



**Washington State  
Department of Transportation**

Lynn Peterson  
Secretary of Transportation

WSDOT Ferries Division (WSF)  
2901 3rd Avenue, Suite 500  
Seattle WA 98121-3014

206-515-3400  
TTY: 1-800-833-6388  
[www.wsdot.wa.gov/farries](http://www.wsdot.wa.gov/farries)

September 8, 2014

K & N.  
415 N. Fancher  
Spokane Valley, WA 99212  
Attn: Mr. Jerry Schmidlkofer

**Subject: EMERGENCY CONTRACT, M.V. TACOMA, INTERNAL WSF NO. 15/2348**

This letter is to confirm our request for your services to perform emergency work as described in the following paragraph to the M.V. TACOMA. When signed by your company's representative it will constitute a Contract between your company and the Department of Transportation, Ferries Division, in accordance with Revised Code of Washington 47.56.030, the current edition of the Standard Specifications for Road, Bridge, and Municipal Construction, Division 1 is made a part of this Contract.

Compensation for this work will be made on a time and materials basis. You are hereby authorized to perform the following work: Repairs of the MV. Tacoma propulsion switchboards to open, disassemble, clean, repair, reassemble, test, and certify the Number 3 and Number 4 propulsion switchboard sections in their entirety; Inspect, repair and certify the Number 3 and Number 4 switchboard cubicles structural integrity; Evaluate the need to have bottom panels installed in the all the switchboard cubicles; Evaluate the current installation and operation of the F14 phase loss relays; Evaluate the suitability of the currently installed surge suppressors; Inspect and test the Number 1 and number 2 switchboard sections in their entirety; Replace the propulsion cables from the NO.3 and NO.4 propulsion generators to their respective switchboards in their entirety; Provide onsite Siemens technician during the entire duration of this work; Provide the services of Siemens Industry Inc. to recondition and certify all (4) propulsion generator breakers, all (4) propulsion motor breakers and both (2) propulsion bus tie breakers; Provide the services of Siemens Industry Inc. to recondition and certify all eight (8) medium voltage contactors; and other work to make necessary repairs as authorized by WSF Project Engineer. All repair work including final testing shall be completed no later than December 5, 2014.

Perform a root cause analyst of the causality and provide a written report of the findings not later than November 26, 2014.

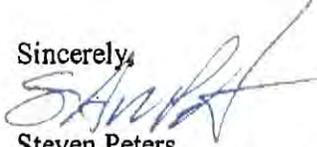
Provide the services of Siemens Industry Inc. to complete an engineering review of the entire propulsion switchboard and provide a report of findings and recommendations of possible needed updates and or necessary changes. This shall be accomplished in parallel with the repair and recommissioning of the switchboard. Provide a schedule and completion date of engineering review.

Point of contact for Siemens Industry Inc. is Daniel Enge, PMP Manager Marine Service, 770-740-3570 (Office) or 404-934-0869 (Cell)



Please sign both originals and return one to Washington State Ferries, Vessel Engineering Department, Attn: Steven Peters, 2901 Third Avenue, Suite 500, Seattle, WA 98121. Thank you.

Sincerely,



Steven Peters  
Vessel Project Engineer  
Washington State Ferries

Acceptance by: K & N

 4-9-14  
Jerry Schmidkofer Date

# WSF Construction Sub Program W, X, or Both Director's Work Order Authorization Request

**WIN M81031I**

Date Request Submitted to Vessel Work Order Specialist:	9/23/2014; updated 10/10/2014
Work Order Manager:	Tim Browning
Phase: <i>(Indicate PE, RW or CN if work order is new)</i>	CN
Work Order Number: <i>(Enter existing number or indicate "New")</i>	00-NEW
Work Order Title: <i>(Only if this is a new work order)</i>	MV Tacoma Emergency Repair

Dollars Requested:	\$1,800,000.00
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Description of Work Being Authorized:	Repair the damaged Propulsion Switchboard and perform design review of the switchboard to determine root cause and implement any fixes identified during same.
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Work Order Justification:	This work is required to maintain and preserve the vessel in a safe, reliable, and efficient material condition.
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Notes:	<p>Emergency Repair            Project Engineer: Steve Peters Work Period: Sept. 9th - Dec. 5th, 2014            To Accounting: Setup Groups as follows:</p> <p><b>GC01</b>            Group 01 Emer Repair; K and N; 981031F; \$1,093,245.00</p> <p><b>GC02</b>            Group 32 Emer Repair; Global Diving-UCB1233; 981031F; \$20,436.00</p> <p><b>GC03</b>            Group 61 CE-Emergency Repair; 981031F; 100%            Distribution Total = \$160,000</p> <p><b>GC06 Contingency</b>            NO Group; 981031F; \$461,403.06</p> <p><b>GC99</b>            Group 31 Emer Repair; Foss; 981031F; \$14,915.94            Group 33 Emer Repair; Siemens-Other; 981031F; \$50,000</p>
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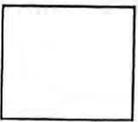
Name of Person Releasing:	T. Browning / R. Hiller / Sio Ng
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Attachments as appropriate:                      Task Order Cover Page

Cost Estimate (only for contract work orders)

Other





WIN

M98910D

Tacoma Switchboard Emergency Repairs Estimate

Task	Estimated Cost	Quantity	Total
Breaker Initial Inspection	\$750	11	\$8,250
Contactor Initial Inspection	\$750	8	\$6,000
Engineering Design Review	\$110,745	1	\$110,745
Root Cause Analysis	\$125,000	1	\$125,000
Breaker #3 & #4 Repair	\$50,000	2	\$100,000
Remaining Breaker Overhaul	\$10,000	9	\$90,000
Contactor Overhaul	\$10,000	8	\$80,000
Replace Cabling #3 & #4 Gens	\$75,000	2	\$150,000
Bussing Replacement	\$80,000	1	\$80,000
Replace Surge Arrestors	\$250	9	\$2,250
Disassemble/Assemble Switch Board	\$175,000	1	\$175,000
Siemens Tech Rep	\$102,000	1	\$102,000
Testing	\$64,000	1	\$64,000
		<b>Total</b>	<b>\$1,093,245</b>
		Contingency @ 50%	\$546,623
		<b>Grand Total</b>	<b>\$1,639,868</b>

The above estimate is a rough order of magnitude as the entire scope of the damage has yet to be identified.

# WSF Construction Sub Program W, X, or Both Director's Work Order Authorization Request

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Name of Person Releasing:	T. Browning / R. Hiller / Sio Ng
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Attachments as appropriate: \_\_\_\_\_ Task Order Cover Page

Cost Estimate (only for contract work orders)  
 Other

Job No	Group Title	Fin Agreement No.	PIN (See Table 2)	Control Sec (See Table 3)	Total Amount Requested	'13-'15 Amount Requested
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00NEW-01	Emer Repair; K and N; 981031F; \$1,093,245.00				\$1,800,000.00	
GC01	AO	981031F	810300		\$1,093,245.00	\$1,093,245.00
			"			

00NEW-32	Emer Repair; Global Diving-UCB1233; 981031F; \$20,436.00					
GC02	AO	981031F	810300		\$20,436.00	\$20,436.00
			"			

00NEW-60	Emergency Repair State Force; 981031F; \$160,000					
GC03	AO	981031F	810300		\$160,000.00	\$160,000.00
			"			

61 100%

00NEW	Contingency					
GC06	AO	981031F	810300		\$461,403.06	\$461,403.06
			"			

00NEW-31	Emer Repair; Foss; 981031F; \$14,915.94					
GC99	AO	981031F	810300		\$14,915.94	\$14,915.94
			"			

00NEW-33	Emer Repair; Siemens-Other; 981031F; \$50,000					
GC99	AO	981031F	810300		\$50,000.00	\$50,000.00
			"			

CPMS PINs

GC01	\$1,093,245.00
GC02	\$20,436.00
GC03	\$160,000.00
GC04	\$0.00
GC06	\$461,403.06
GC99	\$64,915.94
	<u>\$1,800,000.00</u>
	<u>\$1,800,000.00</u>

981031F \$1,800,000.00  
 \$1,800,000.00

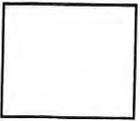
Before After Auth Code

981031F; AO \$1,800,000.00

902694 (\$897,306.00) PCRf Needed

N-Line  
 N-Line  
 N-Line  
 N-Line

\$1,800,000.00



WIN

M98910D

## Tacoma Switchboard Emergency Repairs Estimate

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		Contingency @ 50%	\$546,623
		<b>Grand Total</b>	<b>\$1,639,868</b>

The above estimate is a rough order of magnitude as the entire scope of the damage has yet to be identified.

**Siemens Marine Solutions**  
Commissioning & Field Services Report

REPORT BY: Fritz Schuckert  
REPORT NO: 1914  
DATE: 08-11-2014  
JOB NO. :  
REPORT PERIOD: 08/03 – 08/12/2014

**DISTRIBUTION:**

SII/CS/Marine-Services

**1. SERVICE / PROJECT NAME IDENTIFICATION:**

Washington-State-Ferry, WSF "Tacoma" Investigation of "July-29<sup>th</sup>" Incident

**2. CUSTOMER & WORK LOCATION:**

Owner / Operator: WSF  
Vessel Name: "TACOMA"  
IMO No.: 1052576  
Contact Person: Staff C/E Ben Davis  
Work Location: Eagle Harbor  
City / State / Zip: Bainbridge, WAQ

**3. EQUIPMENT SERVICED / SERIAL NUMBERS:**

HV-Switchboard-2, Siemens-Canada, 4,76 kV, Type: 83K20, April 1995, ASEZ278

#### 4. SERVICE ACTIVITIES PERFORMED / SUMMARY:

WSF asked Siemens-Atlanta to investigate the incident from July 29<sup>th</sup> at 12:31 PDT which caused a Black-Out of the 480 V Bus-System and substantial damage to the HV-Cubicle for Alternator-3 and Alternator-4. There was also minor damage at the HV-Feeder for Excitation-Transformer AC1.

Although the 4,16 kV Bus-System had a temporary-voltage dip, it did not Black-Out. Generator-1 and Bus-Tie did not trip during the incident. Bus-Voltage dipped to 1.1 kV for ~ 1.5 sec.

An additional report, covering damage-assessment (incl. photos) and required parts for repair, will be furnished by Siemens's Switchgear-Div. in Seattle. (Mr. Loren Bailey)

The interpretation of the recorded signals must consider the fact that some of the transducer-signals are filtered (up to 200 msec) and various channels are configured at different scan-rates (up to 500 msec) at the IBA/PDA Data-Acquisition System. In other words, some of the actual signals/values may have looked quite different than depicted at the chart-recordings.

Confirmed as being "totally" damaged:

- 2 PT-Fuses Alternator-4 (both blown)
- 3 PT-Fuses Alternator-3 (all disintegrated)
- 3 Surge-Limiter Alternator-4 (Phase-1 exploded, 2 other damaged)
- 3 Surge-Limiter Alternator-3 (Phase-3 exploded, 2 other damaged)
- 1 Surge-Limiter Excitation-Transformer AC1 (Phase-1 damaged)
- 1 HV Power-Fuse Excitation-Transformer AC1 (Phase-1 blown)
- Some insulators, copper-bars and metal-parts in Cubicle-3 and 4

Being partially damaged (Arc-Flash):

- 3 PT's Alternator-3
- HV Power-Cables Alternator-3 and 4
- Partitions in Cubicle-3 and 4
- Control-Wire harness Cubicle-3

Although it may be decided to have the following items re-tested and/or replaced, some preliminary testing confirmed that they do not show any obvious electrical damage. The results from these tests are only used as supportive tool to establish a probable "sequence of events".

- All PT's for Alternator-4 and 3 checked ok.
- 6 Rotating-Diodes each, Alternator-1, -3 and 4 checked ok.
- Alternator-1, -3 and 4 checked ok.
- HV Cable Alternator-3 and 4 checked ok.
- HV Vacuum-Breaker Alternator-3 and 4 checked ok.

## July 29<sup>th</sup> 2014, Sequence of Events:

### Arriving at Seattle-Dock

- 11:51:56 Alternator-4 taken offline @ 0.27 PU Amp
- 11:51:58 Over-Voltage Alarm Alternator-4
- 11:51:58 Alternator-4 PT-Fuse(s) Phase-1 and Phase-3 blown due to Voltage-Surge.
- 11:53:15 Over-Voltage Alarm for Alternator-4, Acknowledged

### Leaving Seattle-Dock

- 12:10 Alternator-1 and 3 online

### Approaching Bainbridge-Dock

- 12:30:48 Start of Alternator-4.
  - Note: AVR for Alternator-4 will cause an actual, but undetected Over-Voltage because missing PT Voltage Feedback due to blown PT-Fuse(s).
- 12:31:00 Closing of Alternator-4 HV-Breaker although Phasing/Voltage is not matched.
  - Note: Because 2 out of 3 PT-Fuses are blown, the Alternator PT Voltage Feedback becomes erratic and unreliable. This "false" Voltage-Feedback allowed Breaker-Closure.
- 12:31:00 Current-Surge affecting all online Alternators because severely mismatched synchronization with subsequent severe Voltage-Dip at the whole Bus-System.
- 12:31:00 Instant opening of Alternator-4 Breaker due to presence of Under-Voltage Trip-Signal from F11.
- 12:31:01 Several Under-Voltage Alarms are reported at Bus-1 and Bus-2 as well as at the electric propulsion system.
- 12:31:01 Alternator-1 and 3 lost their Synchronisms due to severe voltage-dip.
  - Note: This causes the reactive currents between the two remaining Alternators to rise to very high levels and also prevents a Bus-Voltage built-up.

12:31:01 Alternator-3 HV-Breaker opens with subsequent current-decay and rising Bus-voltage, fed from Alternator-1 which remains online.

12:31:02 Alternator-3 and 4 Diff-Trip is generated. (Alternator-3: 672%, Alternator-4: 368%)

Remarks: Alternator-3 and 4 Over-Current Relays registered an Over-current condition, but did not time-out. Therefore no trip-signal was issued.

Because the extensive compartment/component-damage and limited data available, several attempts and different approaches to explain the exact timing and source of Arcing/Flash-Over failed.

However, the following explains the Root-Cause of the Main-Event.

- 1) A previous, related Overvoltage Alarm got acknowledged without further investigation.
- 2) A partial Alternator PT Fuse-Loss (e.g. 2 out of 3 Fuses lost) goes unnoticed because an Idiosyncrasy of the PT-circuitry in conjunction with the installed Phase-Loss Relay F14.  
  
See attached PT Test-Results.
- 3) The installed Woodward Synchronizer A1 does not monitor the Voltages, only the Phasing.
- 4) The installed 3-Phase-Loss Relay F14, measures Phase to Neutral Voltages. It does not sense a Phase to Phase Voltage-Loss. In other words, if it receives 3 identical, "in-phase" Voltages as generated during a Fuse-Loss, it will issue an "All-3-Phases-Healthy" Status, although two of the actual Alternator Phase-Voltages are missing.  
  
See attached PT Test-Results.
- 5) 2) 3) and 4) allowed the Alternator-4 Breaker to be closed, although Voltage and Phase did not match. Breaker Closure under these conditions will cause a current-surge with a subsequent sever Bus-Voltage Dip.
- 6) Under-voltage Relay F11 (measuring Phase to Phase Voltage) trips Alternator-4 Breaker instantly upon its Closure.
- 7) A severe bus-voltage dip causes Alternator-1 and 3 to "Slip" and to lose Synchronism with a subsequent rise of reactive current between the two Alternators to very high levels.

Note: Breaking of high Alternator-Currents with Vacuum Breaker will result in power-full Voltage-Surges with possible loss of Surge-Limiters and Arcing/Flash-Over.

As an immediate (short-term) solution the following is recommended:

- 1) Operator verifies Alternator-Voltage with ECR panel-meter and waits additional 10 sec, after confirming nominal-voltage (+/- 3%) before issuing an Auto-Close command.
- 2) Replace existing Synchronizer A1 with Model 9905-003 or similar.
- 3) Replace or re-configure Phase-Loss Relay F14, in order that all 3 "Phase to Phase" Voltages are monitored.

Note: The same switch-board equipment is installed onboard two of "Tacoma's" sister-vessels which are presently operated by WSF.

## 5. ATTACHMENTS:

- PDA-CHARTS
- ALARM PRINT-OUTS
- SWBD-DIAGRAMMS
- PROTECTIVE RELAYS
- MEGGER-READINGS
- PT-MEASUREMENTS
- PT BENCH-TEST
- SETTINGS
- PLC-LOGIC

Fritz Schuckert  
Consulting Service Engineer

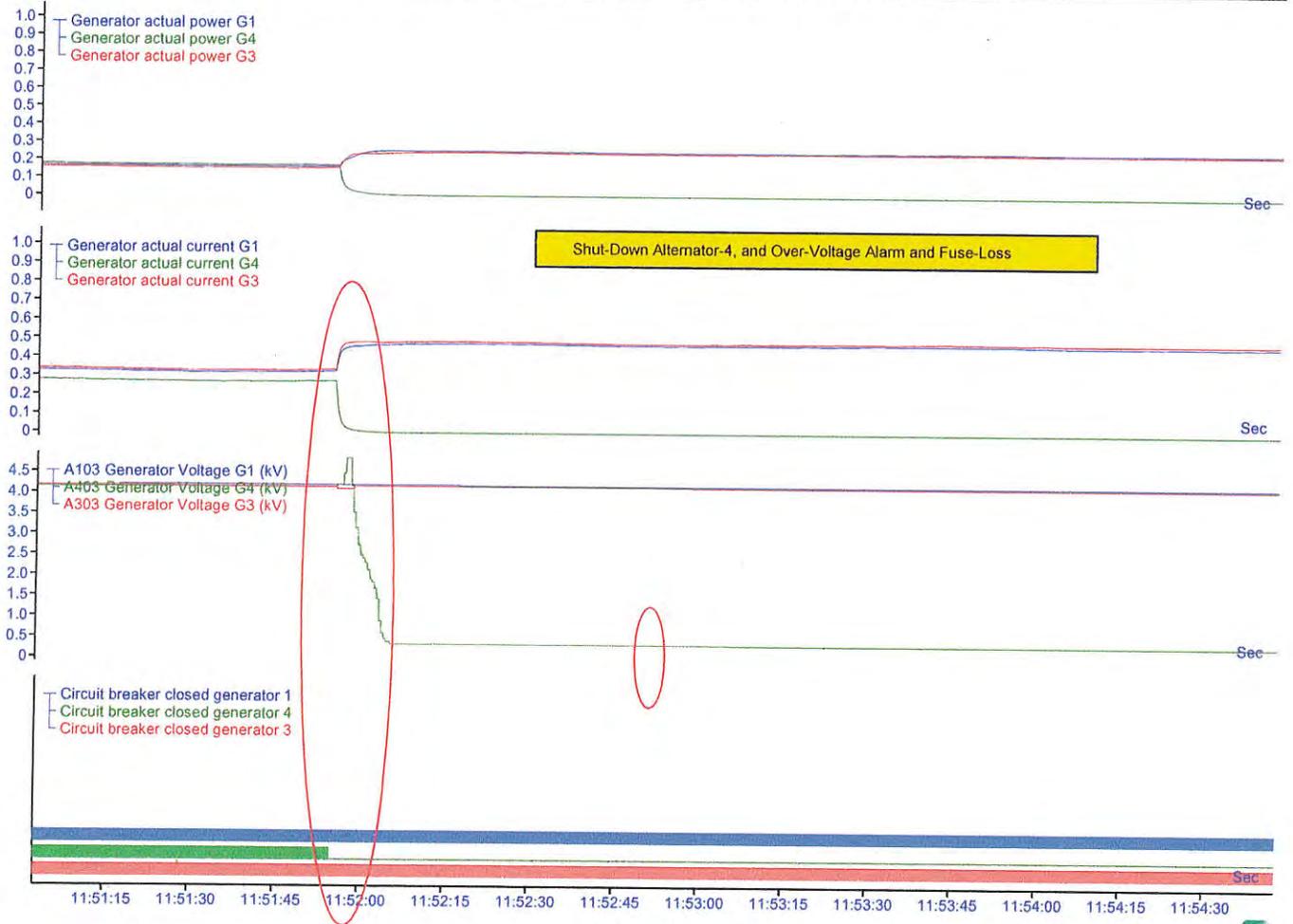
Siemens Industry Inc  
Marine Services

Email: austrotec@cs.com  
Mobile Phone: 678-429-7123

Siemens Marine Solutions

100 Technology Drive, Alpharetta, Ga. 30005  
Tel. +1-770-740-3570







Active Alarms	S...	Alarm Feat	Description	Start Time	End Time	Acknowledge Time	Alarm Status	Worst Value	Enddate	Current Value	Start Date	Acknowledge D...	Alar...
		1004	PASSENGER ELEVATOR TROUBLE	11:45:58 AM 420	11:45:58 AM 820		ALARM	ALARM	7/29/2014	Normal	7/29/2014		961
		1004	PASSENGER ELEVATOR TROUBLE	11:45:59 AM 430	11:46:00 AM 460	11:46:50 AM 030	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	961
		4404	ALT 4 HIGH	11:51:50 AM 180	11:51:50 AM 100	11:53:25 AM 820	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	965
		E425	ME 4 FO PRESS	11:55:23 AM 420	11:55:23 AM 620	11:55:56 AM 590	ALARM	ALARM	7/29/2014	0	7/29/2014	7/29/2014	2002
		E435	ME 4 DIESEL CTRL PHL SUN ALARM	12:30:42 PM 670	12:31:00 PM 600	1:30:30 PM 240	ALARM	ALARM	7/29/2014	Blocked	7/29/2014	7/29/2014	961
		A311	ALT 3 FREQ	12:31:00 PM 670	12:31:02 PM 270	1:20:30 PM 180	H/W ERROR	60	7/29/2014	60	7/29/2014	7/29/2014	2004
		A503	END 2 TIE B/A BUS FREQ	12:31:00 PM 670	12:31:02 PM 270	1:20:30 PM 230	H/W ERROR	60	7/29/2014	57	7/29/2014	7/29/2014	2004
		Y146	ST GEAR 1 - FU STEERING FAILURE	12:31:00 PM 980	12:31:13 PM 070		ALARM	ALARM	7/29/2014	ALARM	7/29/2014	7/29/2014	2004
		Y246	ST GEAR 2 - FU STEERING FAILURE	12:31:00 PM 980	12:31:13 PM 070		ALARM	ALARM	7/29/2014	ALARM	7/29/2014	7/29/2014	961
		A111	ALT 1 FREQ	12:31:01 PM 130	12:31:02 PM 530	1:20:30 PM 270	H/W ERROR	60	7/29/2014	56	7/29/2014	7/29/2014	2004
		A504	END 1 BUS FREQUENCY	12:31:01 PM 130	12:31:02 PM 530	1:20:03 PM 930	H/W ERROR	60	7/29/2014	57	7/29/2014	7/29/2014	2004
		A509	END 2 TIE B/A BUS V	12:31:01 PM 270	12:31:02 PM 270	1:20:30 PM 100	ALARM	3.67	7/29/2014	0.00	7/29/2014	7/29/2014	2002
		S205	PM BRG 2 1 HTR & OIL LVL 30%	12:31:01 PM 270	12:31:01 PM 770	1:20:30 PM 180	ALARM	ALARM	7/29/2014	Blocked	7/29/2014	7/29/2014	961
		S212	PM BRG 2 2 HTR & OIL LVL 30%	12:31:01 PM 270	12:31:01 PM 770	1:20:30 PM 180	ALARM	ALARM	7/29/2014	Blocked	7/29/2014	7/29/2014	961
		D242	END 2 A/B 2W CHARGER FAULT	12:31:01 PM 380	12:31:27 PM 720		ALARM	ALARM	7/29/2014	Blocked	7/29/2014	7/29/2014	961
		T218	E/PMR 2 MAIN CONTACTOR TRIP	12:31:01 PM 470		1:20:30 PM 350	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	961
		A509	END 1 BUS VOLTAGE	12:31:01 PM 530	12:31:03 PM 430	1:20:30 PM 270	ALARM	2.64	7/29/2014	0.06	7/29/2014	7/29/2014	965
		S105	PM BRG 1 1 HTR & OIL LVL 30%	12:31:01 PM 530	12:31:02 PM 470	1:20:21 PM 450	ALARM	ALARM	7/29/2014	Blocked	7/29/2014	7/29/2014	2002
		S112	PM BRG 1 2 HTR & OIL LVL 30%	12:31:01 PM 530	12:31:02 PM 470	1:20:21 PM 450	ALARM	ALARM	7/29/2014	Blocked	7/29/2014	7/29/2014	961
		S126	PM BRG 1 3 HTR & OIL LVL 30%	12:31:01 PM 600	12:31:02 PM 550	1:20:21 PM 130	ALARM	ALARM	7/29/2014	Blocked	7/29/2014	7/29/2014	961
		F135	ME 1 W/SE 1 CTRL PHL SUN ALARM	12:31:01 PM 630	12:45:41 PM 320	1:20:21 PM 130	ALARM	ALARM	7/29/2014	Blocked	7/29/2014	7/29/2014	961
		D142	END 1 A/B 2W CHARGER FAULT	12:31:01 PM 650	12:31:27 PM 280		ALARM	ALARM	7/29/2014	Blocked	7/29/2014	7/29/2014	961
		*313	PM3 SIDOR 1 UNDERVOLTAGE	12:31:01 PM 670	12:34:27 PM 650	1:20:20 PM 990	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	961
		*413	PM4 SIDOR 1 UNDERVOLTAGE	12:31:01 PM 670	12:34:27 PM 650	1:20:20 PM 990	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	961
		L117	END 1 MTR/ALT F/W LOW FLOW	12:31:01 PM 750	1:43:32 PM 430	1:20:21 PM 230	ALARM	ALARM	7/29/2014	ALARM	7/29/2014	7/29/2014	961
		L211	END 2 SCR BRG F/W FLOW/LOW	12:31:01 PM 730	1:44:14 PM 840	1:20:21 PM 030	ALARM	ALARM	7/29/2014	ALARM	7/29/2014	7/29/2014	961
		A307	ALT 3 CURRENT	12:31:01 PM 770	12:31:02 PM 270	1:20:21 PM 030	H/W ERROR	65	7/29/2014	0	7/29/2014	7/29/2014	2004
		P212	PM3 DRIVE NOT READY	12:31:01 PM 770	1:51:30 PM 970	1:20:21 PM 030	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	961
		P178	PM3 EXCITATION 1 FAULT	12:31:01 PM 770	12:31:03 PM 670	1:20:21 PM 030	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	961
		P213	PM4 DRIVE NOT READY	12:31:01 PM 770		1:20:21 PM 030	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	961
		F183	PM4 EXCITATION 1 FAULT	12:31:01 PM 770	12:31:03 PM 670	1:20:21 PM 030	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	961
		P201	PM3 EXCITATION SWITCHED OVER	12:31:01 PM 810	12:31:03 PM 270	1:20:21 PM 030	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	961
		P209	PM4 EXCITATION SWITCHED OVER	12:31:01 PM 810	12:31:03 PM 240	1:20:21 PM 150	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	961
		J01	N/A M/A SE 1 MOTOR PWR (M/A)	12:31:01 PM 830	12:31:02 PM 430	1:20:21 PM 430	H/W ERROR	72	7/29/2014	2	7/29/2014	7/29/2014	2004
		003	TEP CHRG FAULT	12:31:01 PM 840	12:31:21 PM 160		ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	961
		A107	ALT 1 CURRENT	12:31:01 PM 900	12:31:02 PM 530	1:20:21 PM 450	H/W ERROR	65	7/29/2014	3	7/29/2014	7/29/2014	2004
		L111	END 1 SCR BRG F/W FLOW/LOW	12:31:01 PM 910	1:43:44 PM 950	1:20:21 PM 450	ALARM	ALARM	7/29/2014	ALARM	7/29/2014	7/29/2014	961
		L217	END 2 MTR/ALT F/W LOW FLOW	12:31:01 PM 970	1:44:09 PM 110	1:20:21 PM 210	ALARM	ALARM	7/29/2014	ALARM	7/29/2014	7/29/2014	961
		P172	PM3 INTERNAL DRIVE FAULT	12:31:02 PM 030	12:31:03 PM 400	1:20:21 PM 200	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	961
		P173	PM4 INTERNAL DRIVE FAULT	12:31:02 PM 030	12:31:03 PM 400	1:20:21 PM 200	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	961
		I451	END 2 HR SW EDDL 2A PMP FAULT	12:31:02 PM 170	12:31:05 PM 600	1:20:20 PM 800	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	961
		F190	END 2 HR SW EDDL 2A PMP FAULT	12:31:02 PM 170	12:31:05 PM 600	1:20:21 PM 240	H/W ERROR	100.64	7/29/2014	Normal	7/29/2014	7/29/2014	961

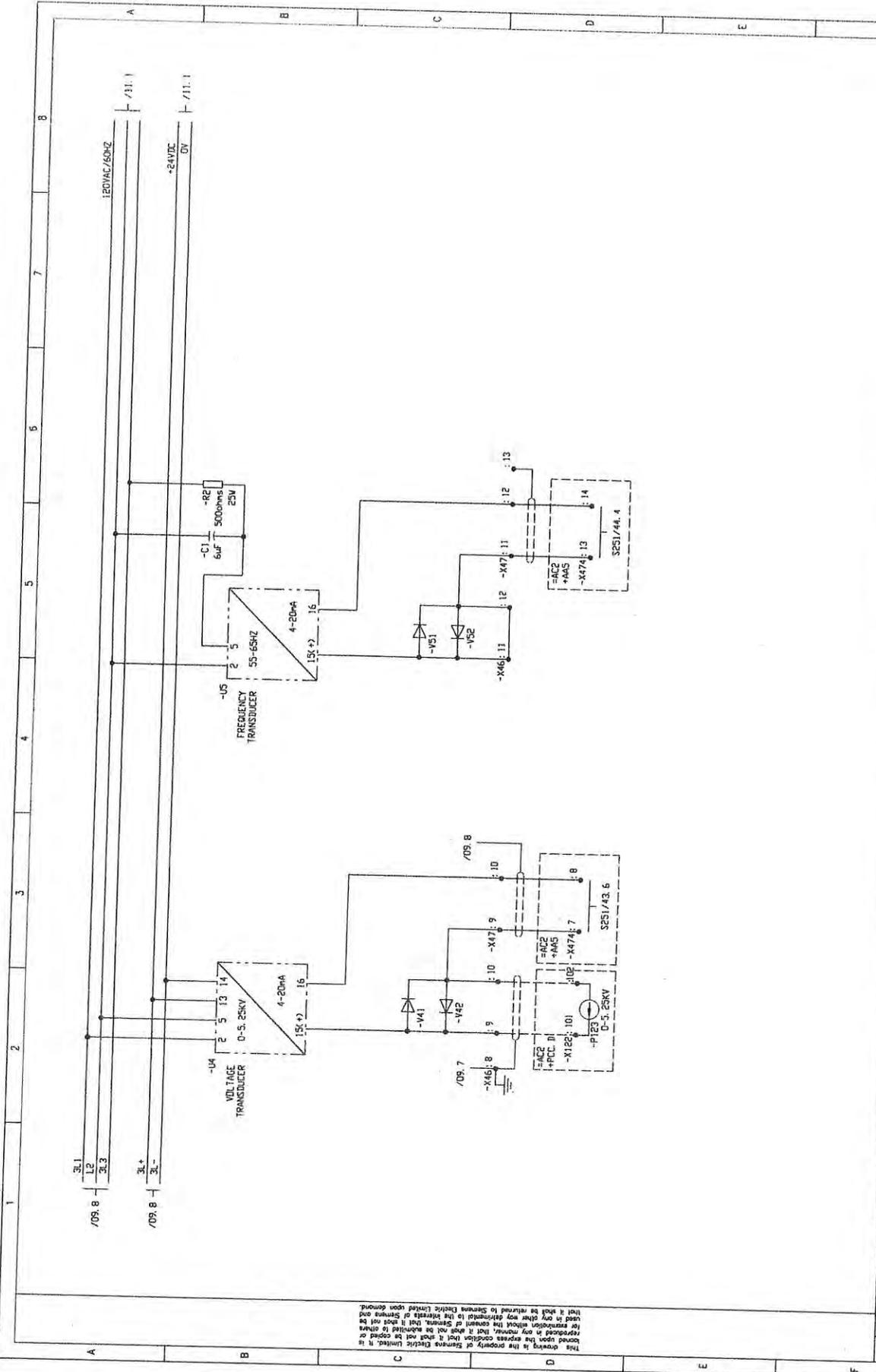
Alarm Point	Description	Start Time	End Time	Acknowledge Time	Alarm Status	Worst Value	End date	Current Value	Start Date	Acknowledge D...	Alr...
P173	FM4 INTERNAL DRIVE FAULT	12:31:02 PM 030	12:31:03 PM 460	1:20:21 PM 230	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
M461	END2 HR SW COOL 2A PMP FAULT	12:31:02 PM 170	12:31:03 PM 600	1:20:20 PM 960	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
L109	END1 MCHRY S/W PUMP 1A FAULT	12:31:02 PM 190	12:31:03 PM 550	1:20:21 PM 230	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
L120	END1 MTRALT F/W PUMP 1A FAULT	12:31:02 PM 190	12:31:03 PM 650	1:20:21 PM 230	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
L107	END1 SCR/REG F/W PUMP 1A FAULT	12:31:02 PM 190	12:31:03 PM 550	1:20:21 PM 230	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
M109	FM1 FAN 1B TRIP	12:31:02 PM 190	12:31:03 PM 550	1:20:21 PM 230	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
M110	FM1 FAN 1C TRIP	12:31:02 PM 190	12:31:03 PM 550	1:20:21 PM 230	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
M209	FM2 FAN 2B TRIP	12:31:02 PM 190	12:31:03 PM 550	1:20:21 PM 230	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
M210	FM2 FAN 2C TRIP	12:31:02 PM 190	12:31:03 PM 550	1:20:21 PM 230	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
A309	ALT DIFF PROTECTION	12:31:02 PM 270	12:31:17 PM 810	1:20:12 PM 250	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
A409	AL1A DIFF PROTECTION	12:31:02 PM 270	12:31:17 PM 380	1:20:12 PM 250	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
S235	END2 S/TUBE LUBO PUMP FAULT	12:31:02 PM 320	12:31:03 PM 320	1:20:12 PM 310	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
M416	ME1 - HI REC PMP FAULT SUM ALM	12:31:02 PM 430	12:31:14 PM 250		ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
M456	ME2 - HI REC PMP FAULT SUM ALM	12:31:02 PM 430	12:31:14 PM 250		ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
X116	FM1 SITOR 2 UNDERVOLTAGE	12:31:02 PM 430	12:34:27 PM 840	1:20:11 PM 330	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
X212	FM2 SITOR 1 UNDERVOLTAGE	12:31:02 PM 430	12:34:27 PM 840	1:20:11 PM 330	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
P214	END1 FREQUENCY LIMITER ACTIVE	12:31:02 PM 470	12:31:04 PM 260	1:20:12 PM 000	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
L206	END2 MCHRY S/W PUMP 2A FAULT	12:31:02 PM 470	12:31:03 PM 670	1:20:12 PM 600	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
L207	END2 SCR/REG F/W PUMP 2A FAULT	12:31:02 PM 470	12:31:03 PM 670	1:20:12 PM 010	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
T419	EXMR 4 MAIN CONTACTOR TRIP	12:31:02 PM 470	12:31:04 PM 320		TRIPPED	TRIPPED	7/29/2014	TRIPPED	7/29/2014	7/29/2014	565
P710	FM1 DRIVE NOT READY	12:31:02 PM 470	1:49:36 PM 596	1:20:12 PM 000	ALARM	ALARM	7/29/2014	ALARM	7/29/2014	7/29/2014	561
P190	FM1 EXCITATION 2 FAULT	12:31:02 PM 470	12:31:04 PM 260	1:20:12 PM 000	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
P211	FM2 DRIVE NOT READY	12:31:02 PM 470		1:20:12 PM 000	ALARM	ALARM	7/29/2014	ALARM	7/29/2014	7/29/2014	561
M309	FM3 FAN 3A TRIP	12:31:02 PM 470	12:31:03 PM 870	1:20:12 PM 000	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
M310	FM3 FAN 3C TRIP	12:31:02 PM 470	12:31:03 PM 870	1:20:12 PM 000	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
M408	FM4 FAN 4A TRIP	12:31:02 PM 470	12:31:03 PM 870	1:20:12 PM 000	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
M410	FM4 FAN 4C TRIP	12:31:02 PM 470	12:31:03 PM 870	1:20:12 PM 000	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
T412	EXMR 4 MAIN CB TRIP	12:31:02 PM 470	12:31:04 PM 320		TRIPPED	TRIPPED	7/29/2014	TRIPPED	7/29/2014	7/29/2014	565
S135	END1 S/TUBE LUBO PUMP FAULT	12:31:02 PM 550	12:31:03 PM 890		ALARM	ALARM	7/29/2014	TRIPPED	7/29/2014	7/29/2014	565
P200	FM1 EXCITATION SWITCHED OVER	12:31:02 PM 550	12:31:04 PM 350	1:20:12 PM 050	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
P202	FM2 PHASE A SWITCHED OVER	12:31:02 PM 550	12:31:03 PM 030	1:20:12 PM 050	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
X108	FM1 SITOR 1 AIR FLOW LOW	12:31:02 PM 630	12:31:03 PM 130	1:20:12 PM 110	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
X109	FM1 SITOR 2 AIR FLOW LOW	12:31:02 PM 630	12:31:03 PM 130	1:20:12 PM 110	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
P204	FM2 PHASE B SWITCHED OVER	12:31:02 PM 630	12:31:03 PM 030	1:20:12 PM 110	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
P206	FM2 PHASE C SWITCHED OVER	12:31:02 PM 630	12:31:03 PM 030	1:20:12 PM 110	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
M462	END2 HR SW COOL 2B PMP FAULT	12:31:02 PM 670	12:31:04 PM 070		ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
M436	ME3 - HI REC PMP FAULT SUM ALM	12:31:02 PM 670	12:31:14 PM 300		ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
M446	ME4 - HI REC PMP FAULT SUM ALM	12:31:02 PM 670	12:31:14 PM 300		ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
P107	FM3 TRIP BY SIBADYN D	12:31:02 PM 670	12:31:04 PM 510		ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
P109	FM4 TRIP BY SIBADYN D	12:31:02 PM 670	12:31:04 PM 510		ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
T318	EXMR 3 MAIN CONTACTOR TRIP	12:31:02 PM 680	12:31:04 PM 020		TRIPPED	TRIPPED	7/29/2014	TRIPPED	7/29/2014	7/29/2014	565
T312	EXMR 2 MAIN CONTACTOR TRIP	12:31:02 PM 680	12:31:04 PM 020		TRIPPED	TRIPPED	7/29/2014	TRIPPED	7/29/2014	7/29/2014	565

Alarm Log	S...	Alarm Point	Description	Start Time	End Time	Acknowledge Time	Alarm Status	Worst Value	End date	Current Value	Start Date	Acknowledge D...	Alar...
P193		PM4 TRIP BY SHADYN D		12:31:02 PM 670	12:31:04 PM 510		ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
T318		PFMR 3 MAIN CONTACTOR TRIP		12:31:02 PM 630	12:31:04 PM 030		TRIPPED	TRIPPED	7/29/2014	TRIPPED	7/29/2014		565
T312		PFMR 3 MAIN CB TRIP		12:31:02 PM 630	12:31:04 PM 030		TRIPPED	TRIPPED	7/29/2014	TRIPPED	7/29/2014		565
P170		PM1 INTERNAL DRIVE FAULT		12:31:02 PM 720	12:31:04 PM 120	1:20:12 PM 220	ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
P171		PM2 INTERNAL DRIVE FAULT		12:31:02 PM 720	12:31:04 PM 120	1:20:12 PM 220	ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
P215		END 2 FREQUENCY LIMITER ACTIVE		12:31:02 PM 770	12:31:03 PM 670	1:20:12 PM 250	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
P195		PM3 PHASE A SWITCHED OVER		12:31:02 PM 620	12:31:03 PM 270	1:20:12 PM 330	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
P137		PM3 PHASE B SWITCHED OVER		12:31:02 PM 620	12:31:03 PM 270	1:20:12 PM 330	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
P199		PM4 PHASE A SWITCHED OVER		12:31:02 PM 620	12:31:03 PM 270	1:20:11 PM 830	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
T318		TC3 A1 ZERO CURR MONITOR FLT		12:31:02 PM 620	12:31:03 PM 270	1:20:11 PM 830	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
P205		PM4 PHASE B SWITCHED OVER		12:31:02 PM 620	12:31:04 PM 670	1:20:12 PM 330	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
P207		PM4 PHASE C SWITCHED OVER		12:31:02 PM 620	12:31:03 PM 270	1:20:04 PM 040	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
C327		TC3 C1 ZERO CURR MONITOR FLT		12:31:02 PM 620	12:31:04 PM 700	1:20:04 PM 040	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
C408		TC4 A1 ZERO CURR MONITOR FLT		12:31:02 PM 620	12:31:04 PM 700	1:20:04 PM 040	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
L210		END 2 MCHRY 5 AW PUMP 2B FAULT		12:31:02 PM 570	12:31:04 PM 320	1:20:04 PM 100	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
L206		END 2 SCVBRG 5 AW PUMP 2B FAULT		12:31:02 PM 570	12:31:04 PM 320	1:20:04 PM 100	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
M306		PM3 FAN 3B TRIP		12:31:02 PM 570	12:31:04 PM 320	1:20:04 PM 100	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
M405		PM4 FAN 4B TRIP		12:31:02 PM 570	12:31:04 PM 320	1:20:04 PM 100	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
Y013		ST GEAR 1 - CONTROL PWR FAILURE - 1A		12:31:03 PM 070	12:31:12 PM 360	1:20:03 PM 760	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
Y014		ST GEAR 1 - CONTROL PWR FAILURE - 1B		12:31:03 PM 070	12:31:12 PM 360	1:20:03 PM 760	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
Y011		ST GEAR 1 - PWR FAILURE - 1A		12:31:03 PM 070	12:31:11 PM 770	1:20:03 PM 760	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
Y012		ST GEAR 1 - PWR FAILURE - 1B		12:31:03 PM 070	12:31:11 PM 770	1:20:03 PM 760	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
Y023		ST GEAR 2 - CONTROL PWR FAILURE - 2A		12:31:03 PM 070	12:31:13 PM 620	1:20:03 PM 780	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
Y024		ST GEAR 2 - CONTROL PWR FAILURE - 2B		12:31:03 PM 070	12:31:13 PM 620	1:20:03 PM 780	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
Y021		ST GEAR 2 - PWR FAILURE - 2A		12:31:03 PM 070	12:31:11 PM 670	1:20:03 PM 780	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
Y022		ST GEAR 2 - PWR FAILURE - 2B		12:31:03 PM 070	12:31:11 PM 670	1:20:03 PM 780	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
L110		END 1 MCHRY 5 AW PUMP 1B FAULT		12:31:03 PM 160	12:31:04 PM 470	1:20:04 PM 070	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
L108		END 1 SCVBRG 5 AW PUMP 1B FAULT		12:31:03 PM 160	12:31:04 PM 470	1:20:04 PM 070	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
M109		PM1 FAN 1A TRIP		12:31:03 PM 160	12:31:04 PM 470	1:20:04 PM 070	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
M200		PM2 FAN 2A TRIP		12:31:03 PM 160	12:31:04 PM 470	1:20:04 PM 070	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
T212		PFMR 2 MAIN CB TRIP		12:31:03 PM 420	12:31:05 PM 180	1:20:04 PM 070	TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014	7/29/2014	565
I113		PH1 24VDC CHARGER FAULT		12:31:03 PM 470	12:31:05 PM 610		ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
I213		PH2 24VDC CHARGER FAULT		12:31:03 PM 470	12:31:05 PM 610		ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
T110		PFMR 1 MAIN CONTACTOR TRIP		12:31:03 PM 520	12:31:05 PM 320		TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014		565
T112		PFMR 1 MAIN CB TRIP		12:31:03 PM 520	12:31:05 PM 320		TRIPPED	TRIPPED	7/29/2014	Normal	7/29/2014		565
P167		PM3 SYNCHR. VOLT. FAILED		12:31:03 PM 970	12:31:04 PM 350	1:20:04 PM 120	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
P168		PM4 SYNCHR. VOLT. FAILED		12:31:03 PM 970	12:31:04 PM 350	1:20:04 PM 120	ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
P106		PM1 TRIP BY SHADYN D		12:31:04 PM 560	12:31:05 PM 070		ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
P108		PM2 TRIP BY SHADYN D		12:31:04 PM 560	12:31:05 PM 070		ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
I113		PH1 24VDC CHARGER FAULT		12:31:06 PM 770	12:31:12 PM 610		ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
I213		PH2 24VDC CHARGER FAULT		12:31:06 PM 770	12:31:12 PM 610		ALARM	ALARM	7/29/2014	Normal	7/29/2014		561

Alarm Log	File	View	Customize	Actions	Help								
Active Alarms	S...	Alarm Point	Description	Start Time	End Time	Acknowledge Time	Alarm Status	Worst Value	End date	Current Value	Start Date	Acknowledge D...	Alar...
P103		PH2 TRIP BY SIMADYN D	12:31:04 PM 660	12:31:05 PM 670			ALARM	ALARM	7/29/2014	Normal	7/29/2014		361
I112		PH1 24VDC CHARGER FAULT	12:31:06 PM 770	12:31:12 PM 610			ALARM	ALARM	7/29/2014	Normal	7/29/2014		361
I213		PH2 24VDC CHARGER FAULT	12:31:06 PM 770	12:31:12 PM 610			ALARM	ALARM	7/29/2014	Normal	7/29/2014		361
I225		E GEN START BAT CUR/DIR/OF CUR	12:31:07 PM 500	12:31:06 PM 550	1:20:03 PM 620		ALARM	ALARM	7/29/2014	Normal	7/29/2014		361
I002		TEP BAT CUR & DIR OF CUR	12:31:09 PM 580	12:31:19 PM 510	1:19:36 PM 900		H/W ERROR	11	7/29/2014	2	7/29/2014	7/29/2014	2004
E321		ME3 - LURO PRESS	12:31:11 PM 340	12:31:16 PM 300	1:20:04 PM 290		ALARM	-43	7/29/2014	0	7/29/2014	7/29/2014	2002
M424		ME2 - HT/REC PMP MTR RPM	12:31:11 PM 310	12:31:12 PM 320			H/W ERROR	0	7/29/2014	0	7/29/2014	7/29/2014	2002
E319		ME3 - TURBO OIL PRESS	12:31:12 PM 240	12:31:16 PM 570	1:20:03 PM 920		ALARM	20	7/29/2014	0	7/29/2014		2004
M415		ME1 - HT/REC PMP MTR AMP	12:31:12 PM 300	12:31:12 PM 710			H/W ERROR	0	7/29/2014	0	7/29/2014	7/29/2014	2002
M414		ME1 - HT/REC PMP MTR RPM	12:31:12 PM 300	12:31:12 PM 710			H/W ERROR	0	7/29/2014	0	7/29/2014		2004
M425		ME2 - HT/REC PMP MTR AMP	12:31:12 PM 300	12:31:13 PM 100			H/W ERROR	0	7/29/2014	0	7/29/2014		2004
M445		ME4 - HT/REC PMP MTR AMP	12:31:12 PM 700	12:31:13 PM 100			H/W ERROR	0	7/29/2014	0	7/29/2014		2004
M444		ME4 - HT/REC PMP MTR RPM	12:31:12 PM 700	12:31:13 PM 100			H/W ERROR	1	7/29/2014	1	7/29/2014		2004
M435		ME3 - HT/REC PMP MTR AMP	12:31:13 PM 100	12:31:16 PM 570			H/W ERROR	0	7/29/2014	0	7/29/2014		2004
M434		ME3 - HT/REC PMP MTR RPM	12:31:13 PM 100	12:31:16 PM 570			H/W ERROR	1	7/29/2014	1	7/29/2014		2004
M415		ME1 - HT/REC PMP MTR RPM	12:31:13 PM 110	12:31:16 PM 200			H/W ERROR	0	7/29/2014	0	7/29/2014		2004
M414		ME1 - HT/REC PMP MTR RPM	12:31:13 PM 110	12:31:16 PM 200			H/W ERROR	1	7/29/2014	1	7/29/2014		2004
M425		ME2 - HT/REC PMP MTR AMP	12:31:13 PM 110	12:31:16 PM 010			H/W ERROR	0	7/29/2014	0	7/29/2014		2004
M424		ME2 - HT/REC PMP MTR RPM	12:31:13 PM 110	12:31:17 PM 010			H/W ERROR	0	7/29/2014	0	7/29/2014		2004
I001		TEP BAT V (120V)	12:31:13 PM 110	12:31:21 PM 210	1:20:03 PM 620		ALARM	116	7/29/2014	127	7/29/2014	7/29/2014	2002
M445		ME4 - HT/REC PMP MTR AMP	12:31:13 PM 570	12:31:16 PM 110			H/W ERROR	2	7/29/2014	1	7/29/2014		2004
M444		ME4 - HT/REC PMP MTR RPM	12:31:13 PM 570	12:31:16 PM 110			H/W ERROR	0	7/29/2014	0	7/29/2014		2004
E375		ME3 DIESEL CTRL PNL SUM ALARM	12:31:14 PM 940	12:31:17 PM 020			ALARM	ALARM	7/29/2014	Blocked	7/29/2014	7/29/2014	561
Y013		ST GEAR 1 - CONTROL PWR FAILURE - 1A	12:31:20 PM 420	12:31:22 PM 510	1:20:03 PM 900		ALARM	ALARM	7/29/2014	Normal	7/29/2014	7/29/2014	561
Y023		ST GEAR 2 - CONTROL PWR FAILURE - 2A	12:31:20 PM 420	12:33:26 PM 140			ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
I002		TEP BAT CUR & DIR OF CUR	12:31:21 PM 580	12:31:22 PM 680			H/W ERROR	171	7/29/2014	0	7/29/2014		561
Y013		ST GEAR 1 - CONTROL PWR FAILURE - 1A	12:31:25 PM 040	12:31:27 PM 150			ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
Y013		ST GEAR 1 - CONTROL PWR FAILURE - 1A	12:31:30 PM 150	12:31:31 PM 570			ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
Y013		ST GEAR 1 - CONTROL PWR FAILURE - 1A	12:31:31 PM 450	12:31:35 PM 680			ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
Y013		ST GEAR 1 - CONTROL PWR FAILURE - 1A	12:31:38 PM 060	12:31:39 PM 780			ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
Y013		ST GEAR 1 - CONTROL PWR FAILURE - 1A	12:31:42 PM 060	12:31:43 PM 670			ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
Y013		ST GEAR 1 - CONTROL PWR FAILURE - 1A	12:31:45 PM 340	12:31:47 PM 550			ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
Y013		ST GEAR 1 - CONTROL PWR FAILURE - 1A	12:31:50 PM 420	12:31:50 PM 570			ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
Y013		ST GEAR 1 - CONTROL PWR FAILURE - 1A	12:31:51 PM 420	12:31:54 PM 610			ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
Y245		ST GEAR 1 - CONTI HOL PWR FAILURE - 1A	12:32:27 PM 020	12:32:31 PM 610			ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
Y146		ST GEAR 2 - FU STEERING FAILURE	12:32:28 PM 080	12:32:31 PM 610			ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
U242		END1 ABM 24V CHARGER FAULT	12:32:28 PM 360	12:32:44 PM 180			ALARM	ALARM	7/29/2014	ALARM	7/29/2014		561
I112		PH1 24VDC CHARGER FAULT	12:32:28 PM 430	12:32:30 PM 520			ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
I213		PH2 24VDC CHARGER FAULT	12:32:28 PM 430	12:32:30 PM 520			ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
D142		END1 ABM 24V CHARGER FAULT	12:32:28 PM 520	12:32:44 PM 010			ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
I002		TEP CHR9 FAULT	12:32:28 PM 600	12:32:28 PM 650			ALARM	ALARM	7/29/2014	Normal	7/29/2014		561
Y012		ST GEAR 1 - CONTROL PWR FAILURE - 1A	12:32:29 PM 420	12:32:29 PM 100			ALARM	ALARM	7/29/2014	Normal	7/29/2014		561



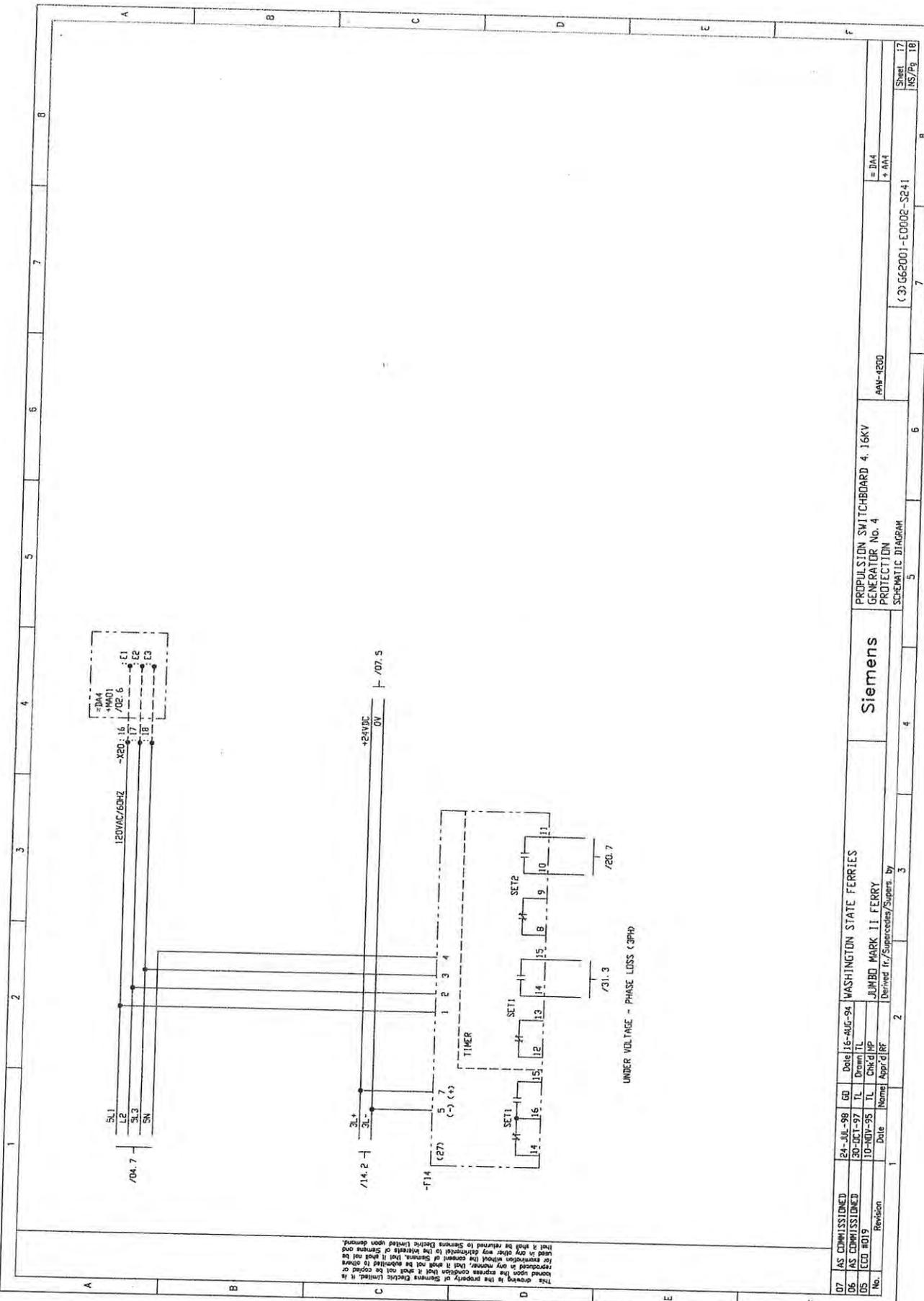




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No.	Revision	Date	Name	Appr. or Ref.	1	2	3	4	5	6	7	8
06	FINAL MODIFICATIONS	MAR-1999	DP									
05	AS COMMISSIONED	30-OCT-97	TL	Drawn	TL							
04	ECD #015	10-NOV-95	TL	Chk'd	MP							
WASHINGTON STATE FERRIES JUMBO MARK II FERRY Derived Tr./Supersedes/Supers. by												
PROPULSION SWITCHBOARD 4, 16KV GENERATOR No. 4 VOLTAGE & FREQUENCY TRANSducers SCHEMATIC DIAGRAM												
Siemens										AAW-4200		
										(3) G62001-E0002-S241		
										= J44		
										+ A44		
										Sheet 10		
										NS/Pg. 11		

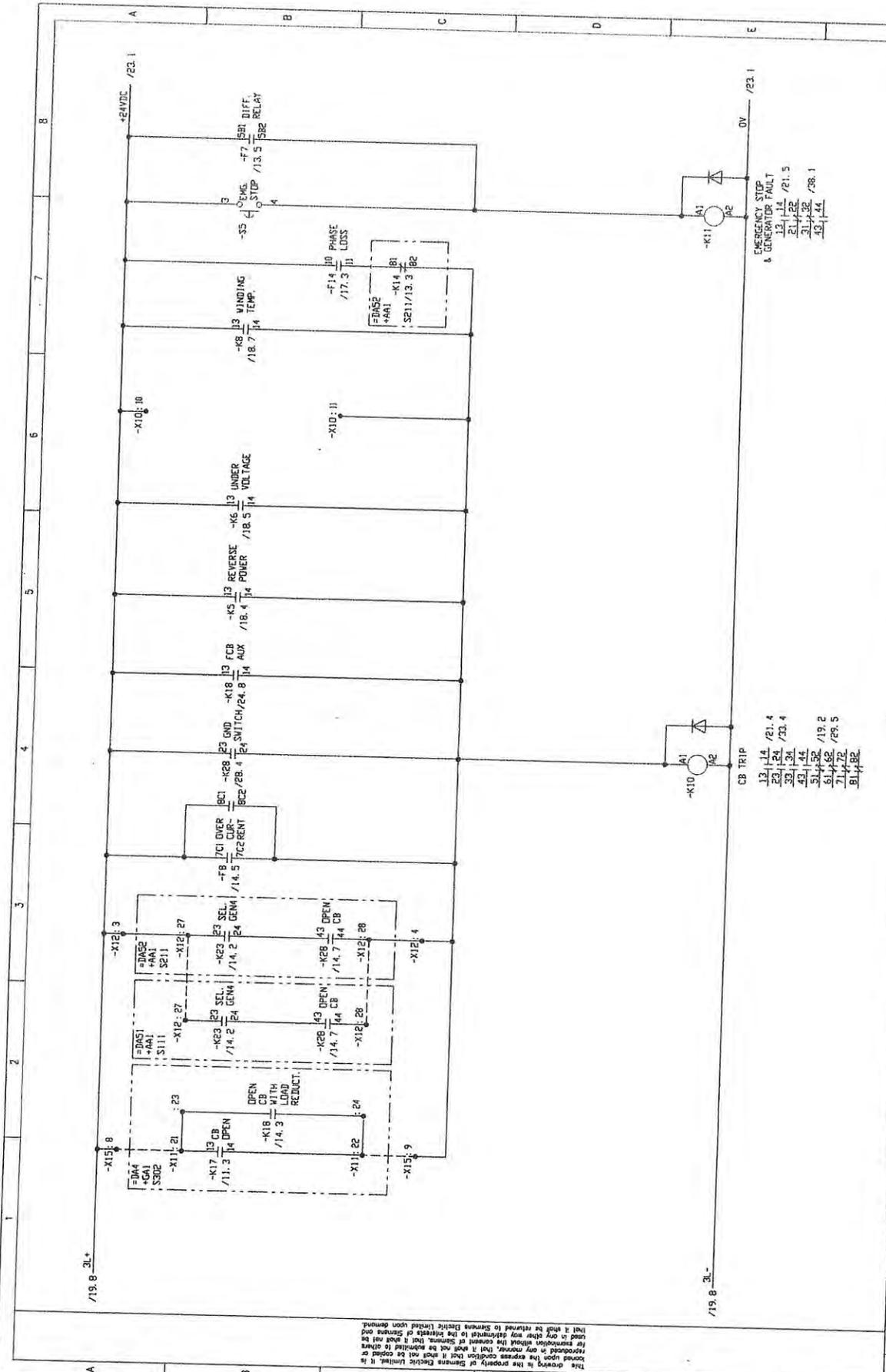




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07	AS COMMISSIONED	24-JUL-98	GD	Date	16-AUG-94	WASHINGTON STATE FERRIES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
06	AS COMMISSIONED	30-DEC-97	TL	Drawn	TL	JUMBO MARK II FERRY	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
05	ECD #019	10-NOV-95	TL	Chk'd by	TL	JUMBO MARK II FERRY	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
	Revision	Date	Name	Appr'd by	Superseded/Supers. by																			
										PROTECTION SWITCHBOARD 4, 16KV GENERATOR No. 4 PROTECTION SCHEMATIC DIAGRAM														
										Siemans AAW-4800 (3) G62001-ED002-S241														
										Sheet 17 NS/Pg 18														





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08	AS COMMISSIONED	24-JUL-98	GD	Date	16-AUG-94	WASHINGTON STATE FERRIES
07	AS COMMISSIONED	30-OCT-97	TL	Drawn	TL	
06	ECC #020	26-JUL-96	GD	Chk'd/IMP		
Revision		Date	Name	Apr/d'f/r		
					2	
					3	
					4	
					5	
					6	
					7	
					8	
						Sheet 20
						NS/Pg. 21
						(3) G62001-E0002-S241
						AAW-4200
						= DMA1 + AA1
						PROPULSION SWITCHBOARD 4, 16KV GENERATOR NO. 4 CIRCUIT BREAKER TRIP CTRL. CIRC. SCHEMATIC DIAGRAM
						Siemens
						CB TRIP
						-X10 / A1 A2
						EMERGENCY STOP & GENERATOR FAULT
						-X11 / A1 A2
						0V / P3.1
						-X12: 14 / P1.4
						-X12: 23 / P1.4
						-X12: 24 / P1.5
						-X12: 33 / P1.5
						-X12: 44 / P1.5
						-X12: 51 / P1.2
						-X12: 52 / P1.5
						-X12: 53 / P1.5
						-X12: 54 / P1.5
						-X12: 55 / P1.5
						-X12: 56 / P1.5
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						-X12: 95 / P1.5
						-X12: 96 / P1.5
						-X12: 97 / P1.5
						-X12: 98 / P1.5
						-X12: 99 / P1.5
						-X12: 100 / P1.5



Protective Relays

Diff 5UT5125-2CA00-0B/JH

O/C 7SJ5115-2CA00-0A/FF

Gen-4

DIFF

LED-1

5200 LAST

FAULT # 752

5200 LAST

0 PICK-UP DIFF

5200 LAST

11 FAULT ID>

5200 LAST

1010 TRIP L123

5200 LAST

IDIFF.> 368%

5200 LAST

1789 DROP-DIFF

O/C

LED 2 3 4

FAULT

001 04/13/72

SYS FAULT:C

002 04:06:26,048

FAULT: C

003 0 MS

FAULT L12: C

004 17MS

FAULT L123:C

005 32 MS

FAULT L123E:C

006 39 MS

FAULT L123:C

007 56 MS

FAULT L123E:C

008 87MS

FAULT L123:C

009 1740 MS

FAULT L12 :C

010 1748 MS

DEV. DROP-OFF :C

GEN-3

DIFF

LED-1

FAULT 327

0 PICK-UP DIFF

4 FAULT ID>

1004 TRIP L123

I DIFF> 672%

2073 DROP-DIFF

O/C

LED 1 2 3

001 12/28/70

SYS FAULT :C

002 22:52:15,367

FAULT:C

003 0 MS

FAULT L13:C

004 18 MS

FAULT L12 :C

005 25MS

FAULT L1:C

006 39 MS

DEV. DROP-OFF :C

Megger WSF

7-31-2014 5kV 5 min.

Generator-3 8 Gohm

Cable 1 Tohm

Generator-4 10 Gohm

Cable 1 Tohm

PT-Measurement Gen-1

PT-Fuses pulled, variable voltage injected at X-1 and X-2 at Phase-2

Applied Voltage X-1 to X-2	F11 „Under-Voltage“ Phase – Phase	F14 „Phase-Loss“ Phase- Neutral	A1 Synchronizer Phase – Phase	U4 V-Transducer Phase – Phase	Conneted Devices
47 V	7.55 V	48.6 V 46.8 V 48.2 V	7.55 V	7.55 V	F14+AVR+Q +Q4
47 V	28.7 V	20.6 V 47.4 V 34.3 V	28.7 V	28.7 V	F14+Q3+Q4
47 V		0 V 47.2 V 0 V			Only F14
		Phase-Phase			
47 V		7.67 V 6.95 V 0.73 V			F14+AVR+Q3+Q4

P.T.'s Bench-Test

Gen-4: H-L > 400 Gohm

H+L - G > 60 Gohm

L - H+G > 1000 Gohm

Gen-3: H-L > 80 Mohm

H+L-G > 80 Mohm

L-H+G > 1 Gohm

Ratio-Test: All 35 : 1

Impedance/Saturation:

Secondary Voltage:	30 V	0.029 A	1,34 kOhm
	60 V	0,052 A	1,15 kOhm
	120 V	0.181 A	0,66 kOhm

Manufacturer, Model and Settings of relevant Protective Relays:

Under-Voltage, F11: Basler BE4-27

80% 96 V

6 sec via K6A

Phase-Loss, F14: Siemens 7TU9914-1EA0/AB

42 V

6 sec

Synchronizer A1: Woodward SPM-A 9905-01

No Voltage-Matching

# SIEMENS

