case - EONH4CF
Online - A-A & B-B closed
Heavy Load - 25.1 MW + 11.4 MVAR (pf = .91)
Low Grid - 116KV

For these conditions, 480 volt bus voltages, including the 1E buses, remain above 414 volts.

The lowest MCC voltage is 417 volts on MCC 1C, while the lowest 480v bus voltage is 421 volts on bus 17. The 480 volt 1E busses (14,16,17 & 18) have a degraded undervoltage relay setting of 414 volts.

The lowest 4160 bus voltage was 3798 volts at bus 12B which is well above the 3600 volt limit

6.2.3 To ensure the capability to safely shut down the plant, a Safety Injection Pump must be able to be started for the worst case conditions described in 6.2.2. Case EONH4CF, with the startup of SI pump 1A on bus 14.

Case - ESIH4CF, ESSH4CF
Same conditions as EONH4CF, with the startup of SI pump 1A on bus 14, and then recovery after the motor is up to speed.

During the SI pump start, 480 volt bus and motor terminal voltages stay above the 372 volt trip point. The minimum voltage was 384 volts at MCC 1C.The lowest 4160 bus voltage was 3761 volts at bus 12A which is well above the 3200 volt limit.

After the start, the voltage on bus 14 recovers to 423 volts, and the motor also goes above 414. However, MCC 1C is shown to go below the criteria, to 412 volts. This will be considered marginally acceptable because there is no undervoltage relaying on the MCC so there will be no bus trip. Also, the MCC loads are estimated conservatively in the model to help represent the balance of the unidentified bus loads, so the MCC bus would not normally have that much voltage drop. Therefore, these cases show the capability of line 767 to safely shutdown the plant during the worst low voltage conditions.

6.2.4 As a preferred power source to the station, line 767 must be capable of starting and running the reactor coolant pumps (RCPs). To show that the startup voltages do not go below the transient criteria, RCP 1A will be started up with RCP 1B already running. The maximum RCP prestart load results from the case where the plant is ready to go online and RCP1A trips out and is restarted. The details of the prestart load are given in attachment 3. The source voltage will be assumed to be at its minimum value of 116 kv and the source strength reflects Ginna being offline.

Case - EMSH4CF & EMSH4CF2
Offline - A-A & B-B closed
Prestart Load - 13.7 MW
Low Grid - 116KV & 118.5kv

Node 11AS (the motor terminals of RCP 1A) voltage stays above 80% of motor rated voltage (4000V), indicating it will start up. The minimum 1E 480 bus voltage was 368

volts at bus 14. This voltage is high enough to prevent the 480 volt motors from stalling however it is below the 372v setpoint of the undervoltage relay.

This case was repeated assuming a slightly higher source voltage of 118.5kv (EMSH4CF2). This is a reasonable assumption considering the operators routinely request power control to boost the voltage prior to an RCP start. As previously noted, the voltage range on the 115 kv system is between 116kv and 123kv. The minimum 1E 480 bus voltage for this case was 377 volts at bus 14. The lowest MCC voltage for this case was 368 volts at MCC 1C. As previously noted, there are no undervoltage relays on MCC 1C therefore the voltage on MCC 1C can be considered marginally acceptable since it is 80% of 460 volts (368 volts).

The bus voltages after the RCP has successfully accelerated will be higher for startup cases EMSH4CF and EMSH4CF2 than what has already been shown for full load case EONH4CF because of the reduced prestart load.

6.2.5 Because of the reduced prestart load associated with the largest motors (RCPs), it is necessary to simulate the startup of the second largest motor (Steam Generator Feedwater Pumps - 4500 hp). For this simulation the prestart load was assumed to be the same as case EONH4CF with Steam Generator Feedwater Pump 1A off. Again the source voltage will be assumed to be at its minimum value and the source strength reflects Ginna being offline.

Case - EMSY4CF - Start Steam Generator Feedwater Pump
Offline - A-A & B-B closed
Prestart Load - 21.9 MW
Low Grid - 116KV

The minimum voltage at the terminals of the SGFWP 1A was 3257 which is slightly above the 3200 volt criteria. The minimum voltage at any of the 1E 480 volt buses was 373 volts at bus 14. This is slightly above the 372 volt relay setpoint. The minimum voltage at an MCC occurred at MCC 1C and was 364 volts. This is slightly below the 368 volt criteria (80 % 460 volt) but can be considered marginally acceptable because of various conservatism associated with the calculation. The existing MCC load estimates are believed to be conservative and therefore this case will be reevaluated after more refined load data has been obtained.

The steady state voltages that exist after the successful start of the SGFWP 1A will be slightly worse than for case EONH4CF because of the weaker source strength (Ginna is assumed offline in this case). For these steady state conditions, 480 volt bus voltages, including the 1E buses, remain above 414 volts.The lowest MCC voltage is 417 volts on MCC 1C, while the lowest 480v bus voltage is 421 volts on bus 17. The lowest 4160 bus voltage was 3798 volts at bus 12B which is well above the 3600 volt limit.

6.2.6 The following LOCA simulations quantify the performance of Circuit 767 during an accident condition. The source strength reflects Ginna being offline. The load is assumed to be the same as Case EONH4CF except that the Steam generator Feedwater Pumps are off and the 480 volt safety loads are on. Specific load details for this case can be found in attachment 3.

Case - EOF_LOCA, EOF_LOC2
Offline - $\bar{A}$-A & B-B $\bar{c}$losed
Total Load - 20.6 MW + 8.9 MVAR (pf = .92)
Low Grid - 116KV (EOF_LOCA) & 118 KV (EOF_LOC2)

For the EOF_LOCA case, 480 volt bus voltages, including the 1E buses, remain above 414 volts. The lowest 480v bus voltage is 415 volts on bus 14. The voltages at motor terminals 14S and 14C dip to 412 and 413 volts respectively which is slightly below the 414 volt criteria. The lowest MCC voltage is 405 volts on MCC 1C which is about 2 % below the 414 volt criteria.

The lowest 4160 bus voltage was 3860 volts at bus 12A which is well above the 3600 volt limit.

This case demonstrates the possibility of having poor voltages at MCC 1C during LOCA conditions and therefore warrents further investigation. This case was repeated (EOF_LOC2) assuming the source voltage was 118 kV rather than 116 kV. As previously mentioned, Ref 3.5 indicates that the source voltage is at least 118 kV more than 95% of the time.

For the EOF_LOC2 case, 480 volt bus voltages, including the 1E buses, remain above 414 volts. The lowest 480v bus voltage is 424 volts on bus 14. The voltages at motor terminals 14S and 14C are 421 and 422 volts respectively. The lowest MCC voltage is 413.3 volts on MCC 1C which is close enough to the 414 volt criteria to be considered marginally acceptable.

The lowest 4160 bus voltage for the EOF_LOC2 case was

3935 volts at bus 12A which is well above the 3600 volt limit.

The EOF_LOC2 case demonstrates that circuit 767 will be able to maintain adequate voltages during LOCA conditions for normally anticipated source voltage conditions (ie >= 118kv). Case EOF_LOCA does however demonstrate the possibility of low MCC voltages for the worst case source voltage of 116kv. As previously mentioned, the MCC loads used in these simulations are believed to be conservative estimates so the EOF_LOCA case will be reinvestigated once more refined load information is obtained.

6.3 Adequacy of 751 as a preferred power source - 0/100 configuration.

Settings for the voltage regulator and the tap for transformer 12A were determined in coordination with each other. The regulator is modeled as holding a constant voltage of 35KV at the primary terminals of transformer 12A as long as the maximum boost or buck of 10% is not exceeded. The regulator has a tap range of + or - 10% with 5/8% stepsize. The tap on Transformer 12A is assumed to be nominal.

6.3.1 For worst case high voltage conditions, demonstrate ability of 480 volt bus voltages to stay below 505 volts and 4160 volt busses to stay below 4400 volts. The results for the 50/50 operating mode will be more limiting and these results are shown in Section 6.4.2.

Case DONL9F
Online - A-A & B-B open
Light Load - 1.6 MW supplied by offsite power
High Grid - 37KV Transformer 12A Tap - 1.0 pu

Case DONL9TF
Same conditions as DONL9F with 12A tap at +2.5%

With the unity tap position, 480 bus voltages are maintained at 479 volts and below. The 4160 volt bus voltages are maintained at 4197 volts. With the tap boosting +2.5%, 480 bus voltages are shown to go as high as 492 volts, which is well below the 505 volt acceptance criteria. The 4160 volt bus voltages go to 4306 volts which is also well below the 4400 volt criteria. Even though these voltage levels are well below the criteria, it was decided to maintain the nominal 1.0 tap setting on transformer 12A.

6.3.2 For the lowest voltage conditions during steady state operation, a low grid, heavy load case is modeled.

Case - DONH4CF
Online - A-A & B-B closed
Heavy Load - 25.3 MW
Low Grid - 33KV
Regulator - full 10% boost (V12ATP = 34.08KV)

For these conditions, 480 volt bus voltages, including the 1E buses, remain above 414 volts.

The lowest MCC voltage is 441 volts on MCC 1C, while the lowest 480v bus voltage is 447 volts on bus 13. The 480 volt 1E busses (14,16,17 & 18) have a degraded undervoltage relay setting of 414 volts.

The lowest 4160 bus voltage was 4019 volts at bus 12B which is well above the 3600 volt limit.

6.3.3 To ensure the capability to safely shut down the plant, a Safety Injection Pump must be able to be started for the worst case conditions described in 6.3.2. Case DONH4CF, with the startup of SI pump 1A on bus 14.

Case - DSIH4CF, DSSH4CF
Same conditions as DONH4CF, with the startup of SI pump 1A on bus 14, and then recovery after the motor is up to speed.

During the SI pump start, 480 volt bus and motor terminal voltages stay above the 372 volt trip point. The minimum voltage was 406 volts at MCC 1C. The lowest 4160 bus voltage was 3964 volts at bus 12A which is well above the 3200 volt limit.

After the start, the voltage on bus 14 recovers to 448 volts, and the motor also goes above 414. The lowest MCC voltage is 437 volts at MCC 1C while the lowest 480v bus voltage is 446 volts at Bus 13. The lowest 4160 bus voltage was 4014 volts at bus 12A which is well above the 3600 volt limit.

6.3.4 As a preferred power source to the station, line 751 must be capable of starting and running the reactor coolant pumps (RCPs). To show that the startup voltages do not go below the transient criteria, RCP 1A will be started up with RCP 1B already running. The maximum RCP prestart load results from the case where the plant is ready to go online and RCP1A trips out and is restarted. The details of the prestart load are given in attachment 3. The source voltage will be assumed to

be at its minimum value of 33 kv and the source strength reflects Ginna being offline.

Case - DMSH4CF & DMSH4CF2
Offline - A-A & B-B closed
Prestart Load - 13.8 MW
Low Grid - 33KV & kv

Node 11AS (the motor terminals of RCP 1A) voltage stays above 80% of motor rated voltage (4000V), indicating it will start up. The voltage at 11AS was 3211 which is slightly above the 3200 volt limit. The minimum 1E 480 bus voltage was 370 volts at bus 14. This voltage is probably high enough to prevent the 480 volt motors from stalling however it is below the 372v setpoint of the undervoltage relay.

This case was repeated assuming a slightly higher source voltage of 33.66kv (DMSH4CF2) and that the regulator had been manually adjusted to full boost. As previously noted, the voltage range on the 34.5kv system is between 33kv and 37kv. The operators routinely request power control to boost the voltage prior to an RCP start and the RCP start procedure (ref 3.11) suggests having the prestart voltage on the 1E 480 volt busses between 490 and 500 volts.

The prestart voltage at the primary terminals of the 12A transformer was 35.9 kv and was 4297 at bus 12A. The prestart voltage at bus 14 was 485 volts and 490.6 at bus 18.

The minimum 1E 480 bus voltage during the start was 381 volts at bus 14. The lowest MCC voltage for this case was 371 volts at MCC 1C. As previously noted, there are no undervoltage relays on MCC 1C therefore the voltage on MCC 1C can be considered marginally acceptable since it is slightly above 80% of 460 volts (368 volts). The minimum voltage at the RCP terminals was 3299 which is above the 3200 volt criteria.

The bus voltages after the RCP has successfully accelerated will be higher for RCP start cases DMSH4CF and DMSH4CF2 than what has already been shown for full load case DONH4CF because of the reduced prestart load.

6.3.5 Because of the reduced prestart load associated with the largest motors (RCPs), it is necessary to simulate the startup of the second largest motor (Steam Generator Feedwater Pumps - 4500 hp). For this simulation the prestart load was assumed to be the same as case DONH4CF with Steam Generator Feedwater Pump 1A

off. Again the source voltage will be assumed to be at its minimum value and the source strength reflects Ginna being offline.

Case - DMSY4CF - Start Steam Generator Feedwater Pump
Offline - A-A & B-B closed
Prestart Load - 22.1 MW
Low Grid - 33KV Regulator max boost

The prestart voltage at the primary terminals of the 12A transformer was 34.4 kv and was 4081 & 4064 at busses 12A & 12B respectively.

The minimum voltage during the start at the terminals of the SGFWP 1A was 3303 which is above the 3200 volt criteria. The minimum voltage at any of the 1E 480 volt buses was 378 volts at bus 14. This is slightly above the 372 volt relay setpoint. The minimum voltage at an MCC occurred at MCC 1C and was 369 volts. This is slightly above the 368 volt criteria (80 % 460 volt) and can be considered marginally acceptable.

For these steady state conditions, 480 volt bus voltages, including the 1E buses, remain above 414 volts.The lowest MCC voltage is 441 volts on MCC 1C, while the lowest 480v bus voltage is 447 volts on bus 13. The lowest 4160 bus voltage was 4019 volts at bus 12B which is well above the 3600 volt limit.

6.3.6 The following LOCA simulations quantify the performance of Circuit 751 during an accident condition. The source strength reflects Ginna being offline. The load is assumed to be the same as Case DONH4CF except that the Steam generator Feedwater Pumps are off and the 480 volt safety loads are on. Specific load details for this case can be found in attachment 3.

Case - DOF_LOCA
Offline - A-A & B-B closed
Total Load - 20.6 MW + 8.9 MVAR (pf = .92)
Low Grid - 33KV
Regulator is at full boost (V12atp = 34.5 kv)

For the DOF_LOCA case, 480 volt bus voltages, including the 1E buses, remain above 414 volts. The lowest 480v bus voltage is 443 volts on bus 14. The voltages at motor terminals 14S and 14C are 440 and 441 volts. The lowest MCC voltage is 431 volts on MCC 1C which is also above the 414 volt criteria.

The lowest 4160 bus voltage was 4089 volts at bus 12A which is well above the 3600 volt limit.

6.4 767 and 751 running in the 50/50 configuration.

6.4.1 To insure that the 50/50 configuration will not cause high voltages to occur on the buses fed by 767, a highest voltage case will be run in this configuration.

Case - E50L9
Online - A-A & B-B open
Light Load - .8 MW supplied by 767
High Grid - 123KV

The maximum voltage on the 480 volt system was 494 volts at bus 17. This is well below the 505 volt criteria. The maximum voltage on a 4160 volt bus was 4331 at bus 12B. This is below the 4400 volt criteria.

6.4.2 To insure that the 50/50 configuration will not cause high voltages to occur on the buses fed by 751, a highest voltage case will be run in this configuration.

Case - D50L9F
Online - A-A & B-B open
Light Load - .8 MW supplied by 751
High Grid - 37KV

The maximum voltage on the 480 volt system was 477 volts at bus 18. This is well below the 505 volt criteria. The maximum voltage on a 4160 volt bus was 4206 at bus 12A. This is below the 4400 volt criteria.

6.5
Summary of Cases

6.5.1 767 at 100/0
(* = Voltages violate criteria of 414 < V > 505 volts)
(! = Voltages violate 372 volt criteria)
(# = Voltage violates 368 volt criteria)

Conditions	Case	Section	Limiting Voltages
Light Load, High Grid	EONL9,	6.2.1	493
Tap = +2.5%	EONL9T		506*
Heavy Load, Low Grid	EONH4CF	6.2.2	417
Heavy Load, Low Grid, Start SIP	ESIH4CF	6.2.3	384
SIP Running (steady state)	ESSH4CF		412*
Start RCPs maximum prestart load	EMSH4CF	6.2.4	368!
Start RCPs with 118.5kv	EMSH4CF2		368
Heavy Load, Low Grid, Start SGFWP	EMSY4CF	6.2.5	364#
LOCA with 116KV source	EOF_LOCA	6.2.6	405*
LOCA with 118KV source	EOF_LOC2	6.2.6	413.3*

6.5.2 751 at 0/100 (Regulator in service)

Light Load, High Grid 37KV	DONL9F	6.3.1	479
Tap = +2.5% (12A Xfmr)	DONL9TF		492
Heavy Load, Low Grid, 0/100	DONH4CF	6.3.2	441
Heavy Load, Low Grid, Start SIP	DSIH4CF	6.3.3	406
SIP Running (Steady State)	DSSH4CF	6.3.3	437
Start RCPs maximum prestart load	DMSH4CF	6.3.4	370!
Start RCPs with 33.66kv	DMSH4CF2	6.3.4	371
Heavy Load, Low Grid, Start SGFWP	DMSY4CF	6.3.5	369
LOCA load, Low grid	DOF_LOCA	6.3.6	431

6.5.3 767 and 751 - 50/50

Light Load, High Grid, Open Ties	E50L9	6.4.1	494
Light Load, High Grid, Open Ties	D50L9F	6.4.2	477

6.6 The loadflow case results also provide current and power flows through all lines and equipment. These results will be compared against the ratings of the equipment utilized for this modification. Specifically, equipment ratings will be compared against actual current and power flows calculated by the program for worst case conditions for the following equipment:

34.5kv Lines - 751 and 767
Transformers - 12A and 12B, primary and secondary

		windings
4kv Bus Duct	-	Trans. 12A and 12B to 4160 volt buses 12A and 12B
4160 volt Breakers	-	12AX, 12AY, 12BX, 12BY
34.5kv Breakers	-	75112, 76702

Worst case loadings are seen in the heavy load cases. EONH4CF for line 767 as source and DONH4CF for line 751 as source.

6.6.1 Line ratings for the transmission line feeds from offsite power have three ratings: Normal, Long Term Emergency (LTE) (4 hours), and Short Term Emergency (STE) (15 minutes). There are different ratings for Summer and Winter, so the Summer ratings will be used as they are more limiting. Ratings are per Reference 3.10.

Line 767 - 520 Normal, 640 LTE, 660 STE
Line 751 - 520 Normal, 620 LTE, 660 STE
Worst case loadflows show maximum line currents of:

Line 767 - 509 Amps Line 751 - 483 Amps

Both lines show maximum currents within the continuous normal ratings of the lines.

6.6.2 These 12A and 12B transformers have two load ratings associated with them, the OA and FA ratings. The OA (oil-air) rating is the load it can carry continuously without any extra cooling. The FA (forced air) rating is the load it can carry with the fans turned on to help cool the oil. The FA rating will be the allowable limit for these cases since these transformers have that capability, per the transformer test data sheets.

12A and 12B Primary winding OA/FA - 28,000/37333 kvA
12A & 12B secondary winding OA/FA - 14000/18666 kvA
(These are the 55 C ratings. A 12% higher rating applies at 65 C. See the manufacture's data for details)

Worst case loadflows show maximum loads of:

12A Primary - 28.6 MVA
12B Primary - 28.6 MVA
12A Secondary - 14.6 MVA
12B Secondary - 14.4 MVA

These worst case loads are well below the maximum transformer ratings.

6.6.3 Per the Design Criteria, the 4160 volt bus duct and circuit breakers are rated 3000 amps continuous. The worst case load on any of the 4160 volt equipment between transformers 12A and 12B and buses 12A and 12B is 2159 amps. This is well below the maximum rating.

6.6.4 Likewise, the Design Criteria specifies 34.5 kv breaker ratings of 1200 amps. Lines 751 and 767 have maximum currents well below that level.

Line 751 - 483 amps
Line 767 - 509 amps

7.0 Results

7.1 The system conditions modelled demonstrate that line 767 from Station 13A can adequately hold the required voltage levels for high and low voltage operating conditions, as well as for practical plant startup and SI pump start conditions. Circuit 767 can also hold the required voltage levels during LOCA conditions as long as the source voltage is at least 118 kV (source voltage is greater than or equal to 118 kv more than 95% of the time). For the worst case source voltage of 116 kV, the voltages at the MCCs could be approximately 2% below the 414 volt criteria. This case will be reevaluated with more refined load data. The existing MCC load estimates are believed to be conservative.

These results indicate that circuit 767 is adequate to be used as a preferred offsite power source. 12B transformer tap is recommended to be maintained at 1.0 p.u to provide the adequate voltage regulation.

7.2 751 from Station 204 can adequately hold the required voltage levels for high and low voltage operating conditions, as well as for practical plant startup and SI pump start conditions. Circuit 751 can also hold the required voltage levels during LOCA conditions. These results indicate that Circuit 751 is adequate to be used as a preferred offsite power source. In order to provide adequate voltage regulation the 12A transformer tap is recommended to be maintained at 1.0 p.u and the voltage regulator should be set to maintain 35 kv at the primary terminals of transformer 12A.

7.3 Both sources 767 and 751 can be used alone as preferred power sources in the 100/0 or 0/100 configurations. They also can be used together in a 50/50 configuration to supply the offsite power to Ginna Station. 751 with the regulator maintains better voltage regulation at the 480 volt bus level than does 767 as sources.

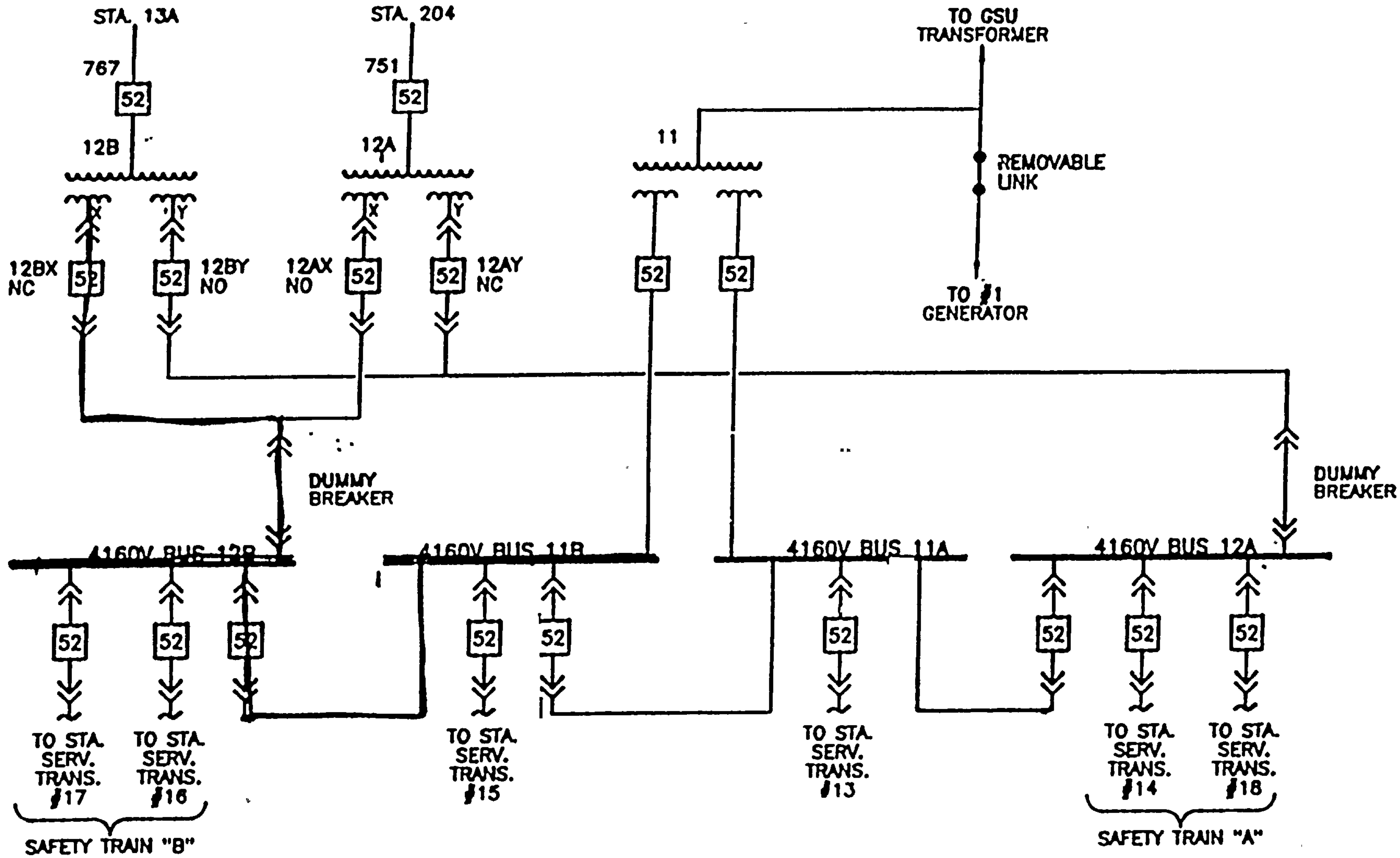
7.4 Current and power flows for 34.5 kv and 4 kv equipment affected by this modification are within their ratings.

7.5 This analysis is based in part on load information taken in 1980 (ref 3.9). The load survey will be repeated during the 1991 outage and this analysis will be modified accordingly. The tap settings for the transformers and the regulator will also be reevaluated at that time.

7.6 Because of the large range of voltages seen in these cases, it is recommended to further evaluate the installation of a voltage regulation device on line 767. Based on the results to date, a regulator would keep the Ginna Station voltages much more constant for any operating conditions, provide a greater margin from the operating limits, and provide a better voltage match between the A and B trains when in the 50/50 mode.

Attachment 1

OFFSITE DISTRIBUTION SYSTEM
CONCEPTUAL DESIGN
EWR 4525
OPTION 5



ATTACHMENT 2

Summary printout for all cases
Detailed printout for cases EONH4CF & DONH4CF

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

GINNA CASE EONL9, 767 TO 12B , ONLINE, LIGHT LOAD   JUL 31 1990
123 KV GRID, A-A&B-B OPEN, 12B TAP @ 1.0   TUE, 14:58

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S13AE	ABC	1.070	71.0	107.0	
S13A	ABC	1.070	71.0	107.0	
767	ABC	1.040	20.7	104.0	
12BTP	ABC	1.040	20.7	104.0	
12BT	ABC	1.040	2.5	104.0	
12BY	ABC	1.039	2.5	103.9	
12A	ABC	1.039	2.5	103.9	
SST14	ABC	1.038	2.5	103.8	
14	ABC	1.016	0.5	101.6	L
14C	ABC	1.016	0.5	101.6	L
14S	ABC	1.010	0.5	101.0	L
1C	ABC	0.990	0.5	99.0	L
SST18	ABC	1.038	2.5	103.8	
18	ABC	1.022	0.5	102.2	L
18C	ABC	1.021	0.5	102.1	L
18S	ABC	1.022	0.5	102.2	L
12AS	ABC	1.039	2.5	103.9	
12BTS	ABC	1.040	2.5	104.0	
12BX	ABC	1.039	2.5	103.9	
12B	ABC	1.039	2.5	103.9	
SST16	ABC	1.038	2.5	103.8	
16	ABC	1.016	0.5	101.6	L
16C	ABC	1.016	0.5	101.6	L
16S	ABC	1.011	0.5	101.1	L
1D	ABC	0.993	0.5	99.3	L
SST17	ABC	1.038	2.5	103.8	
17	ABC	1.028	0.5	102.8	L
17C	ABC	1.028	0.5	102.8	L
17S	ABC	1.025	0.5	102.5	L

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

GINNA CASE EONL9, 767 TO 12B , ONLINE, LIGHT LOAD JUL 31 1990
123 KV GRID, A-A&B-B OPEN, 12B TAP @ 1.0 TUE, 14:58

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
53	29	0	8	4	0	0	4	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	1657.66	21.87	0.00	1046.00		
KVAR	1217.01	90.80	0.00	547.23	10.82	0.00
PF	0.806					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	589.80
KVAR	0.00	0.00	0.00	589.80

MAX V-LN 1.070 PU, 71.02 KV, 107.0/ 100.0 V AT NODE S13AE PHASE A
MIN V-LN 1.038 PU, 2.49 KV, 103.8/ 100.0 V AT NODE SST14 PHASE B
MAX V-LL 1.028 PU, 0.50 KV, 102.8/ 100.0 V AT NODE 17 PHASE CA
MIN V-LL 0.990 PU, 0.48 KV, 99.0/ 100.0 V AT NODE 1C PHASE AB

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	600.00
KVAR	0.00	0.00	0.00	600.00
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	589.80
KVAR	0.00	0.00	0.00	589.80

	GENERATORS		MOTORS	
	ASYNCHRONOUS	SYNCHRONOUS	ASYNCHRONOUS	SYNCHRONOUS
KW	0.00	0.00	1046.00	0.00
KVAR	0.00	0.00	547.23	0.00

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR.PSS/U VERSION 4.0

GINNA CASE EONL9T, 767 TO 12B, ONLINE, LIGHT LOAD JUL 31 1990
123 KV GRID, A-A&B-B OPEN, 12B TAP @ +2.5% TUE. 15:03

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S13AE	ABC	1.070	71.0	107.0	
S13A	ABC	1.070	71.0	107.0	
767	ABC	1.040	20.7	104.0	
12BTP	ABC	1.040	20.7	104.0	
12BT	ABC	1.066	2.6	106.6	
12BY	ABC	1.065	2.6	106.5	
12A	ABC	1.065	2.6	106.5	
SST14	ABC	1.065	2.6	106.5	
14	ABC	1.042	0.5	104.2	L
14C	ABC	1.042	0.5	104.2	L
14S	ABC	1.037	0.5	103.7	L
1C	ABC	1.016	0.5	101.6	L
SST18	ABC	1.065	2.6	106.5	
18	ABC	1.049	0.5	104.9	L
18C	ABC	1.048	0.5	104.8	L
18S	ABC	1.049	0.5	104.9	L
12AS	ABC	1.065	2.6	106.5	
12BTS	ABC	1.066	2.6	106.6	
12BX	ABC	1.065	2.6	106.5	
12B	ABC	1.065	2.6	106.5	
SST16	ABC	1.065	2.6	106.5	
16	ABC	1.042	0.5	104.2	L
16C	ABC	1.042	0.5	104.2	L
16S	ABC	1.037	0.5	103.7	L
1D	ABC	1.019	0.5	101.9	L
SST17	ABC	1.065	2.6	106.5	
17	ABC	1.055	0.5	105.5	L
17C	ABC	1.055	0.5	105.5	L
17S	ABC	1.052	0.5	105.2	L

GINNA CASE EONL9T, 767 TO 12B, ONLINE, LIGHT LOAD — JUL 31 1990
123 KV GRID, A-A&B-B OPEN, 12B TAP @ +2.5% — TUE, 15:03

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
53	29	0	8	4	0	0	4	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	1688.65	21.79	0.00	1046.00		
KVAR	1249.58	92.31	0.00	547.23	10.82	0.00
PF	0.804					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	620.86
KVAR	0.00	0.00	0.00	620.86

MAX V-LN 1.070 PU, 71.02 KV, 107.0/ 100.0 V AT NODE S13AE PHASE A
MIN V-LN 1.040 PU, 20.72 KV, 104.0/ 100.0 V AT NODE 12BTP PHASE B
MAX V-LL 1.055 PU, 0.51 KV, 105.5/ 100.0 V AT NODE 17 PHASE CA
MIN V-LL 1.016 PU, 0.49 KV, 101.6/ 100.0 V AT NODE 1C PHASE AB

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	600.00
KVAR	0.00	0.00	0.00	600.00
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	620.86
KVAR	0.00	0.00	0.00	620.86

	GENERATORS ASYNCHRONOUS	GENERATORS SYNCHRONOUS	MOTORS ASYNCHRONOUS	MOTORS SYNCHRONOUS
KW	0.00	0.00	1046.00	0.00
KVAR	0.00	0.00	547.23	0.00

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

EONH4CF,P&Q,BUS Z ADDED, ONLINE JUL 31 1990
HEAVY LOAD 116KV GRID TUE, 15:05

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S13AE	ABC	1.009	67.0	100.9	
S13A	ABC	1.009	67.0	100.9	
767	ABC	0.940	18.7	94.0	
12BTP	ABC	0.937	18.7	93.7	
12BT	ABC	0.931	2.2	93.1	
12BY	ABC	0.916	2.2	91.6	
12BY2	ABC	0.914	2.2	91.4	
12A	ABC	0.914	2.2	91.4	
SST14	ABC	0.913	2.2	91.3	
14	ABC	0.891	0.4	89.1	L
14C	ABC	0.891	0.4	89.1	L
14S	ABC	0.885	0.4	88.5	L
1C	ABC	0.869	0.4	86.9	L
SST18	ABC	0.913	2.2	91.3	
18	ABC	0.901	0.4	90.1	L
18C	ABC	0.901	0.4	90.1	L
18S	ABC	0.898	0.4	89.8	L
11A	ABC	0.914	2.2	91.4	
11AC	ABC	0.906	2.2	90.6	
11AS	ABC	0.910	2.2	91.0	
SST13	ABC	0.914	2.2	91.4	
13	ABC	0.878	0.4	87.8	L
13C	ABC	0.877	0.4	87.7	L
13S	ABC	0.874	0.4	87.4	L
12AS	ABC	0.914	2.2	91.4	
12BTS	ABC	0.931	2.2	93.1	
12BX	ABC	0.916	2.2	91.6	
12BX2	ABC	0.916	2.2	91.6	
12B	ABC	0.913	2.2	91.3	
SST16	ABC	0.913	2.2	91.3	
16	ABC	0.891	0.4	89.1	L
16C	ABC	0.891	0.4	89.1	L
16S	ABC	0.886	0.4	88.6	L
1D	ABC	0.871	0.4	87.1	L
SST17	ABC	0.912	2.2	91.2	
17	ABC	0.877	0.4	87.7	L
17C	ABC	0.875	0.4	87.5	L
17S	ABC	0.873	0.4	87.3	L
11B	ABC	0.913	2.2	91.3	
11BC	ABC	0.907	2.2	90.7	
11BS	ABC	0.909	2.2	90.9	
SST15	ABC	0.913	2.2	91.3	

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

EONH4CF,P&Q,BUS Z ADDED, ONLINE   JUL 31 1990
HEAVY LOAD 116KV GRID   TUE, 15:05

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
15	ABC	0.879	0.4	87.9	L
15C	ABC	0.879	0.4	87.9	L
15S	ABC	0.872	0.4	87.2	L

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR.PSS/U VERSION 4.0

EONH4CF,P&Q,BUS Z ADDED, ONLINE JUL 31 1990
HEAVY LOAD 116KV GRID TUE, 15:05

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	45	0	10	6	0	0	0	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	25.51M	449.27	0.00	0.00		
KVAR	15.69M	4294.55	0.00	0.00	8.80	0.00
PF	0.852					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.06M
KVAR	0.00	0.00	0.00	11.40M

MAX V-LN 1.009 PU, 66.97 KV, 100.9/ 100.0 V AT NODE S13AE PHASE A
MIN V-LN 0.906 PU, 2.17 KV, 90.6/ 100.0 V AT NODE 11AC PHASE B
MAX V-LL 0.901 PU, 0.44 KV, 90.1/ 100.0 V AT NODE 18 PHASE CA
MIN V-LL 0.869 PU, 0.42 KV, 86.9/ 100.0 V AT NODE 1C PHASE AB

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.33M
KVAR	0.00	0.00	0.00	11.66M
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.06M
KVAR	0.00	0.00	0.00	11.40M

	GENERATORS ASYNCHRONOUS	GENERATORS SYNCHRONOUS	MOTORS ASYNCHRONOUS	MOTORS SYNCHRONOUS
KW	0.00	0.00	0.00	0.00
KVAR	0.00	0.00	0.00	0.00

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

[illegible]ONH4CF,P&Q,BUS Z ADDED, ONLINE   AUG 02 1990
[illegible]AVY LOAD 116KV GRID   THU, 13:15

NODE DATA

NODE	KV (LN)	AREA	X	Y	ORIENTATION
S13AE	66.40	1	4.50	3.45	3
S204C	19.92	1	1.00	1.15	3
1G	10.98	1	4.50	6.15	3
1GS	10.98	1	5.00	5.00	4
767	19.92	1	7.50	3.45	4
12ATP	19.92	1	9.00	1.15	3
12AT	2.40	1	11.00	1.15	2
12AY	2.40	1	14.00	1.15	3
SST14	2.40	1	15.00	1.15	3
SST18	2.40	1	16.00	2.15	2
14	0.28	1	17.50	1.15	2
14C	0.28	1	17.50	1.55	4
14S	0.28	1	17.50	0.75	4
18	0.28	1	18.50	2.15	2
18C	0.28	1	18.50	2.55	4
18S	0.28	1	18.50	1.75	4
1C	0.28	1	18.50	1.15	4
12AX	2.40	1	13.00	2.15	2
SST16	2.40	1	16.00	4.45	2
[illegible]T17	2.40	1	16.00	3.45	3
[illegible]	0.28	1	17.50	4.45	2
16C	0.28	1	17.50	4.85	4
16S	0.28	1	17.50	4.15	4
17	0.28	1	18.50	3.45	2
17C	0.28	1	18.50	3.85	4
17S	0.28	1	18.50	3.05	4
1D	0.28	1	18.50	4.45	4
T11IN	2.40	1	11.00	6.15	2
11A	2.40	1	15.00	6.15	3
11AC	2.40	1	14.50	6.75	3
11AS	2.40	1	15.50	6.75	4
11B	2.40	1	14.00	7.45	3
11BC	2.40	1	13.50	7.85	3
11BS	2.40	1	14.50	7.85	4
SST13	2.40	1	16.00	6.15	3
SST15	2.40	1	16.00	7.45	2
13	0.28	1	17.50	6.15	2
13C	0.28	1	17.50	6.55	4
13S	0.28	1	17.50	5.75	4
15	0.28	1	18.50	7.45	3
15C	0.28	1	18.50	7.85	4
15S	0.28	1	18.50	7.05	4
S13A	66.40	1	6.50	3.45	3
T11	2.40	1	11.00	7.45	2
12A	2.40	1	15.00	2.15	3
[illegible]	2.40	1	14.00	4.45	3
[illegible]TP	19.92	1	9.00	3.45	2
12BX	2.40	1	13.00	4.45	2
12BY	2.40	1	13.00	3.45	3
12BT	2.40	1	11.00	3.45	3
12ATS	2.40	1	11.00	2.15	2

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

[illegible]ONH4CF,P&Q,BUS Z ADDED, ONLINE   AUG 02 1990
HEAVY LOAD 116KV GRID   THU, 13:15

NODE DATA

NODE	KV (LN)	AREA	X	Y	ORIENTATION
12BTS	2.40	1	11.00	4.45	2
12AS	2.40	1	15.00	1.75	3
12BY2	2.40	1	14.00	2.80	4
12BX2	2.40	1	13.50	4.45	4

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

NH4CF,P&Q,BUS Z ADDED, ONLINE AUG 02 1990
VY LOAD 116KV GRID THU, 13:15

LOAD DATA - CATEGORY 4

NODE	LOAD TYPE	LOAD (KW -- KVAR) P - A	Q - A	P - B	Q - B	P - C	Q - C
14S	31	261.0	126.4				
18S	31	224.0	108.5				
1C	32	300.0	300.0				
16S	31	261.0	126.4				
17C	31	373.0	231.2				
17S	31	224.0	108.5				
1D	32	300.0	300.0				
11AC	31	7188.4	2862.9				
11AS	31	4378.7	2120.7				
11BC	31	6276.1	2421.1				
11BS	31	4378.7	2120.7				
13	32	200.0	175.0				
13C	31	306.0	189.6				
13S	31	75.0	36.4				
15	32	350.0	300.0				
15C	31	119.0	73.7				
15S	31	112.0	54.2				

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

[illegible]NH4CF,P&Q,BUS Z ADDED, ONLINE   AUG 02 1990
[illegible]VY LOAD 116KV GRID   THU, 13:15

MACHINE DATA

NODE	CATEGORY	LOAD TYPE	LOAD (KW)	RATING (KVA)
1G	2	-94	-505000.00	608400.00
14C	4	-66	1343.00	1492.00
18C	4	-66	224.00	249.00
16C	4	-66	1678.00	1864.00
12A	4	-56	261.00	290.00
12AS	4	-56	261.00	290.00

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

[illegible]ONH4CF,P&Q,BUS Z ADDED, ONLINE AUG 02 1990
HEAVY LOAD 116KV GRID THU, 13:15

BRANCH DATA - IMPEDANCES IN OHMS,MICROMHOS

FROM	TO	PHAS	CON TYPE	LENGTH	ZB1 R	ZB1 X	ZB0 R	ZB0 X	STAT	BC1	BC0
12A	SST14	ABC	EK1B	0.30	0.007	0.012	0.007	0.012	1	0.0	0.0
12A	SST18	ABC	EK1C	0.33	0.016	0.012	0.016	0.012	1	0.0	0.0
18	18C	ABC	LINE	1.00	0.000	0.001	0.000	0.001	1	0.0	0.0
18	18S	ABC	LINE	1.00	0.002	0.002	0.002	0.002	1	0.0	0.0
14	1C	ABC	LINE	1.00	0.002	0.018	0.002	0.018	1	0.0	0.0
14	14C	ABC	LINE	1.00	0.000	0.001	0.000	0.001	1	0.0	0.0
14	14S	ABC	LINE	1.00	0.003	0.004	0.003	0.004	1	0.0	0.0
12B	SST16	ABC	EK1B	0.29	0.007	0.011	0.007	0.011	1	0.0	0.0
12B	SST17	ABC	EK1C	0.39	0.019	0.014	0.019	0.014	1	0.0	0.0
11B	11BC	ABC	LINE	1.00	0.010	0.015	0.010	0.015	1	0.0	0.0
11B	11BS	ABC	LINE	1.00	0.009	0.015	0.009	0.015	1	0.0	0.0
11A	11AC	ABC	LINE	1.00	0.010	0.016	0.010	0.016	1	0.0	0.0
11A	11AS	ABC	LINE	1.00	0.007	0.012	0.007	0.012	1	0.0	0.0
17	17C	ABC	LINE	1.00	0.000	0.001	0.000	0.001	1	0.0	0.0
17	17S	ABC	LINE	1.00	0.002	0.002	0.002	0.002	1	0.0	0.0
16	1D	ABC	LINE	1.00	0.001	0.017	0.001	0.017	1	0.0	0.0
16	16C	ABC	LINE	1.00	0.000	0.001	0.000	0.001	1	0.0	0.0
16	16S	ABC	LINE	1.00	0.003	0.003	0.003	0.003	1	0.0	0.0
[illegible]A	SST13	ABC	EK1C	0.05	0.002	0.002	0.002	0.002	1	0.0	0.0
[illegible]B	SST15	ABC	EK1C	0.06	0.003	0.002	0.003	0.002	1	0.0	0.0
13	13C	ABC	LINE	1.00	0.000	0.001	0.000	0.001	1	0.0	0.0
13	13S	ABC	LINE	1.00	0.008	0.008	0.008	0.008	1	0.0	0.0
15	15C	ABC	LINE	1.00	0.000	0.001	0.000	0.001	1	0.0	0.0
15	15S	ABC	LINE	1.00	0.009	0.009	0.009	0.009	1	0.0	0.0
12A	12AS	ABC	LINE	1.00	0.004	0.003	0.004	0.003	1	0.0	0.0
767	12BTP	ABC	LINE	1.00	0.085	0.069	0.336	0.021	1	8.4	0.0
12ATP	S204C	ABC	LINE	1.00	1.266	2.930	3.554	8.403	0	142.9	0.0
12BY2	12BY	ABC	BUS	1.47	0.000	0.006	0.000	0.006	1	0.0	0.0
12BX2	12B	ABC	BUS	1.66	0.000	0.007	0.000	0.007	1	0.0	0.0

[illegible]H4CF,P&Q,BUS Z ADDED, ONLINE   AUG 02 1990
[illegible]VY LOAD 116KV GRID   THU, 13:15

SWITCH DATA

FROM	TO	PHAS	CON TYPE	STATUS
S13AE	S13A	ABC	SWCH	1
12A	11A	ABC	SWCH	1
12B	11B	ABC	SWCH	1
T11IN	T11	ABC	SWCH	1
12ATP	12BTP	ABC	SWCH	0
12A	12BY2	ABC	SWCH	1
12BX	12BX2	ABC	SWCH	1
12AT	12ATS	ABC	SWCH	1
12BT	12BTS	ABC	SWCH	1
12AX	12B	ABC	SWCH	0
12AY	12A	ABC	SWCH	0

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

[illegible]ONH4CF,P&Q,BUS Z ADDED, ONLINE   AUG 02 1990
[illegible]AVY LOAD 116KV GRID   THU, 13:15

TRANSFORMER DATA - TAP CHANGE DATA

FROM	TO	PHAS	CON TYPE	TNSF TYPE	1-PH KVA	TAP CHG A	B	C	VMAX	VMIN	TMAX	TMIN	TSTP	STAT
1G	S13AE	ABC	TRNF	3	******	4	4	4	1.05	1.04	1.1	0.9	0.00625	0
T11IN	1G	ABC	TRNF	2	9333.	-4	-4	-4	1.05	1.04	1.1	0.9	0.00625	3
767	S13A	ABC	TRNF	2	10000.	4	4	4	1.05	1.04	1.1	0.9	0.00625	3
12AT	12ATP	ABC	TRNF	2	9333.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
14	SST14	ABC	TRNF	11	500.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
18	SST18	ABC	TRNF	11	333.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
16	SST16	ABC	TRNF	11	500.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
17	SST17	ABC	TRNF	11	333.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
11A	T11IN	ABC	TRNF	1	4667.	0	0	0	1.05	1.04	1.1	0.9	0.00625	0
11B	T11	ABC	TRNF	1	4667.	0	0	0	1.05	1.04	1.1	0.9	0.00625	0
13	SST13	ABC	TRNF	11	333.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
15	SST15	ABC	TRNF	11	333.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
12BT	12BTP	ABC	TRNF	2	9333.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
12AX	12ATS	ABC	TRNS	1	4667.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
12AY	12AT	ABC	TRNS	1	4667.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
12BY	12BT	ABC	TRNS	1	4667.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
12BX	12BTS	ABC	TRNF	1	4667.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

NH4CF,P&Q,BUS Z ADDED, ONLINE   AUG 02 1990
VY LOAD 116KV GRID   THU, 13:15

TRANSFORMER DATA - IMPEDANCE AND COMPOUNDING DATA

FROM	TO	ZB1		ZB0		ZCOMP					
		R	X	R	X	A		B		C	
1G	S13AE	0.000	0.100	0.000	0.100	0.00	0.00	0.00	0.00	0.00	0.00
T11IN	1G	0.000	0.007	0.000	0.007	0.00	0.00	0.00	0.00	0.00	0.00
767	S13A	0.006	0.078	0.006	0.078	0.00	0.00	0.00	0.00	0.00	0.00
12AT	12ATP	0.000	0.005	0.000	0.005	0.00	0.00	0.00	0.00	0.00	0.00
14	SST14	0.019	0.054	0.019	0.054	0.00	0.00	0.00	0.00	0.00	0.00
18	SST18	0.022	0.052	0.022	0.052	0.00	0.00	0.00	0.00	0.00	0.00
16	SST16	0.019	0.054	0.019	0.054	0.00	0.00	0.00	0.00	0.00	0.00
17	SST17	0.022	0.052	0.022	0.052	0.00	0.00	0.00	0.00	0.00	0.00
11A	T11IN	0.000	0.051	0.000	0.051	0.00	0.00	0.00	0.00	0.00	0.00
11B	T11	0.000	0.051	0.000	0.051	0.00	0.00	0.00	0.00	0.00	0.00
13	SST13	0.022	0.052	0.022	0.052	0.00	0.00	0.00	0.00	0.00	0.00
15	SST15	0.022	0.052	0.022	0.052	0.00	0.00	0.00	0.00	0.00	0.00
12BT	12BTP	0.000	0.011	0.000	0.011	0.00	0.00	0.00	0.00	0.00	0.00
12AX	12ATS	0.000	0.032	0.000	0.032	0.00	0.00	0.00	0.00	0.00	0.00
12AY	12AT	0.000	0.032	0.000	0.032	0.00	0.00	0.00	0.00	0.00	0.00
12BY	12BT	0.001	0.029	0.001	0.029	0.00	0.00	0.00	0.00	0.00	0.00
12BX	12BTS	0.001	0.030	0.001	0.030	0.00	0.00	0.00	0.00	0.00	0.00

[illegible]NH4CF,P&Q,BUS Z ADDED, ONLINE
[illegible]VY LOAD 116KV GRID

AUG 02 1990
THU, 13:15

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SYSTEM KVA BASE =  100000.0     SYSTEM DEFAULT KV (LN) =    66.40
    SOURCE NODE = S13AE                 SOURCE KV (LN) =    66.97
POSITIVE SEQUENCE SOURCE IMPEDANCE =    0.00209 +j    0.02772
    ZERO SEQUENCE SOURCE IMPEDANCE =    0.00110 +j    0.01450

ACCELERATION FACTOR =  0.80     TOLERANCE = .00001
ZERO SEQUENCE ACCELERATION FACTOR =  0.15
NOMINAL DELIVERY VOLTAGE =   100.00
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POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

NH4CF,P&Q,BUS Z ADDED, ONLINE AUG 02 1990
VY LOAD 116KV GRID THU, 13:20

SECTION FROM	TO	PHAS	CON TYPE	MAX AMPS	V MIN/ 100.0	SECTION LOAD KW	KVAR	CAP KVAR	TOTAL DIST
	S13AE	ABC		149.0	100.9			0.0	
S13AE	S13A	ABC	SWCH	149.0	100.9	25.5	15.7M	0.0	0.00
S13A	767	ABC	TRNF	509.2	94.0	25.5	15.7M	0.0	0.00
767	12BTP	ABC	LINE	509.2	93.7	25.3	13.3M	0.0	1.00
12BTP	12BT	ABC	TRNF	4227.1	93.1	25.3	13.2M	0.0	1.00
12BT	12BY	ABC	TRNS	2158.8	91.6	12.9	6.5M	0.0	1.00
12BY	12BY2	ABC	BUS	2158.8	91.4	12.9	6.0M	0.0	2.47
12BY2	12A	ABC	SWCH	2158.8	91.4	12.9	6.0M	0.0	2.47
12A	SST14	ABC	EK1B	95.2	91.3	496.2	382.4	0.0	2.77
SST14	14	ABC	TRNF	816.3	89.1L	496.0	382.1	0.0	2.77
14	14C	ABC	LINE	0.0	89.1L	0.0	0.0	0.0	3.77
14	14S	ABC	LINE	390.0	88.5L	262.4	128.2	0.0	3.77
14	1C	ABC	LINE	438.9	86.9L	227.7	237.0	0.0	3.77
12A	SST18	ABC	EK1C	38.5	91.3	226.4	113.2	0.0	2.80
SST18	18	ABC	TRNF	329.8	90.1L	226.3	113.2	0.0	2.80
18	18C	ABC	LINE	0.0	90.1L	0.0	0.0	0.0	3.80
	18S	ABC	LINE	329.8	89.8L	224.7	109.1	0.0	3.80
12A	11A	ABC	SWCH	2027.6	91.4	12.2	5.5M	0.0	2.47
11A	11AC	ABC	LINE	1186.0	90.6	7230.5	2930.4	0.0	3.47
11A	11AS	ABC	LINE	742.5	91.0	4390.6	2140.5	0.0	3.47
11A	SST13	ABC	EK1C	102.2	91.4	547.6	390.5	0.0	2.52
SST13	13	ABC	TRNF	876.4	87.8L	547.5	390.4	0.0	2.52
13	13C	ABC	LINE	488.6	87.7L	306.1	190.4	0.0	3.52
13	13S	ABC	LINE	113.6	87.4L	75.3	36.7	0.0	3.52
12A	12AS	ABC	LINE	0.0	91.4	0.0	0.0	0.0	3.47
12BT	12BTS	ABC	SWCH	2068.3	93.1	12.3	6.3M	0.0	1.00
12BTS	12BX	ABC	TRNF	2068.3	91.6	12.3	6.3M	0.0	1.00
12BX	12BX2	ABC	SWCH	2068.3	91.6	12.3	5.8M	0.0	1.00
12BX2	12B	ABC	BUS	2068.3	91.3	12.3	5.8M	0.0	2.66
12B	SST16	ABC	EK1B	95.3	91.3	496.7	382.5	0.0	2.95
SST16	16	ABC	TRNF	817.0	89.1L	496.5	382.2	0.0	2.95
16	16C	ABC	LINE	0.0	89.1L	0.0	0.0	0.0	3.95
16	16S	ABC	LINE	389.8	88.6L	262.4	127.8	0.0	3.95
	1D	ABC	LINE	440.0	87.1L	228.2	237.5	0.0	3.95
12B	SST17	ABC	EK1C	109.1	91.2	612.0	374.2	0.0	3.05
SST17	17	ABC	TRNF	934.9	87.7L	611.3	373.7	0.0	3.05
17	17C	ABC	LINE	596.8	87.5L	373.1	232.2	0.0	4.05

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

[illegible]NH4CF,P&Q,BUS Z ADDED, ONLINE AUG 02 1990
[illegible]VY LOAD 116KV GRID THU, 13:20

SECTION FROM	TO	PHAS	CON TYPE	MAX AMPS	V MIN/ 100.0	SECTION LOAD KW	KVAR	CAP KVAR	TOTAL DIST
17	17S	ABC	LINE	339.2	87.3L	224.7	109.2	0.0	4.05
12B	11B	ABC	SWCH	1867.1	91.3	11.2	5.0M	0.0	2.66
11B	11BC	ABC	LINE	1030.0	90.7	6307.9	2468.9	0.0	3.66
11B	11BS	ABC	LINE	743.5	90.9	4394.0	2145.9	0.0	3.66
11B	SST15	ABC	EK1C	97.7	91.3	513.2	386.7	0.0	2.72
SST15	15	ABC	TRNF	837.4	87.9L	513.1	386.6	0.0	2.72
15	15C	ABC	LINE	189.7	87.9L	119.0	73.9	0.0	3.72
15	15S	ABC	LINE	169.9	87.2L	112.8	55.0	0.0	3.72

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

ESIH4CF,P&Q,BUS Z ADDED, ONLINE
HEAVY LOAD, START SI

AUG 17 1990
FRI, 13:07

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S13AE	ABC	1.008	66.9	100.8	
S13A	ABC	1.008	66.9	100.8	
767	ABC	0.935	18.6	93.5	
12BTP	ABC	0.932	18.6	93.2	
12BT	ABC	0.926	2.2	92.6	
12BY	ABC	0.907	2.2	90.7	
12BY2	ABC	0.904	2.2	90.4	
12A	ABC	0.904	2.2	90.4	
SST14	ABC	0.902	2.2	90.2	
14	ABC	0.822	0.4	82.2	L
14C	ABC	0.815	0.4	81.5	L
14S	ABC	0.815	0.4	81.5	L
1C	ABC	0.801	0.4	80.1	L
SST18	ABC	0.904	2.2	90.4	
18	ABC	0.892	0.4	89.2	L
18C	ABC	0.892	0.4	89.2	L
18S	ABC	0.889	0.4	88.9	L
[illegible]	ABC	0.904	2.2	90.4	
[illegible]C	ABC	0.896	2.2	89.6	
11AS	ABC	0.900	2.2	90.0	
SST13	ABC	0.904	2.2	90.4	
13	ABC	0.869	0.4	86.9	L
13C	ABC	0.867	0.4	86.7	L
13S	ABC	0.864	0.4	86.4	L
12AS	ABC	0.904	2.2	90.4	
12BTS	ABC	0.926	2.2	92.6	
12BX	ABC	0.910	2.2	91.0	
12BX2	ABC	0.910	2.2	91.0	
12B	ABC	0.908	2.2	90.8	
SST16	ABC	0.907	2.2	90.7	
16	ABC	0.885	0.4	88.5	L
16C	ABC	0.885	0.4	88.5	L
16S	ABC	0.880	0.4	88.0	L
1D	ABC	0.865	0.4	86.5	L
SST17	ABC	0.907	2.2	90.7	
17	ABC	0.871	0.4	87.1	L
17C	ABC	0.869	0.4	86.9	L
17S	ABC	0.867	0.4	86.7	L
11B	ABC	0.908	2.2	90.8	
[illegible]C	ABC	0.901	2.2	90.1	
11BS	ABC	0.903	2.2	90.3	
SST15	ABC	0.907	2.2	90.7	

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

ESIH4CF,P&Q,BUS Z ADDED, ONLINE   AUG 17 1990
HEAVY LOAD, START SI   FRI, 13:07

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
15	ABC	0.873	0.4	87.3	L
15C	ABC	0.873	0.4	87.3	L
15S	ABC	0.866	0.4	86.6	L

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

ESIH4CF,P&Q,BUS Z ADDED, ONLINE   AUG 17 1990
HEAVY LOAD, START SI   FRI, 13:08

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	45	0	10	6	0	0	1	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	25.92M	531.58	0.00	381.08		
KVAR	17.37M	4807.92	0.00	1211.91	8.71	0.00
PF	0.831					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.01M
KVAR	0.00	0.00	0.00	11.36M

MAX V-LN 1.008 PU, 66.94 KV, 100.8/ 100.0 V AT NODE S13AE PHASE A
MIN V-LN 0.896 PU, 2.15 KV, 89.6/ 100.0 V AT NODE 11AC PHASE B
MAX V-LL 0.892 PU, 0.43 KV, 89.2/ 100.0 V AT NODE 18 PHASE AB
MIN V-LL 0.801 PU, 0.39 KV, 80.1/ 100.0 V AT NODE 1C PHASE AB

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.33M
KVAR	0.00	0.00	0.00	11.66M
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.01M
KVAR	0.00	0.00	0.00	11.36M

	GENERATORS		MOTORS	
	ASYNCHRONOUS	SYNCHRONOUS	ASYNCHRONOUS	SYNCHRONOUS
KW	0.00	0.00	381.08	0.00
KVAR	0.00	0.00	1211.91	0.00

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

S
[illegible]H4CF,P&Q,BUS Z ADDED, ONLINE   AUG 02 1990
[illegible]VY LOAD, START SI   THU, 13:49

MINIMUM VOLTAGES BELOW 200.0 PERCENT

NODE	PHAS	MINIMUM VOLTAGE /PU	/KV	/ 100.	
S13AE	ABC	1.009	67.0	100.9	
S13A	ABC	1.009	67.0	100.9	
767	ABC	0.939	18.7	93.9	
12BTP	ABC	0.936	18.6	93.6	
12BT	ABC	0.931	2.2	93.1	
12BY	ABC	0.915	2.2	91.5	
12BY2	ABC	0.912	2.2	91.2	
12A	ABC	0.912	2.2	91.2	
SST14	ABC	0.912	2.2	91.2	
14	ABC	0.881	0.4	88.1	L
14C	ABC	0.880	0.4	88.0	L
14S	ABC	0.875	0.4	87.5	L
1C	ABC	0.859	0.4	85.9	L
SST18	ABC	0.912	2.2	91.2	
18	ABC	0.900	0.4	90.0	L
18C	ABC	0.900	0.4	90.0	L
[illegible]	ABC	0.897	0.4	89.7	L
[illegible]A	ABC	0.912	2.2	91.2	
11AC	ABC	0.905	2.2	90.5	
11AS	ABC	0.909	2.2	90.9	
SST13	ABC	0.912	2.2	91.2	
13	ABC	0.877	0.4	87.7	L
13C	ABC	0.876	0.4	87.6	L
13S	ABC	0.873	0.4	87.3	L
12AS	ABC	0.912	2.2	91.2	
12BTS	ABC	0.931	2.2	93.1	
12BX	ABC	0.915	2.2	91.5	
12BX2	ABC	0.915	2.2	91.5	
12B	ABC	0.913	2.2	91.3	
SST16	ABC	0.912	2.2	91.2	
16	ABC	0.890	0.4	89.0	L
16C	ABC	0.890	0.4	89.0	L
16S	ABC	0.885	0.4	88.5	L
1D	ABC	0.870	0.4	87.0	L
SST17	ABC	0.912	2.2	91.2	
17	ABC	0.876	0.4	87.6	L
17C	ABC	0.875	0.4	87.5	L
17S	ABC	0.873	0.4	87.3	L
[illegible]	ABC	0.913	2.2	91.3	
[illegible]C	ABC	0.906	2.2	90.6	
11BS	ABC	0.908	2.2	90.8	
SST15	ABC	0.913	2.2	91.3	

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

S
ES5H4CF,P&Q,BUS Z ADDED, ONLINE   AUG 02 1990
VY LOAD, START SI   THU, 13:49

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE		
NODE	PHAS	/PU	/KV	/ 100.
15	ABC	0.878	0.4	87.8 L
15C	ABC	0.878	0.4	87.8 L
15S	ABC	0.871	0.4	87.1 L

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

S
FS H4CF,P&Q,BUS Z ADDED, ONLINE AUG 02 1990
VY LOAD, START SI THU, 13:50

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	45	0	10	6	0	0	1	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	25.77M	463.62	0.00	261.00		
KVAR	15.92M	4409.69	0.00	126.41	8.79	0.00
PF	0.851					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.05M
KVAR	0.00	0.00	0.00	11.40M

MAX V-LN 1.009 PU, 66.97 KV, 100.9/ 100.0 V AT NODE S13AE PHASE A
MIN V-LN 0.905 PU, 2.17 KV, 90.5/ 100.0 V AT NODE 11AC PHASE B
MAX V-LL 0.900 PU, 0.44 KV, 90.0/ 100.0 V AT NODE 18 PHASE AB
MIN V-LL 0.859 PU, 0.42 KV, 85.9/ 100.0 V AT NODE 1C PHASE BC

NOMINAL STATIC LOAD

CATEGORY	1	2	3	4
	0.00	0.00	0.00	25.33M
R	0.00	0.00	0.00	11.66M
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.05M
KVAR	0.00	0.00	0.00	11.40M

	GENERATORS		MOTORS	
	ASYNCHRONOUS	SYNCHRONOUS	ASYNCHRONOUS	SYNCHRONOUS
KW	0.00	0.00	261.00	0.00
KVAR	0.00	0.00	126.41	0.00

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

EMSH4CF, P&Q,BUS Z ADDED, OFFLINE   JUL 31 1990
RCP START,116KV GRID   TUE, 15:34

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S13AE	ABC	0.995	66.1	99.5	
S13A	ABC	0.995	66.1	99.5	
767	ABC	0.878	17.5	87.8	
12BTP	ABC	0.874	17.4	87.4	
12BT	ABC	0.861	2.1	86.1	
12BY	ABC	0.800	1.9	80.0	
12BY2	ABC	0.790	1.9	79.0	
12A	ABC	0.790	1.9	79.0	
SST14	ABC	0.789	1.9	78.9	
14	ABC	0.768	0.4	76.8	L
14C	ABC	0.768	0.4	76.8	L
14S	ABC	0.761	0.4	76.1	L
1C	ABC	0.749	0.4	74.9	L
SST18	ABC	0.789	1.9	78.9	
18	ABC	0.776	0.4	77.6	L
18C	ABC	0.776	0.4	77.6	L
18S	ABC	0.772	0.4	77.2	L
11A	ABC	0.790	1.9	79.0	
11AC	ABC	0.784	1.9	78.4	
11AS	ABC	0.769	1.8	76.9	
SST13	ABC	0.790	1.9	79.0	
13	ABC	0.752	0.4	75.2	L
13C	ABC	0.751	0.4	75.1	L
13S	ABC	0.747	0.4	74.7	L
12AS	ABC	0.790	1.9	79.0	
12BTS	ABC	0.861	2.1	86.1	
12BX	ABC	0.852	2.0	85.2	
12BX2	ABC	0.852	2.0	85.2	
12B	ABC	0.850	2.0	85.0	
SST16	ABC	0.850	2.0	85.0	
16	ABC	0.828	0.4	82.8	L
16C	ABC	0.828	0.4	82.8	L
16S	ABC	0.822	0.4	82.2	L
1D	ABC	0.809	0.4	80.9	L
SST17	ABC	0.849	2.0	84.9	
17	ABC	0.810	0.4	81.0	L
17C	ABC	0.809	0.4	80.9	L
17S	ABC	0.807	0.4	80.7	L
11B	ABC	0.850	2.0	85.0	
11BC	ABC	0.849	2.0	84.9	
11BS	ABC	0.845	2.0	84.5	
SST15	ABC	0.850	2.0	85.0	

EMSH4CF, P&Q,BUS Z ADDED, OFFLINE
RCP START,116KV GRID

JUL 31 1990
TUE, 15:34

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
15	ABC	0.816	0.4	81.6	L
15C	ABC	0.816	0.4	81.6	L
15S	ABC	0.808	0.4	80.8	L

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

EMSH4CF, P&Q,BUS Z ADDED, OFFLINE   JUL 31 1990
RCP START,116KV GRID   TUE, 15:34

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	45	0	10	6	0	0	1	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	20.44M	949.83	0.00	6.15M		
KVAR	33.65M	8570.56	0.00	19.57M	7.67	0.00
PF	0.519					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	13.34M
KVAR	0.00	0.00	0.00	5.51M

MAX V-LN 0.995 PU, 66.08 KV, 99.5/ 100.0 V AT NODE S13AE PHASE A
MIN V-LN 0.769 PU, 1.85 KV, 76.9/ 100.0 V AT NODE 11AS PHASE B
MAX V-LL 0.828 PU, 0.40 KV, 82.8/ 100.0 V AT NODE 16 PHASE CA
MIN V-LL 0.747 PU, 0.36 KV, 74.7/ 100.0 V AT NODE 13S PHASE AB

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	13.78M
KVAR	0.00	0.00	0.00	5.93M
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	13.34M
KVAR	0.00	0.00	0.00	5.51M

	GENERATORS ASYNCHRONOUS	GENERATORS SYNCHRONOUS	MOTORS ASYNCHRONOUS	MOTORS SYNCHRONOUS
KW	0.00	0.00	6.15M	0.00
KVAR	0.00	0.00	19.57M	0.00

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

EMSH4CF2, P&Q, BUS Z ADDED, OFFLINE JUL 31 1990
RCP START, 118.5KV GRID TUE, 15:36

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S13AE	ABC	1.017	67.5	101.7	
S13A	ABC	1.017	67.5	101.7	
767	ABC	0.898	17.9	89.8	
12BTP	ABC	0.894	17.8	89.4	
12BT	ABC	0.881	2.1	88.1	
12BY	ABC	0.819	2.0	81.9	
12BY2	ABC	0.808	1.9	80.8	
12A	ABC	0.808	1.9	80.8	
SST14	ABC	0.808	1.9	80.8	
14	ABC	0.786	0.4	78.6	L
14C	ABC	0.786	0.4	78.6	L
14S	ABC	0.779	0.4	77.9	L
1C	ABC	0.767	0.4	76.7	L
SST18	ABC	0.808	1.9	80.8	
18	ABC	0.795	0.4	79.5	L
18C	ABC	0.795	0.4	79.5	L
18S	ABC	0.791	0.4	79.1	L
11A	ABC	0.808	1.9	80.8	
11AC	ABC	0.803	1.9	80.3	
11AS	ABC	0.787	1.9	78.7	
SST13	ABC	0.808	1.9	80.8	
13	ABC	0.771	0.4	77.1	L
13C	ABC	0.770	0.4	77.0	L
13S	ABC	0.766	0.4	76.6	L
12AS	ABC	0.808	1.9	80.8	
12BTS	ABC	0.881	2.1	88.1	
12BX	ABC	0.872	2.1	87.2	
12BX2	ABC	0.872	2.1	87.2	
12B	ABC	0.870	2.1	87.0	
SST16	ABC	0.870	2.1	87.0	
16	ABC	0.848	0.4	84.8	L
16C	ABC	0.848	0.4	84.8	L
16S	ABC	0.842	0.4	84.2	L
1D	ABC	0.829	0.4	82.9	L
SST17	ABC	0.869	2.1	86.9	
17	ABC	0.831	0.4	83.1	L
17C	ABC	0.830	0.4	83.0	L
17S	ABC	0.828	0.4	82.8	L
11B	ABC	0.870	2.1	87.0	
11BC	ABC	0.869	2.1	86.9	
11BS	ABC	0.865	2.1	86.5	
SST15	ABC	0.870	2.1	87.0	

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

EMSH4CF2, P&Q, BUS Z ADDED, OFFLINE   JUL 31 1990
RCP START, 118.5KV GRID   TUE, 15:36

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
15	ABC	0.836	0.4	83.6	L
15C	ABC	0.836	0.4	83.6	L
15S	ABC	0.828	0.4	82.8	L

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR, PSS/U VERSION 4.0

EMSH4CF2, P&Q, BUS Z ADDED, OFFLINE JUL 31 1990
RCP START, 118.5KV GRID TUE, 15:36

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	45	0	10	6	0	0	1	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	20.79M	969.16	0.00	6.45M		
KVAR	34.77M	8727.24	0.00	20.50M	8.03	0.00
PF	0.513					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	13.38M
KVAR	0.00	0.00	0.00	5.55M

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MAX V-LN 1.017 PU, 67.51 KV,  101.7/ 100.0 V AT NODE S13AE PHASE A
MIN V-LN 0.787 PU,  1.89 KV,   78.7/ 100.0 V AT NODE 11AS  PHASE B
MAX V-LL 0.848 PU,  0.41 KV,   84.8/ 100.0 V AT NODE 16    PHASE BC
MIN V-LL 0.766 PU,  0.37 KV,   76.6/ 100.0 V AT NODE 13S   PHASE AB
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NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	13.78M
KVAR	0.00	0.00	0.00	5.93M
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	13.38M
KVAR	0.00	0.00	0.00	5.55M

	GENERATORS		MOTORS	
	ASYNCHRONOUS	SYNCHRONOUS	ASYNCHRONOUS	SYNCHRONOUS
KW	0.00	0.00	6.45M	0.00
KVAR	0.00	0.00	20.50M	0.00

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

EMSY4CF, P&Q, BUS Z ,OFFLINE JUL 31 1990
HEAVY LOAD 116KV GRID TUE, 15:55

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S13AE	ABC	0.998	66.3	99.8	
S13A	ABC	0.998	66.3	99.8	
767	ABC	0.878	17.5	87.8	
12BTP	ABC	0.874	17.4	87.4	
12BT	ABC	0.861	2.1	86.1	
12BY	ABC	0.808	1.9	80.8	
12BY2	ABC	0.799	1.9	79.9	
12A	ABC	0.799	1.9	79.9	
SST14	ABC	0.799	1.9	79.9	
14	ABC	0.777	0.4	77.7	L
14C	ABC	0.777	0.4	77.7	L
14S	ABC	0.770	0.4	77.0	L
1C	ABC	0.758	0.4	75.8	L
SST18	ABC	0.799	1.9	79.9	
18	ABC	0.785	0.4	78.5	L
18C	ABC	0.785	0.4	78.5	L
18S	ABC	0.781	0.4	78.1	L
11A	ABC	0.799	1.9	79.9	
11AC	ABC	0.789	1.9	78.9	
11AS	ABC	0.783	1.9	78.3	
SST13	ABC	0.799	1.9	79.9	
13	ABC	0.762	0.4	76.2	L
13C	ABC	0.760	0.4	76.0	L
13S	ABC	0.757	0.4	75.7	L
12AS	ABC	0.799	1.9	79.9	
12BTS	ABC	0.861	2.1	86.1	
12BX	ABC	0.845	2.0	84.5	
12BX2	ABC	0.845	2.0	84.5	
12B	ABC	0.842	2.0	84.2	
SST16	ABC	0.841	2.0	84.1	
16	ABC	0.820	0.4	82.0	L
16C	ABC	0.820	0.4	82.0	L
16S	ABC	0.814	0.4	81.4	L
1D	ABC	0.801	0.4	80.1	L
SST17	ABC	0.841	2.0	84.1	
17	ABC	0.801	0.4	80.1	L
17C	ABC	0.800	0.4	80.0	L
17S	ABC	0.798	0.4	79.8	L
11B	ABC	0.842	2.0	84.2	
11BC	ABC	0.835	2.0	83.5	
11BS	ABC	0.837	2.0	83.7	
SST15	ABC	0.842	2.0	84.2	

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

EMSY4CF, P&Q, BUS Z ,OFFLINE   JUL 31 1990
HEAVY LOAD 116KV GRID   TUE, 15:55

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
15	ABC	0.808	0.4	80.8	L
15C	ABC	0.807	0.4	80.7	L
15S	ABC	0.800	0.4	80.0	L

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

EMSY4CF, P&Q, BUS Z ,OFFLINE JUL 31 1990

HEAVY LOAD 116KV GRID TUE, 15:55

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	45	0	10	6	0	0	1	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	27.34M	1016.56	0.00	4.72M		
KVAR	34.47M	9799.50	0.00	15.03M	7.68	0.00
PF	0.621					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	21.60M
KVAR	0.00	0.00	0.00	9.65M

MAX V-LN 0.998 PU, 66.26 KV, 99.8/ 100.0 V AT NODE S13AE PHASE A
MIN V-LN 0.783 PU, 1.88 KV, 78.3/ 100.0 V AT NODE 11AS PHASE A
MAX V-LL 0.820 PU, 0.40 KV, 82.0/ 100.0 V AT NODE 16 PHASE CA
MIN V-LL 0.757 PU, 0.37 KV, 75.7/ 100.0 V AT NODE 13S PHASE AB

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	22.04M
KVAR	0.00	0.00	0.00	10.06M
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	21.60M
KVAR	0.00	0.00	0.00	9.65M

	GENERATORS		MOTORS	
	ASYNCHRONOUS	SYNCHRONOUS	ASYNCHRONOUS	SYNCHRONOUS
KW	0.00	0.00	4.72M	0.00
KVAR	0.00	0.00	15.03M	0.00

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

EOF_LOCA,OFFLINE,P&Q, BUS Z   AUG 13 1990
LOCA LOAD 116KV   MON, 13:15

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S13AE	ABC	1.009	67.0	100.9	
S13A	ABC	1.009	67.0	100.9	
767	ABC	0.949	18.9	94.9	
12BTP	ABC	0.947	18.9	94.7	
12BT	ABC	0.943	2.3	94.3	
12BY	ABC	0.930	2.2	93.0	
12BY2	ABC	0.928	2.2	92.8	
12A	ABC	0.928	2.2	92.8	
SST14	ABC	0.927	2.2	92.7	
14	ABC	0.865	0.4	86.5	L
14C	ABC	0.861	0.4	86.1	L
14S	ABC	0.859	0.4	85.9	L
1C	ABC	0.843	0.4	84.3	L
SST18	ABC	0.928	2.2	92.8	
18	ABC	0.909	0.4	90.9	L
18C	ABC	0.909	0.4	90.9	L
18S	ABC	0.909	0.4	90.9	L
11A	ABC	0.928	2.2	92.8	
11AC	ABC	0.925	2.2	92.5	
11AS	ABC	0.925	2.2	92.5	
SST13	ABC	0.928	2.2	92.8	
13	ABC	0.893	0.4	89.3	L
13C	ABC	0.892	0.4	89.2	L
13S	ABC	0.889	0.4	88.9	L
12AS	ABC	0.928	2.2	92.8	
12BTS	ABC	0.943	2.3	94.3	
12BX	ABC	0.932	2.2	93.2	
12BX2	ABC	0.932	2.2	93.2	
12B	ABC	0.930	2.2	93.0	
SST16	ABC	0.928	2.2	92.8	
16	ABC	0.875	0.4	87.5	L
16C	ABC	0.873	0.4	87.3	L
16S	ABC	0.870	0.4	87.0	L
1D	ABC	0.856	0.4	85.6	L
SST17	ABC	0.929	2.2	92.9	
17	ABC	0.911	0.4	91.1	L
17C	ABC	0.910	0.4	91.0	L
17S	ABC	0.911	0.4	91.1	L
11B	ABC	0.930	2.2	93.0	
11BC	ABC	0.927	2.2	92.7	
11BS	ABC	0.925	2.2	92.5	
SST15	ABC	0.929	2.2	92.9	

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

EOF_LOCA,OFFLINE,P&Q, BUS Z   AUG 13 1990
LOCA LOAD 116KV   MON, 13:15

MINIMUM VOLTAGES BELOW 200.0 PERCENT

NODE	PHAS	MINIMUM VOLTAGE /PU	/KV	/ 100.
15	ABC	0.895	0.4	89.5 L
15C	ABC	0.895	0.4	89.5 L
15S	ABC	0.888	0.4	88.8 L

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

EOF_LOCA,OFFLINE,P&Q, BUS Z AUG 13 1990
LOCA LOAD 116KV MON, 13:16

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	45	0	10	6	0	0	0	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	21.01M	378.13	0.00	0.00		
KVAR	12.03M	3086.29	0.00	0.00	8.99	0.00
PF	0.868					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	20.63M
KVAR	0.00	0.00	0.00	8.95M

MAX V-LN 1.009 PU, 66.97 KV, 100.9/ 100.0 V AT NODE S13AE PHASE A
MIN V-LN 0.925 PU, 2.22 KV, 92.5/ 100.0 V AT NODE 11AC PHASE B
MAX V-LL 0.911 PU, 0.44 KV, 91.1/ 100.0 V AT NODE 17 PHASE AB
MIN V-LL 0.843 PU, 0.41 KV, 84.3/ 100.0 V AT NODE 1C PHASE BC

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	20.91M
KVAR	0.00	0.00	0.00	9.21M
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	20.63M
KVAR	0.00	0.00	0.00	8.95M

	GENERATORS ASYNCHRONOUS	GENERATORS SYNCHRONOUS	MOTORS ASYNCHRONOUS	MOTORS SYNCHRONOUS
KW	0.00	0.00	0.00	0.00
KVAR	0.00	0.00	0.00	0.00

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

EOF_LOC2,OFFLINE,P&Q, BUS Z   AUG 13 1990
[illegible]A LOAD 118KV   MON, 13:17

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S13AE	ABC	1.026	68.1	102.6	
S13A	ABC	1.026	68.1	102.6	
767	ABC	0.967	19.3	96.7	
12BTP	ABC	0.965	19.2	96.5	
12BT	ABC	0.961	2.3	96.1	
12BY	ABC	0.949	2.3	94.9	
12BY2	ABC	0.946	2.3	94.6	
12A	ABC	0.946	2.3	94.6	
SST14	ABC	0.945	2.3	94.5	
14	ABC	0.884	0.4	88.4	L
14C	ABC	0.880	0.4	88.0	L
14S	ABC	0.878	0.4	87.8	L
1C	ABC	0.861	0.4	86.1	L
SST18	ABC	0.946	2.3	94.6	
18	ABC	0.928	0.5	92.8	L
18C	ABC	0.927	0.4	92.7	L
[illegible]S	ABC	0.928	0.5	92.8	L
[illegible]	ABC	0.946	2.3	94.6	
[illegible]C	ABC	0.943	2.3	94.3	
11AS	ABC	0.943	2.3	94.3	
SST13	ABC	0.946	2.3	94.6	
13	ABC	0.911	0.4	91.1	L
13C	ABC	0.910	0.4	91.0	L
13S	ABC	0.907	0.4	90.7	L
12AS	ABC	0.946	2.3	94.6	
12BTS	ABC	0.961	2.3	96.1	
12BX	ABC	0.950	2.3	95.0	
12BX2	ABC	0.950	2.3	95.0	
12B	ABC	0.948	2.3	94.8	
SST16	ABC	0.946	2.3	94.6	
16	ABC	0.894	0.4	89.4	L
16C	ABC	0.892	0.4	89.2	L
16S	ABC	0.889	0.4	88.9	L
1D	ABC	0.874	0.4	87.4	L
SST17	ABC	0.947	2.3	94.7	
17	ABC	0.929	0.5	92.9	L
17C	ABC	0.928	0.5	92.8	L
17S	ABC	0.929	0.5	92.9	L
[illegible]B	ABC	0.948	2.3	94.8	
[illegible]C	ABC	0.945	2.3	94.5	
11BS	ABC	0.943	2.3	94.3	
SST15	ABC	0.947	2.3	94.7	

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

EOF_LOC2,OFFLINE,P&Q, BUS Z   AUG 13 1990
LOCA LOAD 118KV   MON, 13:17

MINIMUM VOLTAGES BELOW 200.0 PERCENT

NODE	PHAS	MINIMUM VOLTAGE /PU	/KV	/ 100.	
15	ABC	0.913	0.4	91.3	L
15C	ABC	0.913	0.4	91.3	L
15S	ABC	0.906	0.4	90.6	L

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

EOF_LOC2,OFFLINE,P&Q, BUS Z AUG 13 1990
LOCA LOAD 118KV MON, 13:17

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	45	0	10	6	0	0	0	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	21.03M	366.31	0.00	0.00		
KVAR	11.96M	2983.95	0.00	0.00	9.33	0.00
PF	0.869					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	20.67M
KVAR	0.00	0.00	0.00	8.98M

MAX V-LN 1.026 PU, 68.13 KV, 102.6/ 100.0 V AT NODE S13AE PHASE A
MIN V-LN 0.943 PU, 2.26 KV, 94.3/ 100.0 V AT NODE 11AC PHASE B
MAX V-LL 0.929 PU, 0.45 KV, 92.9/ 100.0 V AT NODE 17 PHASE CA
MIN V-LL 0.861 PU, 0.42 KV, 86.1/ 100.0 V AT NODE 1C PHASE AB

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	20.91M
KVAR	0.00	0.00	0.00	9.21M
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	20.67M
KVAR	0.00	0.00	0.00	8.98M

	GENERATORS		MOTORS	
	ASYNCHRONOUS	SYNCHRONOUS	ASYNCHRONOUS	SYNCHRONOUS
KW	0.00	0.00	0.00	0.00
KVAR	0.00	0.00	0.00	0.00

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

DONL9F, ONLINE, LIGHT LOAD, 1.0 TAP ON 12A JUL 31 1990
REG HOLDS 12A PRIMARY TO 35KV TUE, 16:00

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S204C	ABC	1.072	21.4	107.2	
S204R	ABC	1.015	20.2	101.5	
12ATP	ABC	1.011	20.1	101.1	
12AT	ABC	1.011	2.4	101.1	
12AY	ABC	1.009	2.4	100.9	
12AY2	ABC	1.009	2.4	100.9	
12A	ABC	1.009	2.4	100.9	
SST14	ABC	1.008	2.4	100.8	
14	ABC	0.986	0.5	98.6	L
14C	ABC	0.986	0.5	98.6	L
14S	ABC	0.980	0.5	98.0	L
1C	ABC	0.961	0.5	96.1	L
SST18	ABC	1.008	2.4	100.8	
18	ABC	0.992	0.5	99.2	L
18C	ABC	0.991	0.5	99.1	L
18S	ABC	0.992	0.5	99.2	L
12AS	ABC	1.009	2.4	100.9	
12ATS	ABC	1.011	2.4	101.1	
12AX	ABC	1.009	2.4	100.9	
12AX2	ABC	1.009	2.4	100.9	
12B	ABC	1.009	2.4	100.9	
SST16	ABC	1.008	2.4	100.8	
16	ABC	0.986	0.5	98.6	L
16C	ABC	0.986	0.5	98.6	L
16S	ABC	0.981	0.5	98.1	L
1D	ABC	0.964	0.5	96.4	L
SST17	ABC	1.009	2.4	100.9	
17	ABC	0.998	0.5	99.8	L
17C	ABC	0.998	0.5	99.8	L
17S	ABC	0.995	0.5	99.5	L

RCP RATINGS CHANGED TO 5.265MVA

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

DONL9F, ONLINE, LIGHT LOAD, 1.0 TAP ON 12A JUL 31 1990
REG HOLDS 12A PRIMARY TO 35KV TUE, 16:00

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	30	0	8	3	0	0	0	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	1627.97	25.97	0.00	0.00		
KVAR	1018.45	89.80	0.00	0.00	174.56	0.00
PF	0.848					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	1602.00
KVAR	0.00	0.00	0.00	1103.20

MAX V-LN 1.072 PU, 21.36 KV, 107.2/ 100.0 V AT NODE S204C PHASE A
MIN V-LN 1.008 PU, 2.42 KV, 100.8/ 100.0 V AT NODE SST14 PHASE A
MAX V-LL 0.998 PU, 0.48 KV, 99.8/ 100.0 V AT NODE 17 PHASE CA
MIN V-LL 0.961 PU, 0.47 KV, 96.1/ 100.0 V AT NODE 1C PHASE BC

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	1646.00
KVAR	0.00	0.00	0.00	1147.20
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	1602.00
KVAR	0.00	0.00	0.00	1103.20

	GENERATORS		MOTORS	
	ASYNCHRONOUS	SYNCHRONOUS	ASYNCHRONOUS	SYNCHRONOUS
KW	0.00	0.00	0.00	0.00
KVAR	0.00	0.00	0.00	0.00

RCP RATINGS CHANGED TO 5.265MVA

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

DONL9FT,ONLINE,LIGHT LOAD, 1.025 TAP ON 12A   JUL 31 1990
REG HOLDS 12A PRIMARY TO 35KV   TUE, 16:11

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S204C	ABC	1.072	21.4	107.2	
S204R	ABC	1.015	20.2	101.5	
12ATP	ABC	1.011	20.1	101.1	
12AT	ABC	1.036	2.5	103.6	
12AY	ABC	1.035	2.5	103.5	
12AY2	ABC	1.035	2.5	103.5	
12A	ABC	1.035	2.5	103.5	
SST14	ABC	1.034	2.5	103.4	
14	ABC	1.012	0.5	101.2	L
14C	ABC	1.012	0.5	101.2	L
14S	ABC	1.006	0.5	100.6	L
1C	ABC	0.986	0.5	98.6	L
SST18	ABC	1.034	2.5	103.4	
18	ABC	1.018	0.5	101.8	L
18C	ABC	1.017	0.5	101.7	L
18S	ABC	1.018	0.5	101.8	L
12AS	ABC	1.035	2.5	103.5	
12ATS	ABC	1.036	2.5	103.6	
12AX	ABC	1.035	2.5	103.5	
12AX2	ABC	1.035	2.5	103.5	
12B	ABC	1.035	2.5	103.5	
SST16	ABC	1.034	2.5	103.4	
16	ABC	1.012	0.5	101.2	L
16C	ABC	1.012	0.5	101.2	L
16S	ABC	1.007	0.5	100.7	L
1D	ABC	0.989	0.5	98.9	L
SST17	ABC	1.034	2.5	103.4	
17	ABC	1.024	0.5	102.4	L
17C	ABC	1.024	0.5	102.4	L
17S	ABC	1.021	0.5	102.1	L

RCP RATINGS CHANGED TO 5.265MVA

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

DONL9FT,ONLINE,LIGHT LOAD, 1.025 TAP ON 12A   JUL 31 1990
REG HOLDS 12A PRIMARY TO 35KV   TUE, 16:11

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	30	0	8	3	0	0	0	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	1657.29	26.00	0.00	0.00		
KVAR	1049.05	91.09	0.00	0.00	174.54	0.00
PF	0.845					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	1631.29
KVAR	0.00	0.00	0.00	1132.49

MAX V-LN 1.072 PU, 21.36 KV, 107.2/ 100.0 V AT NODE S204C PHASE A
MIN V-LN 1.011 PU, 20.13 KV, 101.1/ 100.0 V AT NODE 12ATP PHASE A
MAX V-LL 1.024 PU, 0.50 KV, 102.4/ 100.0 V AT NODE 17 PHASE CA
MIN V-LL 0.986 PU, 0.48 KV, 98.6/ 100.0 V AT NODE 1C PHASE AB

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	1646.00
KVAR	0.00	0.00	0.00	1147.20
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	1631.29
KVAR	0.00	0.00	0.00	1132.49

	GENERATORS		MOTORS	
	ASYNCHRONOUS	SYNCHRONOUS	ASYNCHRONOUS	SYNCHRONOUS
KW	0.00	0.00	0.00	0.00
KVAR	0.00	0.00	0.00	0.00

RCP RATINGS CHANGED TO 5.265MVA

DONH4CF,ONLINE,HEAVY LOAD, P&Q, BUS Z 1.0 TAP 12A JUL 31 1990
REG TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE TUE, 16:13

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S204C	ABC	0.957	19.1	95.7	
S204R	ABC	1.049	20.9	104.9	
12ATP	ABC	0.988	19.7	98.8	
12AT	ABC	0.985	2.4	98.5	
12AY	ABC	0.969	2.3	96.9	
12AY2	ABC	0.969	2.3	96.9	
12A	ABC	0.966	2.3	96.6	
11A	ABC	0.966	2.3	96.6	
11AC	ABC	0.959	2.3	95.9	
11AS	ABC	0.963	2.3	96.3	
SST13	ABC	0.966	2.3	96.6	
13	ABC	0.931	0.5	93.1	L
13C	ABC	0.930	0.5	93.0	L
13S	ABC	0.927	0.4	92.7	L
SST14	ABC	0.966	2.3	96.6	
14	ABC	0.944	0.5	94.4	L
14C	ABC	0.944	0.5	94.4	L
14S	ABC	0.938	0.5	93.8	L
1C	ABC	0.920	0.4	92.0	L
SST18	ABC	0.966	2.3	96.6	
18	ABC	0.955	0.5	95.5	L
18C	ABC	0.955	0.5	95.5	L
18S	ABC	0.952	0.5	95.2	L
12AS	ABC	0.966	2.3	96.6	
12ATS	ABC	0.985	2.4	98.5	
12AX	ABC	0.970	2.3	97.0	
12AX2	ABC	0.970	2.3	97.0	
12B	ABC	0.966	2.3	96.6	
SST16	ABC	0.966	2.3	96.6	
16	ABC	0.944	0.5	94.4	L
16C	ABC	0.944	0.5	94.4	L
16S	ABC	0.939	0.5	93.9	L
1D	ABC	0.923	0.4	92.3	L
SST17	ABC	0.965	2.3	96.5	
17	ABC	0.932	0.5	93.2	L
17C	ABC	0.931	0.5	93.1	L
17S	ABC	0.929	0.5	92.9	L
11B	ABC	0.966	2.3	96.6	
11BC	ABC	0.960	2.3	96.0	
11BS	ABC	0.962	2.3	96.2	
SST15	ABC	0.966	2.3	96.6	
15	ABC	0.932	0.5	93.2	L

DONH4CF,ONLINE,HEAVY LOAD, P&Q, BUS Z 1.0 TAP 12A   JUL 31 1990
REG TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   TUE, 16:13

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE		
NODE	PHAS	/PU	/KV	/ 100.
15C	ABC	0.931	0.5	93.1 L
15S	ABC	0.925	0.4	92.5 L

RCP RATINGS CHANGED TO 5.265MVA

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

DONH4CF,ONLINE,HEAVY LOAD, P&Q, BUS Z 1.0 TAP 12A   JUL 31 1990
REG TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   TUE, 16:13

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	44	0	10	5	0	0	0	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	26.24M	1080.87	0.00	0.00		
KVAR	15.18M	3857.21	0.00	0.00	176.56	0.00
PF	0.866					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.16M
KVAR	0.00	0.00	0.00	11.50M

MAX V-LN 1.049 PU, 20.89 KV, 104.9/ 100.0 V AT NODE S204R PHASE A
MIN V-LN 0.957 PU, 19.05 KV, 95.7/ 100.0 V AT NODE S204C PHASE A
MAX V-LL 0.955 PU, 0.46 KV, 95.5/ 100.0 V AT NODE 18 PHASE AB
MIN V-LL 0.920 PU, 0.45 KV, 92.0/ 100.0 V AT NODE 1C PHASE AB

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.33M
KVAR	0.00	0.00	0.00	11.66M
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.16M
KVAR	0.00	0.00	0.00	11.50M

	GENERATORS		MOTORS	
	ASYNCHRONOUS	SYNCHRONOUS	ASYNCHRONOUS	SYNCHRONOUS
KW	0.00	0.00	0.00	0.00
KVAR	0.00	0.00	0.00	0.00

RCP RATINGS CHANGED TO 5.265MVA

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

DONH4CF,ONLINE,HEAVY LOAD, P&Q, BUS Z 1.0 TAP 12A — AUG 02 1990
[illegible] TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE — THU, 13:35

NODE DATA

NODE	KV (LN)	AREA	X	Y	ORIENTATION
S204C	19.92	1	1.00	1.15	3
S13AE	66.40	1	4.50	3.45	3
S13A	66.40	1	6.50	3.45	3
767	19.92	1	7.50	3.45	4
12BTP	19.92	1	9.00	3.45	2
12ATP	19.92	1	9.00	1.15	3
12AT	2.40	1	11.00	1.15	2
12AY	2.40	1	14.00	1.15	3
12B	2.40	1	14.00	4.45	3
SST16	2.40	1	16.00	4.45	2
16	0.28	1	17.50	4.45	2
16C	0.28	1	17.50	4.85	4
16S	0.28	1	17.50	4.15	4
1D	0.28	1	18.50	4.45	4
SST17	2.40	1	16.00	3.45	3
17	0.28	1	18.50	3.45	2
17C	0.28	1	18.50	3.85	4
17S	0.28	1	18.50	3.05	4
11B	2.40	1	14.00	7.45	3
11BC	2.40	1	13.50	7.85	3
11BS	2.40	1	14.50	7.85	4
SST15	2.40	1	16.00	7.45	2
15	0.28	1	18.50	7.45	3
15C	0.28	1	18.50	7.85	4
15S	0.28	1	18.50	7.05	4
T11	2.40	1	11.00	7.45	2
T11IN	2.40	1	11.00	6.15	2
1G	10.98	1	4.50	6.15	3
11A	2.40	1	15.00	6.15	3
11AC	2.40	1	14.50	6.75	3
11AS	2.40	1	15.50	6.75	4
SST13	2.40	1	16.00	6.15	3
13	0.28	1	17.50	6.15	2
13C	0.28	1	17.50	6.55	4
13S	0.28	1	17.50	5.75	4
12A	2.40	1	15.00	2.15	3
SST14	2.40	1	16.00	1.15	3
14	0.28	1	17.50	1.15	2
14C	0.28	1	17.50	1.55	4
14S	0.28	1	17.50	0.75	4
1C	0.28	1	18.50	1.15	4
SST18	2.40	1	16.00	2.15	2
18	0.28	1	18.50	2.15	2
18C	0.28	1	18.50	2.55	4
18S	0.28	1	18.50	1.75	4
12AX	2.40	1	13.00	2.15	2
12ATS	2.40	1	11.00	2.15	2
12AS	2.40	1	15.00	1.75	3
12BT	2.40	1	11.00	3.45	3
12BY	2.40	1	13.00	3.45	3
12BTS	2.40	1	11.00	4.45	2

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

DONH4CF,ONLINE,HEAVY LOAD, P&Q, BUS Z 1.0 TAP 12A   AUG 02 1990
[illegible] TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   THU, 13:35

NODE DATA

NODE	KV (LN)	AREA	X	Y	ORIENTATION
12BX	2.40	1	13.00	4.45	2
S204R	19.92	1	5.00	1.15	4
12AY2	2.40	1	14.50	1.65	4
12AX2	2.40	1	13.50	3.30	4

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

[illegible]ONH4CF,ONLINE,HEAVY LOAD, P&Q, BUS Z 1.0 TAP 12A AUG 02 1990
[illegible]G TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE THU, 13:35

LOAD DATA - CATEGORY 4

NODE	LOAD TYPE	LOAD (KW -- KVAR)					
		P - A	Q - A	P - B	Q - B	P - C	Q - C
16C	-31	982.1	304.5				
16S	31	261.0	126.3				
1D	32	300.0	300.0				
17C	31	373.0	231.2				
17S	31	224.0	108.6				
11BC	31	6276.1	2421.1				
11BS	31	4378.7	2120.7				
15	32	350.0	300.0				
15C	31	119.0	73.7				
15S	31	112.0	54.2				
11AC	31	7188.4	2862.9				
11AS	31	4378.7	2120.7				
13	32	200.0	175.0				
13C	31	306.0	189.6				
13S	31	75.0	36.4				
12A	-31	261.0	126.3				
14C	-31	1217.9	410.5				
14S	31	261.0	126.3				
[illegible]	32	300.0	300.0				
[illegible]C	-31	300.0	186.0				
18S	31	224.0	108.5				

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

[illegible]NH4CF,ONLINE,HEAVY LOAD, P&Q, BUS Z 1.0 TAP 12A   AUG 02 1990
[illegible] TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   THU, 13:35

MACHINE DATA

NODE	CATEGORY	LOAD TYPE	LOAD (KW)	RATING (KVA)
1G	2	-94	-505000.00	608400.00
12AS	4	-56	261.00	290.00

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

[illegible]ONH4CF,ONLINE,HEAVY LOAD, P&Q, BUS Z 1.0 TAP 12A   AUG 02 1990
[illegible] TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   THU, 13:35

BRANCH DATA - IMPEDANCES IN OHMS,MICROMHOS

FROM	TO	PHAS	CON TYPE	LENGTH	ZB1 R	ZB1 X	ZB0 R	ZB0 X	STAT	BC1	BC0
767	12BTP	ABC	LINE	1.00	0.085	0.069	0.336	0.021	1	8.4	0.0
12B	SST16	ABC	EK1B	0.29	0.007	0.011	0.007	0.011	1	0.0	0.0
16	16C	ABC	LINE	1.00	0.000	0.001	0.000	0.001	1	0.0	0.0
16	16S	ABC	LINE	1.00	0.003	0.003	0.003	0.003	1	0.0	0.0
16	1D	ABC	LINE	1.00	0.001	0.017	0.001	0.017	1	0.0	0.0
12B	SST17	ABC	EK1C	0.39	0.019	0.014	0.019	0.014	1	0.0	0.0
17	17C	ABC	LINE	1.00	0.000	0.001	0.000	0.001	1	0.0	0.0
17	17S	ABC	LINE	1.00	0.002	0.002	0.002	0.002	1	0.0	0.0
11B	11BC	ABC	LINE	1.00	0.010	0.015	0.010	0.015	1	0.0	0.0
11B	11BS	ABC	LINE	1.00	0.009	0.015	0.009	0.015	1	0.0	0.0
11B	SST15	ABC	EK1C	0.06	0.003	0.002	0.003	0.002	1	0.0	0.0
15	15C	ABC	LINE	1.00	0.000	0.001	0.000	0.001	1	0.0	0.0
15	15S	ABC	LINE	1.00	0.009	0.009	0.009	0.009	1	0.0	0.0
11A	11AC	ABC	LINE	1.00	0.010	0.016	0.010	0.016	1	0.0	0.0
11A	11AS	ABC	LINE	1.00	0.007	0.012	0.007	0.012	1	0.0	0.0
11A	SST13	ABC	EK1C	0.05	0.002	0.002	0.002	0.002	1	0.0	0.0
13	13C	ABC	LINE	1.00	0.000	0.001	0.000	0.001	1	0.0	0.0
13	13S	ABC	LINE	1.00	0.008	0.008	0.008	0.008	1	0.0	0.0
[illegible]	SST14	ABC	EK1B	0.30	0.007	0.012	0.007	0.012	1	0.0	0.0
[illegible]	14C	ABC	LINE	1.00	0.000	0.001	0.000	0.001	1	0.0	0.0
14	14S	ABC	LINE	1.00	0.003	0.004	0.003	0.004	1	0.0	0.0
14	1C	ABC	LINE	1.00	0.002	0.018	0.002	0.018	1	0.0	0.0
12A	SST18	ABC	EK1C	0.33	0.016	0.012	0.016	0.012	1	0.0	0.0
18	18C	ABC	LINE	1.00	0.000	0.001	0.000	0.001	1	0.0	0.0
18	18S	ABC	LINE	1.00	0.002	0.002	0.002	0.002	1	0.0	0.0
12A	12AS	ABC	LINE	1.00	0.004	0.003	0.004	0.003	1	0.0	0.0
S204R	12ATP	ABC	LINE	1.00	1.266	2.930	3.554	8.403	1	142.9	0.0
12AY2	12A	ABC	BUS	2.09	0.001	0.008	0.001	0.008	1	0.0	0.0
12AX2	12B	ABC	BUS	2.28	0.001	0.009	0.001	0.009	1	0.0	0.0

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

[illegible]ONH4CF,ONLINE,HEAVY LOAD, P&Q, BUS Z 1.0 TAP 12A AUG 02 1990
[illegible]G TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE THU, 13:35

SWITCH DATA

FROM	TO	PHAS	CON TYPE	STATUS
S13AE	S13A	ABC	SWCH	0
12ATP	12BTP	ABC	SWCH	0
12B	11B	ABC	SWCH	1
T11IN	T11	ABC	SWCH	1
12A	11A	ABC	SWCH	1
12BT	12BTS	ABC	SWCH	1
12AT	12ATS	ABC	SWCH	1
12A	12BY	ABC	SWCH	0
12BX	12B	ABC	SWCH	0
12AX	12AX2	ABC	SWCH	1
12AY	12AY2	ABC	SWCH	1

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

DONH4CF,ONLINE,HEAVY LOAD, P&Q, BUS Z 1.0 TAP 12A AUG 02 1990
G TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE THU, 13:35

TRANSFORMER DATA - TAP CHANGE DATA

FROM	TO	PHAS	CON TYPE	TNSF TYPE	1-PH KVA	TAP CHG A	B	C	VMAX	VMIN	TMAX	TMIN	TSTP	STAT
767	S13A	ABC	TRNF	2	10000.	4	4	4	1.05	1.04	1.1	0.9	0.00625	3
12AT	12ATP	ABC	TRNF	2	9333.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
12AY	12AT	ABC	TRNS	1	4667.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
16	SST16	ABC	TRNF	11	500.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
17	SST17	ABC	TRNF	11	333.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
15	SST15	ABC	TRNF	11	333.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
11B	T11	ABC	TRNF	1	4667.	0	0	0	1.05	1.04	1.1	0.9	0.00625	0
T11IN	1G	ABC	TRNF	2	9333.	-4	-4	-4	1.05	1.04	1.1	0.9	0.00625	3
11A	T11IN	ABC	TRNF	1	4667.	0	0	0	1.05	1.04	1.1	0.9	0.00625	0
13	SST13	ABC	TRNF	11	333.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
14	SST14	ABC	TRNF	11	500.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
18	SST18	ABC	TRNF	11	333.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
12AX	12ATS	ABC	TRNS	1	4667.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
12BT	12BTP	ABC	TRNF	2	9333.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
12BY	12BT	ABC	TRNS	1	4667.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
12BX	12BTS	ABC	TRNF	1	4667.	0	0	0	1.05	1.04	1.1	0.9	0.00625	3
1G	S13AE	ABC	TRNF	3	******	4	4	4	1.05	1.04	1.1	0.9	0.00625	3
S204C	S204R	ABC	TRNF	1	12443.	16	16	16	1.05	1.04	1.1	0.9	0.00625	3

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

[illegible]ONH4CF,ONLINE,HEAVY LOAD, P&Q, BUS Z 1.0 TAP 12A   AUG 02 1990
[illegible]G TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   THU, 13:35

TRANSFORMER DATA - IMPEDANCE AND COMPOUNDING DATA

FROM	TO	ZB1		ZB0		ZCOMP					
		R	X	R	X	A		B		C	
767	S13A	0.000	0.078	0.000	0.078	0.00	0.00	0.00	0.00	0.00	0.00
12AT	12ATP	0.000	0.005	0.000	0.005	0.00	0.00	0.00	0.00	0.00	0.00
12AY	12AT	0.001	0.032	0.001	0.032	0.00	0.00	0.00	0.00	0.00	0.00
16	SST16	0.019	0.054	0.019	0.054	0.00	0.00	0.00	0.00	0.00	0.00
17	SST17	0.022	0.052	0.022	0.052	0.00	0.00	0.00	0.00	0.00	0.00
15	SST15	0.022	0.052	0.022	0.052	0.00	0.00	0.00	0.00	0.00	0.00
11B	T11	0.000	0.051	0.000	0.051	0.00	0.00	0.00	0.00	0.00	0.00
T11IN	1G	0.000	0.007	0.000	0.007	0.00	0.00	0.00	0.00	0.00	0.00
11A	T11IN	0.000	0.051	0.000	0.051	0.00	0.00	0.00	0.00	0.00	0.00
13	SST13	0.022	0.052	0.022	0.052	0.00	0.00	0.00	0.00	0.00	0.00
14	SST14	0.019	0.054	0.019	0.054	0.00	0.00	0.00	0.00	0.00	0.00
18	SST18	0.022	0.052	0.022	0.052	0.00	0.00	0.00	0.00	0.00	0.00
12AX	12ATS	0.001	0.032	0.001	0.032	0.00	0.00	0.00	0.00	0.00	0.00
12BT	12BTP	0.000	0.011	0.000	0.011	0.00	0.00	0.00	0.00	0.00	0.00
12BY	12BT	0.000	0.029	0.000	0.029	0.00	0.00	0.00	0.00	0.00	0.00
12BX	12BTS	0.000	0.030	0.000	0.030	0.00	0.00	0.00	0.00	0.00	0.00
1G	S13AE	0.000	0.100	0.000	0.100	0.00	0.00	0.00	0.00	0.00	0.00
S204C	S204R	0.000	0.007	0.000	0.007	0.00	0.00	0.00	0.00	0.00	0.00

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POWER TECHNOLOGIES INC.     POWER SYSTEM SIMULATOR,PSS/U         VERSION   4.0

DONH4CF,ONLINE,HEAVY LOAD, P&Q, BUS Z 1.0 TAP 12A                    AUG 02 1990
  G TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE                    THU,  13:35

RCP RATINGS CHANGED TO 5.265MVA



SYSTEM KVA BASE =  100000.0     SYSTEM DEFAULT KV (LN) =    66.40
    SOURCE NODE = S204C.                SOURCE KV (LN) =    19.05
POSITIVE SEQUENCE SOURCE IMPEDANCE =    0.00770 +j    0.13280
    ZERO SEQUENCE SOURCE IMPEDANCE =    0.00600 +j    0.11750

ACCELERATION FACTOR =  1.00     TOLERANCE = .00001
ZERO SEQUENCE ACCELERATION FACTOR =  0.15
NOMINAL DELIVERY VOLTAGE =   100.00
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[illegible]ONH4CF,ONLINE,HEAVY LOAD, P&Q, BUS Z 1.0 TAP 12A   AUG 02 1990
[illegible] TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   THU, 13:40

SECTION FROM	TO	PHAS	CON TYPE	MAX AMPS	V MIN/ 100.0	SECTION LOAD KW	KVAR	CAP KVAR	TOTAL DIST
	S204C	ABC		530.4	95.7			0.0	
S204C	S204R	ABC	TRNF	530.4	104.9	26.2	15.2M	0.0	0.00
S204R	12ATP	ABC	LINE	482.9	98.8	26.2	15.1M	0.0	1.00
12ATP	12AT	ABC	TRNF	4013.7	98.5	25.4	13.1M	0.0	1.00
12AT	12AY	ABC	TRNS	2048.9	96.9	13.0	6.6M	0.0	1.00
12AY	12AY2	ABC	SWCH	2048.9	96.9	12.9	6.1M	0.0	1.00
12AY2	12A	ABC	BUS	2048.9	96.6	12.9	6.1M	0.0	3.09
12A	11A	ABC	SWCH	1919.6	96.6	12.2	5.5M	0.0	3.09
11A	11AC	ABC	LINE	1120.6	95.9	7226.0	2923.2	0.0	4.09
11A	11AS	ABC	LINE	701.9	96.3	4389.3	2138.4	0.0	4.09
11A	SST13	ABC	EK1C	100.2	96.6	566.3	406.0	0.0	3.14
SST13	13	ABC	TRNF	858.6	93.1L	566.2	405.9	0.0	3.14
13	13C	ABC	LINE	460.6	93.0L	306.1	190.2	0.0	4.14
13	13S	ABC	LINE	107.0	92.7L	75.3	36.7	0.0	4.14
12A	SST14	ABC	EK1B	95.7	96.6	523.6	410.8	0.0	3.39
[illegible]T14	14	ABC	TRNF	820.1	94.4L	523.4	410.5	0.0	3.39
[illegible]	14C	ABC	LINE	0.0	94.4L	0.0	0.0	0.0	4.39
14	14S	ABC	LINE	368.1	93.8L	262.2	127.9	0.0	4.39
14	1C	ABC	LINE	464.7	92.0L	255.2	265.6	0.0	4.39
12A	SST18	ABC	EK1C	36.3	96.6	226.1	112.7	0.0	3.42
SST18	18	ABC	TRNF	311.4	95.5L	226.1	112.7	0.0	3.42
18	18C	ABC	LINE	0.0	95.5L	0.0	0.0	0.0	4.42
18	18S	ABC	LINE	311.4	95.2L	224.6	109.1	0.0	4.42
12A	12AS	ABC	LINE	0.0	96.6	0.0	0.0	0.0	4.09
12AT	12ATS	ABC	SWCH	1964.8	98.5	12.4	6.4M	0.0	1.00
12ATS	12AX	ABC	TRNS	1964.8	97.0	12.4	6.4M	0.0	1.00
12AX	12AX2	ABC	SWCH	1964.8	97.0	12.4	5.9M	0.0	1.00
12AX2	12B	ABC	BUS	1964.8	96.6	12.4	5.9M	0.0	3.28
12B	SST16	ABC	EK1B	95.8	96.6	524.4	411.3	0.0	3.57
SST16	16	ABC	TRNF	821.0	94.4L	524.2	411.0	0.0	3.57
16	16C	ABC	LINE	0.0	94.4L	0.0	0.0	0.0	4.57
16	16S	ABC	LINE	367.7	93.9L	262.2	127.5	0.0	4.57
16	1D	ABC	LINE	466.0	92.3L	256.0	266.4	0.0	4.57
[illegible]	SST17	ABC	EK1C	102.6	96.5	610.3	370.4	0.0	3.67
SST17	17	ABC	TRNF	879.4	93.2L	609.7	369.9	0.0	3.67
17	17C	ABC	LINE	561.4	93.1L	373.1	232.1	0.0	4.67
17	17S	ABC	LINE	319.1	92.9L	224.6	109.2	0.0	4.67

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

DONH4CF,ONLINE,HEAVY LOAD, P&Q, BUS Z 1.0 TAP 12A   AUG 02 1990
[illegible]G TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   THU, 13:40

SECTION FROM	TO	PHAS	CON TYPE	MAX AMPS	V MIN/ 100.0	SECTION LOAD KW	KVAR	CAP KVAR	TOTAL DIST
12B	11B	ABC	SWCH	1769.7	96.6	11.2	5.0M	0.0	3.28
11B	11BC	ABC	LINE	972.8	96.0	6304.5	2463.7	0.0	4.28
11B	11BS	ABC	LINE	702.4	96.2	4392.3	2143.2	0.0	4.28
11B	SST15	ABC	EK1C	98.7	96.6	546.6	415.5	0.0	3.34
SST15	15	ABC	TRNF	845.8	93.2L	546.5	415.5	0.0	3.34
15	15C	ABC	LINE	178.9	93.1L	119.0	73.8	0.0	4.34
15	15S	ABC	LINE	160.2	92.5L	112.7	54.9	0.0	4.34

RCP RATINGS CHANGED TO 5.265MVA

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

DSIH4CF, ONLINE,HEAVY P&Q BUS Z 1.0 TAP 12A   AUG 17 1990
REG TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   FRI, 13:23

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S204C	ABC	0.954	19.0	95.4	
S204R	ABC	1.045	20.8	104.5	
12ATP	ABC	0.979	19.5	97.9	
12AT	ABC	0.977	2.3	97.7	
12AY	ABC	0.957	2.3	95.7	
12AY2	ABC	0.957	2.3	95.7	
12A	ABC	0.953	2.3	95.3	
11A	ABC	0.953	2.3	95.3	
11AC	ABC	0.945	2.3	94.5	
11AS	ABC	0.949	2.3	94.9	
SST13	ABC	0.953	2.3	95.3	
13	ABC	0.918	0.4	91.8	L
13C	ABC	0.917	0.4	91.7	L
13S	ABC	0.914	0.4	91.4	L
SST14	ABC	0.951	2.3	95.1	
14	ABC	0.867	0.4	86.7	L
14C	ABC	0.860	0.4	86.0	L
14S	ABC	0.860	0.4	86.0	L
[illegible]	ABC	0.845	0.4	84.5	L
SST18	ABC	0.952	2.3	95.2	
18	ABC	0.941	0.5	94.1	L
18C	ABC	0.941	0.5	94.1	L
18S	ABC	0.938	0.5	93.8	L
12AS	ABC	0.953	2.3	95.3	
12ATS	ABC	0.977	2.3	97.7	
12AX	ABC	0.961	2.3	96.1	
12AX2	ABC	0.961	2.3	96.1	
12B	ABC	0.958	2.3	95.8	
SST16	ABC	0.957	2.3	95.7	
16	ABC	0.935	0.5	93.5	L
16C	ABC	0.935	0.5	93.5	L
16S	ABC	0.930	0.5	93.0	L
1D	ABC	0.914	0.4	91.4	L
SST17	ABC	0.956	2.3	95.6	
17	ABC	0.923	0.4	92.3	L
17C	ABC	0.921	0.4	92.1	L
17S	ABC	0.919	0.4	91.9	L
11B	ABC	0.958	2.3	95.8	
11BC	ABC	0.951	2.3	95.1	
11BS	ABC	0.953	2.3	95.3	
SST15	ABC	0.957	2.3	95.7	
15	ABC	0.923	0.4	92.3	L

DSIH4CF, ONLINE,HEAVY P&Q BUS Z 1.0 TAP 12A   AUG 17 1990
REG TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   FRI, 13:23

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
15C	ABC	0.922	0.4	92.2	L
15S	ABC	0.916	0.4	91.6	L

RCP RATINGS CHANGED TO 5.265MVA

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

DSIH4CF, ONLINE,HEAVY P&Q BUS Z 1.0 TAP 12A AUG 17 1990
REG TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE FRI, 13:23

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	44	0	10	5	0	0	1	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	26.77M	1237.89	0.00	424.11		
KVAR	17.02M	4401.79	0.00	1348.76	174.55	0.00
PF	0.844					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.11M
KVAR	0.00	0.00	0.00	11.45M

```
MAX V-LN 1.045 PU, 20.82 KV,  104.5/ 100.0 V AT NODE S204R PHASE A
MIN V-LN 0.945 PU,  2.27 KV,   94.5/ 100.0 V AT NODE 11AC  PHASE B
MAX V-LL 0.941 PU,  0.46 KV,   94.1/ 100.0 V AT NODE 18    PHASE CA
MIN V-LL 0.845 PU,  0.41 KV,   84.5/ 100.0 V AT NODE 1C    PHASE AB
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NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.33M
KVAR	0.00	0.00	0.00	11.66M
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.11M
KVAR	0.00	0.00	0.00	11.45M

	GENERATORS ASYNCHRONOUS	GENERATORS SYNCHRONOUS	MOTORS ASYNCHRONOUS	MOTORS SYNCHRONOUS
KW	0.00	0.00	424.11	0.00
KVAR	0.00	0.00	1348.76	0.00

RCP RATINGS CHANGED TO 5.265MVA

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

S
[illegible]H4CF, ONLINE,HEAVY P&Q BUS Z 1.0 TAP 12A   AUG 02 1990
[illegible] TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   THU, 14:01

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S204C	ABC	0.957	19.1	95.7	
S204R	ABC	1.049	20.9	104.9	
12ATP	ABC	0.987	19.7	98.7	
12AT	ABC	0.985	2.4	98.5	
12AY	ABC	0.968	2.3	96.8	
12AY2	ABC	0.968	2.3	96.8	
12A	ABC	0.965	2.3	96.5	
11A	ABC	0.965	2.3	96.5	
11AC	ABC	0.958	2.3	95.8	
11AS	ABC	0.961	2.3	96.1	
SST13	ABC	0.965	2.3	96.5	
13	ABC	0.930	0.5	93.0	L
13C	ABC	0.929	0.5	92.9	L
13S	ABC	0.926	0.4	92.6	L
SST14	ABC	0.964	2.3	96.4	
14	ABC	0.934	0.5	93.4	L
[illegible]	ABC	0.933	0.5	93.3	L
[illegible]S	ABC	0.928	0.4	92.8	L
1C	ABC	0.910	0.4	91.0	L
SST18	ABC	0.964	2.3	96.4	
18	ABC	0.953	0.5	95.3	L
18C	ABC	0.953	0.5	95.3	L
18S	ABC	0.950	0.5	95.0	L
12AS	ABC	0.965	2.3	96.5	
12ATS	ABC	0.985	2.4	98.5	
12AX	ABC	0.969	2.3	96.9	
12AX2	ABC	0.969	2.3	96.9	
12B	ABC	0.966	2.3	96.6	
SST16	ABC	0.965	2.3	96.5	
16	ABC	0.943	0.5	94.3	L
16C	ABC	0.943	0.5	94.3	L
16S	ABC	0.938	0.5	93.8	L
1D	ABC	0.922	0.4	92.2	L
SST17	ABC	0.965	2.3	96.5	
17	ABC	0.931	0.5	93.1	L
17C	ABC	0.930	0.5	93.0	L
17S	ABC	0.928	0.4	92.8	L
11B	ABC	0.966	2.3	96.6	
[illegible]3C	ABC	0.960	2.3	96.0	
[illegible]3S	ABC	0.961	2.3	96.1	
SST15	ABC	0.965	2.3	96.5	
15	ABC	0.931	0.5	93.1	L

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

S
H4CF, ONLINE,HEAVY P&Q BUS Z 1.0 TAP 12A   AUG 02 1990
TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   THU, 14:01

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE		
NODE	PHAS	/PU	/KV	/ 100.
15C	ABC	0.930	0.5	93.0 L
15S	ABC	0.924	0.4	92.4 L

RCP RATINGS CHANGED TO 5.265MVA

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

S
H4CF, ONLINE,HEAVY P&Q BUS Z 1.0 TAP 12A — AUG 02 1990
TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE — THU, 14:04

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	44	0	10	5	0	0	1	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	26.53M	1109.99	0.00	261.00		
KVAR	15.41M	3961.48	0.00	126.41	176.41	0.00
PF	0.865					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.16M
KVAR	0.00	0.00	0.00	11.49M

MAX V-LN 1.049 PU, 20.89 KV, 104.9/ 100.0 V AT NODE S204R PHASE A
MIN V-LN 0.957 PU, 19.05 KV, 95.7/ 100.0 V AT NODE S204C PHASE A
MAX V-LL 0.953 PU, 0.46 KV, 95.3/ 100.0 V AT NODE 18 PHASE CA
MIN V-LL 0.910 PU, 0.44 KV, 91.0/ 100.0 V AT NODE 1C PHASE AB

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.33M
KVAR	0.00	0.00	0.00	11.66M
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	25.16M
KVAR	0.00	0.00	0.00	11.49M

	GENERATORS ASYNCHRONOUS	GENERATORS SYNCHRONOUS	MOTORS ASYNCHRONOUS	MOTORS SYNCHRONOUS
KW	0.00	0.00	261.00	0.00
KVAR	0.00	0.00	126.41	0.00

RCP RATINGS CHANGED TO 5.265MVA

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

DMSH4CF, P&Q, BUS Z ADDED, OFFLINE   JUL 31 1990
REG TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   TUE, 16:29

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S204C	ABC	0.910	18.1	91.0	
S204R	ABC	0.988	19.7	98.8	
12ATP	ABC	0.881	17.5	88.1	
12AT	ABC	0.875	2.1	87.5	
12AY	ABC	0.807	1.9	80.7	
12AY2	ABC	0.807	1.9	80.7	
12A	ABC	0.793	1.9	79.3	
11A	ABC	0.793	1.9	79.3	
11AC	ABC	0.787	1.9	78.7	
11AS	ABC	0.772	1.9	77.2	
SST13	ABC	0.793	1.9	79.3	
13	ABC	0.755	0.4	75.5	L
13C	ABC	0.754	0.4	75.4	L
13S	ABC	0.750	0.4	75.0	L
SST14	ABC	0.792	1.9	79.2	
14	ABC	0.771	0.4	77.1	L
14C	ABC	0.771	0.4	77.1	L
14S	ABC	0.764	0.4	76.4	L
[illegible]	ABC	0.751	0.4	75.1	L
SST18	ABC	0.792	1.9	79.2	
18	ABC	0.779	0.4	77.9	L
18C	ABC	0.779	0.4	77.9	L
18S	ABC	0.775	0.4	77.5	L
12AS	ABC	0.793	1.9	79.3	
12ATS	ABC	0.875	2.1	87.5	
12AX	ABC	0.865	2.1	86.5	
12AX2	ABC	0.865	2.1	86.5	
12B	ABC	0.863	2.1	86.3	
SST16	ABC	0.862	2.1	86.2	
16	ABC	0.841	0.4	84.1	L
16C	ABC	0.841	0.4	84.1	L
16S	ABC	0.835	0.4	83.5	L
1D	ABC	0.822	0.4	82.2	L
SST17	ABC	0.862	2.1	86.2	
17	ABC	0.824	0.4	82.4	L
17C	ABC	0.822	0.4	82.2	L
17S	ABC	0.820	0.4	82.0	L
11B	ABC	0.863	2.1	86.3	
11BC	ABC	0.862	2.1	86.2	
11BS	ABC	0.858	2.1	85.8	
SST15	ABC	0.863	2.1	86.3	
15	ABC	0.829	0.4	82.9	L

DMSH4CF, P&Q, BUS Z ADDED, OFFLINE JUL 31 1990
REG TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE TUE, 16:29

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE		
NODE	PHAS	/PU	/KV	/ 100.
15C	ABC	0.828	0.4	82.8 L
15S	ABC	0.821	0.4	82.1 L

RCP RATINGS CHANGED TO 5.265MVA
RCP START 33KV GRID

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

DMSH4CF, P&Q, BUS Z ADDED, OFFLINE JUL 31 1990
REG TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE TUE, 16:29

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	44	0	10	5	0	0	1	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	21.83M	2279.83	0.00	6.20M		
KVAR	33.74M	8652.62	0.00	19.71M	148.96	0.00
PF	0.543					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	13.36M
KVAR	0.00	0.00	0.00	5.53M

MAX V-LN 0.988 PU, 19.67 KV, 98.8/ 100.0 V AT NODE S204R PHASE A
MIN V-LN 0.772 PU, 1.85 KV, 77.2/ 100.0 V AT NODE 11AS PHASE B
MAX V-LL 0.841 PU, 0.41 KV, 84.1/ 100.0 V AT NODE 16 PHASE CA
MIN V-LL 0.750 PU, 0.36 KV, 75.0/ 100.0 V AT NODE 13S PHASE AB

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	13.78M
KVAR	0.00	0.00	0.00	5.93M
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	13.36M
KVAR	0.00	0.00	0.00	5.53M

	GENERATORS		MOTORS	
	ASYNCHRONOUS	SYNCHRONOUS	ASYNCHRONOUS	SYNCHRONOUS
KW	0.00	0.00	6.20M	0.00
KVAR	0.00	0.00	19.71M	0.00

RCP RATINGS CHANGED TO 5.265MVA
RCP START 33KV GRID

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

DMSH4CF2,P&Q,BUS Z ADDED,OFFLINE,33.66KV JUL 31 1990
REGULATOR MANUALLY BOOSTED TO FULL TUE, 16:39

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S204C	ABC	0.928	18.5	92.8	
S204R	ABC	1.013	20.2	101.3	
12ATP	ABC	0.905	18.0	90.5	
12AT	ABC	0.899	2.2	89.9	
12AY	ABC	0.829	2.0	82.9	
12AY2	ABC	0.829	2.0	82.9	
12A	ABC	0.815	2.0	81.5	
11A	ABC	0.815	2.0	81.5	
11AC	ABC	0.809	1.9	80.9	
11AS	ABC	0.793	1.9	79.3	
SST13	ABC	0.815	2.0	81.5	
13	ABC	0.778	0.4	77.8	L
13C	ABC	0.776	0.4	77.6	L
13S	ABC	0.773	0.4	77.3	L
SST14	ABC	0.814	2.0	81.4	
14	ABC	0.793	0.4	79.3	L
14C	ABC	0.793	0.4	79.3	L
14S	ABC	0.786	0.4	78.6	L
[illegible]	ABC	0.773	0.4	77.3	L
SST18	ABC	0.814	2.0	81.4	
18	ABC	0.801	0.4	80.1	L
18C	ABC	0.801	0.4	80.1	L
18S	ABC	0.797	0.4	79.7	L
12AS	ABC	0.815	2.0	81.5	
12ATS	ABC	0.899	2.2	89.9	
12AX	ABC	0.889	2.1	88.9	
12AX2	ABC	0.889	2.1	88.9	
12B	ABC	0.887	2.1	88.7	
SST16	ABC	0.887	2.1	88.7	
16	ABC	0.865	0.4	86.5	L
16C	ABC	0.865	0.4	86.5	L
16S	ABC	0.859	0.4	85.9	L
1D	ABC	0.845	0.4	84.5	L
SST17	ABC	0.886	2.1	88.6	
17	ABC	0.849	0.4	84.9	L
17C	ABC	0.848	0.4	84.8	L
17S	ABC	0.846	0.4	84.6	L
11B	ABC	0.887	2.1	88.7	
11BC	ABC	0.886	2.1	88.6	
11BS	ABC	0.882	2.1	88.2	
SST15	ABC	0.887	2.1	88.7	
15	ABC	0.853	0.4	85.3	L

DMSH4CF2,P&Q,BUS Z ADDED,OFFLINE,33.66KV
REGULATOR MANUALLY BOOSTED TO FULL

JUL 31 1990
TUE, 16:39

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE		
NODE	PHAS	/PU	/KV	/ 100.
15C	ABC	0.852	0.4	85.2 L
15S	ABC	0.845	0.4	84.5 L

RCP RATINGS CHANGED TO 5.265MVA
RCP START

DMSH4CF2,P&Q,BUS Z ADDED,OFFLINE,33.66KV
REGULATOR MANUALLY BOOSTED TO FULL

JUL 31 1990
TUE, 16:39

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	44	0	10	5	0	0	1	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	22.27M	2326.64	0.00	6.55M		
KVAR	35.09M	8854.42	0.00	20.82M	156.85	0.00
PF	0.536					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	13.40M
KVAR	0.00	0.00	0.00	5.57M

MAX V-LN 1.013 PU, 20.17 KV, 101.3/ 100.0 V AT NODE S204R PHASE A
MIN V-LN 0.793 PU, 1.90 KV, 79.3/ 100.0 V AT NODE 11AS PHASE A
MAX V-LL 0.865 PU, 0.42 KV, 86.5/ 100.0 V AT NODE 16 PHASE BC
MIN V-LL 0.773 PU, 0.37 KV, 77.3/ 100.0 V AT NODE 13S PHASE AB

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	13.78M
KVAR	0.00	0.00	0.00	5.93M
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	13.40M
KVAR	0.00	0.00	0.00	5.57M

	GENERATORS		MOTORS	
	ASYNCHRONOUS	SYNCHRONOUS	ASYNCHRONOUS	SYNCHRONOUS
KW	0.00	0.00	6.55M	0.00
KVAR	0.00	0.00	20.82M	0.00

RCP RATINGS CHANGED TO 5.265MVA
RCP START

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

DMSY 4CF,OFFLINE,HEAVY LOAD P&Q,33KV,SGFWP START JUL 31 1990
REG TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE TUE, 16:41

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S204C	ABC	0.918	18.3	91.8	
S204R	ABC	1.002	20.0	100.2	
12ATP	ABC	0.888	17.7	88.8	
12AT	ABC	0.882	2.1	88.2	
12AY	ABC	.0.822	2.0	82.2	
12AY2	ABC	0.822	2.0	82.2	
12A	ABC	0.810	1.9	81.0	
11A	ABC	0.810	1.9	81.0	
11AC	ABC	0.800	1.9	80.0	
11AS	ABC	0.794	1.9	79.4	
SST13	ABC	0.810	1.9	81.0	
13	ABC	0.773	0.4	77.3	L
13C	ABC	0.771	0.4	77.1	L
13S	ABC	0.768	0.4	76.8	L
SST14	ABC	0.809	1.9	80.9	
14	ABC	0.788	0.4	78.8	L
14C	ABC	0.788	0.4	78.8	L
14S	ABC	0.781	0.4	78.1	L
[illegible]	ABC	0.768	0.4	76.8	L
SST18	ABC	0.809	1.9	80.9	
18	ABC	0.796	0.4	79.6	L
18C	ABC	0.796	0.4	79.6	L
18S	ABC	0.792	0.4	79.2	L
12AS	ABC	0.810	1.9	81.0	
12ATS	ABC	0.882	2.1	88.2	
12AX	ABC	0.864	2.1	86.4	
12AX2	ABC	0.864	2.1	86.4	
12B	ABC	0.860	2.1	86.0	
SST16	ABC	0.860	2.1	86.0	
16	ABC	0.838	0.4	83.8	L
16C	ABC	0.838	0.4	83.8	L
16S	ABC	0.832	0.4	83.2	L
1D	ABC	0.819	0.4	81.9	L
SST17	ABC	0.859	2.1	85.9	
17	ABC	0.821	0.4	82.1	L
17C	ABC	0.820	0.4	82.0	L
17S	ABC	0.818	0.4	81.8	L
11B	ABC	0.860	2.1	86.0	
11BC	ABC	0.854	2.0	85.4	
11BS	ABC	0.856	2.1	85.6	
SST15	ABC	0.860	2.1	86.0	
15	ABC	0.826	0.4	82.6	L

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

DMSY'.4CF,OFFLINE,HEAVY LOAD P&Q,33KV,SGFWP START   JUL 31 1990
REG TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   TUE, 16:41

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE		
NODE	PHAS	/PU	/KV	/ 100.
15C	ABC	0.826	0.4	82.6 L
15S	ABC	0.819	0.4	81.9 L

RCP RATINGS CHANGED TO 5.265MVA

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

DMSY 4CF,OFFLINE,HEAVY LOAD P&Q,33KV,SGFWP START   JUL 31 1990
REG TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   TUE, 16:41

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	44	0	10	5	0	0	1	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	29.13M	2.64M	0.00	4.85M		
KVAR	34.70M	9.74M	0.00	15.43M	152.45	0.00
PF	0.643					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	21.63M
KVAR	0.00	0.00	0.00	9.68M

MAX V-LN 1.002 PU, 19.96 KV, 100.2/ 100.0 V AT NODE S204R PHASE A
MIN V-LN 0.794 PU, 1.91 KV, 79.4/ 100.0 V AT NODE 11AS PHASE B
MAX V-LL 0.838 PU, 0.41 KV, 83.8/ 100.0 V AT NODE 16 PHASE CA
MIN V-LL 0.768 PU, 0.37 KV, 76.8/ 100.0 V AT NODE 13S PHASE AB

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	22.04M
KVAR	0.00	0.00	0.00	10.06M
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	21.63M
KVAR	0.00	0.00	0.00	9.68M

	GENERATORS		MOTORS	
	ASYNCHRONOUS	SYNCHRONOUS	ASYNCHRONOUS	SYNCHRONOUS
KW	0.00	0.00	4.85M	0.00
KVAR	0.00	0.00	15.43M	0.00

RCP RATINGS CHANGED TO 5.265MVA

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

DOF_LOCA,OFFLINE,LOCA LOAD 1.0 TAP 12A AUG 13 1990
REG TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE MON, 13:11

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S204C	ABC	0.957	19.1	95.7	
S204R	ABC	1.050	20.9	105.0	
12ATP	ABC	1.001	19.9	100.1	
12AT	ABC	0.999	2.4	99.9	
12AY	ABC	0.986	2.4	98.6	
12AY2	ABC	0.986	2.4	98.6	
12A	ABC	0.983	2.4	98.3	
11A	ABC	0.983	2.4	98.3	
11AC	ABC	0.980	2.4	98.0	
11AS	ABC	0.980	2.4	98.0	
SST13	ABC	0.983	2.4	98.3	
13	ABC	0.949	0.5	94.9	L
13C	ABC	0.948	0.5	94.8	L
13S	ABC	0.945	0.5	94.5	L
SST14	ABC	0.982	2.4	98.2	
14	ABC	0.922	0.4	92.2	L
14C	ABC	0.919	0.4	91.9	L
14S	ABC	0.917	0.4	91.7	L
[illegible]	ABC	0.899	0.4	89.9	L
SST18	ABC	0.983	2.4	98.3	
18	ABC	0.966	0.5	96.6	L
18C	ABC	0.965	0.5	96.5	L
18S	ABC	0.966	0.5	96.6	L
12AS	ABC	0.983	2.4	98.3	
12ATS	ABC	0.999	2.4	99.9	
12AX	ABC	0.988	2.4	98.8	
12AX2	ABC	0.988	2.4	98.8	
12B	ABC	0.985	2.4	98.5	
SST16	ABC	0.984	2.4	98.4	
16	ABC	0.933	0.5	93.3	L
16C	ABC	0.930	0.5	93.0	L
16S	ABC	0.928	0.4	92.8	L
1D	ABC	0.912	0.4	91.2	L
SST17	ABC	0.984	2.4	98.4	
17	ABC	0.967	0.5	96.7	L
17C	ABC	0.967	0.5	96.7	L
17S	ABC	0.967	0.5	96.7	L
11B	ABC	0.985	2.4	98.5	
11BC	ABC	0.983	2.4	98.3	
11BS	ABC	0.981	2.4	98.1	
SST15	ABC	0.985	2.4	98.5	
15	ABC	0.950	0.5	95.0	L

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

DOF_LOCA,OFFLINE,LOCA LOAD 1.0 TAP 12A   AUG 13 1990
REG TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   MON, 13:11

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
15C	ABC	0.950	0.5	95.0	L
15S	ABC	0.943	0.5	94.3	L

RCP RATINGS CHANGED TO 5.265MVA

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

DOF_LOCA,OFFLINE,LOCA LOAD 1.0 TAP 12A   AUG 13 1990
REG TRIES TO HOLD 35KV AT 12A PRIMARY 33KV SOURCE   MON, 13:13

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	44	0	10	5	0	0	0	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	21.53M	783.36	0.00	0.00		
KVAR	11.65M	2775.84	0.00	0.00	178.97	0.00
PF	0.879					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	20.74M
KVAR	0.00	0.00	0.00	9.06M

MAX V-LN 1.050 PU, 20.91 KV, 105.0/ 100.0 V AT NODE S204R PHASE A
MIN V-LN 0.957 PU, 19.05 KV, 95.7/ 100.0 V AT NODE S204C PHASE A
MAX V-LL 0.967 PU, 0.47 KV, 96.7/ 100.0 V AT NODE 17 PHASE CA
MIN V-LL 0.899 PU, 0.44 KV, 89.9/ 100.0 V AT NODE 1C PHASE AB

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	20.91M
KVAR	0.00	0.00	0.00	9.21M
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	20.74M
KVAR	0.00	0.00	0.00	9.06M

	GENERATORS		MOTORS	
	ASYNCHRONOUS	SYNCHRONOUS	ASYNCHRONOUS	SYNCHRONOUS
KW	0.00	0.00	0.00	0.00
KVAR	0.00	0.00	0.00	0.00

RCP RATINGS CHANGED TO 5.265MVA

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

GINNA CASE E50L9, 767 TO 12B, 50/50 CONFIGURATION   JUL 31 1990
123 KV GRID, A-A&B-B OPEN, 12B TAP @ 1.0   TUE, 16:55

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S13AE	ABC	1.070	71.0	107.0	
S13A	ABC	1.070	71.0	107.0	
767	ABC	1.042	20.8	104.2	
12BTP	ABC	1.042	20.8	104.2	
12BT	ABC	1.042	2.5	104.2	
12BY	ABC	1.042	2.5	104.2	
12BTS	ABC	1.042	2.5	104.2	
12BX	ABC	1.041	2.5	104.1	
12B	ABC	1.041	2.5	104.1	
SST16	ABC	1.040	2.5	104.0	
16	ABC	1.018	0.5	101.8	L
16C	ABC	1.018	0.5	101.8	L
16S	ABC	1.013	0.5	101.3	L
1D	ABC	0.995	0.5	99.5	L
SST17	ABC	1.040	2.5	104.0	
17	ABC	1.030	0.5	103.0	L
17C	ABC	1.030	0.5	103.0	L
17S	ABC	1.027	0.5	102.7	L

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

GINNA CASE E50L9, 767 TO 12B, 50/50 CONFIGURATION JUL 31 1990
123 KV GRID, A-A&B-B OPEN, 12B TAP @ 1.0 TUE, 16:55

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
53	18	0	6	3	0	0	2	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	791.83	10.02	0.00	485.00		
KVAR	560.70	39.85	0.00	234.90	10.86	0.00
PF	0.816					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	296.81
KVAR	0.00	0.00	0.00	296.81

MAX V-LN 1.070 PU, 71.02 KV, 107.0/ 100.0 V AT NODE S13AE PHASE A
MIN V-LN 1.040 PU, 2.50 KV, 104.0/ 100.0 V AT NODE SST16 PHASE B
MAX V-LL 1.030 PU, 0.50 KV, 103.0/ 100.0 V AT NODE 17 PHASE CA
MIN V-LL 0.995 PU, 0.48 KV, 99.5/ 100.0 V AT NODE 1D PHASE AB

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	300.00
KVAR	0.00	0.00	0.00	300.00
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	296.81
KVAR	0.00	0.00	0.00	296.81

	GENERATORS		MOTORS	
	ASYNCHRONOUS	SYNCHRONOUS	ASYNCHRONOUS	SYNCHRONOUS
KW	0.00	0.00	485.00	0.00
KVAR	0.00	0.00	234.90	0.00

POWER TECHNOLOGIES INC.   POWER SYSTEM SIMULATOR,PSS/U   VERSION 4.0

D50L9F,ONLINE,LIGHT LOAD, 1.0 TAP ON 12A,BUS A ONLY   JUL 31 1990
REG HOLDS 12A PRIMARY TO 35KV   TUE, 16:57

MINIMUM VOLTAGES BELOW 200.0 PERCENT

		MINIMUM VOLTAGE			
NODE	PHAS	/PU	/KV	/ 100.	
S204C	ABC	1.072	21.4	107.2	
S204R	ABC	1.015	20.2	101.5	
12ATP	ABC	1.013	20.2	101.3	
12AT	ABC	1.013	2.4	101.3	
12AY	ABC	1.011	2.4	101.1	
12AY2	ABC	1.011	2.4	101.1	
12A	ABC	1.011	2.4	101.1	
SST14	ABC	1.011	2.4	101.1	
14	ABC	0.988	0.5	98.8	L
14C	ABC	0.988	0.5	98.8	L
14S	ABC	0.983	0.5	98.3	L
1C	ABC	0.964	0.5	96.4	L
SST18	ABC	1.011	2.4	101.1	
18	ABC	0.994	0.5	99.4	L
18C	ABC	0.993	0.5	99.3	L
18S	ABC	0.994	0.5	99.4	L
12AS	ABC	1.011	2.4	101.1	
12ATS	ABC	1.013	2.4	101.3	
12AX	ABC	1.013	2.4	101.3	
12AX2	ABC	1.013	2.4	101.3	

RCP RATINGS CHANGED TO 5.265MVA

POWER TECHNOLOGIES INC. POWER SYSTEM SIMULATOR,PSS/U VERSION 4.0

D50L9F,ONLINE,LIGHT LOAD, 1.0 TAP ON 12A,BUS A ONLY JUL 31 1990
REG HOLDS 12A PRIMARY TO 35KV TUE, 16:57

TOTAL NODES	TREE NODES	LOOPS	TNSF	SWCH	ASYNC GENS	SYNC GENS	ASYNC MOTS	SYNC MOTS
55	20	0	6	3	0	0	0	0

	SOURCE	LOSSES	GENERATION	MOTOR LOAD	CHARGING	CAPACITANCE
KW	852.46	12.89	0.00	0.00		
KVAR	460.83	44.92	0.00	0.00	174.96	0.00
PF	0.880					

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	839.57
KVAR	0.00	0.00	0.00	590.87

MAX V-LN 1.072 PU, 21.36 KV, 107.2/ 100.0 V AT NODE S204C PHASE A
MIN V-LN 1.011 PU, 2.43 KV, 101.1/ 100.0 V AT NODE SST14 PHASE A
MAX V-LL 0.994 PU, 0.48 KV, 99.4/ 100.0 V AT NODE 18 PHASE CA
MIN V-LL 0.964 PU, 0.47 KV, 96.4/ 100.0 V AT NODE 1C PHASE AB

NOMINAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	861.00
KVAR	0.00	0.00	0.00	612.30
DEFSC	0.00	0.00	0.00	0.00
DEFPF	1.00	1.00	1.00	1.00

ACTUAL STATIC LOAD

BY CATEGORY	1	2	3	4
KW	0.00	0.00	0.00	839.57
KVAR	0.00	0.00	0.00	590.87

	GENERATORS		MOTORS	
	ASYNCHRONOUS	SYNCHRONOUS	ASYNCHRONOUS	SYNCHRONOUS
KW	0.00	0.00	0.00	0.00
KVAR	0.00	0.00	0.00	0.00

RCP RATINGS CHANGED TO 5.265MVA

Attachment 3

4KV motor loads for Cases EMSH4CF & DMSH4CF

RCP Start on Bus 11a

Bus	#Motor Name	Volts	Rated HP	% Brak	Brake HP	Eff	PF	P kw	Qkvar
11A	Cond Boost	4000	350	0	0	.92	.9	.00	.00
11A	Circ Wtr Pmp1A	4000	1750	1	1750	.92	1	1419.02	.00
11A	Heater Drain1A	4000	400	0	0	.92	.9	.00	.00
11A	Cond Pmp1C	4000	1250	.5	625	.92	.9	506.79	245.45
11A	Cond Pmp1A	4000	1250	.5	625	.92	.9	506.79	245.45
11A	Feedwater Pmp	4000	4500	.6	2700	.92	.9	2189.35	1060.35
11A	Aux Bld Ex Fns	4000	350	.9	315	.92	.9	255.42	123.71
								-------	-------
								4877.38	1674.96(11AC)
11A	RCP	4000	6000	0	0	.92	.9	.00	.00
								-------	-------
								4877.38	1674.96

Bus	#Motor Name	Volts	Rated HP	% Brak	Brake HP	Eff	PF	P kw	Qkvar
12A	Cond Boost	4000	350	0	0	.92	.9	.00	.00(12AC)

Bus	#Motor Name	Volts	Rated HP	% Brak	Brake HP	Eff	PF	P kw	Qkvar
11B	AuxBldExFn1B	4000	350	0	0	.92	.9	.00	.00
11B	Feedwater Pmp	4000	4500	0	0	.92	.9	.00	.00
11B	Cond Pmp 1B	4000	1250	0	0	.92	.9	.00	.00
11B	Heater Drain	4000	400	0	0	.92	.9	.00	.00
11B	Circ Wtr Pmp1B	4000	1750	1	1750	.92	1	1419.02	.00
11B	Cond Boost	4000	350	0	0	.92	.9	.00	.00
								-------	-------
								1419.02	.00(11BC)
11B	RCP	4000	6000	.9	5400	.92	.9	4378.70	2120.70(11BS)
								-------	-------
								5797.72	2120.70

4KV motor loads for Cases EONH4CF & DONH4CF

Bus	#Motor Name	Volts	Rated HP	% Brak	Brake HP	Eff	PF	P kw	Qkvar
11A	Cond Boost	4000	350	.9	315	.92	.9	255.42	123.71
11A	Circ Wtr Pmp1A	4000	1750	.9	1575	.92	1	1277.12	.00
11A	Heater Drain1A	4000	400	.9	360	.92	.9	291.91	141.38
11A	Cond Pmp1C	4000	1250	.9	1125	.92	.9	912.23	441.81
11A	Cond Pmp1A	4000	1250	.9	1125	.92	.9	912.23	441.81
11A	Feedwater Pmp	4000	4500	.9	4050	.92	.9	3284.02	1590.52
11A	Aux Bld Ex Fns	4000	350	.9	315	.92	.9	255.42	123.71
								-------	-------
								7188.36	2862.94(11AC)
11A	RCP	4000	6000	.9	5400	.92	.9	4378.70	2120.70(11AS)
								-------	-------
								11567.05	4983.64

Bus	#Motor Name	Volts	Rated HP	% Brak	Brake HP	Eff	PF	P kw	Qkvar
12A	Cond Boost	4000	350	0	0	.92	.9	.00	.00(12AC)

Bus	#Motor Name	Volts	Rated HP	% Brak	Brake HP	Eff	PF	P kw	Qkvar
11B	AuxBldExFn1B	4000	350	.9	315	.92	.9	255.42	123.71
11B	Feedwater Pmp	4000	4500	.9	4050	.92	.9	3284.02	1590.52
11B	Cond Pmp 1B	4000	1250	.9	1125	.92	.9	912.23	441.81
11B	Heater Drain	4000	400	.9	360	.92	.9	291.91	141.38
11B	Circ Wtr Pmp1B	4000	1750	.9	1575	.92	1	1277.12	.00
11B	Cond Boost	4000	350	.9	315	.92	.9	255.42	123.71
								-------	-------
								6276.13	2421.13(11BC)
11B	RCP	4000	6000	.9	5400	.92	.9	4378.70	2120.70(11BS)
								-------	-------
								10654.83	4541.83

4KV motor loads for Cases EOF_LOCA & DOF_LOCA

Bus	#Motor Name	Volts	Rated HP	% Brak	Brake HP	Eff	PF	P kw	Qkvar
11A	Cond Boost	4000	350	.9	315	.92	.9	255.42	123.71
11A	Circ Wtr Pmp1A	4000	1750	.9	1575	.92	1	1277.12	.00
11A	Heater Drain1A	4000	400	.9	360	.92	.9	291.91	141.38
11A	Cond Pmp1C	4000	1250	.9	1125	.92	.9	912.23	441.81
11A	Cond Pmp1A	4000	1250	.9	1125	.92	.9	912.23	441.81
11A	Feedwater Pmp	4000	4500	0	0	.92	.9	.00	.00
11A	Aux Bld Ex Fns	4000	350	.9	315	.92	.9	255.42	123.71
								-------	-------
								3904.34	1272.42(11AC)
11A	RCP	4000	6000	.9	5400	.92	.9	4378.70	2120.70(11AS)
								-------	-------
								8283.03	3393.12

Bus	#Motor Name	Volts	Rated HP	% Brak	Brake HP	Eff	PF	P kw	Qkvar
12A	Cond Boost	4000	350	0	0	.92	.9	.00	.00(12AC)

Bus	#Motor Name	Volts	Rated HP	% Brak	Brake HP	Eff	PF	P kw	Qkvar
11B	AuxBldExFn1B	4000	350	.9	315	.92	.9	255.42	123.71
11B	Feedwater Pmp	4000	4500	0	0	.92	.9	.00	.00
11B	Cond Pmp 1B	4000	1250	.9	1125	.92	.9	912.23	441.81
11B	Heater Drain	4000	400	.9	360	.92	.9	291.91	141.38
11B	Circ Wtr Pmp1B	4000	1750	.9	1575	.92	1	1277.12	.00
11B	Cond Boost	4000	350	.9	315	.92	.9	255.42	123.71
								-------	-------
								2992.11	830.61(11BC)
11B	RCP	4000	6000	.9	5400	.92	.9	4378.70	2120.70(11BS)
								-------	-------
								7370.80	2951.31

1E motor loads for Cases EOF_LOCA & DOF_LOCA

Bus	#Motor Name	Volts	Rated HP	% Brak	Brake HP	Eff	PF	P kw	Qkvar
14	Saf Inj 1C swng	440	350	.9	315	.945	.909	248.67	114.02
14	Cont Spray 1A	460	200	.9	180	.898	.902	149.53	71.57
14	Cnmt Fan 1D	440	300	.9	270	.931	.906	216.35	101.08
14	Aux Bld Exh Fan		75	0	0	.9	.85	.00	.00
14	Aux FWP 1A	440	250	.9	225	.935	.889	179.52	92.47
14	RHR 1A	460	200	.9	180	.927	.91	144.85	66.00
14	PresHeatContGrp							0.00	.00
14	Comp Cool 1A	460	150	0	0	.919	.905	.00	.00
14	CHG PMP 1A	460	100	0	0	.9	.85	.00	.00
14	Cnmt Fan 1A	440	300	.9	270	.931	.906	216.35	101.08
14	SAFW Pmp 1C	460	300	0	0	.93	.89	.00	.00
								-------	-------
								1155.27	546.21(14C)
14	Saf Inj 1a	440	350	.9	315	.945	.909	248.67	114.02(14S)
								-------	-------
								1403.93	660.23
14	MCC 1C							300.00	300.00
								-------	-------
								1703.93	960.23

Bus	#Motor Name	Volts	Rated HP	% Brak	Brake HP	Eff	PF	P kw	Qkvar
18	Intake Heater1A							125.00	.00
18	Intake Heater1C							125.00	.00
18	ServWatPmp1A	440	300	.9	270	.936	.88	215.19	116.15
								-------	-------
								465.19	116.15(18C)
18	ServWatPmp1C	440	300	0	0	.936	.88	.00	.00(18S)
								-------	-------
								465.19	116.15
18	MCC1G							.00	.00
								-------	-------
								465.19	116.15

1E motor loads for Cases EOF_LOCA & DOF_LOCA

Bus	#Motor Name	Volts	Rated HP	% Brak	Brake HP	Eff	PF	P kw	Qkvar
16	Cont Spray 1B	460	200	.9	180	.898	.902	149.53	71.57
16	Cnmt Fan 1B	440	300	.9	270	.931	.906	216.35	101.08
16	Cnmt Fan 1C	440	300	.9	270	.931	.906	216.35	101.08
16	Aux FWP 1B	440	250	.9	225	.935	.889	179.52	92.47
16	RHR 1B	460	200	.9	180	.927	.91	144.85	66.00
16	CHG PMP 1B	460	100	0	0	.9	.85	.00	.00
16	CHG PMP 1C	460	100	0	0	.9	.85	.00	.00
16	Press Htr 1B							0.00	.00
16	Comp Cool 1B	460	150	0	0	.919	.905	.00	.00
16	Spent Fuel 2		100	0	0	.9	.85	.00	.00
16	SAFW Pmp 1D	460	300	0	0	.93	.89	.00	.00
								-------	-------
								906.60	432.19(16C)
16	Saf Inj 1B	440	350	.9	315	.945	.909	248.67	114.02(16S)
								-------	-------
								1155.27	546.21
16	MCC 1D							300.00	300.00
								-------	-------
								1455.27	846.21

Bus	#Motor Name	Volts	Rated HP	% Brak	Brake HP	Eff	PF	P kw	Qkvar
17	Fire Pump	440	200	0	0	.93	.89	.00	.00
17	Intake Heater1B							125.00	.00
17	Intake Heater1D							125.00	.00
17	ServWatPmp1B	440	300	.9	270	.936	.88	215.19	116.15
								-------	-------
								465.19	116.15(17C)
17	ServWatPmp1D	440	300	0	0	.936	.88	.00	.00(17S)
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								465.19	116.15
17	MCC1G							.00	.00
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								465.19	116.15