



ALASKA
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RURAL ENERGY GROUP
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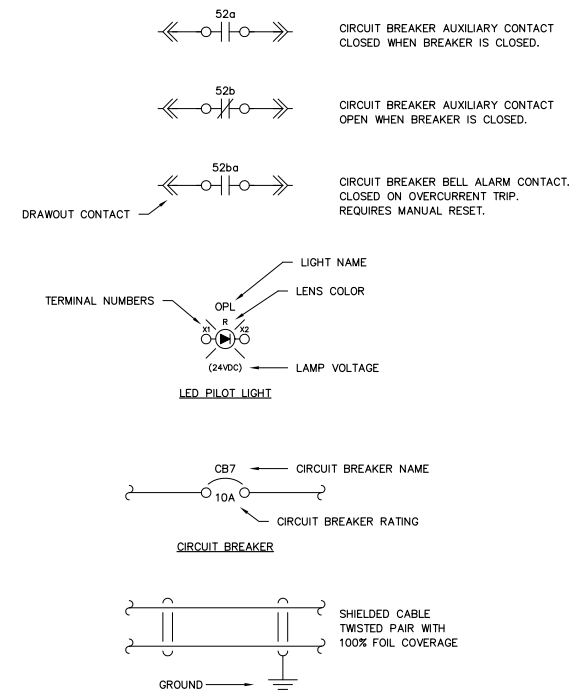
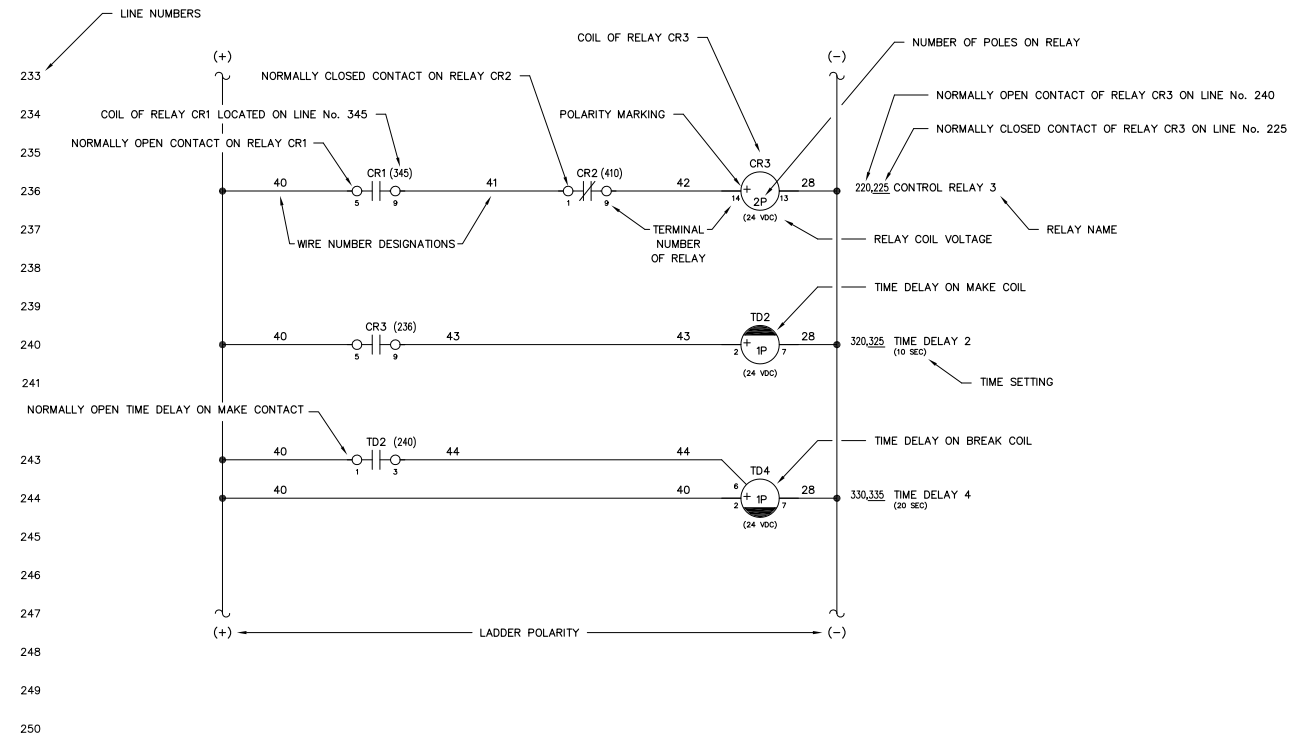
**LARSEN BAY HYDRO GENERATOR SWITCHGEAR
ALASKA ENERGY AUTHORITY PURCHASE ORDER No. REG-08-076
CONTROLLED POWER, INC. JOB No. 6581**

DRAWING No.

6581-2101-D
6581-3101-D
6581-4101-D
6581-5101-D
6581-5201-D
6581-5202-D
6581-5301-D
6581-5302-D
6581-5303-D
6581-5304-D
6581-5305-D
6581-5401-D
6581-5501-D
6581-5502-D
6581-5601-D
6581-5602-D
6581-5701-D
6581-6101-D
6581-6201-D
6581-6202-D
6581-7101-D
6581-8101-D

DRAWING TITLE

COVER SHEET
SCHEMATIC LEGEND AND NOTES
HYDRO GENERATOR SWITCHGEAR ELEVATION VIEW, OUTLINE DIAGRAM
HYDRO GENERATOR SWITCHGEAR SINGLE LINE, SCHEMATIC DIAGRAM
HYDRO GENERATOR SWITCHGEAR AC THREE LINE, OUTLINE DIAGRAM
HYDRO GENERATOR SWITCHGEAR AC THREE LINE, OUTLINE DIAGRAM
HYDRO GENERATOR DC CONTROL, SCHEMATIC DIAGRAM
HYDRO GENERATOR DC CONTROL, SCHEMATIC DIAGRAM
HYDRO GENERATOR DC CONTROL, SCHEMATIC DIAGRAM
HYDRO GENERATOR DC CONTROL, SCHEMATIC DIAGRAM
HYDRO GENERATOR DC CONTROL, SCHEMATIC DIAGRAM
HYDRO GENERATOR BREAKER CONTROL, SCHEMATIC DIAGRAM
PLC COMMUNICATION, SCHEMATIC DIAGRAM
PLC COMMUNICATION, SCHEMATIC DIAGRAM
COMMUNICATION NETWORK DIAGRAM
COMMUNICATION NETWORK DIAGRAM
HEATER, LIGHTING & FAN CONTROL, SCHEMATIC DIAGRAM
CONTROL SWITCH TARGET DIAGRAM
NAMEPLATE ENGRAVING SCHEDULE, FABRICATION DIAGRAM
ANNUNCIATOR WINDOWS, FABRICATION DIAGRAM
INTERCONNECTION DIAGRAM
SPEAR CONTROL SWITCH BRACKET, FABRICATION DIAGRAM



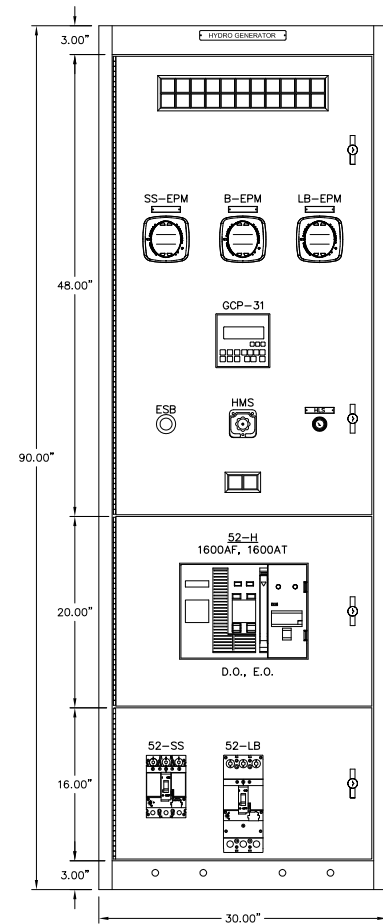
NOTES:

1. SCHEMATIC IS SHOWN AS FOLLOWS:
 - ALL AC AND DC POWER REMOVED.
 - ALL RELAY CONTACTS DE-ENERGIZED.
 - ALL CIRCUIT BREAKERS IN THE OPEN/RESET POSITION.
 - ALL MODE SWITCHES IN THE "OFF" POSITION.
 - ALL EMERGENCY STOP SWITCHES IN THE "NORMAL" POSITION.
 - ALL PRESSURE SWITCHES SHOWN WITHOUT PRESSURE PRESENT.
 - ALL LEVEL SWITCHES SHOWN WITHOUT FLUID PRESENT.
 - ALL TEMPERATURE SWITCHES SHOWN AT AMBIENT.
2. (Circled dot symbol) INDICATES FIELD TERMINALS IN GENERATOR CONTROL SECTION.
3. (Square with dot symbol) INDICATES TERMINALS AT ENGINE/GENERATOR.
4. (Circle with dot symbol) INDICATES INTERCONNECT TERMINALS IN GENERATOR CONTROL SECTION.
5. (Square with dot symbol) INDICATES TERMINALS IN SCR BOILER PANEL.
5. - INDICATES FIELD WIRING BY OTHERS.
 - ALL CONTROL WIRING TO BE No. 14 AWG, 600 VOLT, TYPE SIS EXCEPT AS NOTED.
6. SHIELDED WIRING TO BE No. 18 AWG, 300 VOLT, TWISTED LINE WITH 100% FOIL COVERAGE.
7. ALL DIODES ARE 1N4007 EXCEPT AS NOTED.

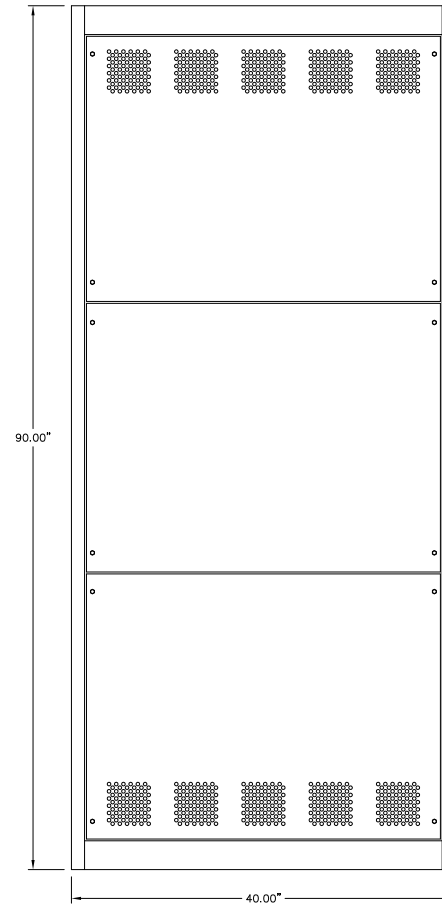
REV.	DATE	DESCRIPTION	BY
A	10-06-14	FIELD MODIFICATIONS	GPN
AEA PURCHASE ORDER No. REG-08-076			CONTROLLED POWER JOB No. 6581
TITLE: SCHEMATIC LEGEND & NOTES			
SCALE: NONE	DATE: 08-19-08	DWN. BY: GPN	
DWG. No: 6581-3101-D	SHEET: 1 OF 1	CKD. BY: JMD	
JOB: LARSEN BAY HYDRO PLANT			

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GENERATOR SWITCHGEAR – ELEVATION VIEW
 277/480V, 3 ϕ , 3W, 65KAIC RATED, LUG IN / LUG OUT



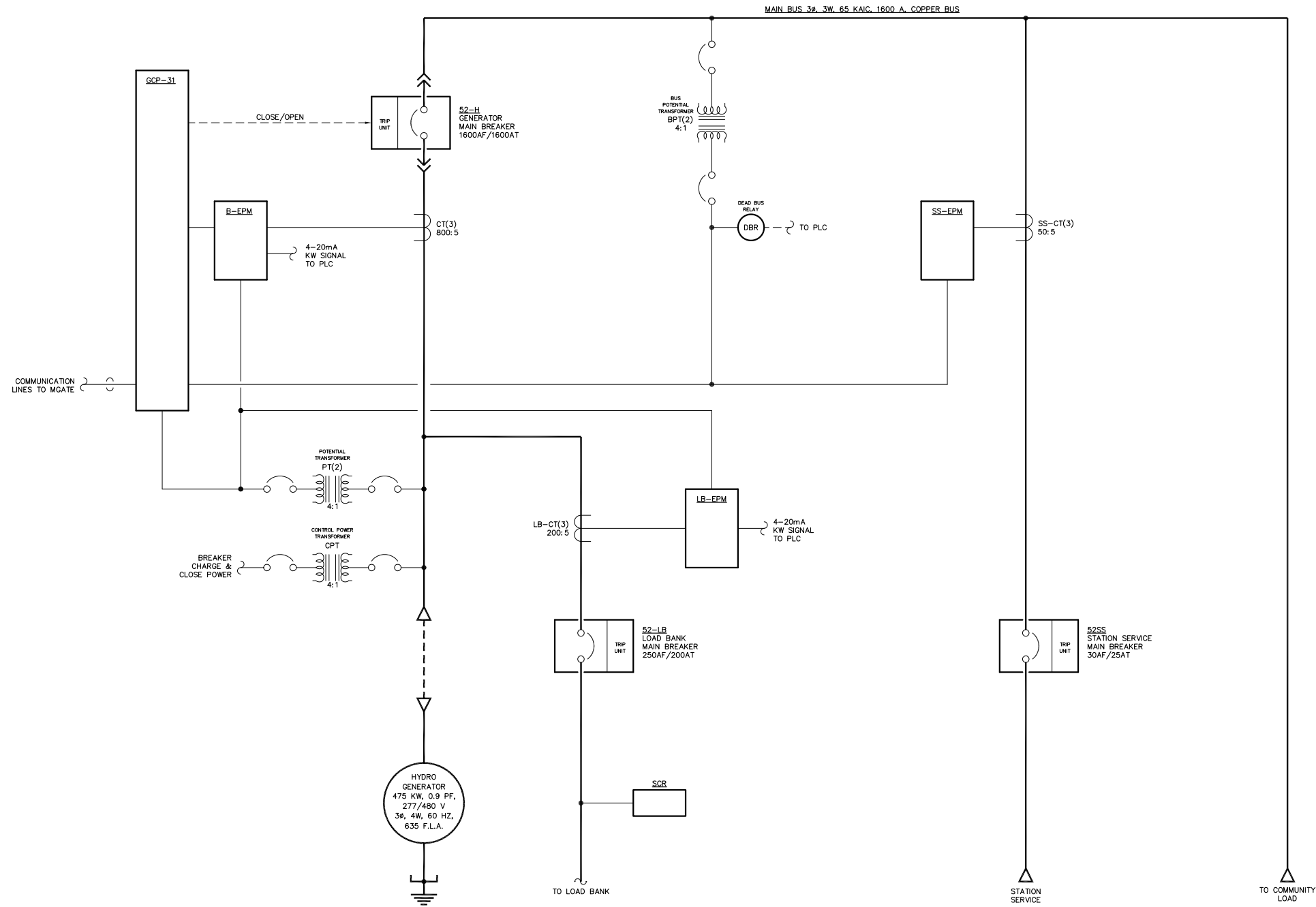
SIDE VIEW

NOTE:
 1. NEMA 1

REV.	DATE	DESCRIPTION	BY
A	10-06-14	FIELD MODIFICATIONS	GPN
AEA PURCHASE ORDER No. REG-08-076		CONTROLLED POWER JOB No. 5481	
TITLE: HYDRO GENERATOR SWITCHGEAR ELEVATION VIEW, OUTLINE DIAGRAM			
SCALE: 1/10	DATE: 04-04-08	DWN. BY: GPN	
DWG. No: 6581-4101-D	SHEET: 1 OF 1	CKD. BY: DLW	
JOB: LARSEN BAY HYDRO PLANT			

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 6581-3101-D.

REV.	DATE	DESCRIPTION	BY
A	10-06-14	FIELD MODIFICATIONS	GPN

AEA PURCHASE ORDER No. REG-08-076 CONTROLLED POWER JOB No. 6581

TITLE: HYDRO GENERATOR SWITCHGEAR SINGLE LINE, SCHEMATIC DIAGRAM

SCALE: NONE DATE: 08-07-08 DWN. BY: GPN

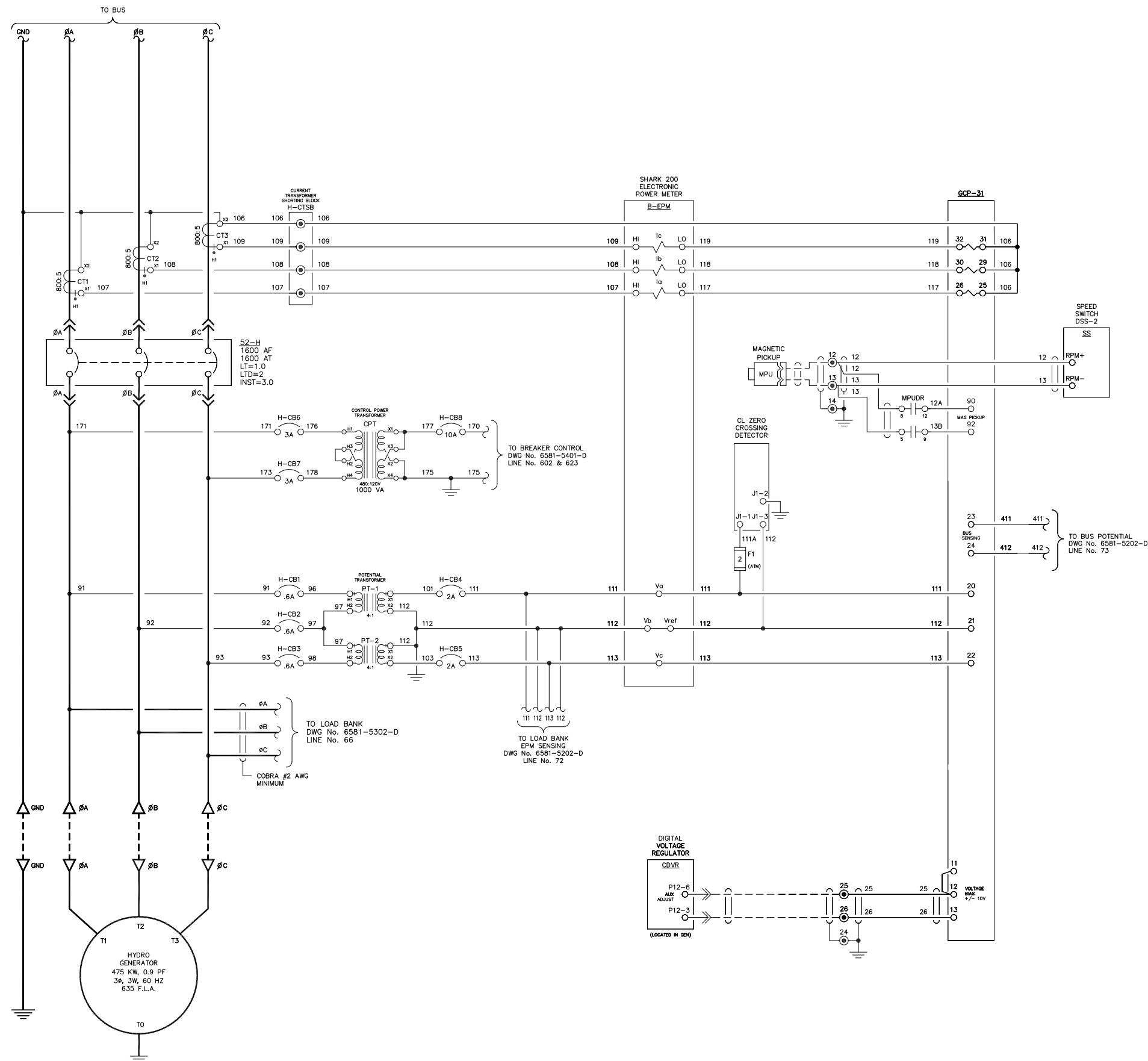
DWG. No: 6581-5101-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY HYDRO PLANT

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 6581-3101-D.

REV.	DATE	DESCRIPTION	BY
A	10-06-14	FIELD MODIFICATIONS	GPN

AEA PURCHASE ORDER No. REG-08-076 CONTROLLED POWER JOB No. 6581

TITLE: HYDRO GENERATOR AC THREE LINE, SCHEMATIC DIAGRAM

SCALE: NONE DATE: 08-08-08 DWN. BY: GPN

DWG. No: 6581-5201-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY HYDRO PLANT

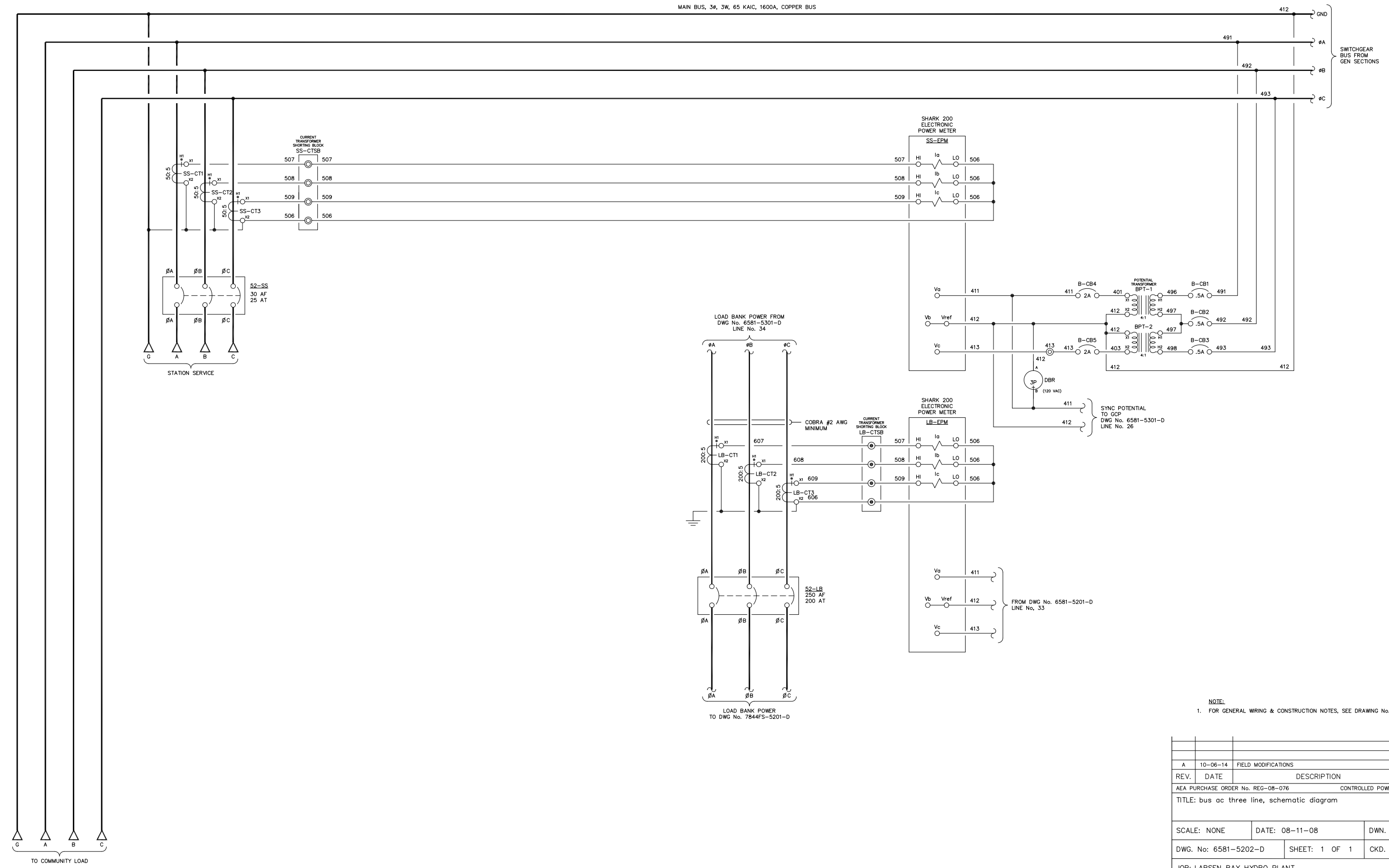
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MAIN BUS, 3φ, 3W, 65 KAIC, 1600A, COPPER BUS



NOTE:
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REV.	DATE	DESCRIPTION	BY
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AEA PURCHASE ORDER No. REG-08-076 CONTROLLED POWER JOB No. 6581

TITLE: bus ac three line, schematic diagram

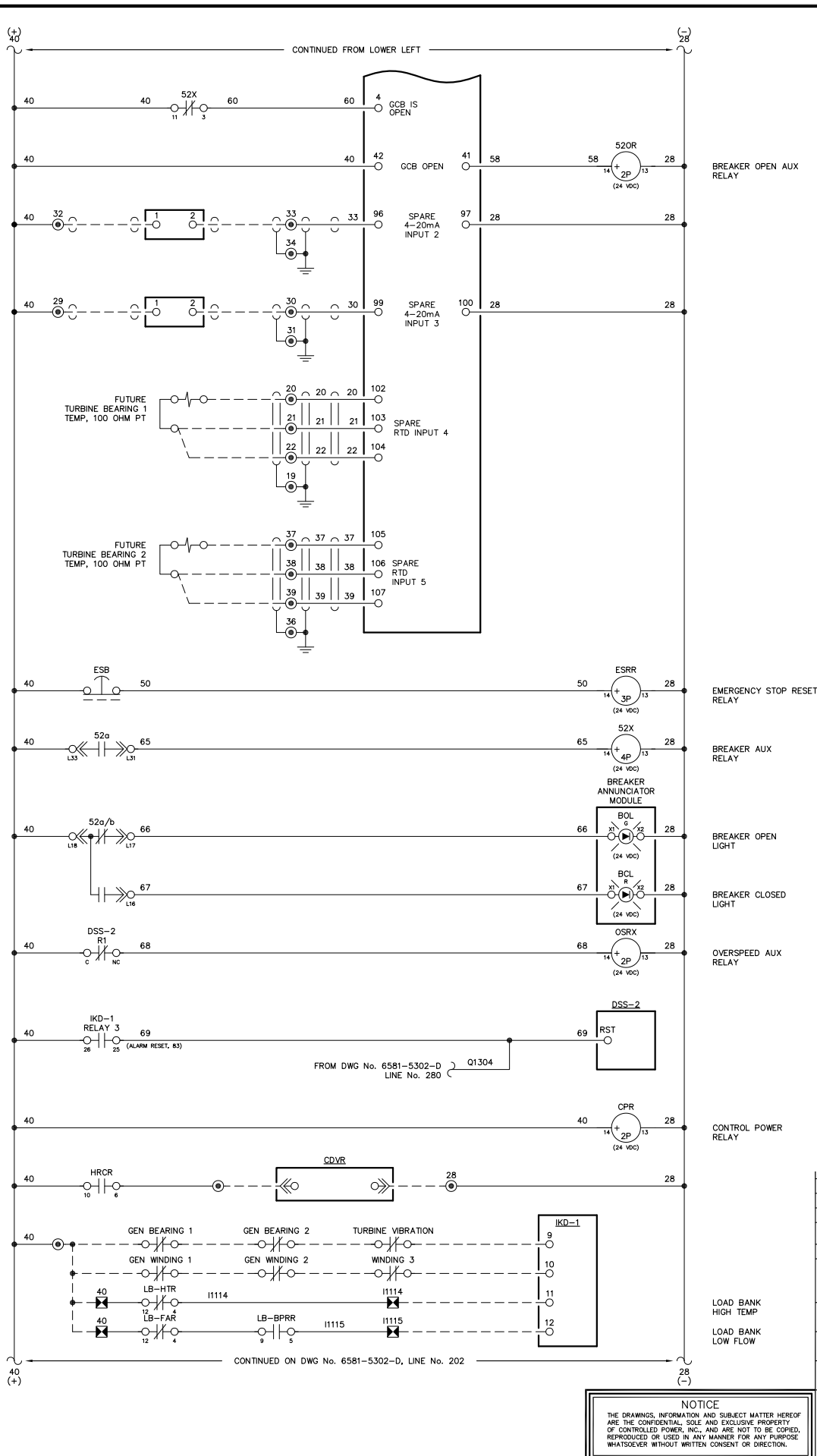
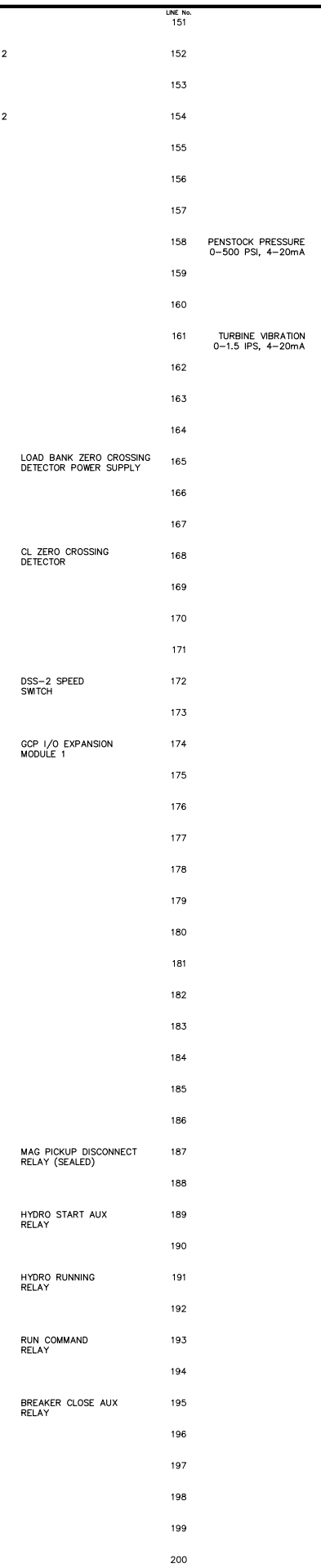
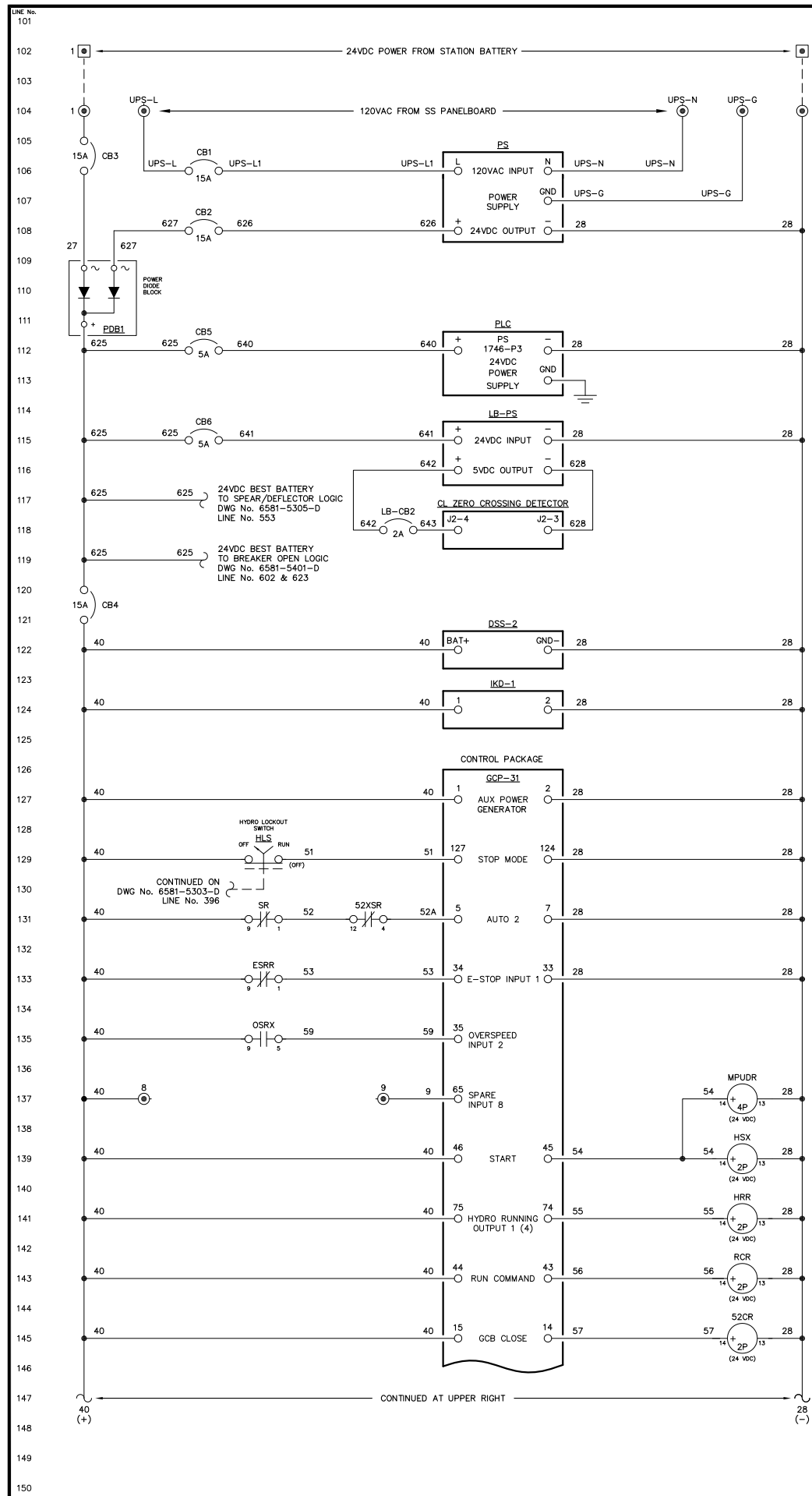
SCALE: NONE DATE: 08-11-08 DWN. BY: GPN

DWG. No: 6581-5202-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY HYDRO PLANT

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NOTE:
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REV.	DATE	DESCRIPTION	BY
A	10-06-14	FIELD MODIFICATIONS	GPN

AEA PURCHASE ORDER No. REG-08-076 CONTROLLED POWER JOB No. 6581

TITLE: HYDRO GENERATOR DC CONTROL, SCHEMATIC DIAGRAM

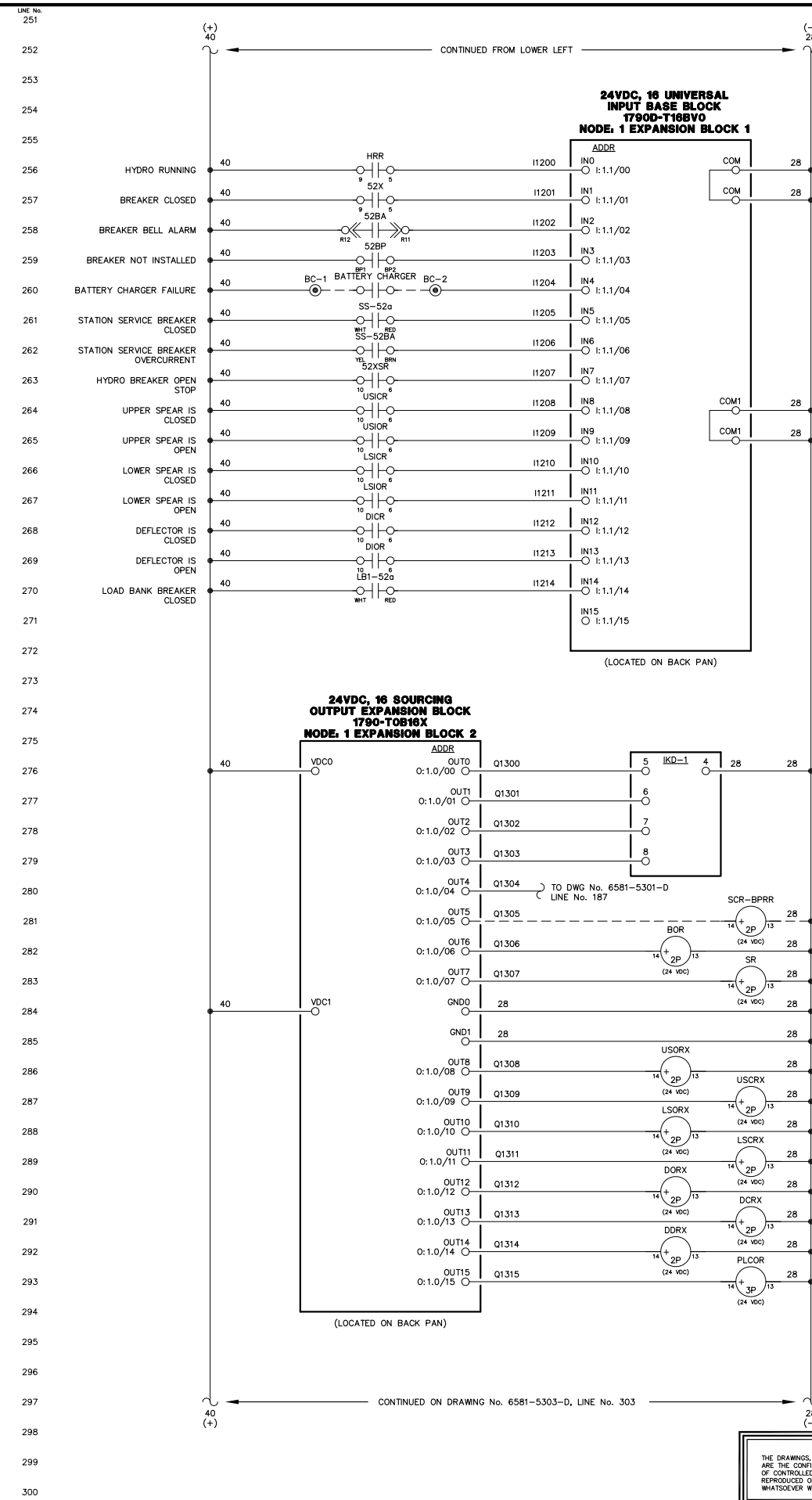
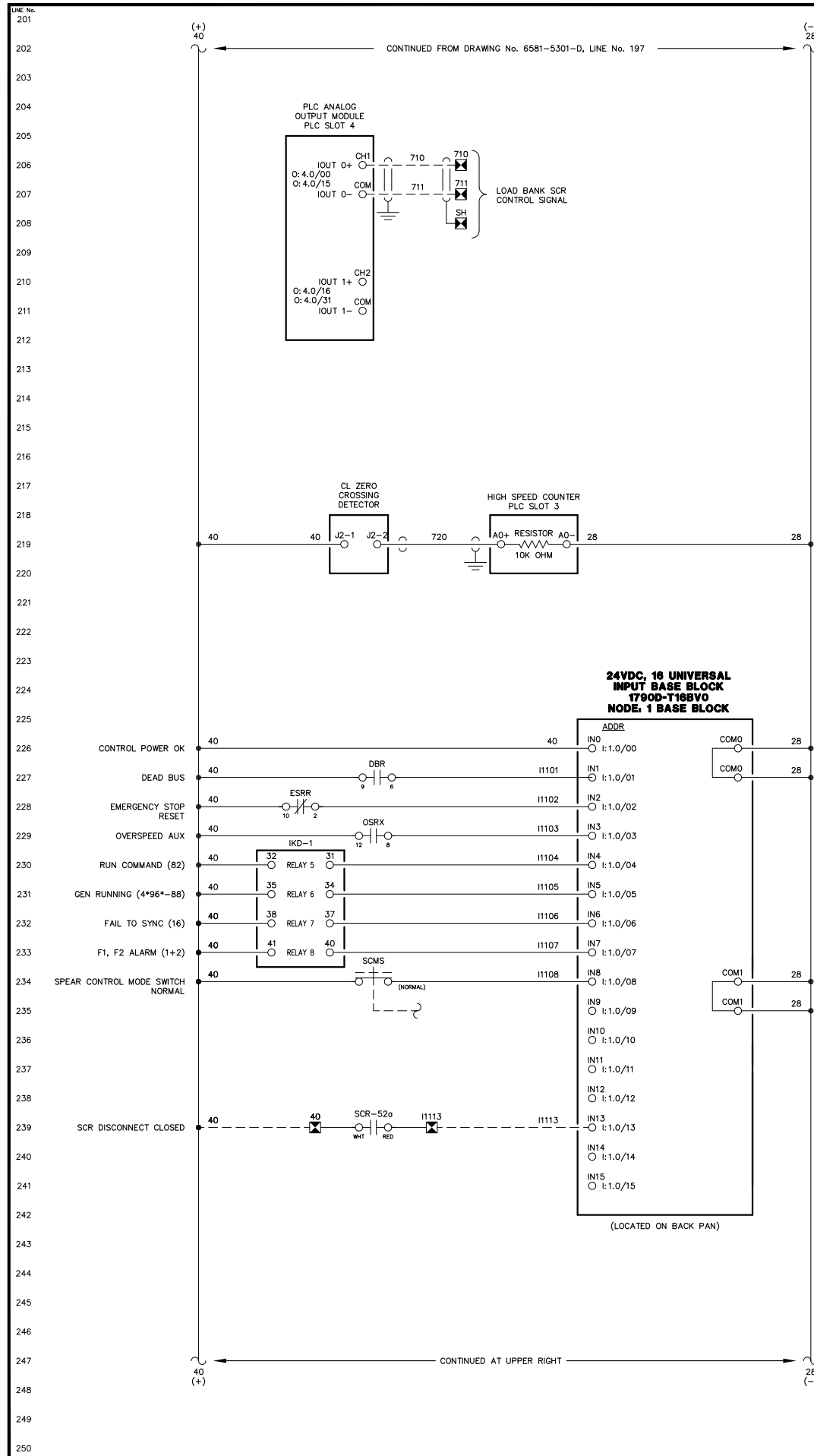
SCALE: NONE DATE: 08-12-08 DWN. BY: GPN

DWG. No: 6581-5301-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY HYDRO PLANT

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AEA PURCHASE ORDER No. REG-08-076 CONTROLLED POWER JOB No. 6581

TITLE: HYDRO GENERATOR DC CONTROL, SCHEMATIC DIAGRAM

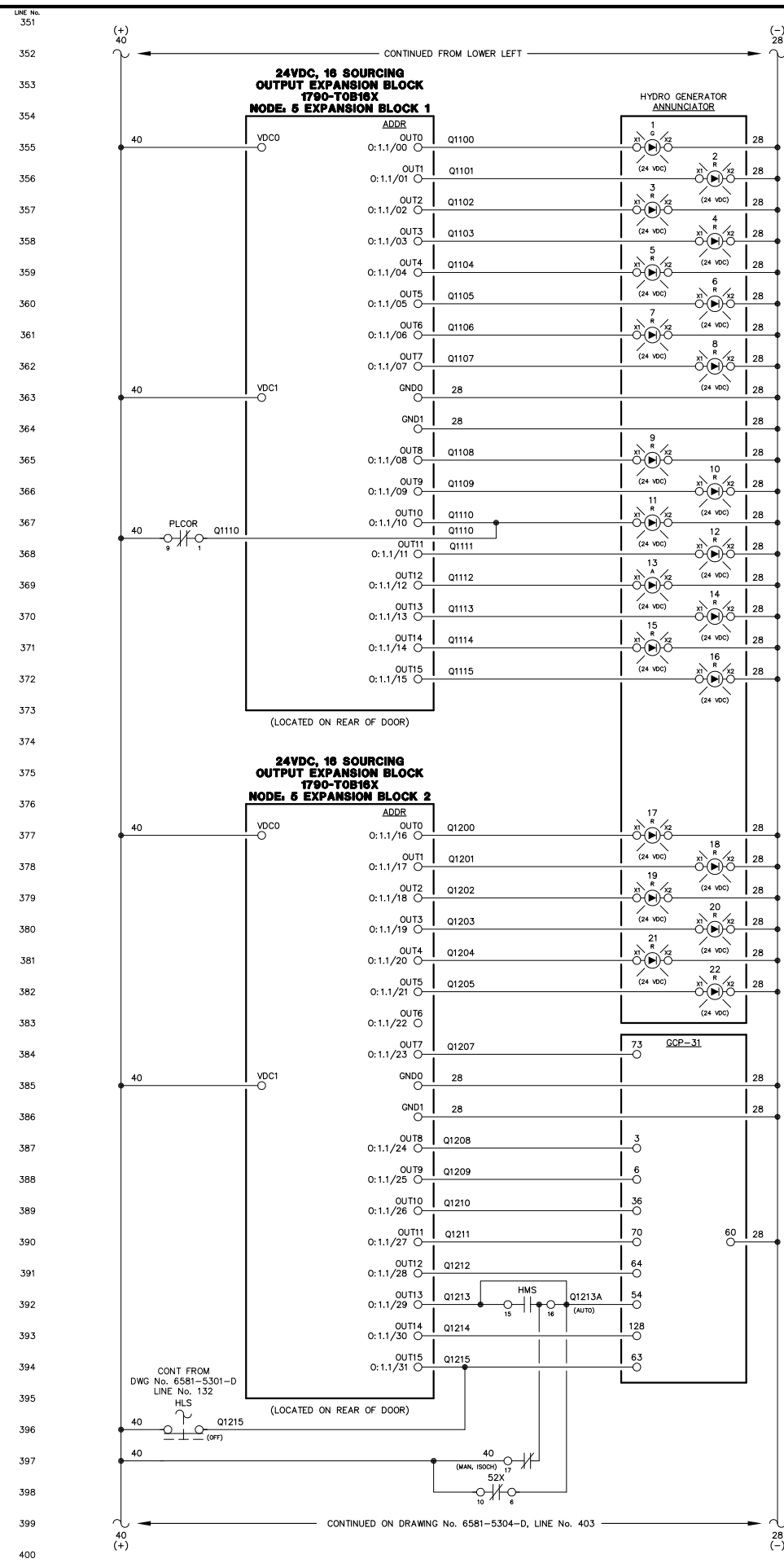
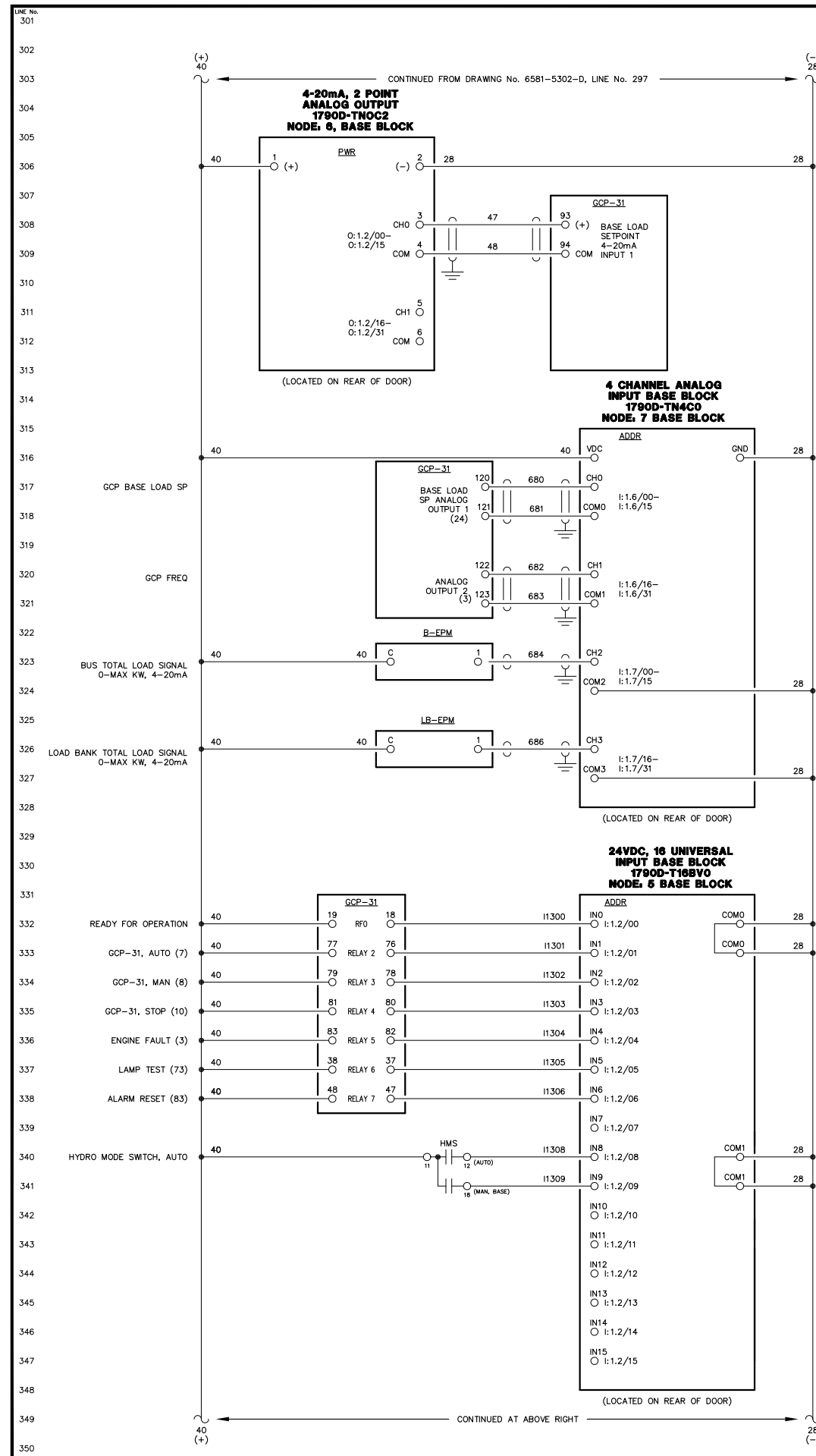
SCALE: NONE DATE: 08-12-08 DWN. BY: GPN

DWG. No: 6581-5302-D SHEET: 1 OF 1 CKD. BY: JMD

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- HYDRO RUNNING LIGHT
- ALARM/LOCKOUT LIGHT
- DEFLECTOR IS CLOSED LIGHT
- EMERGENCY STOP LIGHT
- GEN WINDING TEMP ALARM LIGHT
- OVERSPEED LIGHT
- FAIL TO SYNC LIGHT
- RUNNING TIMEOUT LIGHT
- BATTERY CHARGER FAIL LIGHT
- LOAD BANK HIGH TEMP/LOSS OF FLOW ALARM LIGHT
- PLC FAIL LIGHT
- TURBINE VIBRATION ALARM LIGHT
- NORMAL STOP LIGHT
- NOT IN AUTO LIGHT
- TURBINE BEARING HIGH TEMP ALARM LIGHT
- GEN BEARING HIGH TEMP LIGHT
- OVERCURRENT LIGHT
- UNDER VOLTAGE LIGHT
- OVER VOLTAGE LIGHT
- UNDER FREQUENCY LIGHT
- OVER FREQUENCY LIGHT
- REVERSE POWER LIGHT
- GEN FAIL TO START
- AUTO 1
- MULTIFUNCTION (REMOTE ACK)
- INPUT 3 - COOLDOWN/LOCKOUT
- INPUT 13 - IDLE MODE
- INPUT 7 - BREAKER LOGIC
- MCB IS OPEN
- AUTOMATIC MODE
- MODE SELECTION LOCK

NOTE:
 1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 6581-3101-D.

REV.	DATE	DESCRIPTION	BY
A	10-06-14	FIELD MODIFICATIONS	GPN

AEA PURCHASE ORDER No. REG-08-076 CONTROLLED POWER JOB No. 6581

TITLE: HYDRO GENERATOR DC CONTROL, SCHEMATIC DIAGRAM

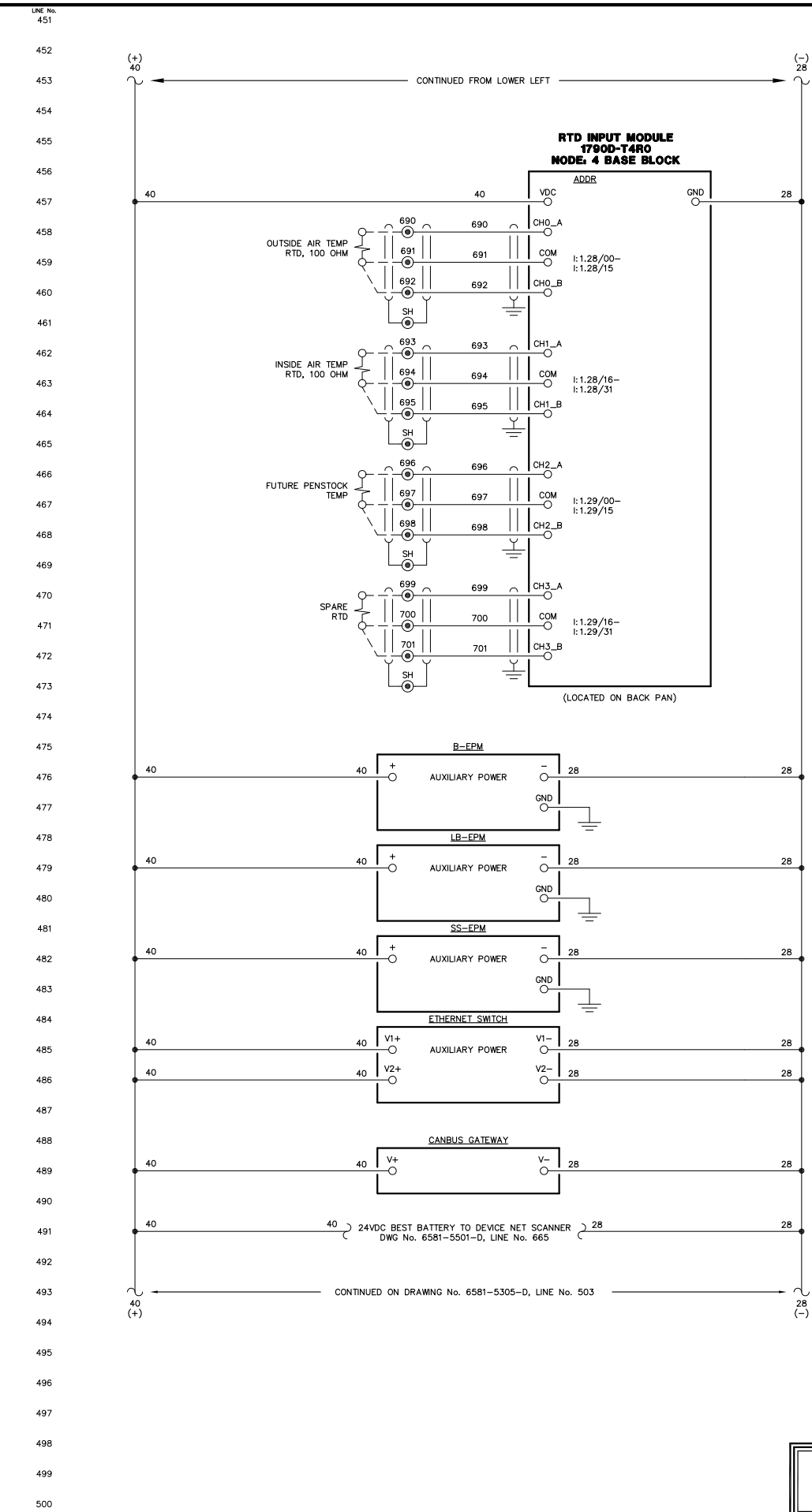
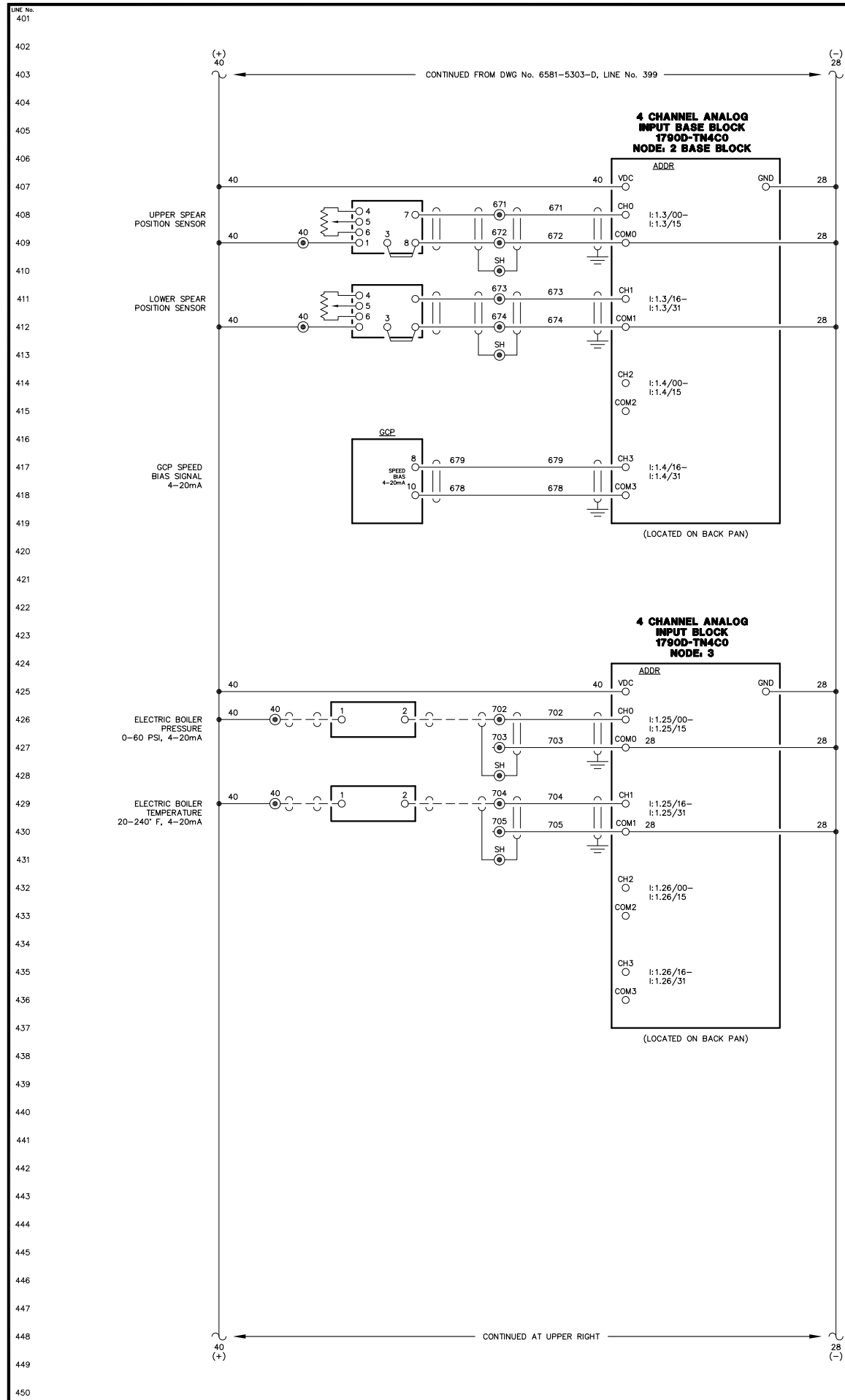
SCALE: NONE DATE: 08-12-08 DWN. BY: GPN

DWG. No: 6581-5303-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY HYDRO PLANT

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NOTE:
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REV.	DATE	DESCRIPTION	BY
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AEA PURCHASE ORDER No. REG-08-076 CONTROLLED POWER JOB No. 6581

TITLE: HYDRO GENERATOR DC CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE DATE: 08-12-08 DWN. BY: GPN

DWG. No: 6581-5304-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY HYDRO PLANT

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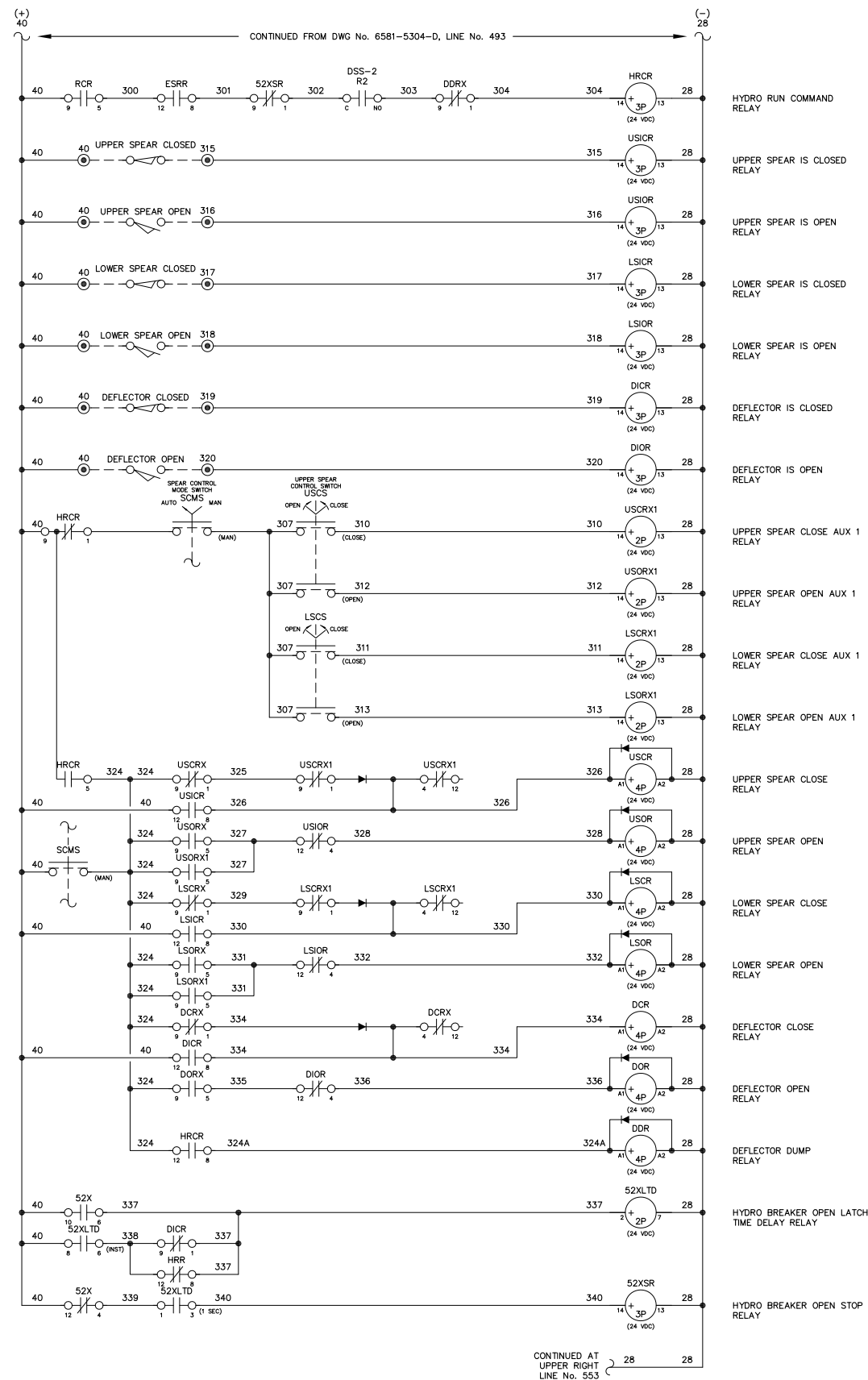
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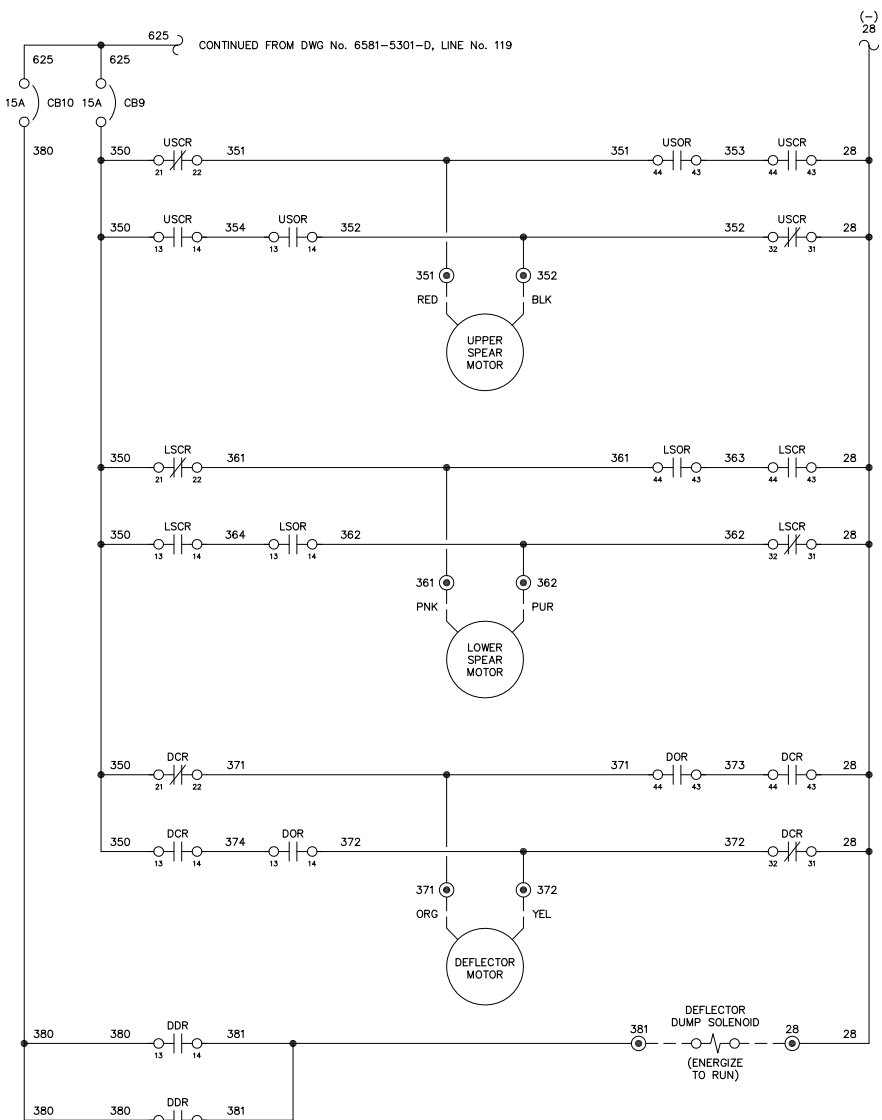
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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 6581-3101-D.

REV.	DATE	DESCRIPTION	BY
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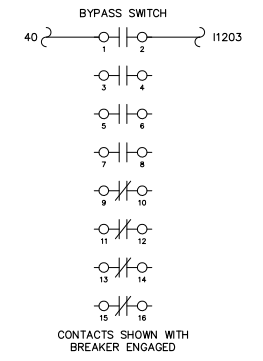
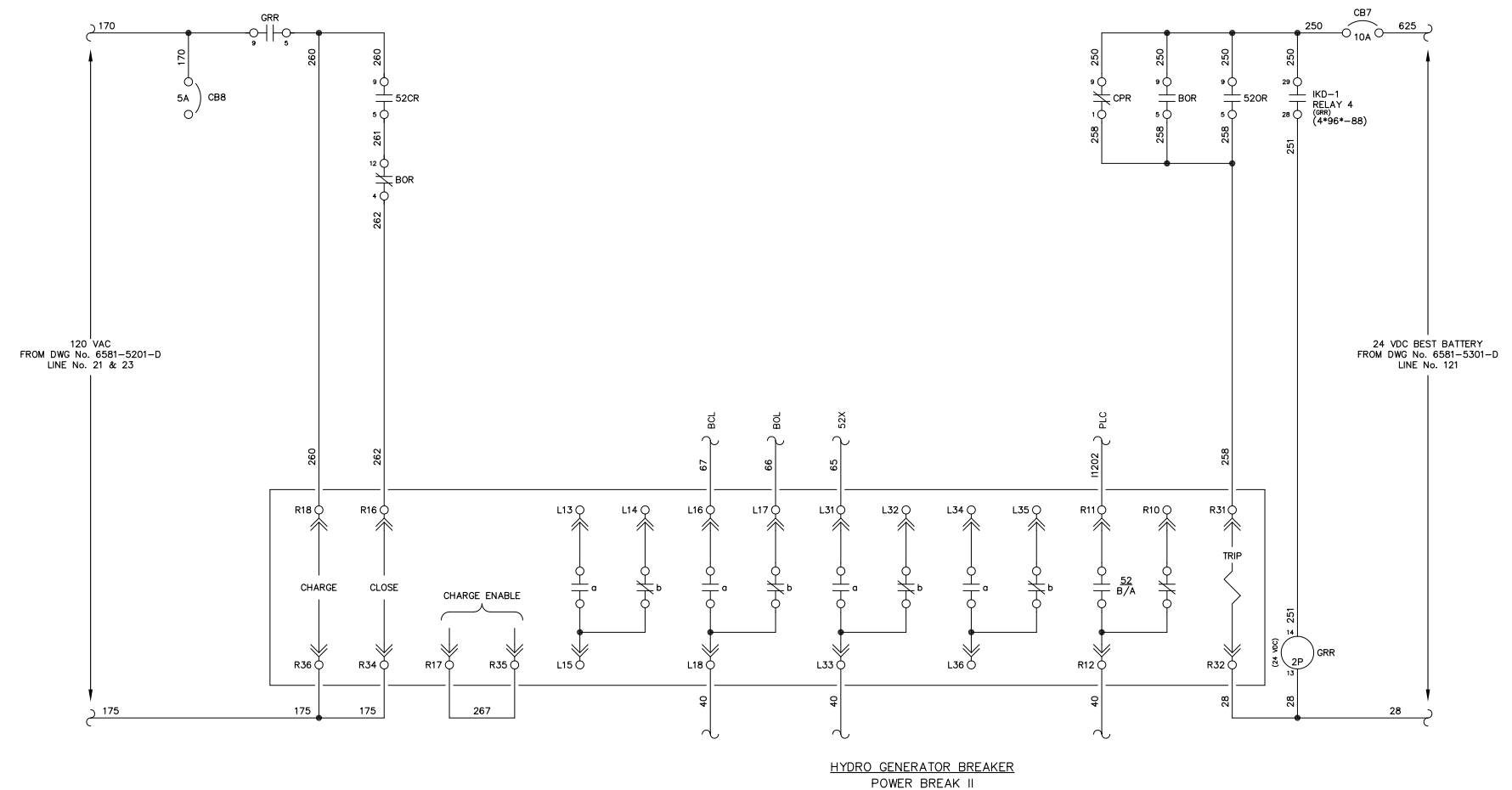
AEA PURCHASE ORDER No. REG-08-076 CONTROLLED POWER JOB No. 6581
TITLE: HYDRO GENERATOR DC CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE DATE: 08-12-08 DWN. BY: GPN
DWG. No: 6581-5305-D SHEET: 1 OF 1 CKD. BY: JMD
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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 6581-3101-D.

REV.	DATE	DESCRIPTION	BY
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AEA PURCHASE ORDER No. REG-08-076 CONTROLLED POWER JOB No. 6581

TITLE: HYDRO GENERATOR BREAKER CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE DATE: 08-12-08 DWN. BY: GPN

DWG. No: 6581-5401-D SHEET: 1 OF 1 CKD. BY: JMD

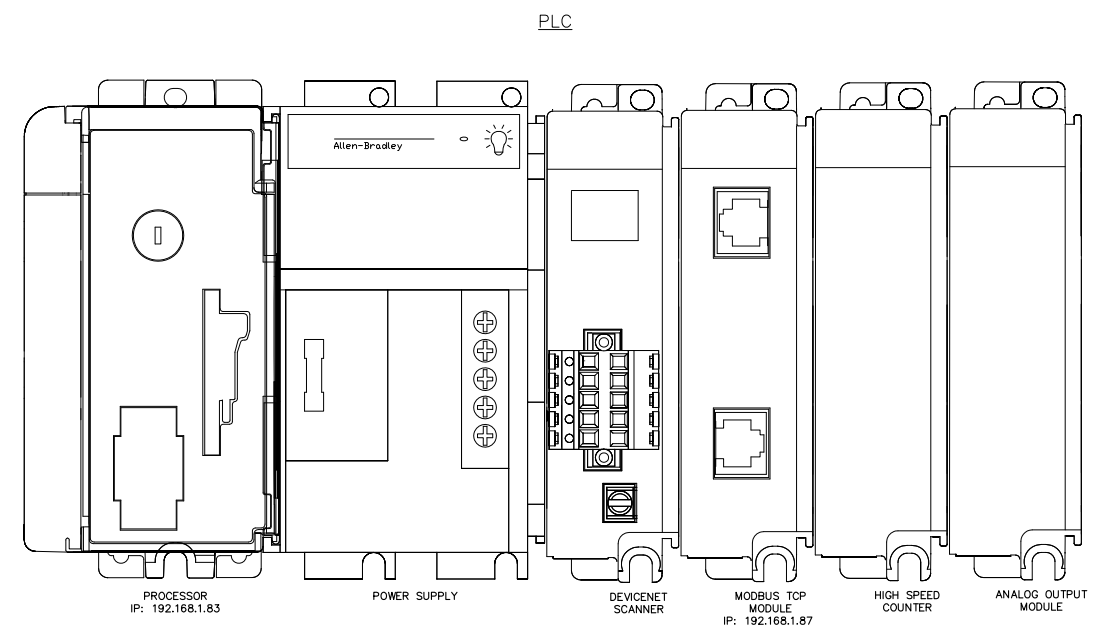
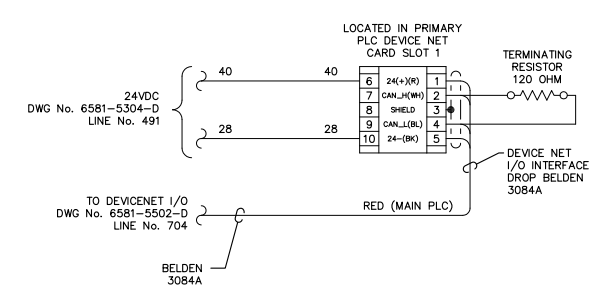
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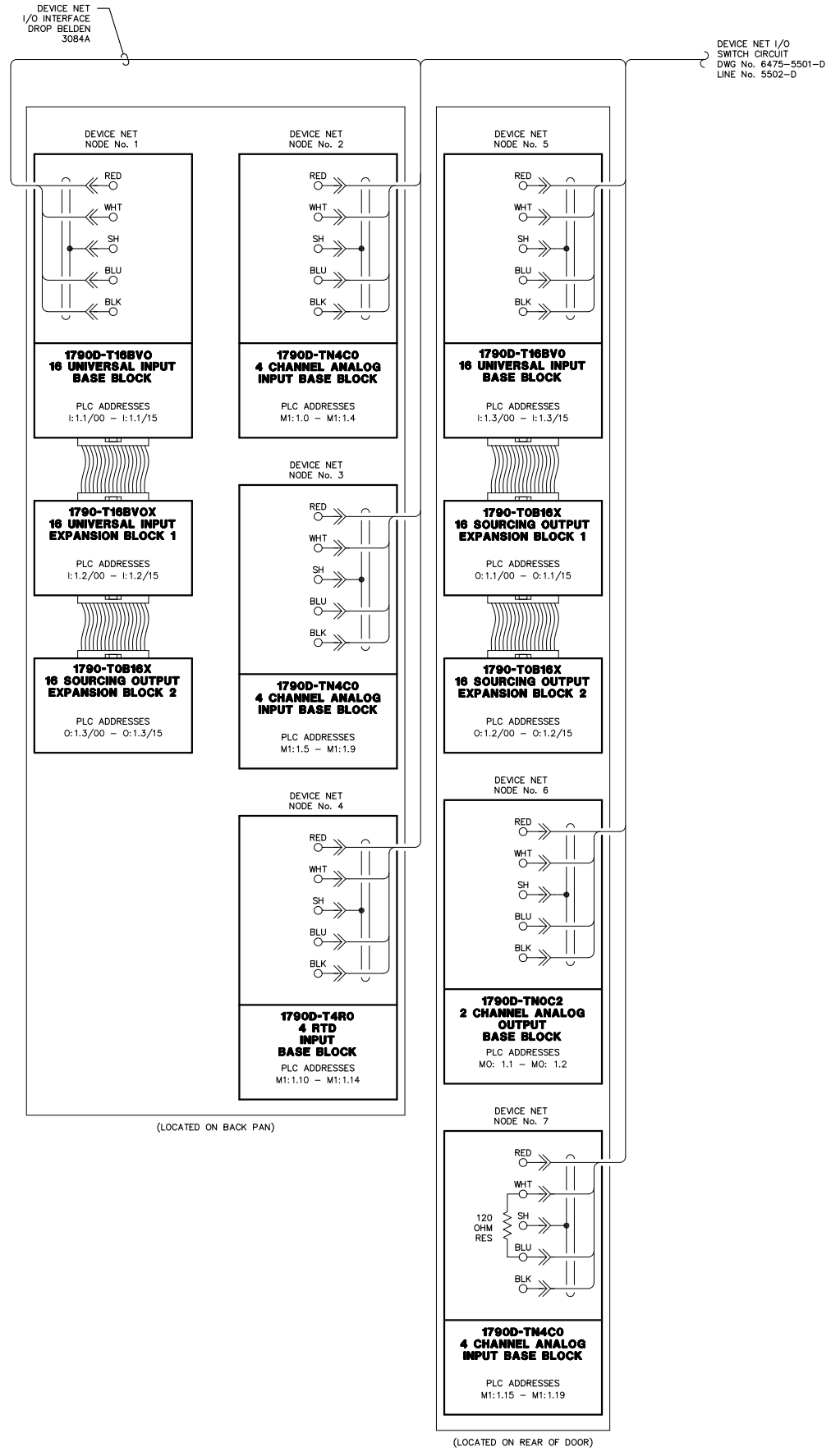
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TITLE: PLC COMMUNICATION, SCHEMATIC DIAGRAM			
SCALE: NONE	DATE: 08-12-08	DWN. BY: GPN	
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(LOCATED ON BACK PAN)

(LOCATED ON REAR OF DOOR)

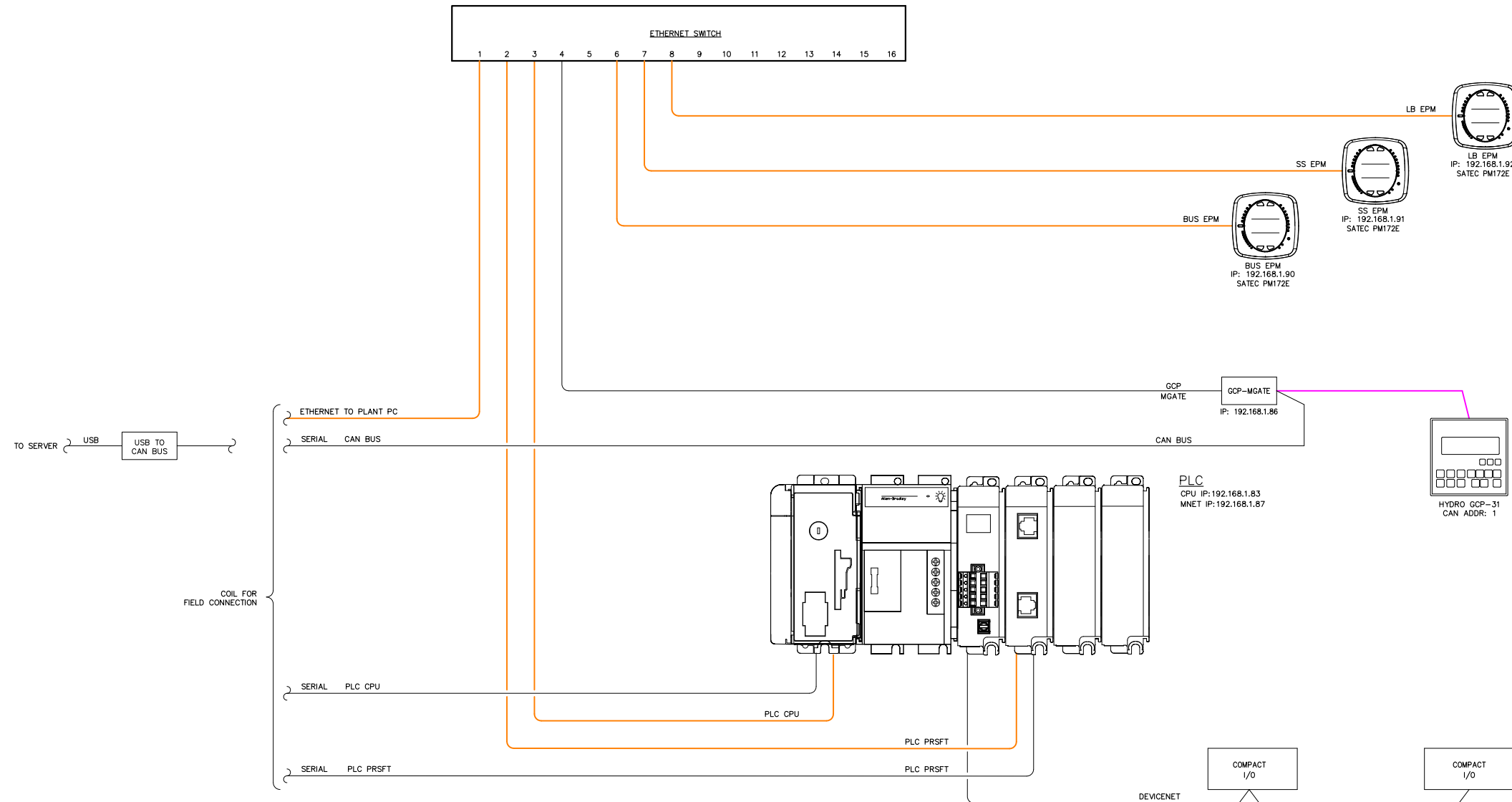
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REV.	DATE	DESCRIPTION	BY
A	10-06-14	FIELD MODIFICATIONS	GPN
AEA PURCHASE ORDER No. REG-08-076		CONTROLLED POWER JOB No. 6581	
TITLE: PLC COMMUNICATION, SCHEMATIC DIAGRAM			
SCALE: NONE	DATE: 08-12-08	DWN. BY: GPN	
DWG. No: 6581-5502-D	SHEET: 1 OF 1	CKD. BY: JMD	
JOB: LARSEN BAY HYDRO PLANT			

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 6581-3101-D.

REV.	DATE	DESCRIPTION	BY
A	10-06-14	FIELD MODIFICATIONS	GPN

AEA PURCHASE ORDER No. REG-08-076 CONTROLLED POWER JOB No. 6581

TITLE: COMMUNICATION NETWORK DIAGRAM

SCALE: NONE DATE: 08-19-08 DWN. BY: GPN

DWG. No: 6581-5601-D SHEET: 1 OF 1 CKD. BY: JMD

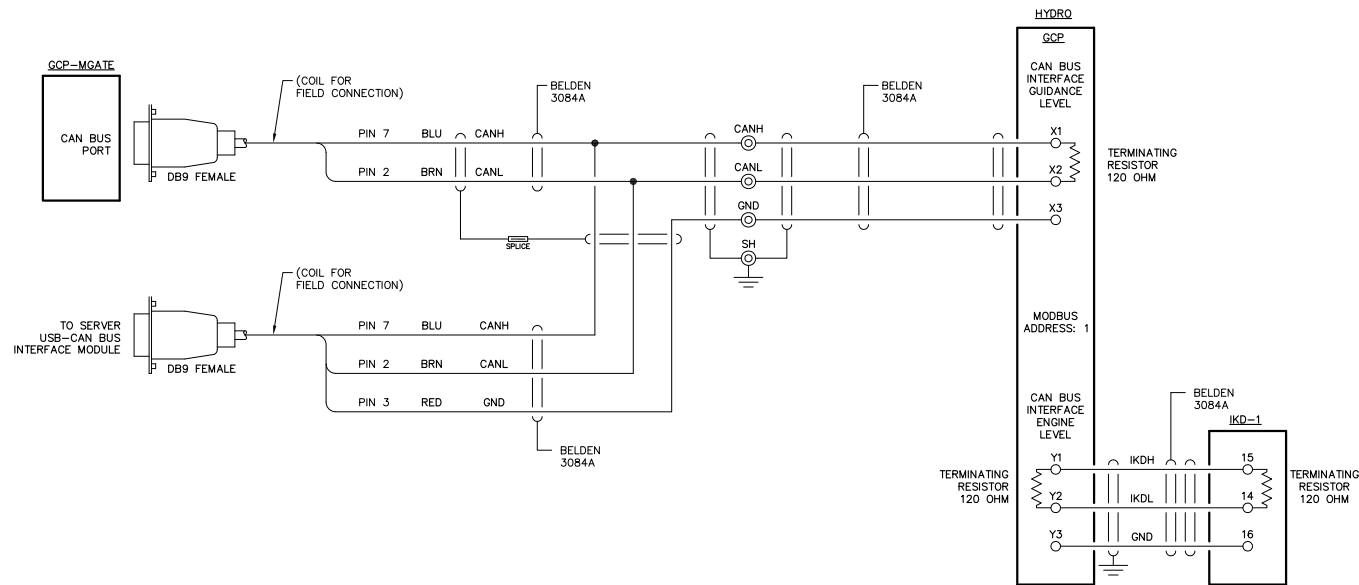
JOB: LARSEN BAY HYDRO PLANT

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 6581-3101-D.

REV.	DATE	DESCRIPTION	BY
A	10-06-14	FIELD MODIFICATIONS	GPN

AEA PURCHASE ORDER No. REG-08-076 CONTROLLED POWER JOB No. 6581

TITLE: COMMUNICATION NETWORK DIAGRAM

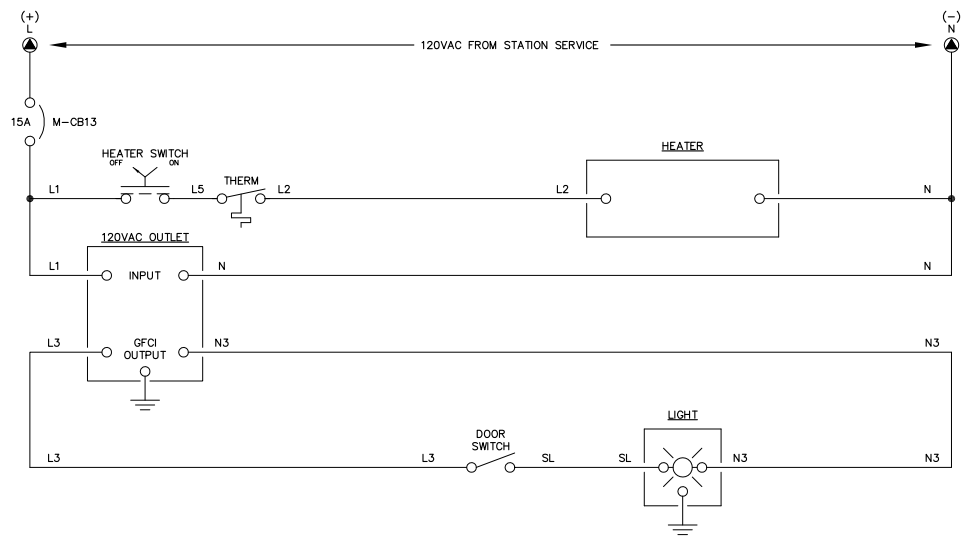
SCALE: NONE DATE: 08-19-08 DWN. BY: GPN

DWG. No: 6581-5602-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY HYDRO PLANT

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 6581-3101-D.

REV.	DATE	DESCRIPTION	BY
A	10-06-14	FIELD MODIFICATIONS	GPN

AEA PURCHASE ORDER No. REG-08-076 CONTROLLED POWER JOB No. 6581

TITLE: HEATER, LIGHTING & FAN CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-19-08	DWN. BY: GPN
DWG. No: 6481-5701-D	SHEET: 1 OF 1	CKD. BY: JMD

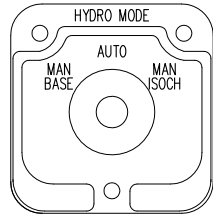
JOB: LARSEN BAY HYDRO PLANT

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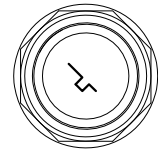
HYDRO MODE SWITCH - HMS



(ELECTROSWITCH 24201C)
KNURLED HANDLE
QTY 1

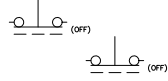
DECK	CONTACTS		POS.		
			MAN BASE	AUTO	MAN ISOCH
12	11	X			
	13	X			
16	15	X			
	17	X			
11	18	X			
	12	X			
15	14	X			
	16	X			

GENERATOR LOCKOUT SWITCH - GLS
GENERATOR LOCKOUT FOR SERVICE
OFF RUN



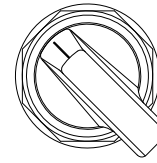
KEY OPERATED
2 POS MAINTAINED
QTY 3

POS	OFF	RUN
X		
	X	
		X



HEATER CONTROL SWITCH - HCS

HEATER
OFF ON



MAINTAINED
LOCATED ON MASTER
BACK PAN

POS	OFF	ON
X		
	X	
		X



- NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 6581-3101-D.

REV.	DATE	DESCRIPTION	BY
A	10-06-14	FIELD MODIFICATIONS	GPN

AEA PURCHASE ORDER No. REG-08-076 CONTROLLED POWER JOB No. 6581

TITLE: CONTROL SWITCH TARGET DIAGRAM

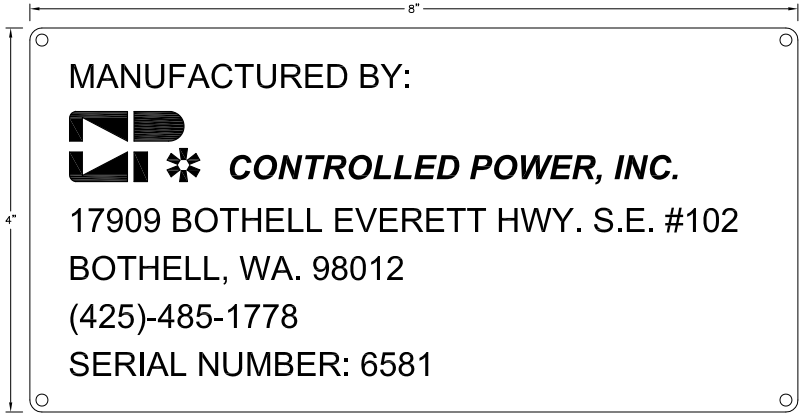
SCALE: NONE	DATE: 08-19-08	DWN. BY: GPN
DWG. No: 6581-6101-D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: LARSEN BAY HYDRO PLANT

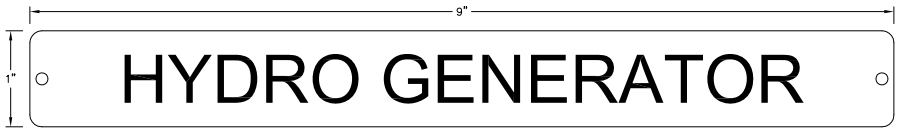
NOTICE
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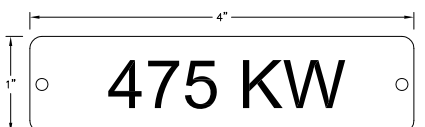
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TEXT 1/4"
QUANTITY 1
SCALE 1/1
SEE NOTE 



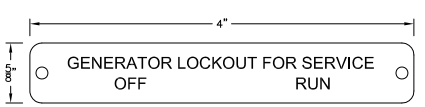
NP
TEXT 1/2"
QUANTITY 1
SCALE 1/1



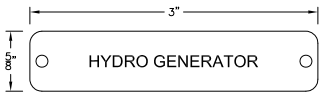
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TEXT 1/2"
QUANTITY 1
SCALE 1/1



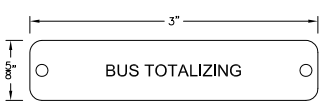
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TEXT 1/8"
QUANTITY 1
SCALE 1/1



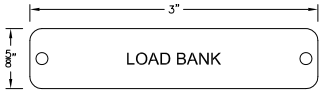
NP
TEXT 1/8"
QUANTITY 1
SCALE 1/1



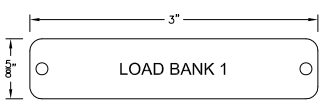
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TEXT 1/8"
QUANTITY 1
SCALE 1/1



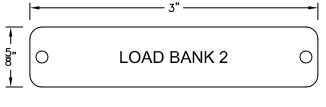
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QUANTITY 1
SCALE 1/1



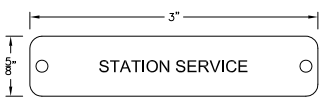
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TEXT 1/8"
QUANTITY 1
SCALE 1/1



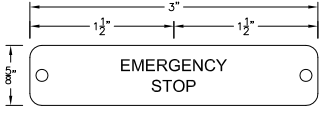
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TEXT 1/8"
QUANTITY 1
SCALE 1/1



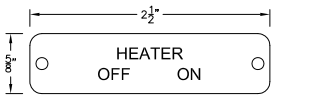
NP
TEXT 1/8"
QUANTITY 2
SCALE 1/1





NP
TEXT 1/8"
QUANTITY 1
SCALE 1/1
SEE NOTE 



NP
TEXT 1/8"
QUANTITY 1
SCALE 1/1



- NOTES:
1. ALL NAMEPLATES SHALL BE BLACK FACE WITH WHITE LETTERS EXCEPT AS NOTED.
 2. ALL NAMEPLATES SHALL HAVE PRESSURE SENSITIVE ADHESIVE ON BACK, 100 % COVERAGE.
 3. ALL NAMEPLATES SHALL HAVE MOUNTING HOLES DRILLED AS INDICATED.
-  INDICATES THAT NAMEPLATE SHALL BE BRUSHED ALUMINUM WITH BLACK ENGRAVED LETTERS.
-  INDICATES THAT NAMEPLATE SHALL BE RED WITH WHITE ENGRAVED LETTERS.

REV.	DATE	DESCRIPTION	BY
A	10-06-14	FIELD MODIFICATIONS	GPN

AEA PURCHASE ORDER No. REG-08-076 CONTROLLED POWER JOB No. 6581

TITLE: NAMEPLATE ENGRAVING SCHEDULE, FABRICATION DIAGRAM

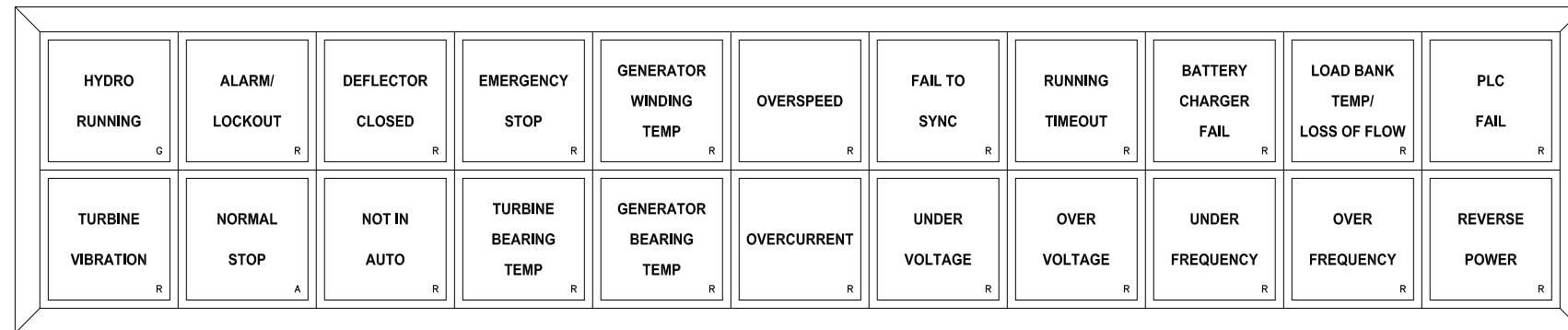
SCALE: NONE	DATE: 08-19-08	DWN. BY: GPN
DWG. No: 6581-6201-D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: LARSEN BAY HYDRO PLANT

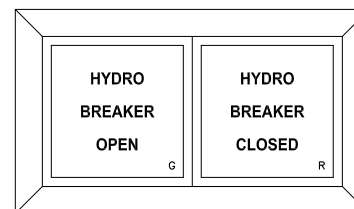
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GENERATOR ANNUNCIATOR

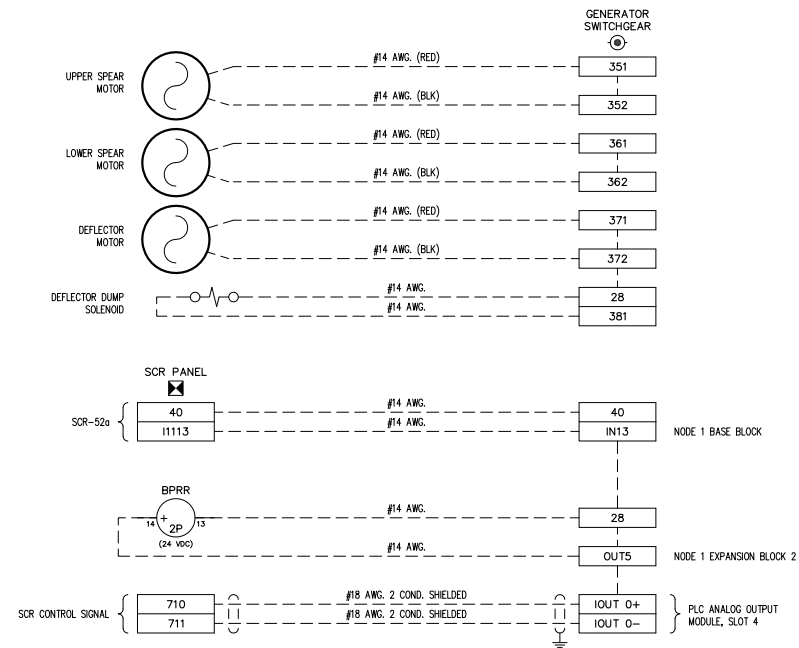
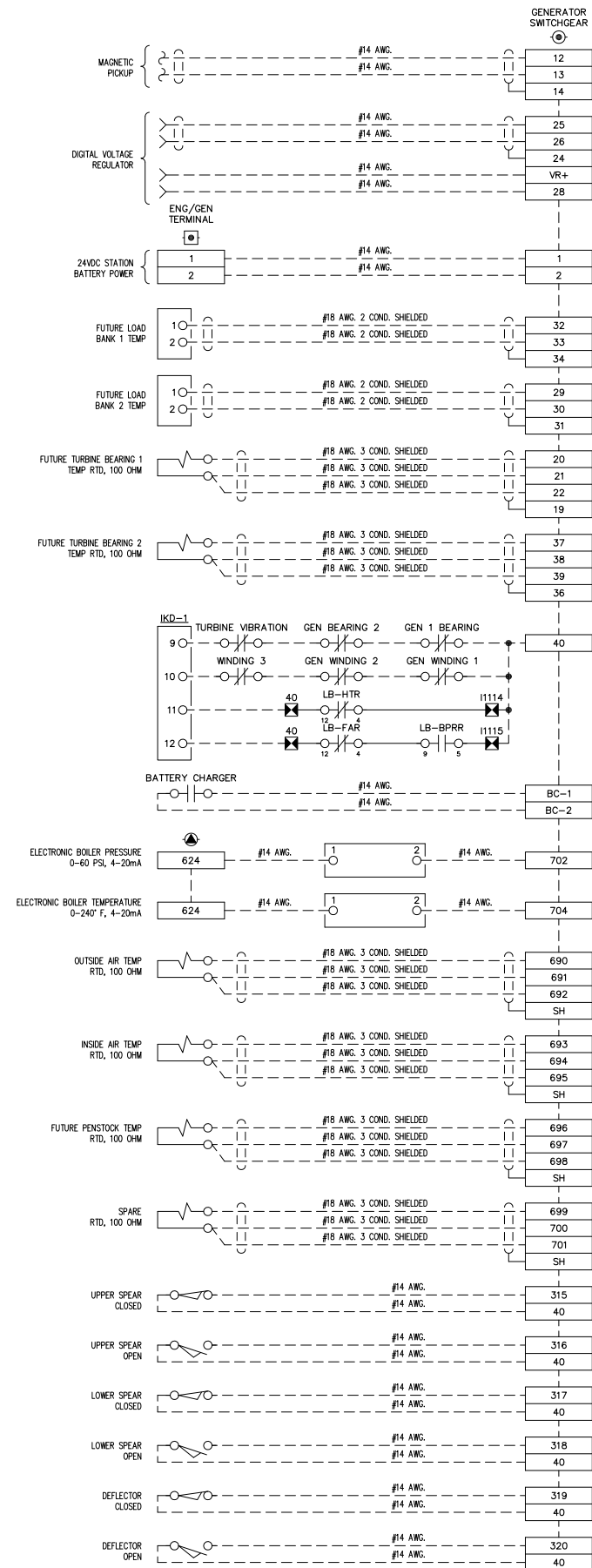


GENERATOR BREAKER ANNUNCIATOR

REV.	DATE	DESCRIPTION	BY
A	10-06-14	FIELD MODIFICATIONS	GPN
AEA PURCHASE ORDER No. REG-08-076		CONTROLLED POWER JOB No. 6581	
TITLE: NAMEPLATE ENGRAVING SCHEDULE, FABRICATION DIAGRAM			
SCALE: NONE	DATE: 08-19-08	DWN. BY: GPN	
DWG. No: 6581-6202-D	SHEET: 1 OF 1	CKD. BY: JMD	
JOB: LARSEN BAY HYDRO PLANT			

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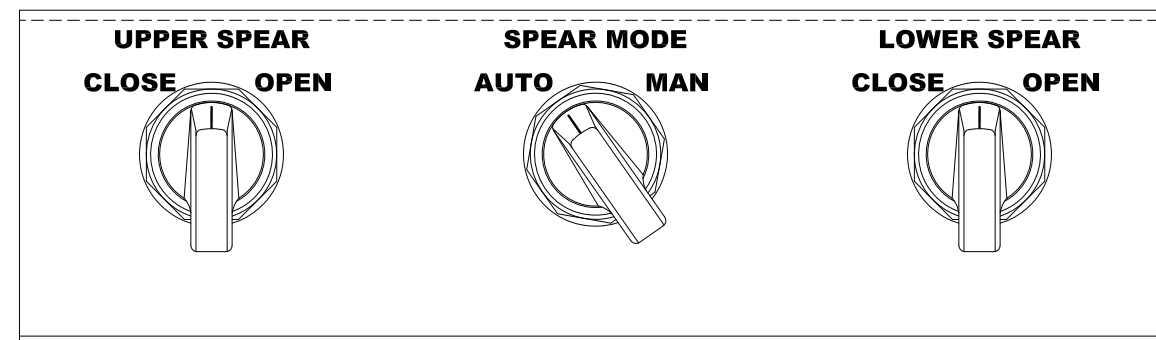
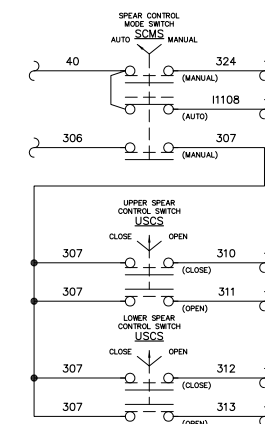
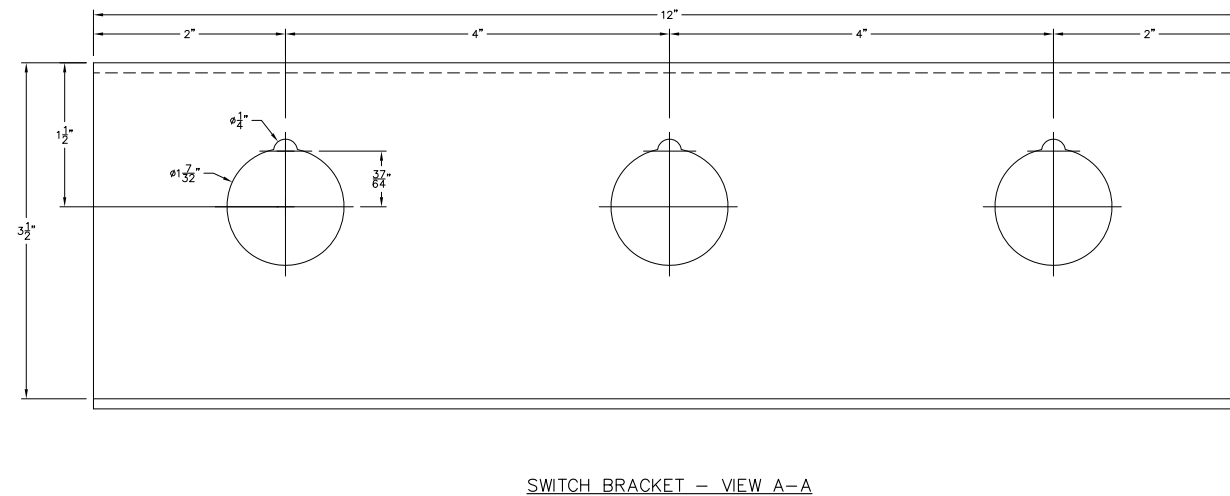
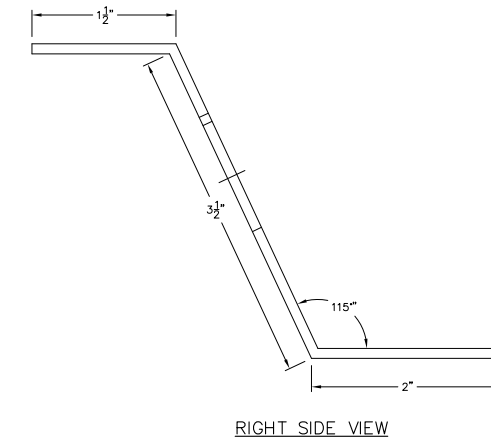
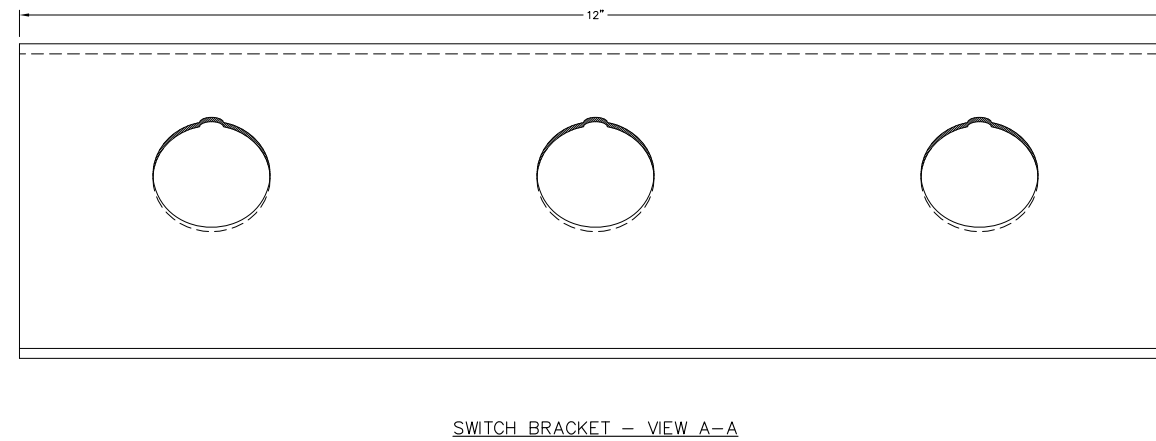
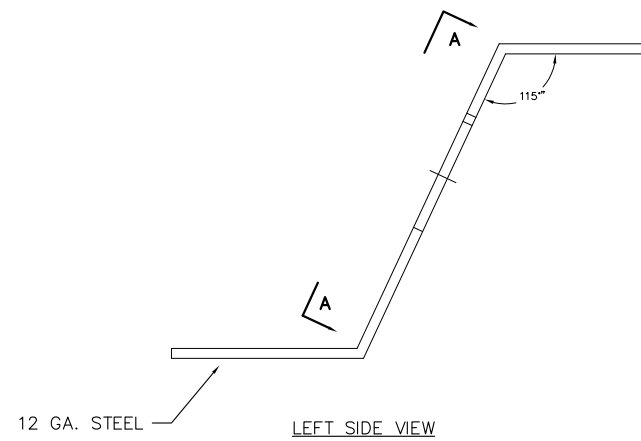
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REV.	DATE	DESCRIPTION	BY
A	10-06-14	FIELD MODIFICATIONS	GPN
AEA PURCHASE ORDER No. REG-08-076		CONTROLLED POWER JOB No. 6581	
TITLE: INTERCONNECTION DIAGRAM			
SCALE: NONE	DATE: 11-13-09	DWN. BY: GPN	
DWG. No: 6581-7101-D	SHEET: 1 OF 1	CKD. BY: JMD	
JOB: LARSEN BAY HYDRO PLANT			

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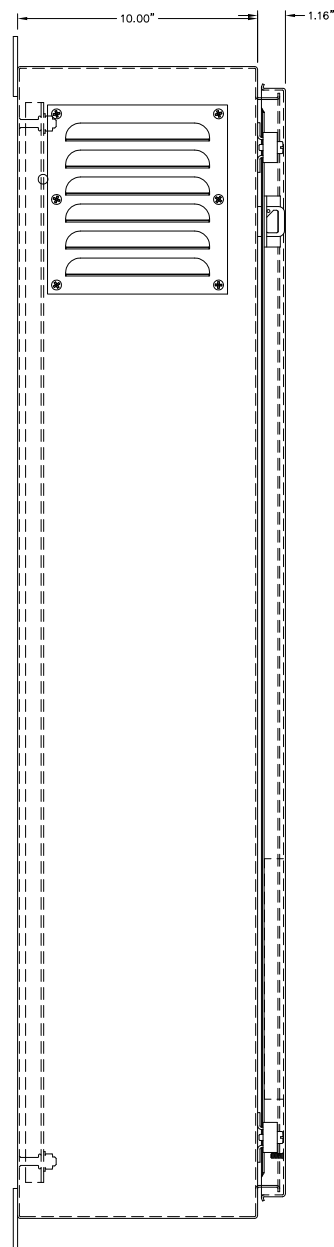


REV.	DATE	DESCRIPTION	BY
A	10-06-14	FIELD MODIFICATIONS	GPN
AEA PURCHASE ORDER No. REG-08-076		CONTROLLED POWER JOB No. 6581	
TITLE: SPEAR CONTROL SWITCH BRACKET, FABRICATION DIAGRAM			
SCALE: NONE	DATE: 02-20-09	DWN. BY: GPN	
DWG. No: 6581-8101-D	SHEET: 1 OF 1	CKD. BY: JMD	
JOB: LARSEN BAY HYDRO PLANT			

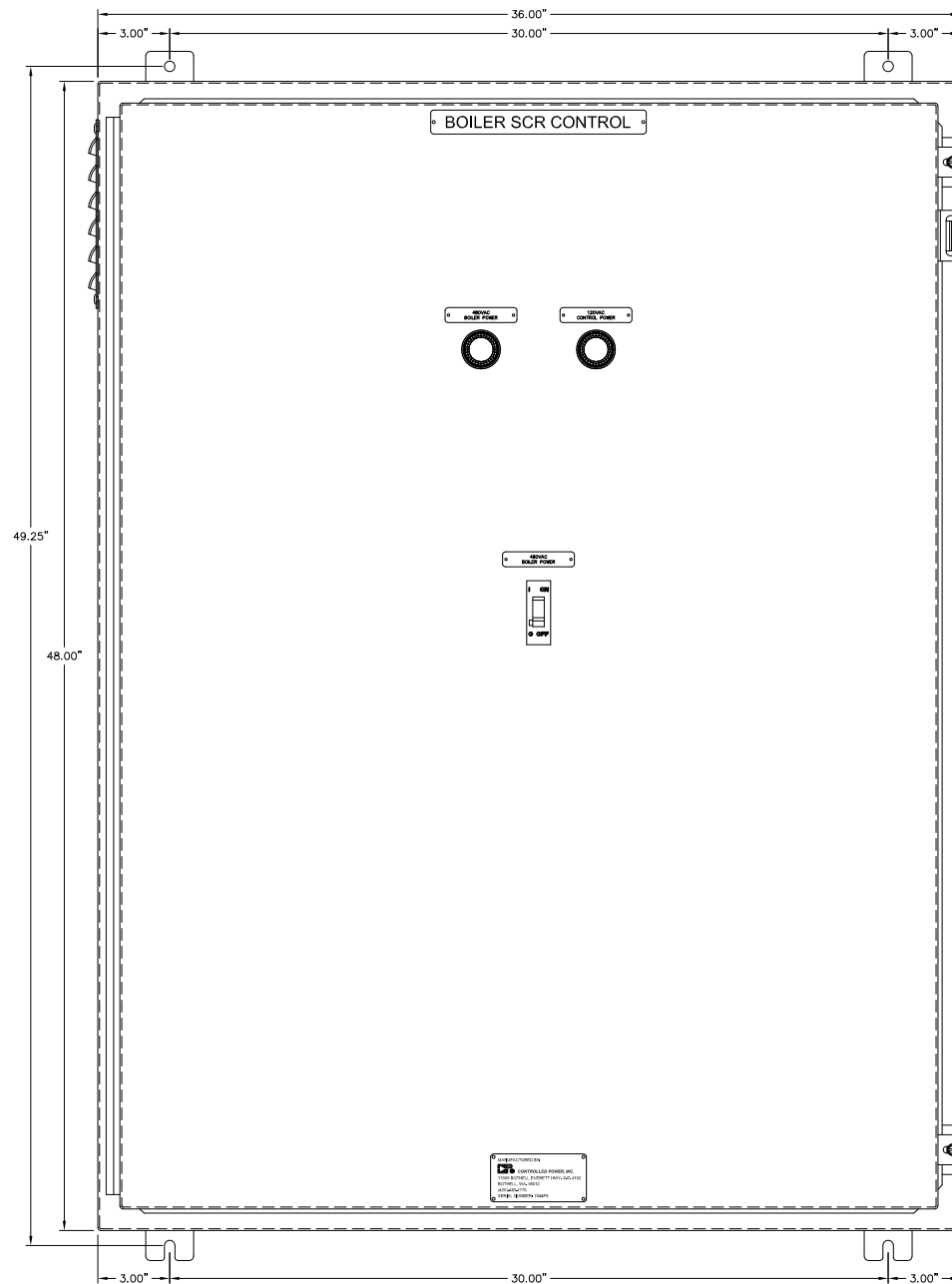
NOTICE
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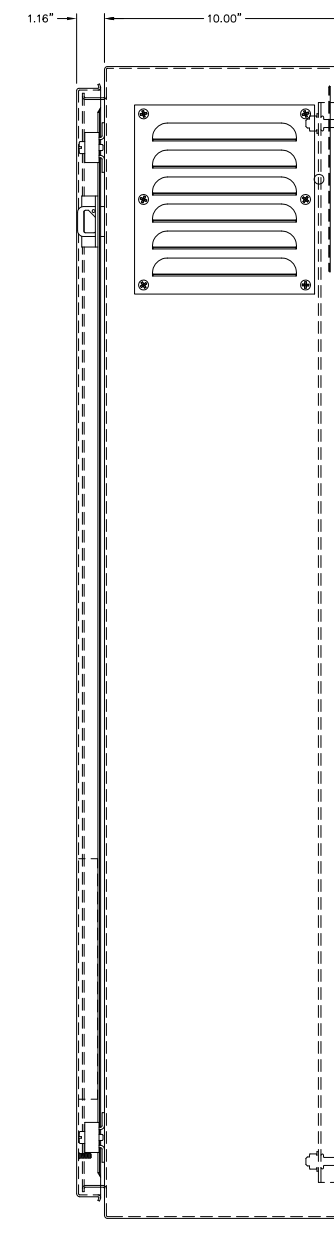
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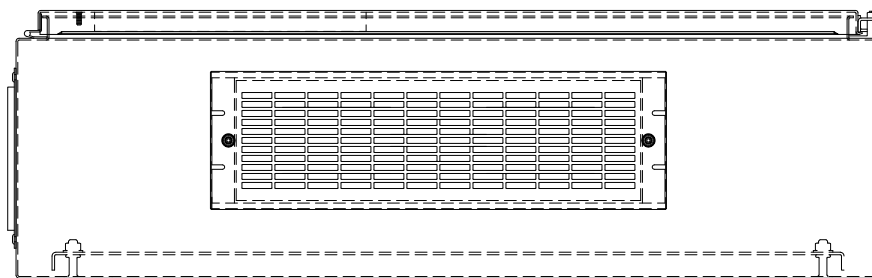
LEFT SIDE VIEW



SCR PANEL - TYPICAL FRONT VIEW



RIGHT SIDE VIEW



TYPICAL BOTTOM VIEW

C	10-06-14	AS INSTALLED	GPN
B	06-12-14	SHOP AS BUILT	GPN
A	05-12-14	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. CONTROLLED POWER JOB No. 7844

TITLE: LOAD BANK SCR PANEL ELEVATION VIEW, OUTLINE DIAGRAM

SCALE: 1/4 DATE: 05-12-14 DWN. BY: GPN

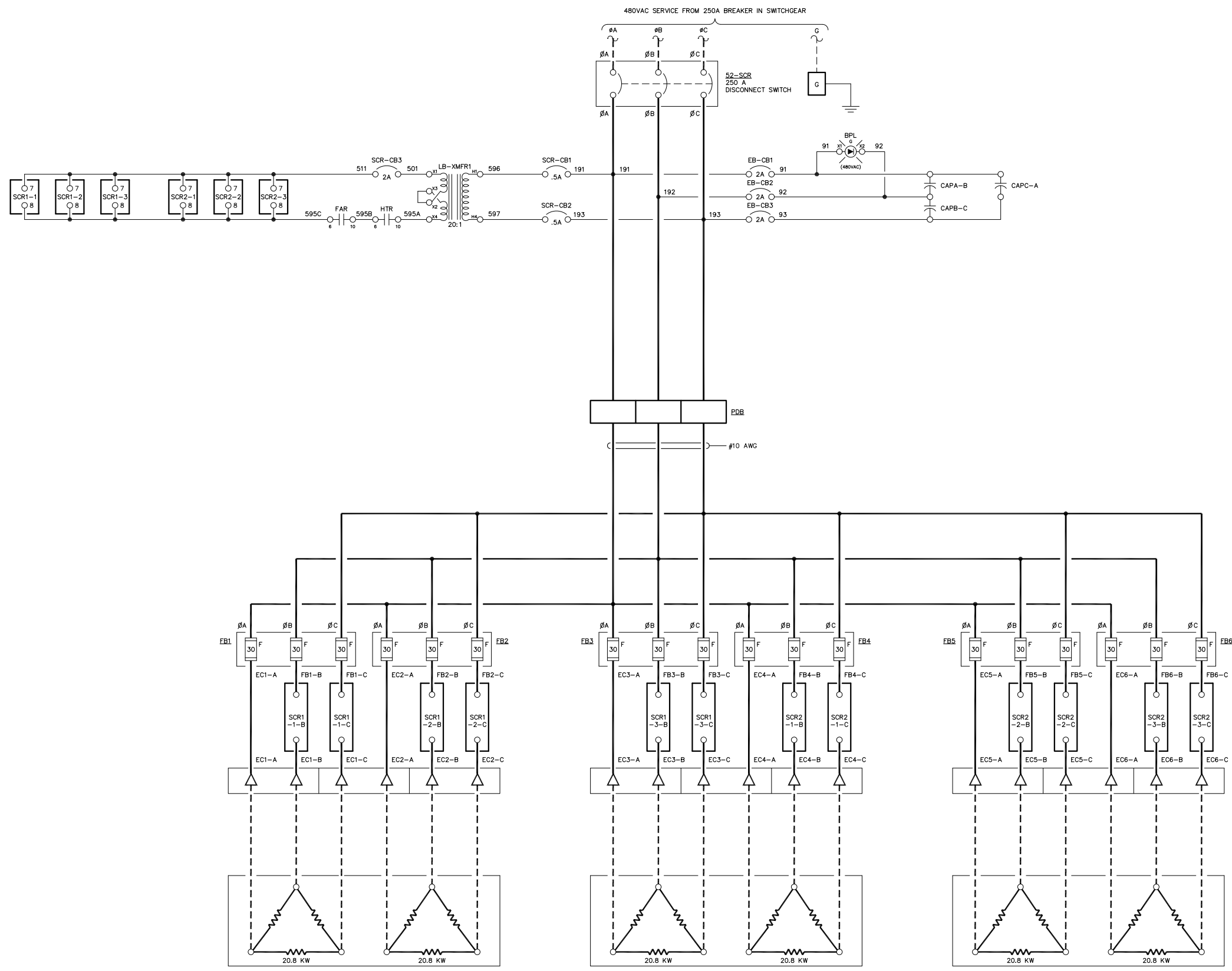
DWG. No: 7844FS-4101-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY HYDRO PLANT

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7989-3101-D.

REV.	DATE	DESCRIPTION	BY
C	10-06-14	AS INSTALLED	GPN
B	06-12-14	SHOP AS-BUILT	GPN
A	05-12-14	SUBMITTAL	GPN

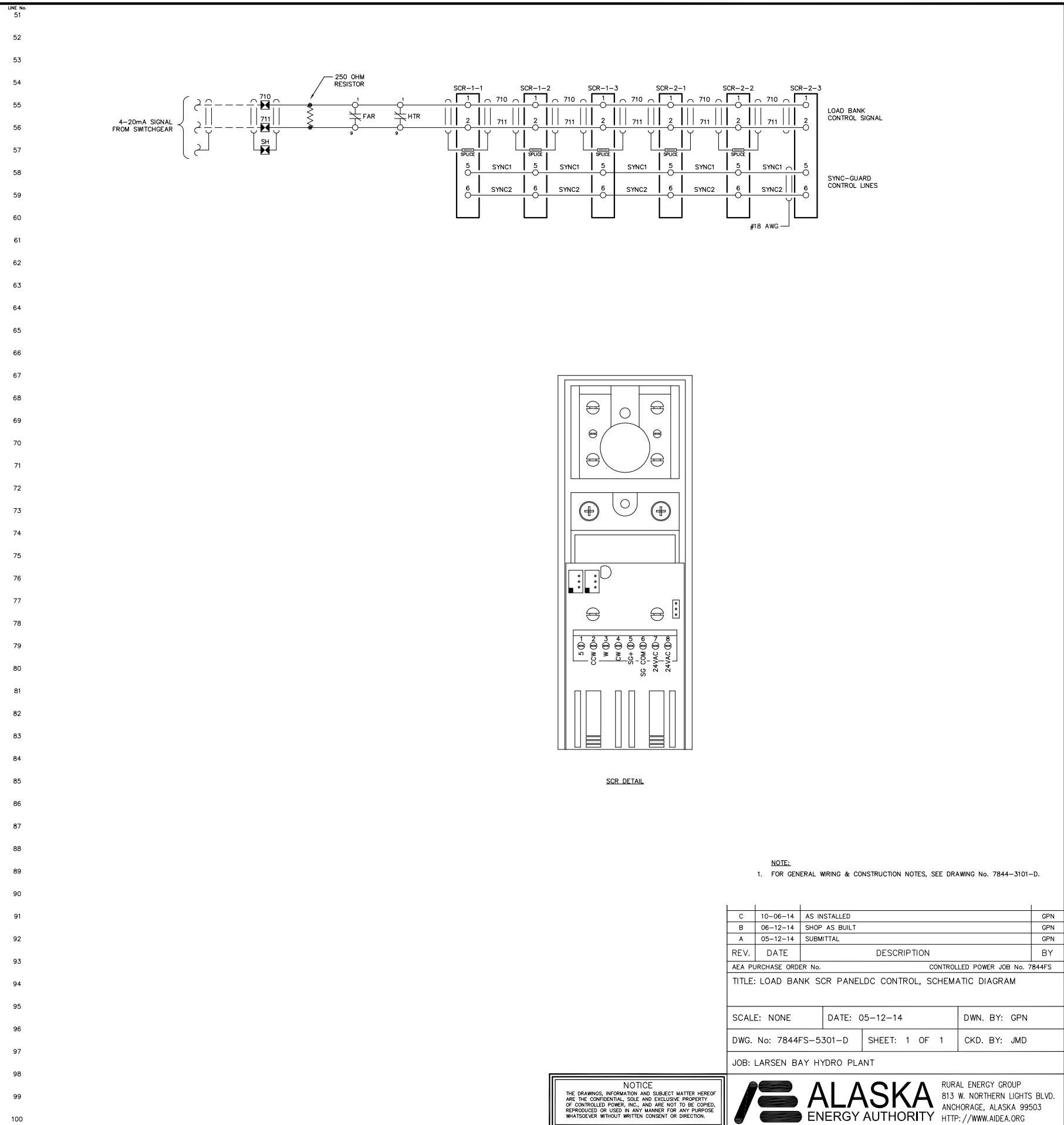
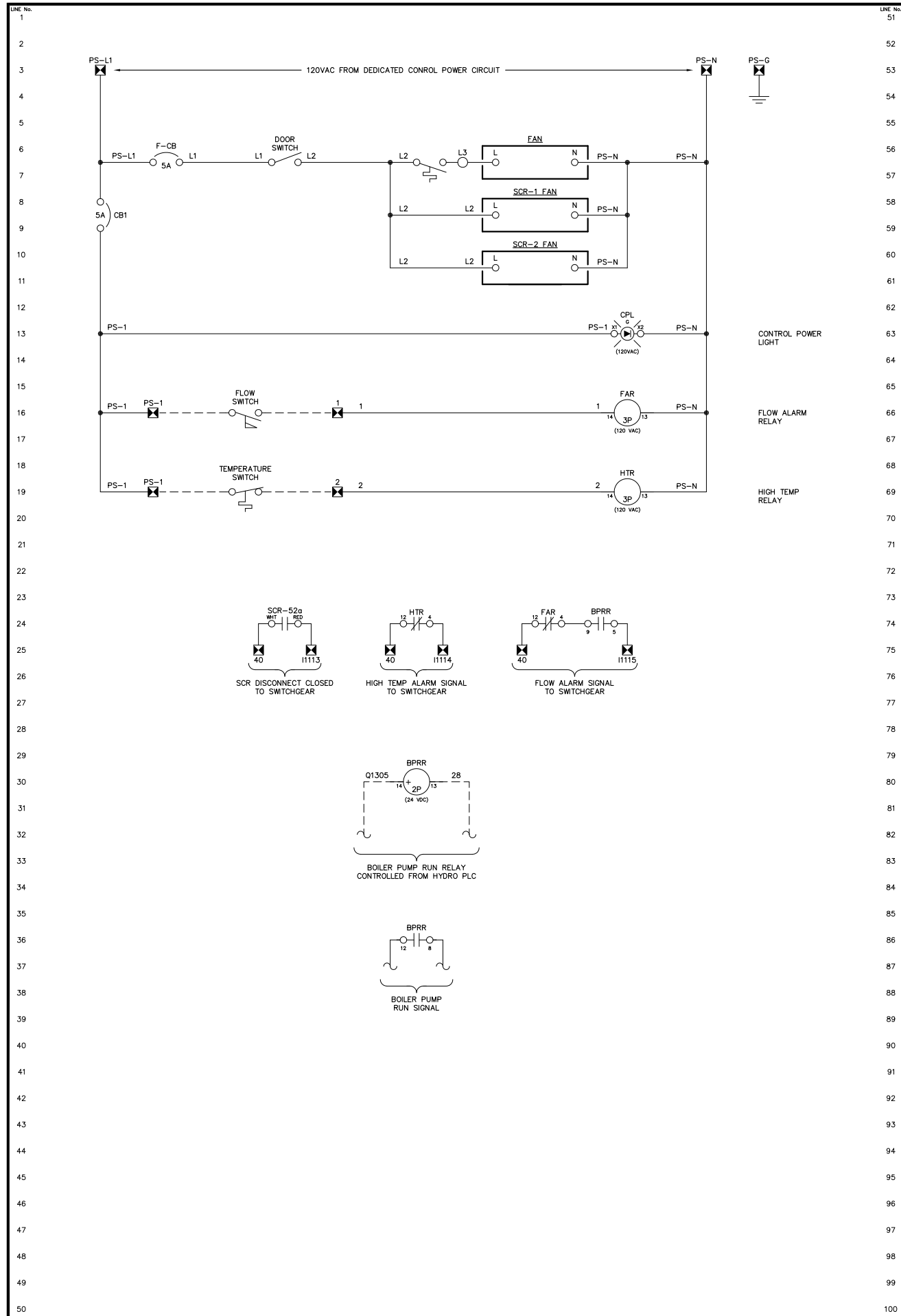
AEA PURCHASE ORDER No. CONTROLLED POWER JOB No. 7844FS
TITLE: LOAD BANK SCR PANEL AC THREE LINE, SCHEMATIC DIAGRAM

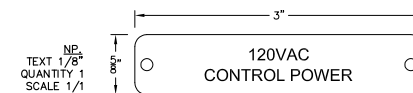
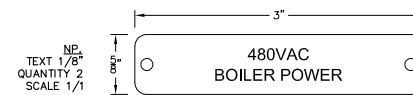
SCALE: NONE	DATE: 05-12-14	DWN. BY: GPN
DWG. No: 7844FS-5201-D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: LARSEN BAY HYDRO PLANT

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- NOTES:
1. ALL NAMEPLATES SHALL BE BLACK FACE WITH WHITE LETTERS EXCEPT AS NOTED.
 2. ALL NAMEPLATES SHALL HAVE PRESSURE SENSITIVE ADHESIVE ON BACK, 100 % COVERAGE.
 3. ALL NAMEPLATES SHALL HAVE MOUNTING HOLES DRILLED AS INDICATED.
- △ INDICATES THAT NAMEPLATE SHALL BE BRUSHED ALUMINUM WITH BLACK ENGRAVED LETTERS.

REV.	DATE	DESCRIPTION	BY
C	10-06-14	AS INSTALLED	GPN
B	06-12-14	SHOP AS-BUILT	GPN
A	05-12-14	SUBMITTAL	GPN

AEA PURCHASE ORDER No. _____ CONTROLLED POWER JOB No. 7844FS

TITLE: LOAD BANK SCR PANEL NAMEPLATE ENGRAVING SCHEDULE FABRICATION DIAGRAM

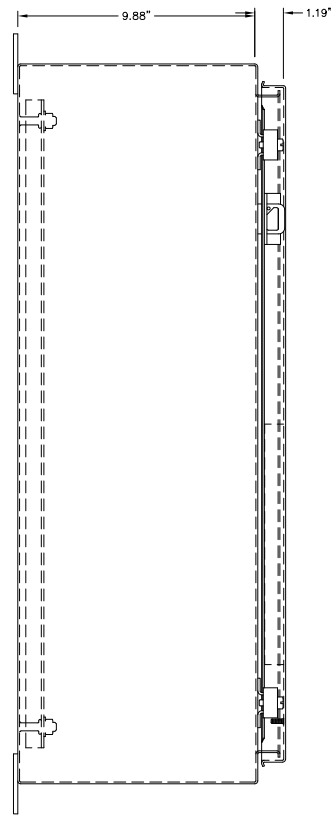
SCALE: NONE DATE: 05-12-14 DWN. BY: GPN

DWG. No: 7844FS-6201-D SHEET: 1 OF 1 CKD. BY: JMD

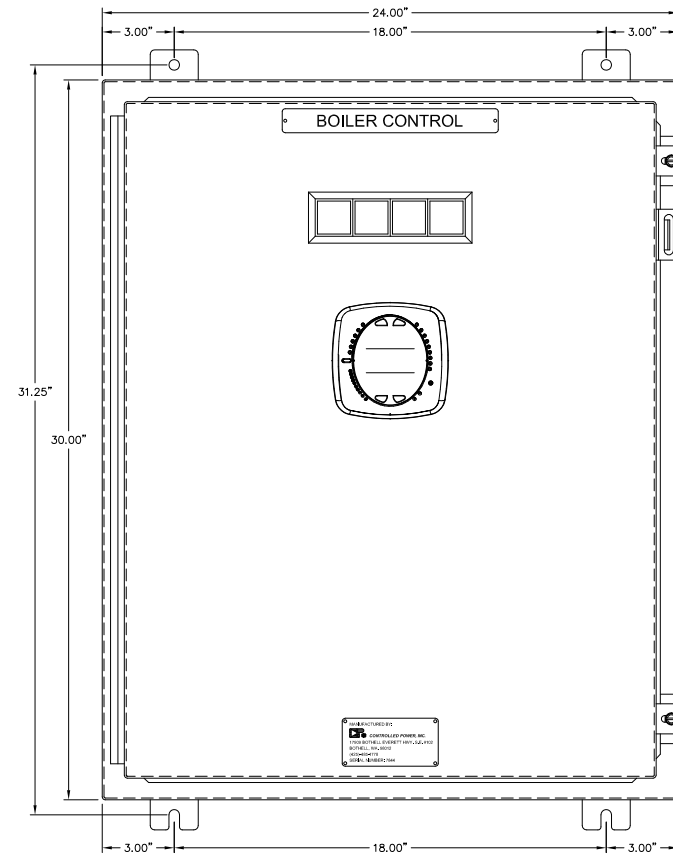
JOB: LARSEN BAY HYDRO PLANT

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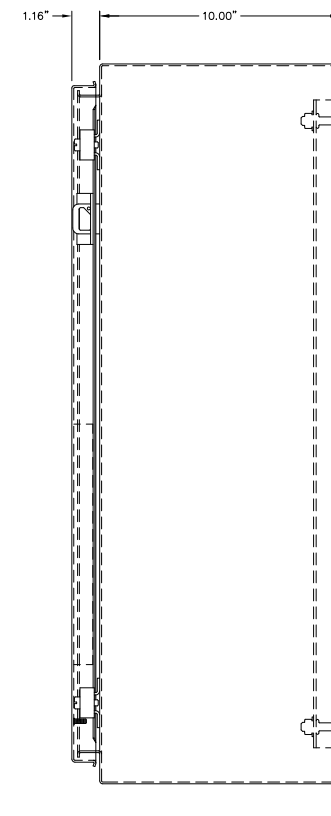




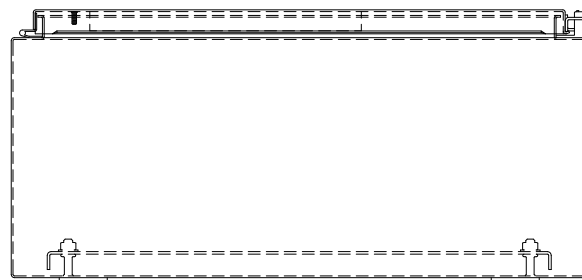
LEFT SIDE VIEW



BOILER PANEL - TYPICAL FRONT VIEW



RIGHT SIDE VIEW



TYPICAL BOTTOM VIEW

E	02-13-15	REVISED PER ENGINEERING REVIEW	GPN
D	01-14-15	AS INSTALLED	GPN
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: ELECTRIC BOILER CONTROL PANEL ELEVATION VIEW, OUTLINE DIAGRAM

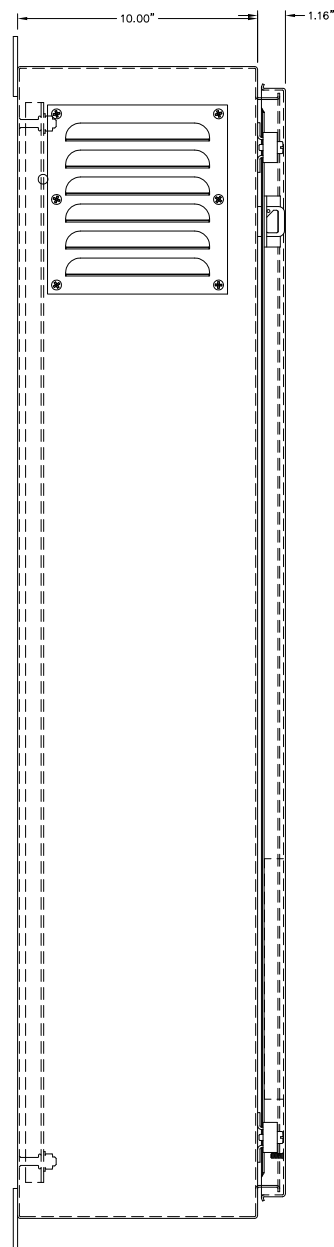
SCALE: 1/4 DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-4102-D SHEET: 1 OF 1 CKD. BY: JMD

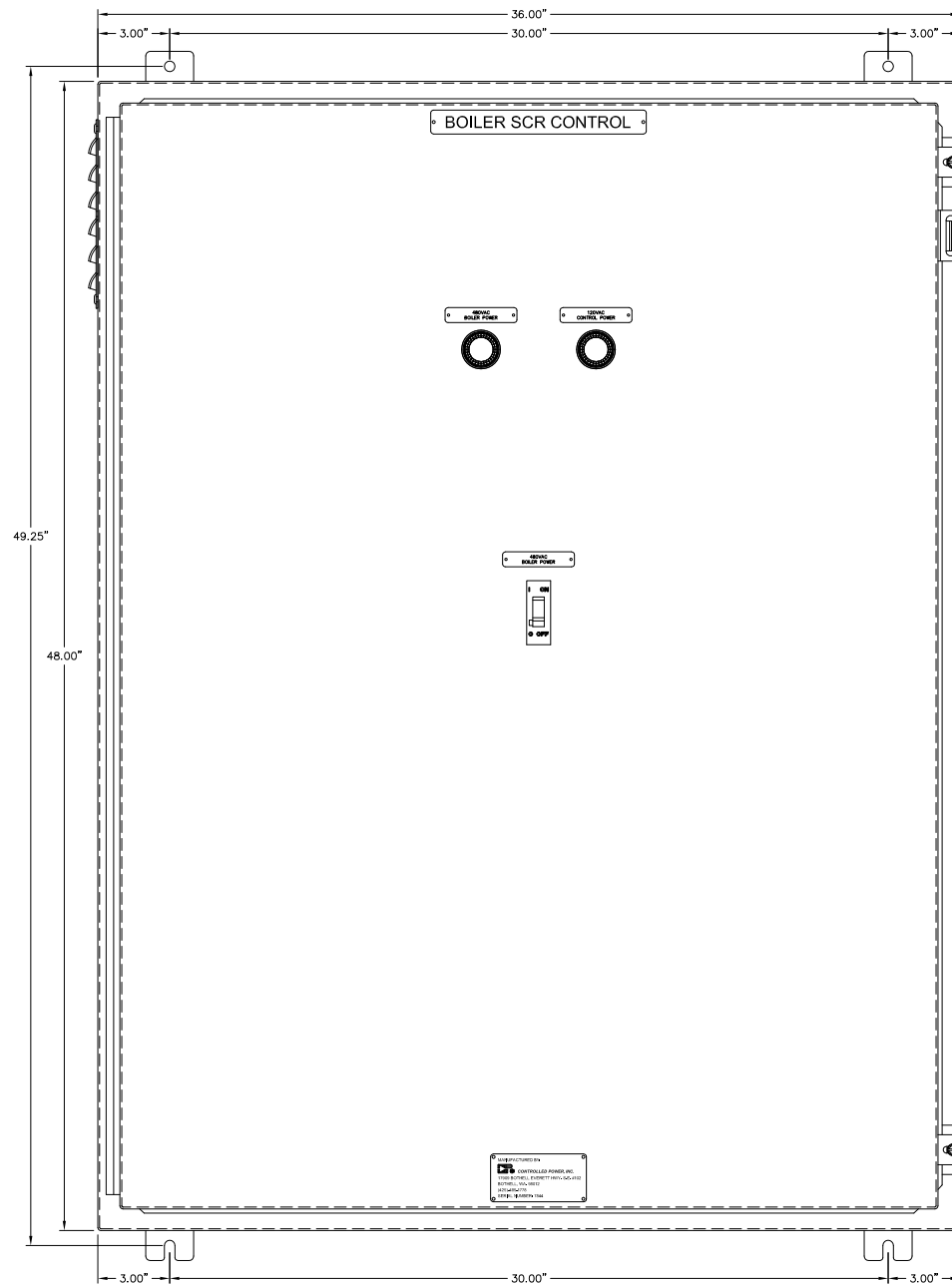
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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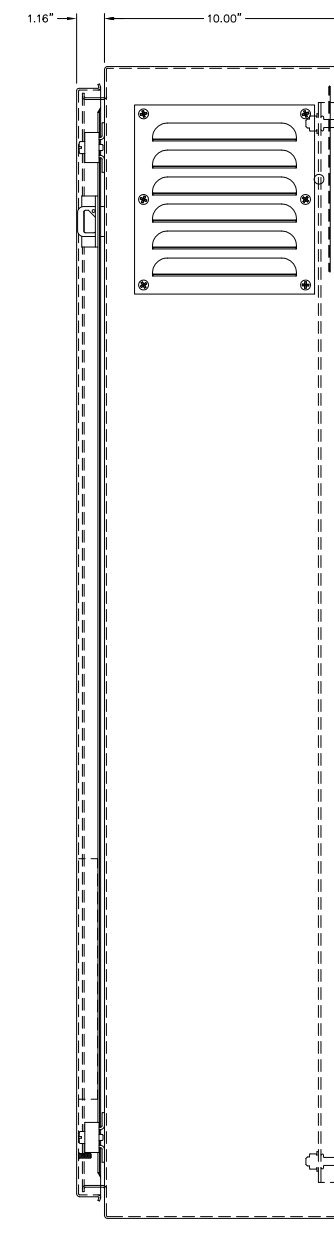
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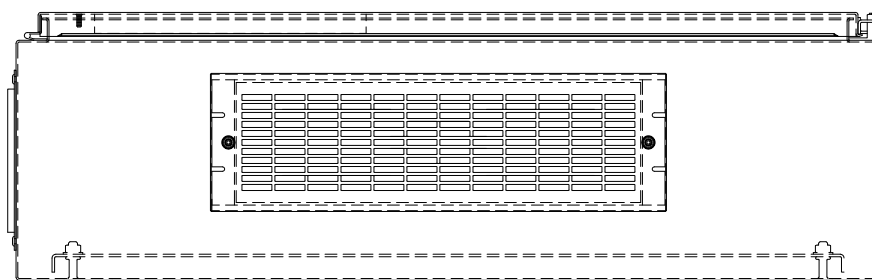
LEFT SIDE VIEW



SCR PANEL - TYPICAL FRONT VIEW



RIGHT SIDE VIEW



TYPICAL BOTTOM VIEW

E	02-13-15	REVISED PER ENGINEERING REVIEW	GPN
D	01-14-15	AS INSTALLED	GPN
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: ELECTRIC BOILER SCR PANEL ELEVATION VIEW, OUTLINE DIAGRAM

SCALE: 1/4 DATE: 08-26-13 DWN. BY: GPN
 DWG. No: 7844-4103-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

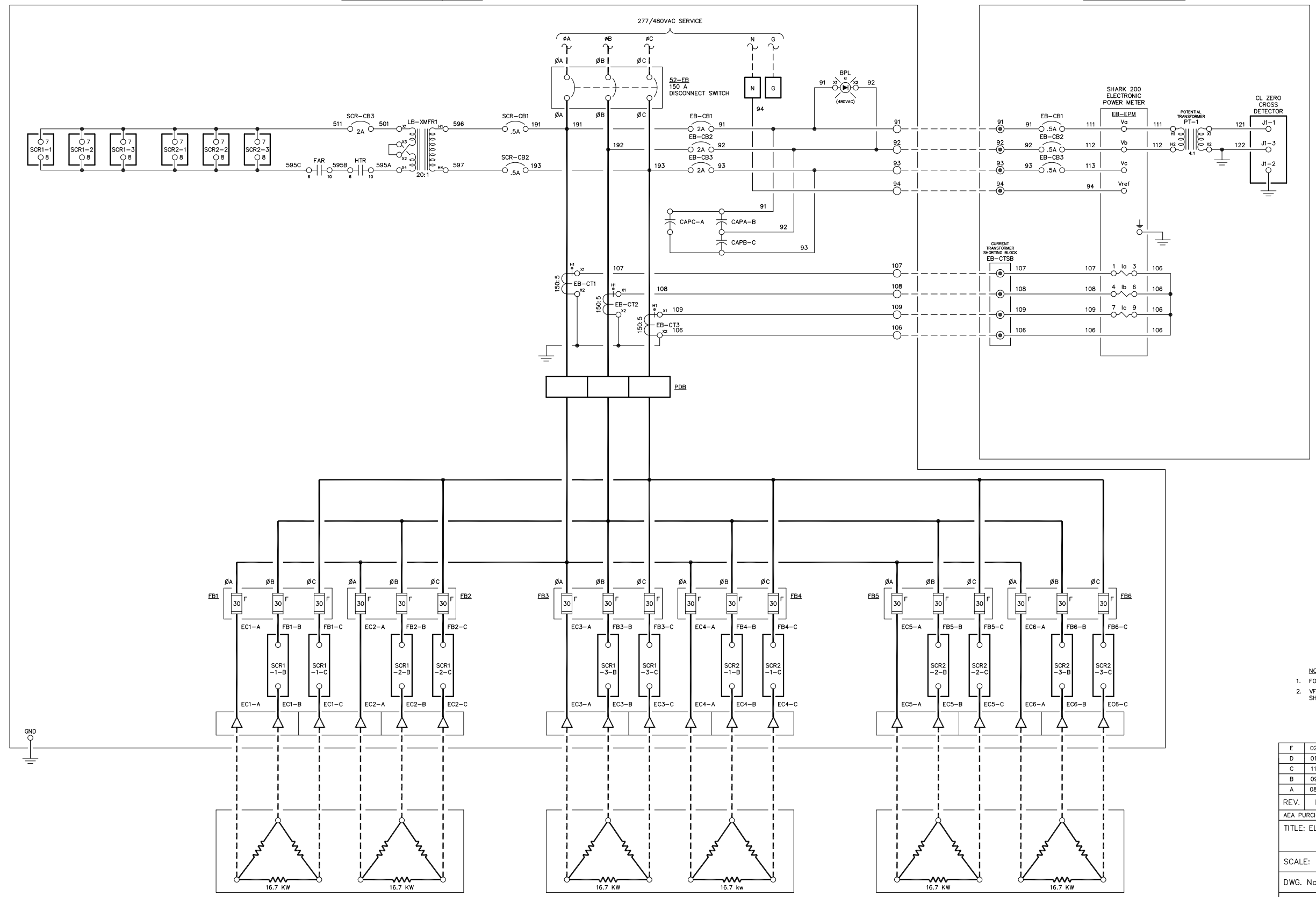
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ELECTRICAL BOILER DISCONNECT / SCR PANEL

ELECTRIC BOILER CONTROL PANEL



- NOTE:
- FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.
 - VFD LOAD WIRES SHALL BE ROUTED SEPARATE FROM ALL OTHER WIRING OR SHIELDED TO AVOID RF INTERFERENCE.

E	02-13-15	REVISED PER ENGINEERING REVIEW	GPN
D	01-14-15	AS INSTALLED	GPN
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A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: ELECTRIC BOILER AC THREE LINE, SCHEMATIC DIAGRAM

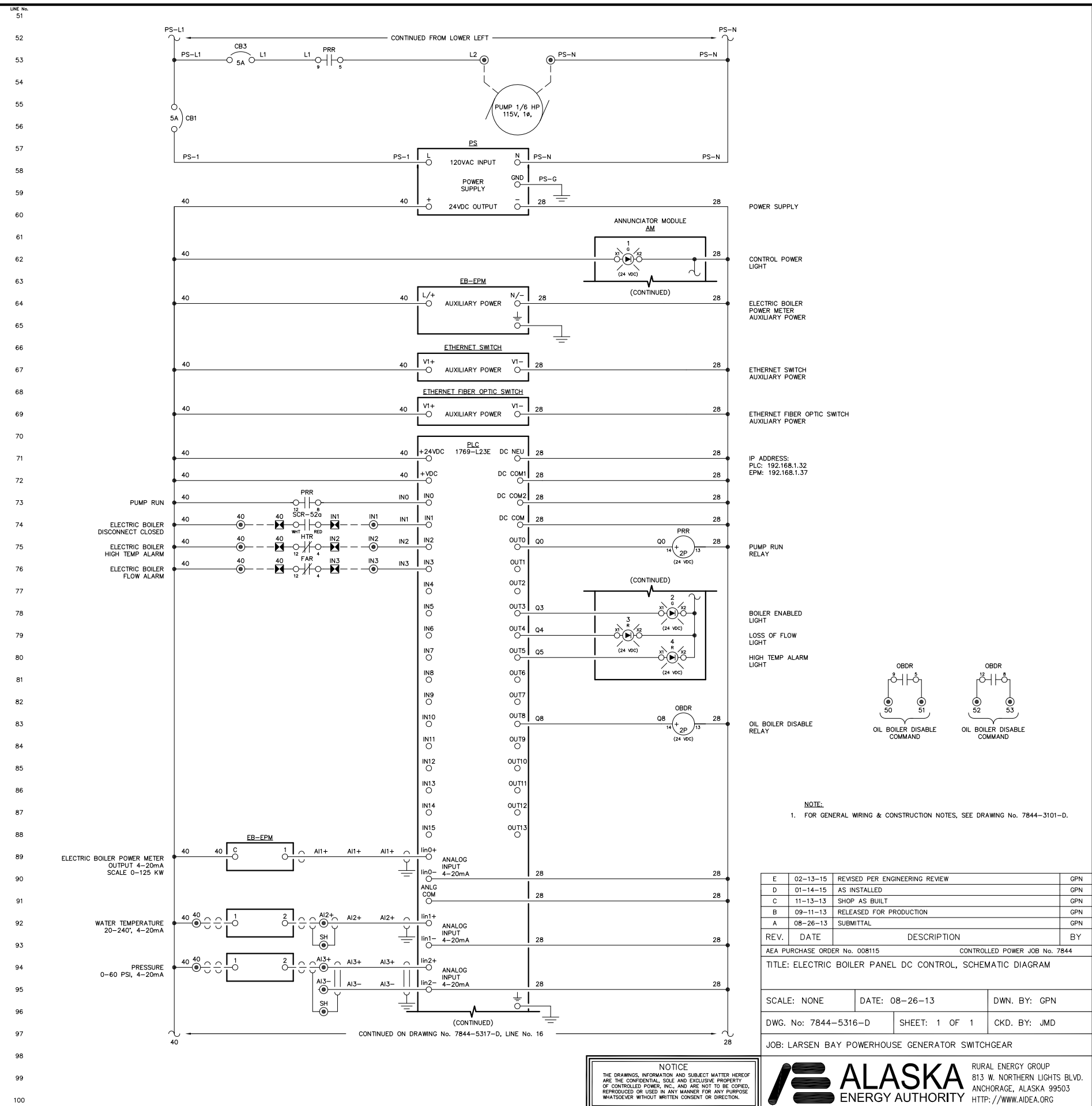
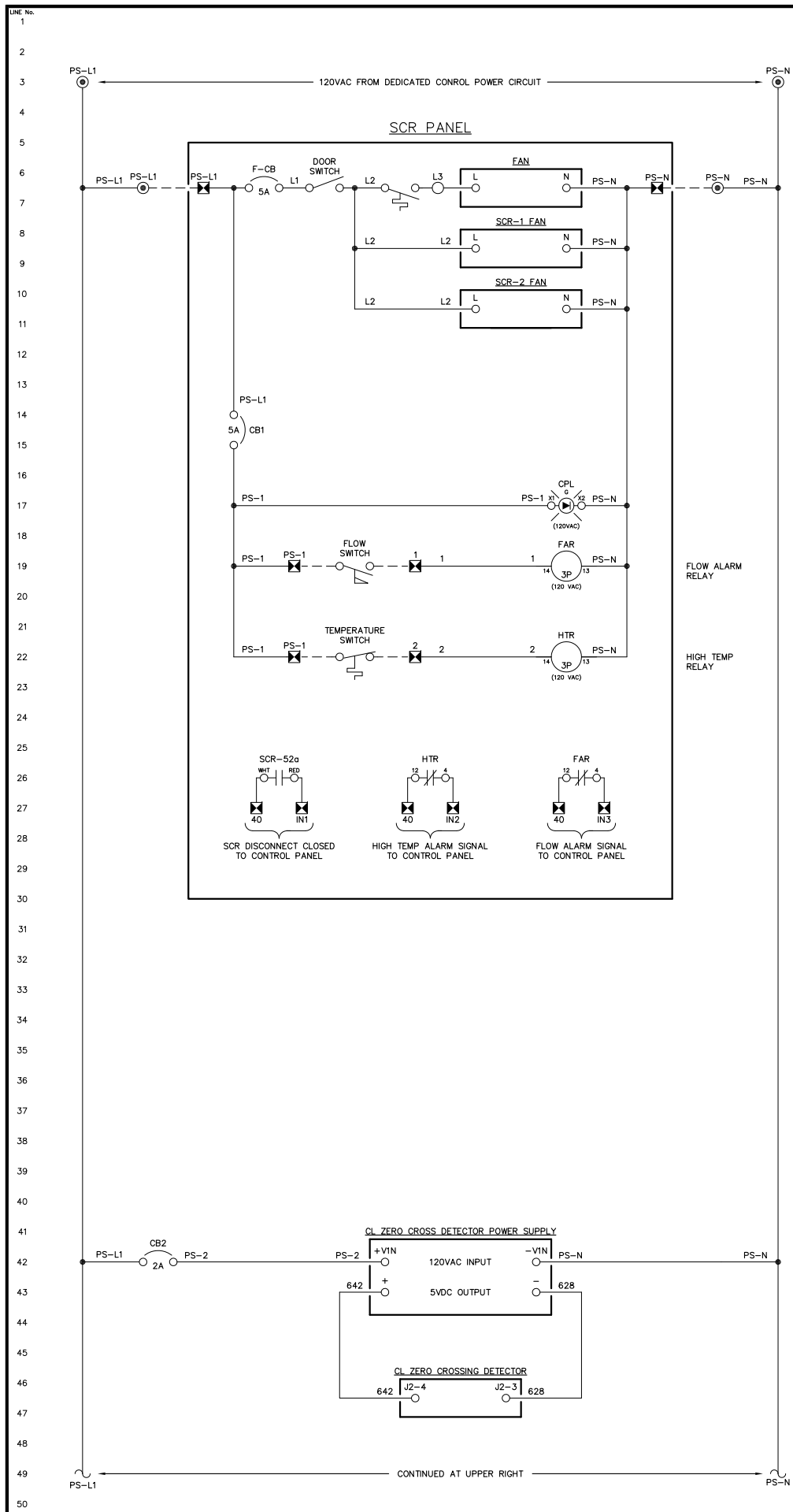
SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5206-D SHEET: 1 OF 1 CKD. BY: JMD

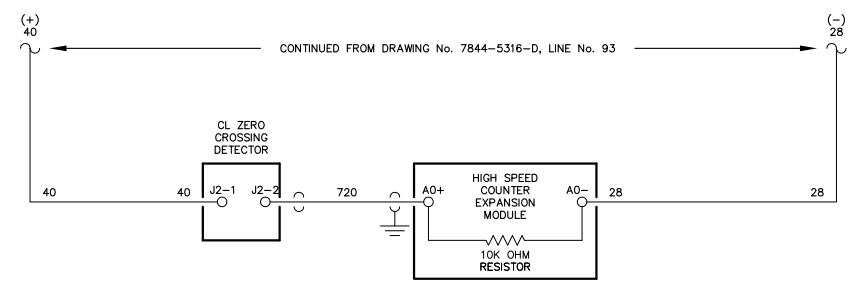
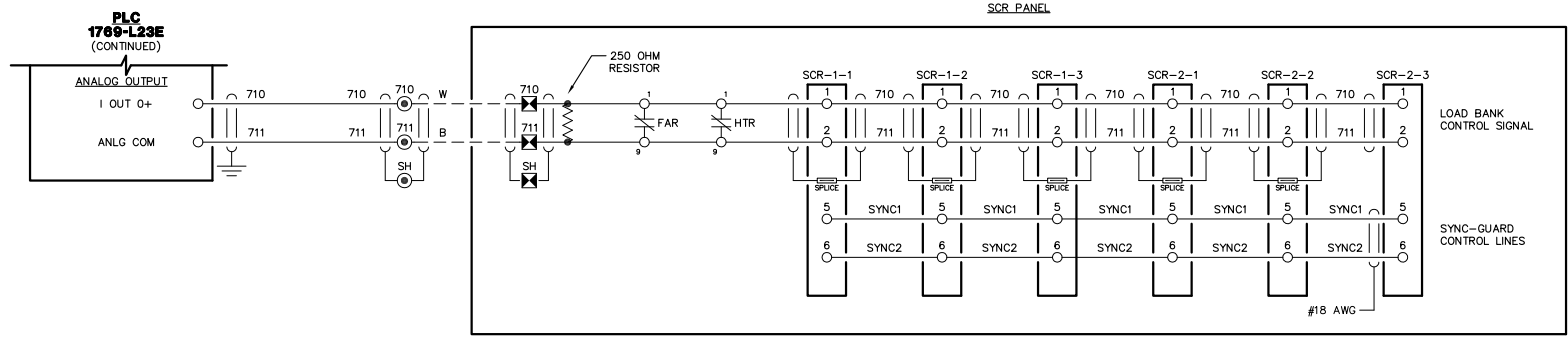
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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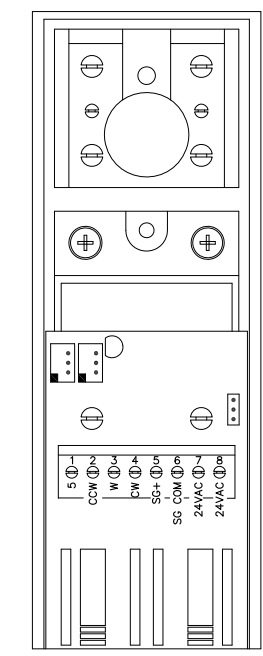
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SCR DETAIL

NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

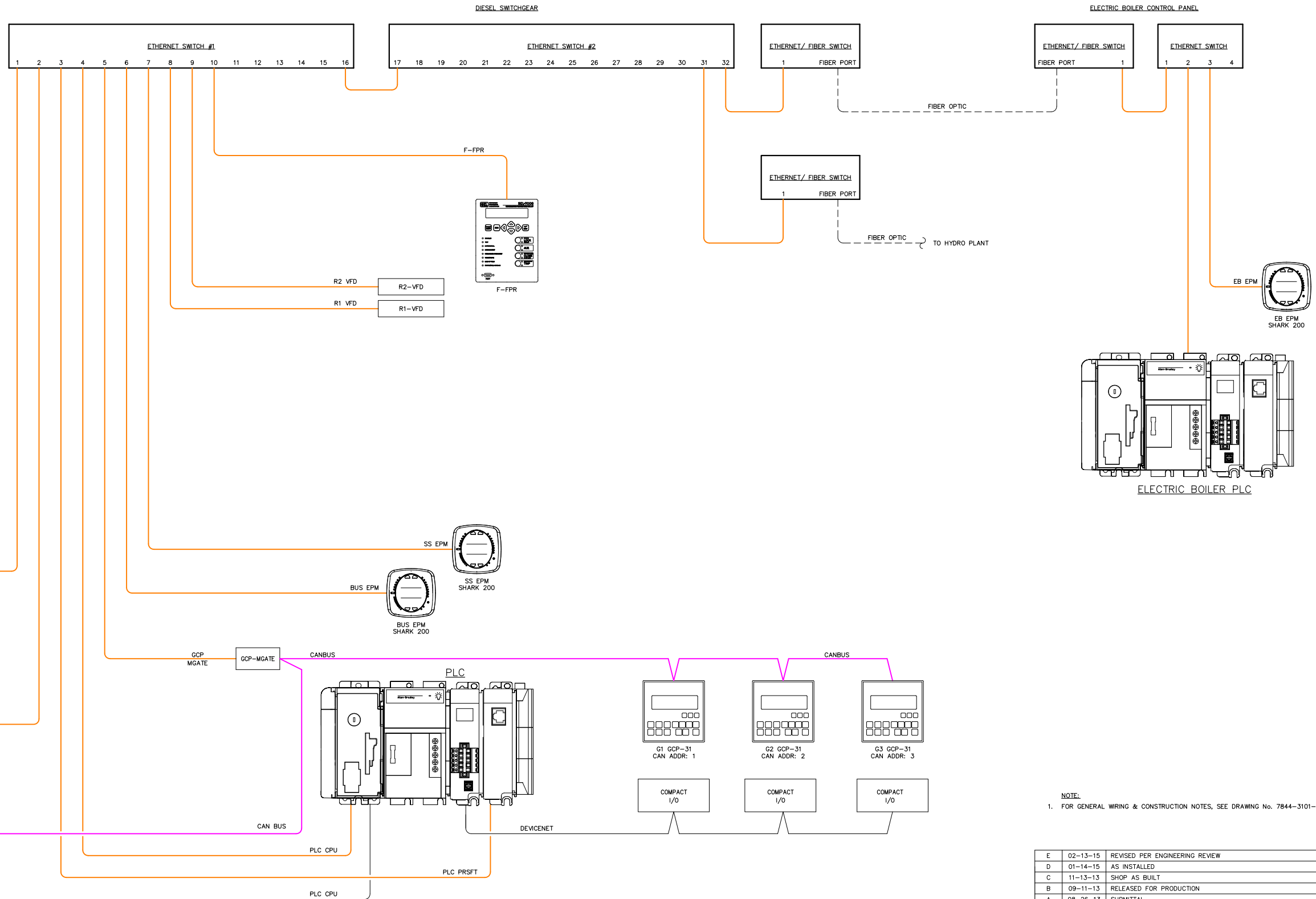
E	02-13-15	REVISED PER ENGINEERING REVIEW	GPN
D	01-14-15	AS INSTALLED	GPN
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY
AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844			
TITLE: ELECTRIC BOILER PANEL DC CONTROL, SCHEMATIC DIAGRAM			
SCALE: NONE	DATE: 08-26-13	DWN. BY: GPN	
DWG. No: 7844-5317-D	SHEET: 1 OF 1	CKD. BY: JMD	
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR			

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DEVICE	IP ADDRESS
SERVER	192.168.1.142
F-FPR	192.168.1.155
R1 VFD	192.168.1.171
R2 VFD	192.168.1.172
OIU	192.168.1.182
PLC CPU	192.168.1.183
GCP MGATE	192.168.1.186
PLC PROSOFT	192.168.1.187
BUS EPM	192.168.1.190
SS EPM	192.168.1.191
EB EPM	192.168.1.37
EB PLC	192.168.1.32



NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

REV.	DATE	DESCRIPTION	BY
E	02-13-15	REVISED PER ENGINEERING REVIEW	GPN
D	01-14-15	AS INSTALLED	GPN
C	11-13-13	SHOP AS BUILT	GPN
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A	08-26-13	SUBMITTAL	GPN

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: COMMUNICATION NETWORK DIAGRAM

SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5601-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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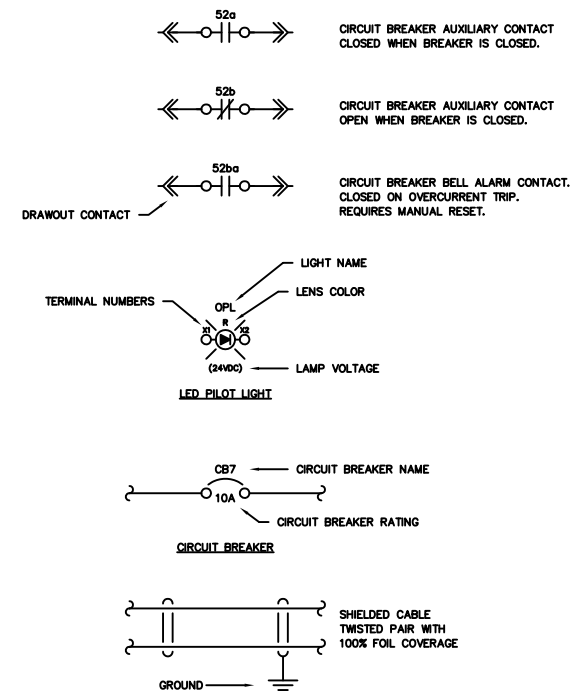
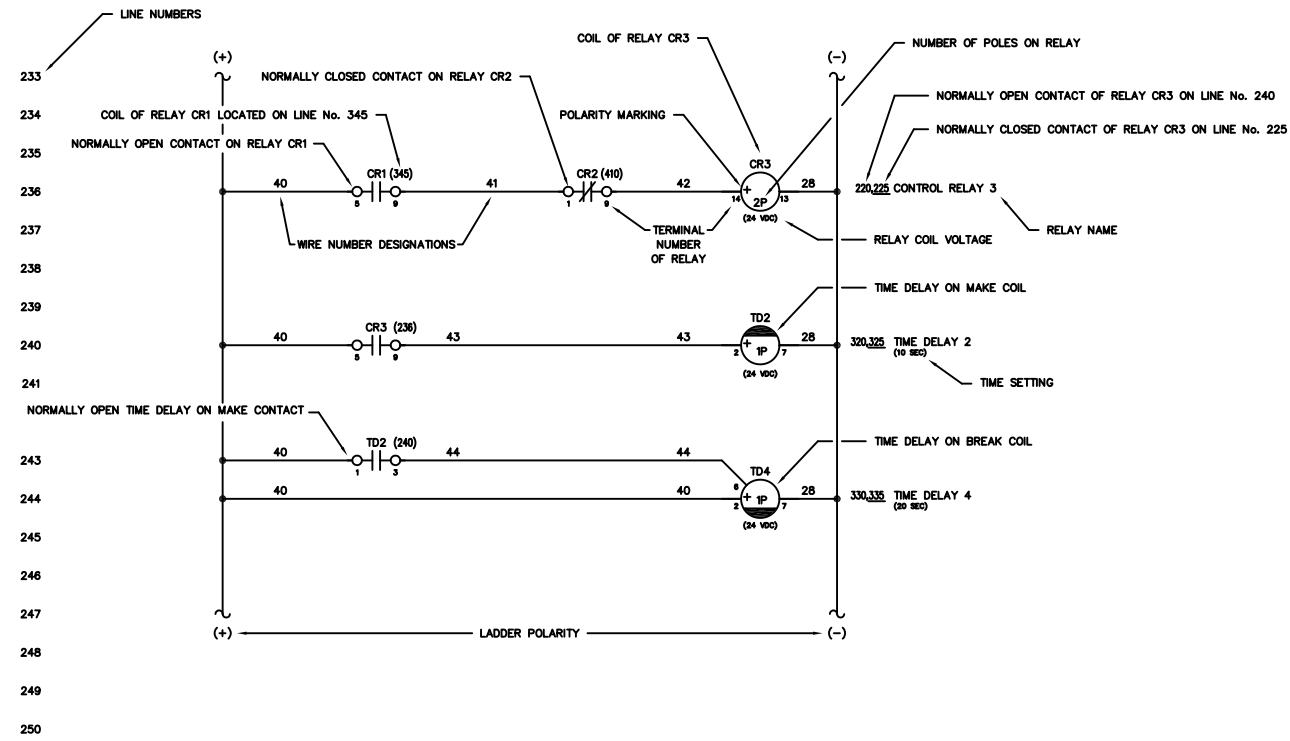
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LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR
ALASKA ENERGY AUTHORITY PURCHASE ORDER No. 008115
CONTROLLED POWER, INC. JOB No. 7844

<u>DRAWING No.</u>	<u>DRAWING TITLE</u>	<u>DRAWING No.</u>	<u>DRAWING TITLE</u>
7844-2101-D	COVER SHEET	7844-5310-D	MASTER DC CONTROL, SCHEMATIC DIAGRAM
7844-3101-D	SCHEMATIC LEGEND AND NOTES	7844-5311-D	MASTER DC CONTROL, SCHEMATIC DIAGRAM
7844-4101-D	GENERATOR SWITCHGEAR ELEVATION VIEW, OUTLINE DIAGRAM	7844-5312-D	MASTER DC CONTROL, SCHEMATIC DIAGRAM
7844-4102-D	ELECTRIC BOILER CONTROL PANEL ELEVATION VIEW, OUTLINE DIAGRAM	7844-5313-D	MASTER DC CONTROL, SCHEMATIC DIAGRAM
7844-4103-D	ELECTRIC BOILER SCR PANEL ELEVATION VIEW, OUTLINE DIAGRAM	7844-5314-D	FEEDER DC CONTROL, SCHEMATIC DIAGRAM
7844-5101-D	GENERATOR SWITCHGEAR SINGLE LINE, SCHEMATIC DIAGRAM	7844-5315-D	VFD DC CONTROL, SCHEMATIC DIAGRAM
7844-5201-D	GENERATOR 1 AC THREE LINE, SCHEMATIC DIAGRAM	7844-5316-D	ELECTRIC BOILER PANEL DC CONTROL, SCHEMATIC DIAGRAM
7844-5202-D	GENERATOR 2 AC THREE LINE, SCHEMATIC DIAGRAM	7844-5317-D	ELECTRIC BOILER PANEL DC CONTROL, SCHEMATIC DIAGRAM
7844-5203-D	GENERATOR 3 AC THREE LINE, SCHEMATIC DIAGRAM	7844-5401-D	GENERATOR 1 & 2 CIRCUIT BREAKER CONTROL, SCHEMATIC DIAGRAM
7844-5204-D	MASTER AC THREE LINE, SCHEMATIC DIAGRAM	7844-5402-D	GENERATOR 3 & FEEDER CIRCUIT BREAKER CONTROL, SCHEMATIC DIAGRAM
7844-5205-D	VFD AC THREE LINE, SCHEMATIC DIAGRAM	7844-5501-D	PLC COMMUNICATION, SCHEMATIC DIAGRAM
7844-5206-D	ELECTRIC BOILER AC THREE LINE, SCHEMATIC DIAGRAM	7844-5502-D	PLC COMMUNICATION, SCHEMATIC DIAGRAM
7844-5301-D	GENERATOR 1 DC CONTROL, SCHEMATIC DIAGRAM	7844-5601-D	COMMUNICATION NETWORK DIAGRAM
7844-5302-D	GENERATOR 1 DC CONTROL, SCHEMATIC DIAGRAM	7844-5602-D	COMMUNICATION NETWORK DIAGRAM
7844-5303-D	GENERATOR 1 DC CONTROL, SCHEMATIC DIAGRAM	7844-5701-D	AC SERVICE, LIGHTING & FAN CONTROL, SCHEMATIC DIAGRAM
7844-5304-D	GENERATOR 2 DC CONTROL, SCHEMATIC DIAGRAM	7844-5702-D	AC CONTROL POWER, SCHEMATIC DIAGRAM
7844-5305-D	GENERATOR 2 DC CONTROL, SCHEMATIC DIAGRAM	7844-6101-D	CONTROL SWITCH TARGET DIAGRAM
7844-5306-D	GENERATOR 2 DC CONTROL, SCHEMATIC DIAGRAM	7844-6201-D	NAMEPLATE ENGRAVING SCHEDULE, FABRICATION DIAGRAM
7844-5307-D	GENERATOR 3 DC CONTROL, SCHEMATIC DIAGRAM	7844-6202-D	ANNUNCIATOR WINDOWS, FABRICATION DIAGRAM
7844-5308-D	GENERATOR 3 DC CONTROL, SCHEMATIC DIAGRAM	7844-7101-D	INTERCONNECTION DIAGRAM
7844-5309-D	GENERATOR 3 DC CONTROL, SCHEMATIC DIAGRAM	7844-7102-D	INTERCONNECTION DIAGRAM



NOTES:

1. SCHEMATIC IS SHOWN AS FOLLOWS:
 - ALL AC AND DC POWER REMOVED
 - ALL RELAY CONTACTS DE-ENERGIZED
 - ALL CIRCUIT BREAKERS IN THE OPEN/RESET POSITION
 - ALL MODE SWITCHES IN THE "OFF" POSITION
 - ALL EMERGENCY STOP SWITCHES IN THE "NORMAL" POSITION
 - ALL PRESSURE SWITCHES SHOWN WITHOUT PRESSURE PRESENT
 - ALL LEVEL SWITCHES SHOWN WITHOUT FLUID PRESENT
 - ALL TEMPERATURE SWITCHES SHOWN AT AMBIENT
2. (O) INDICATES FIELD TERMINALS IN GENERATOR CONTROL SECTION.
3. (E) INDICATES TERMINALS AT ENGINE/GENERATOR.
4. (M) INDICATES INTERCONNECT TERMINALS IN MASTER SECTION.
5. (D) INDICATES FIELD TERMINALS IN MASTER SECTION.
6. (G) INDICATES INTERCONNECT TERMINALS IN GENERATOR CONTROL SECTION.
7. (V) INDICATES INTERCONNECT TERMINALS IN VFD/DIST SECTION.
8. (B) INDICATES FIELD TERMINALS IN VFD/DIST SECTION.
9. (S) INDICATES FIELD TERMINALS IN ELECTRIC BOILER SCR PANEL.
10. - INDICATES FIELD WIRING BY OTHERS
ALL CONTROL WIRING TO BE No. 14 AWG, 600 VOLT, TYPE SIS EXCEPT AS NOTED
11. SHIELDED WIRING TO BE No. 18 AWG, 300 VOLT, TWISTED LINE WITH 100% FOIL COVERAGE
12. ALL DIODES ARE 1N4007 EXCEPT AS NOTED

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: SCHEMATIC LEGEND & NOTES

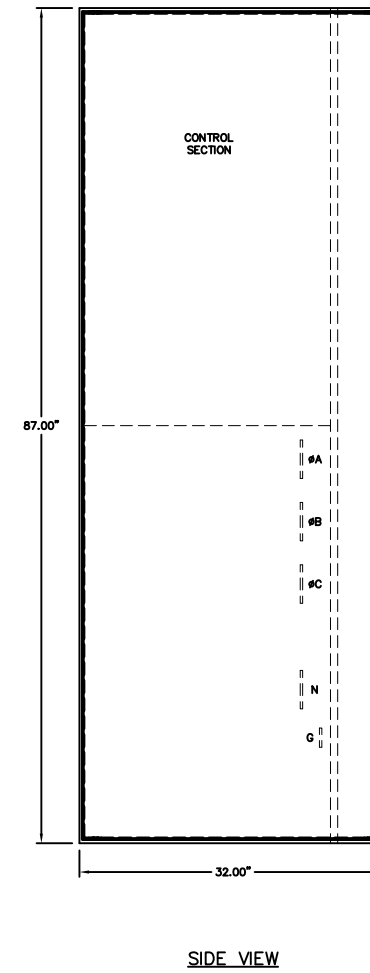
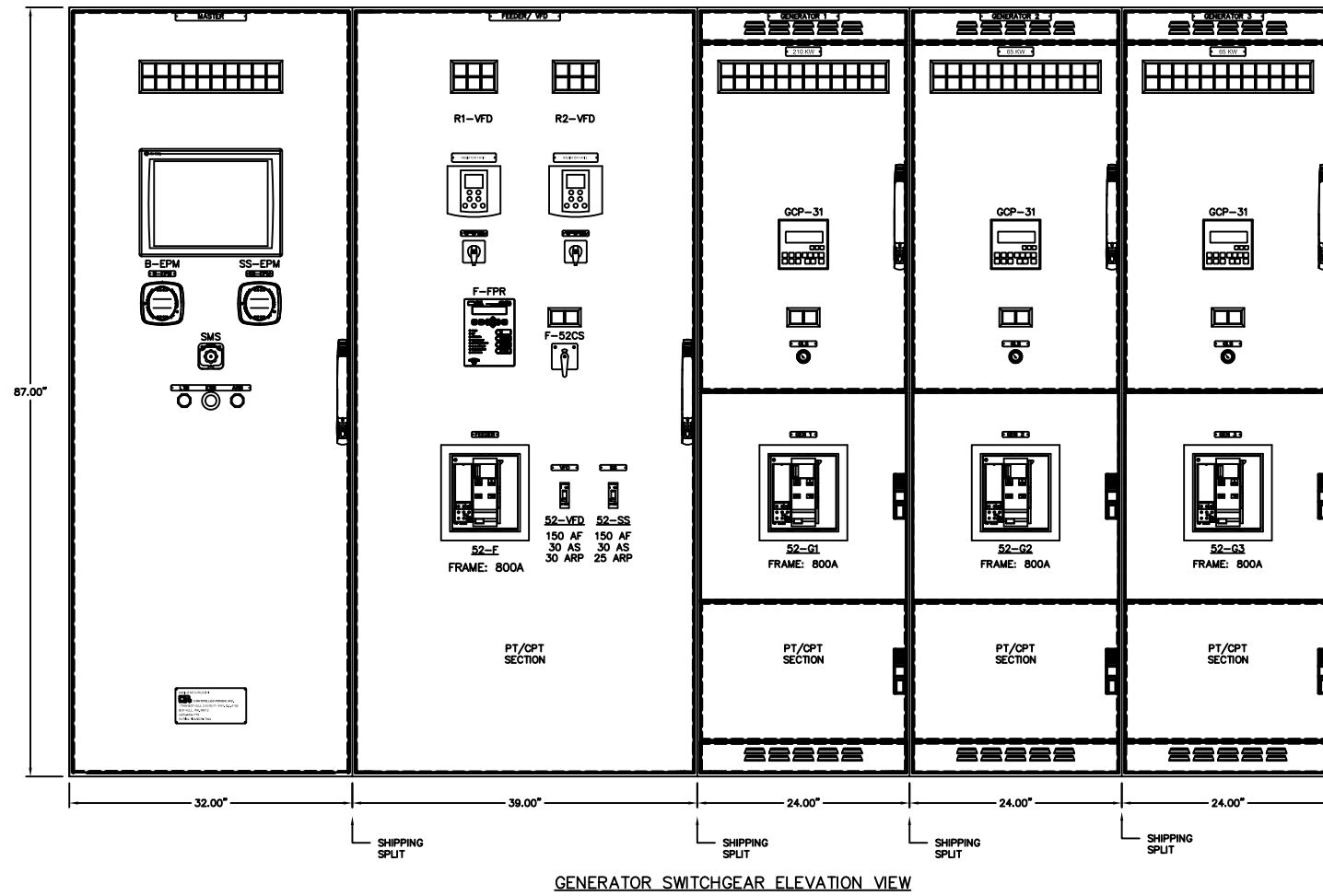
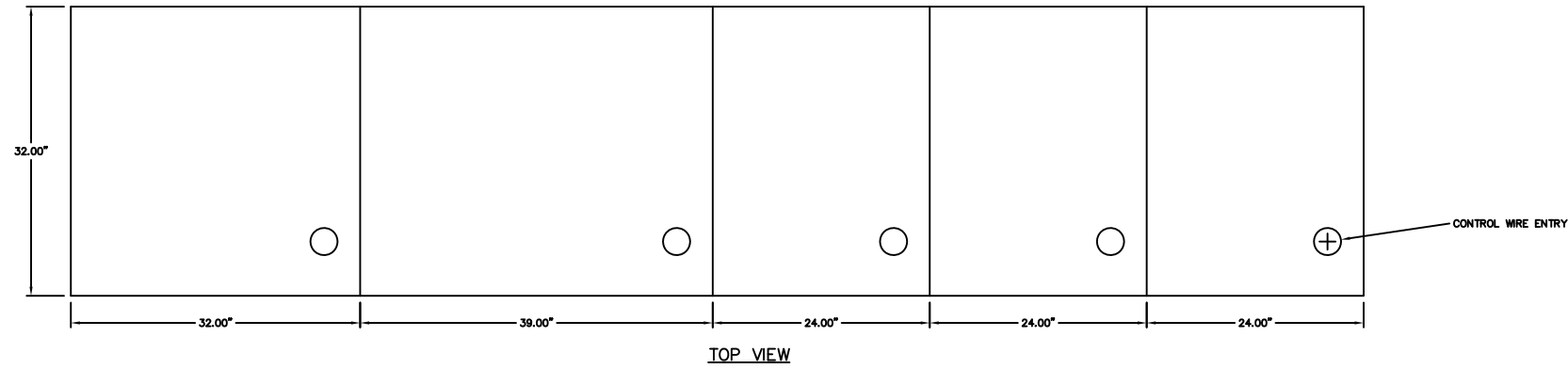
SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-3101-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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REV.	DATE	DESCRIPTION	BY
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: GENERATOR SWITCHGEAR ELEVATION VIEW, OUTLINE DIAGRAM

SCALE: 1/10 DATE: 08-26-13 DWN. BY: GPN

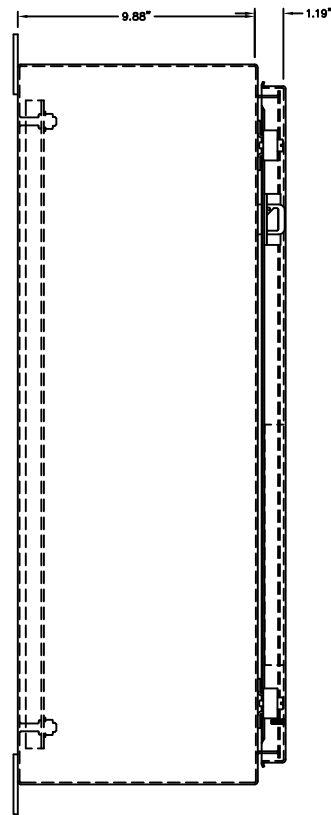
DWG. No: 7844-4101-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

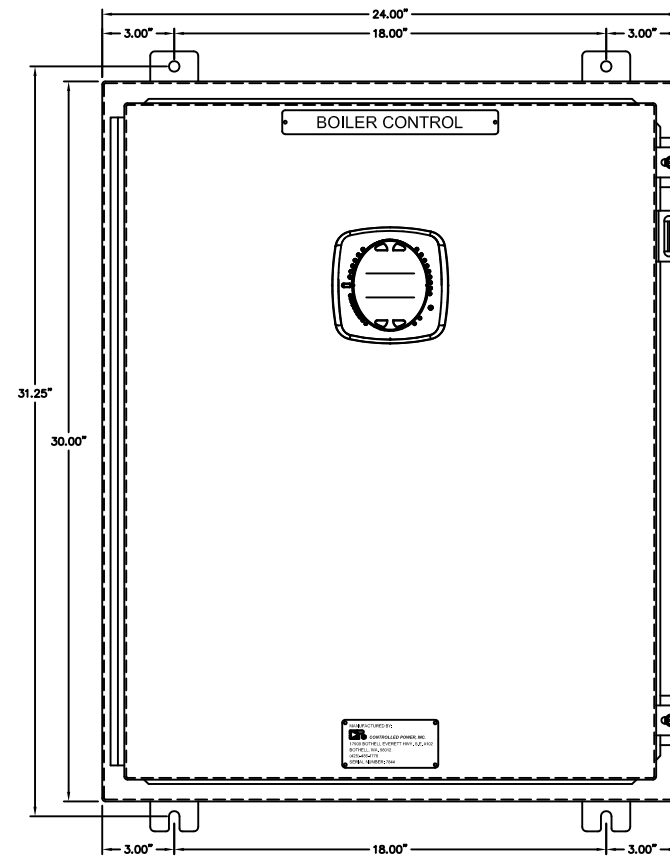
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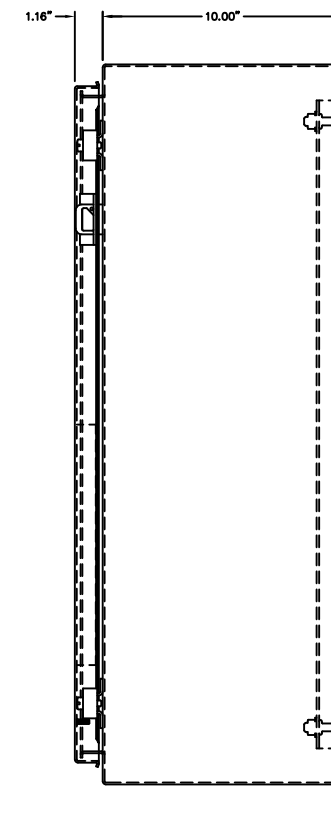
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LEFT SIDE VIEW



BOILER PANEL - TYPICAL FRONT VIEW



RIGHT SIDE VIEW



TYPICAL BOTTOM VIEW

REV.	DATE	DESCRIPTION	BY
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: ELECTRIC BOILER CONTROL PANEL ELEVATION VIEW, OUTLINE DIAGRAM

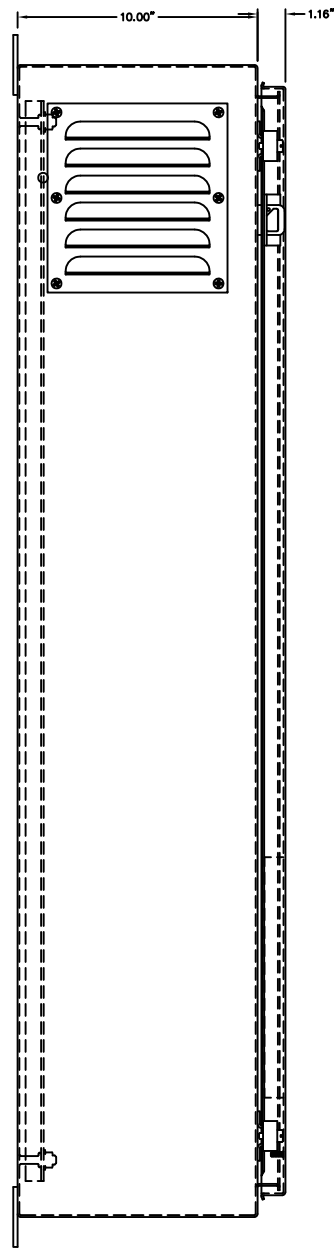
SCALE: 1/4 DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-4102-D SHEET: 1 OF 1 CKD. BY: JMD

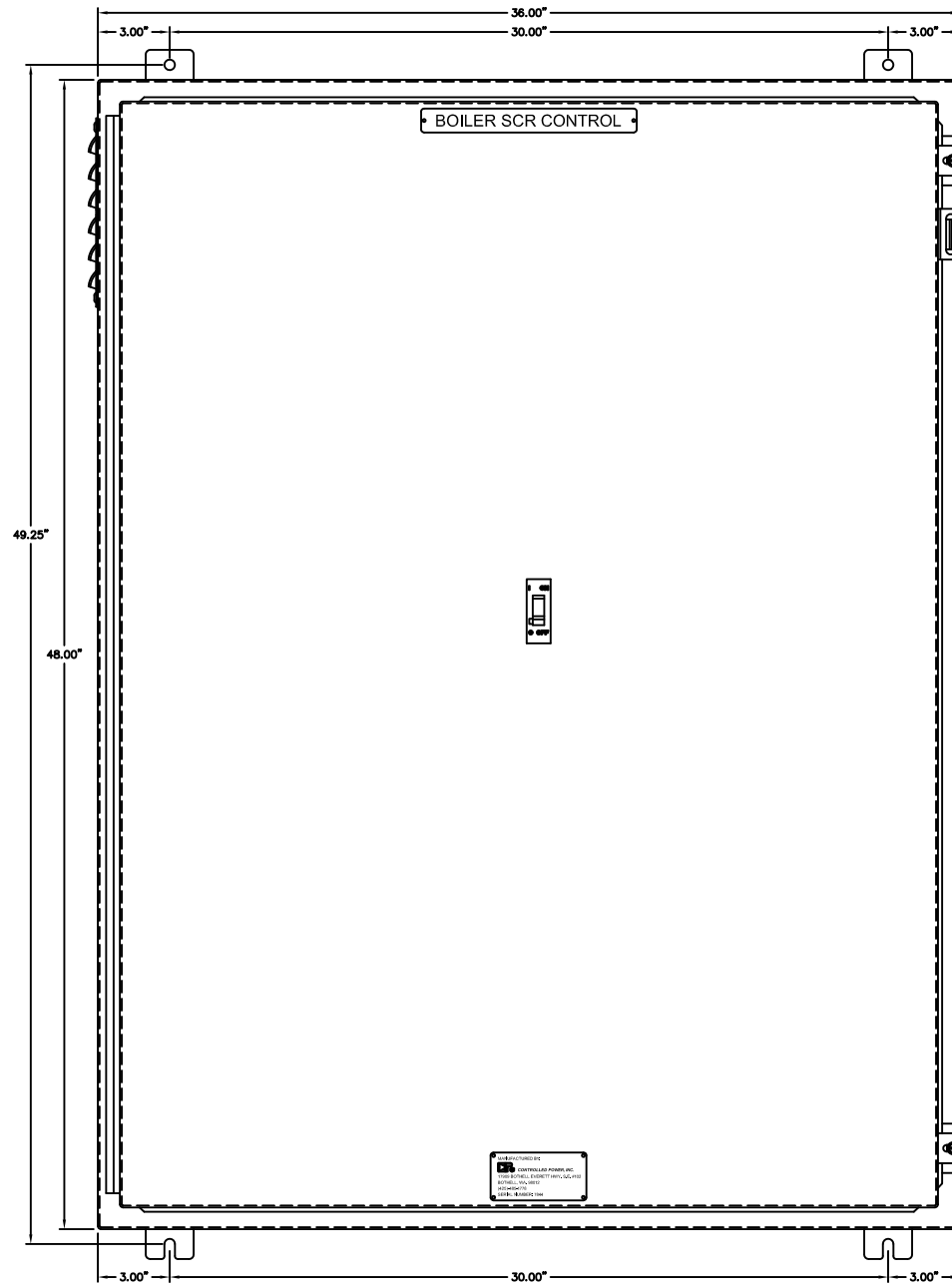
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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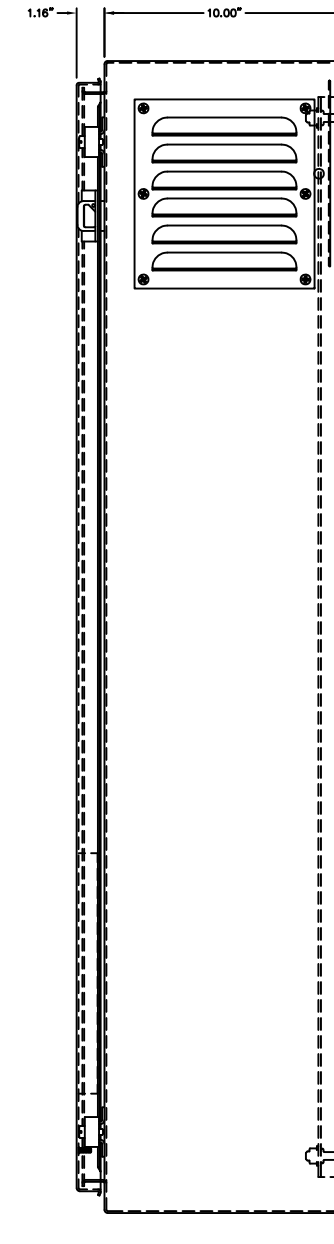
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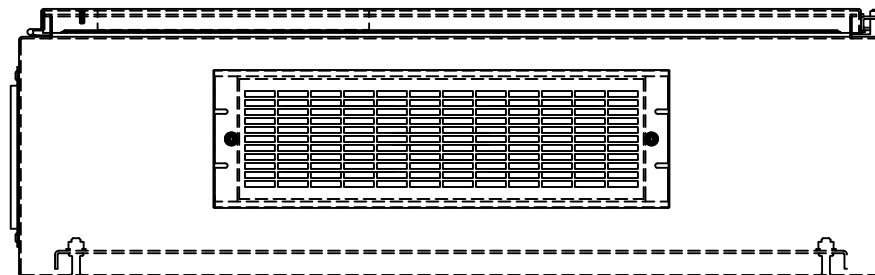
LEFT SIDE VIEW



SCR PANEL - TYPICAL FRONT VIEW



RIGHT SIDE VIEW



TYPICAL BOTTOM VIEW

REV.	DATE	DESCRIPTION	BY
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844
 TITLE: ELECTRIC BOILER SCR PANEL ELEVATION VIEW, OUTLINE DIAGRAM

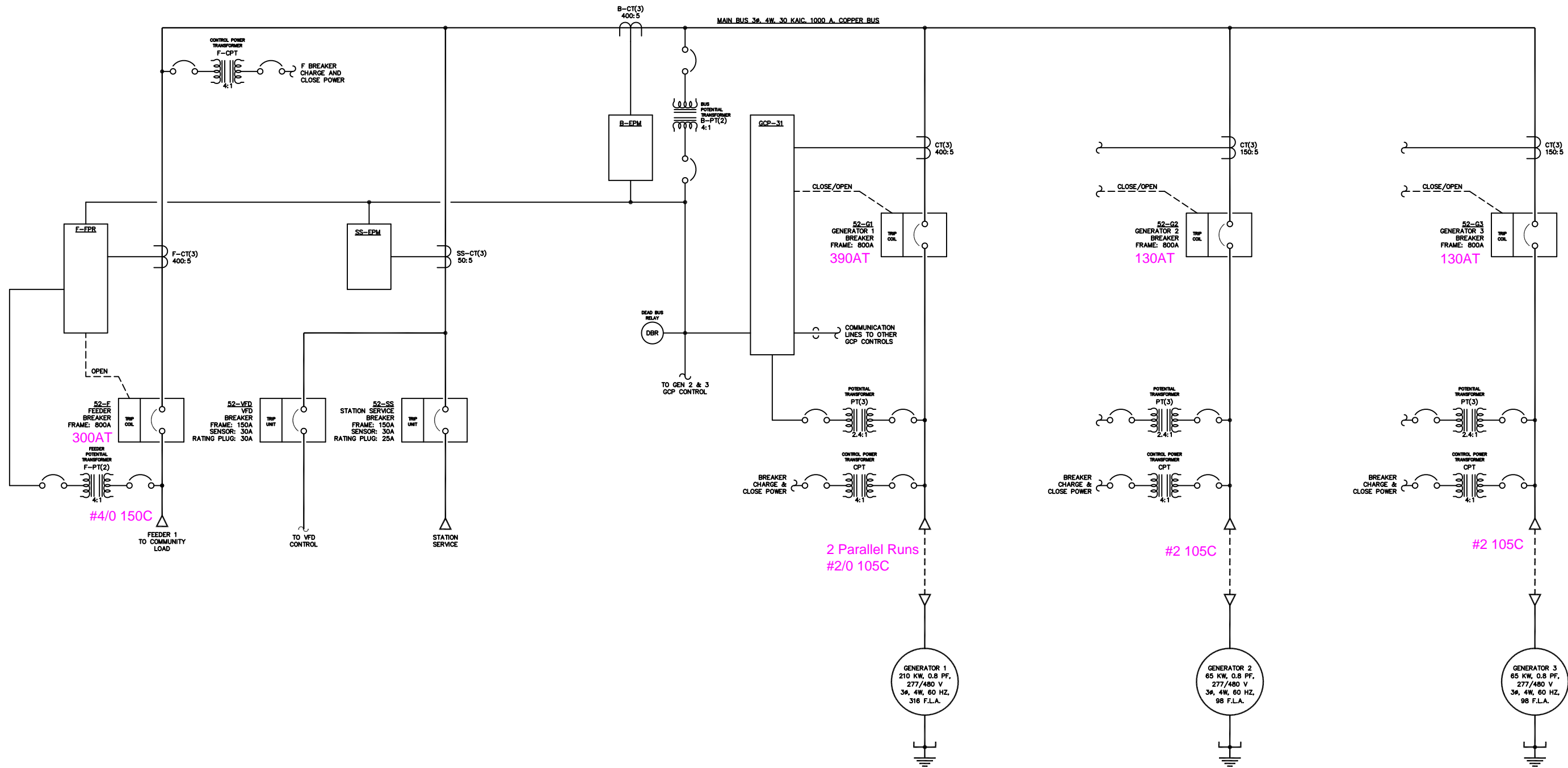
SCALE: 1/4 DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-4103-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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Notes:
 1) Conductor sizes and temperature ratings shown based on original design and have not been confirmed. Field verify.
 2) Breaker trip setpoints shown based on original commissioning and may not match present operating conditions. Field verify.

NOTES:
 1. GENERATORS 2 & 3 SIMILAR TO GENERATOR 1.

NOTE:
 1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844
 TITLE: GENERATOR SWITCHGEAR SINGLE LINE, SCHEMATIC DIAGRAM

SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

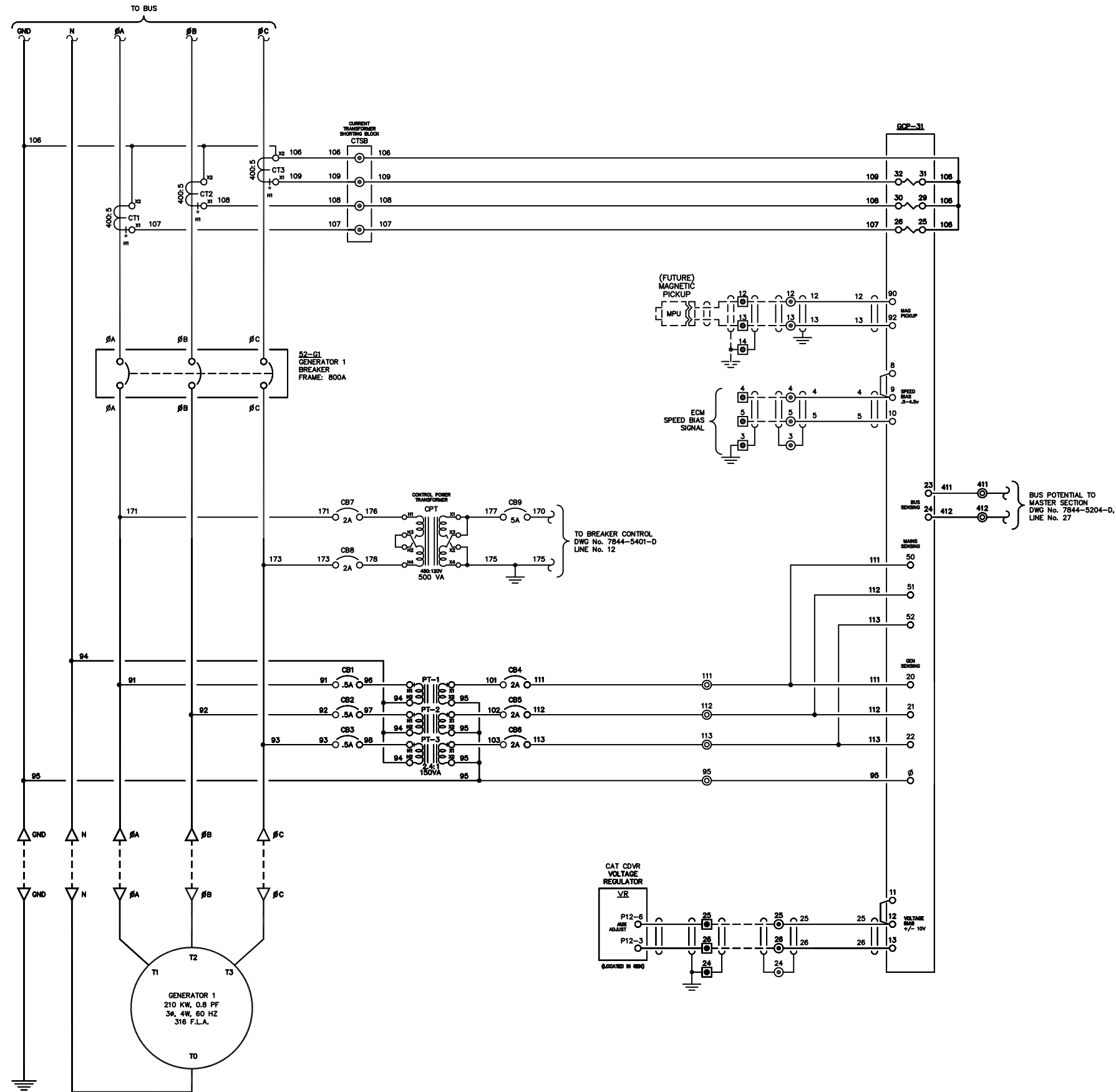
DWG. No: 7844-5101-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

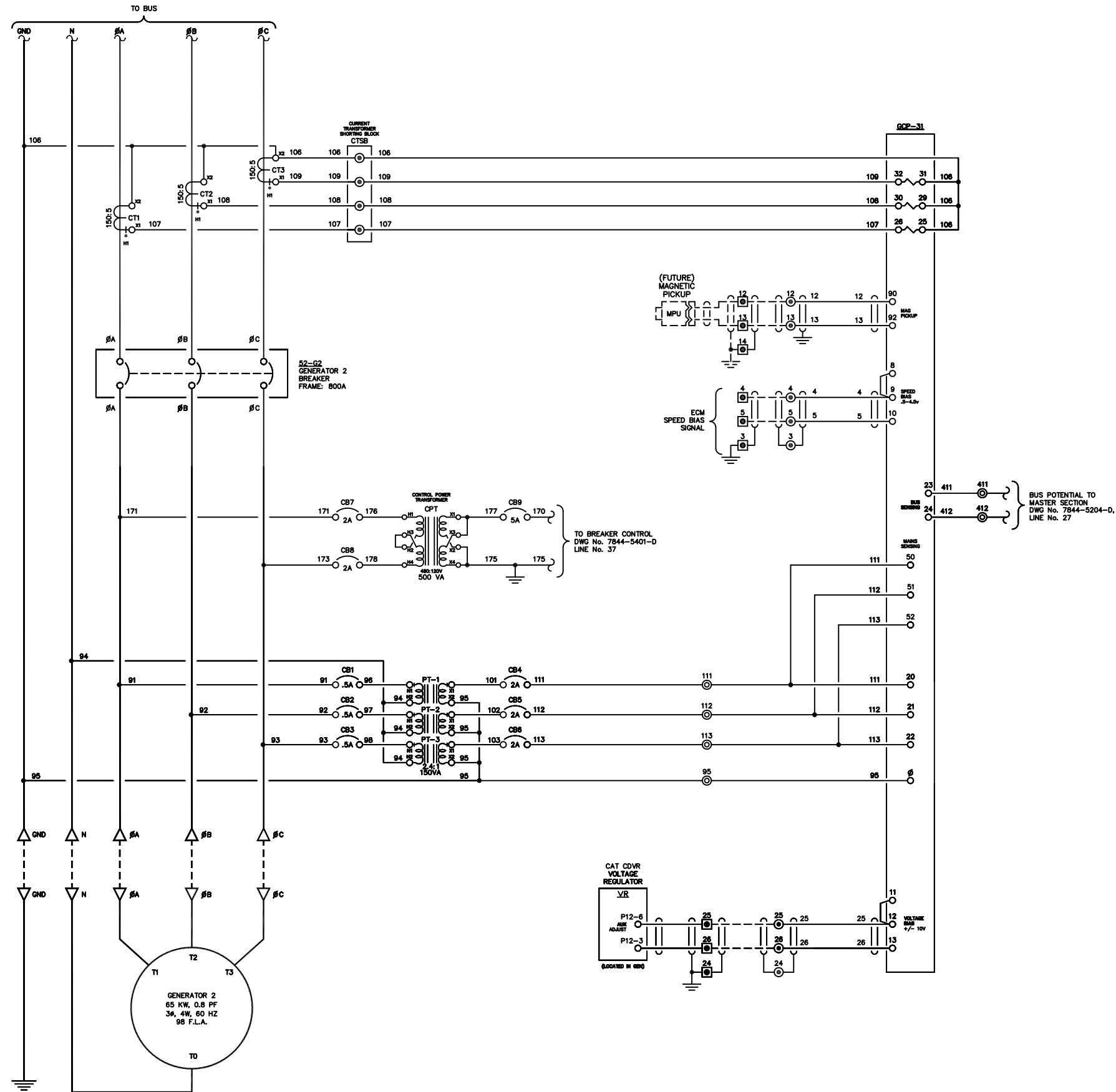
AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844
TITLE: GENERATOR 1 AC THREE LINE, SCHEMATIC DIAGRAM

SCALE: NONE DATE: 08-26-13 DWN. BY: GPN
DWG. No: 7844-5201-D SHEET: 1 OF 1 CKD. BY: JMD
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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NOTE:
 1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

REV.	DATE	DESCRIPTION	BY
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B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN

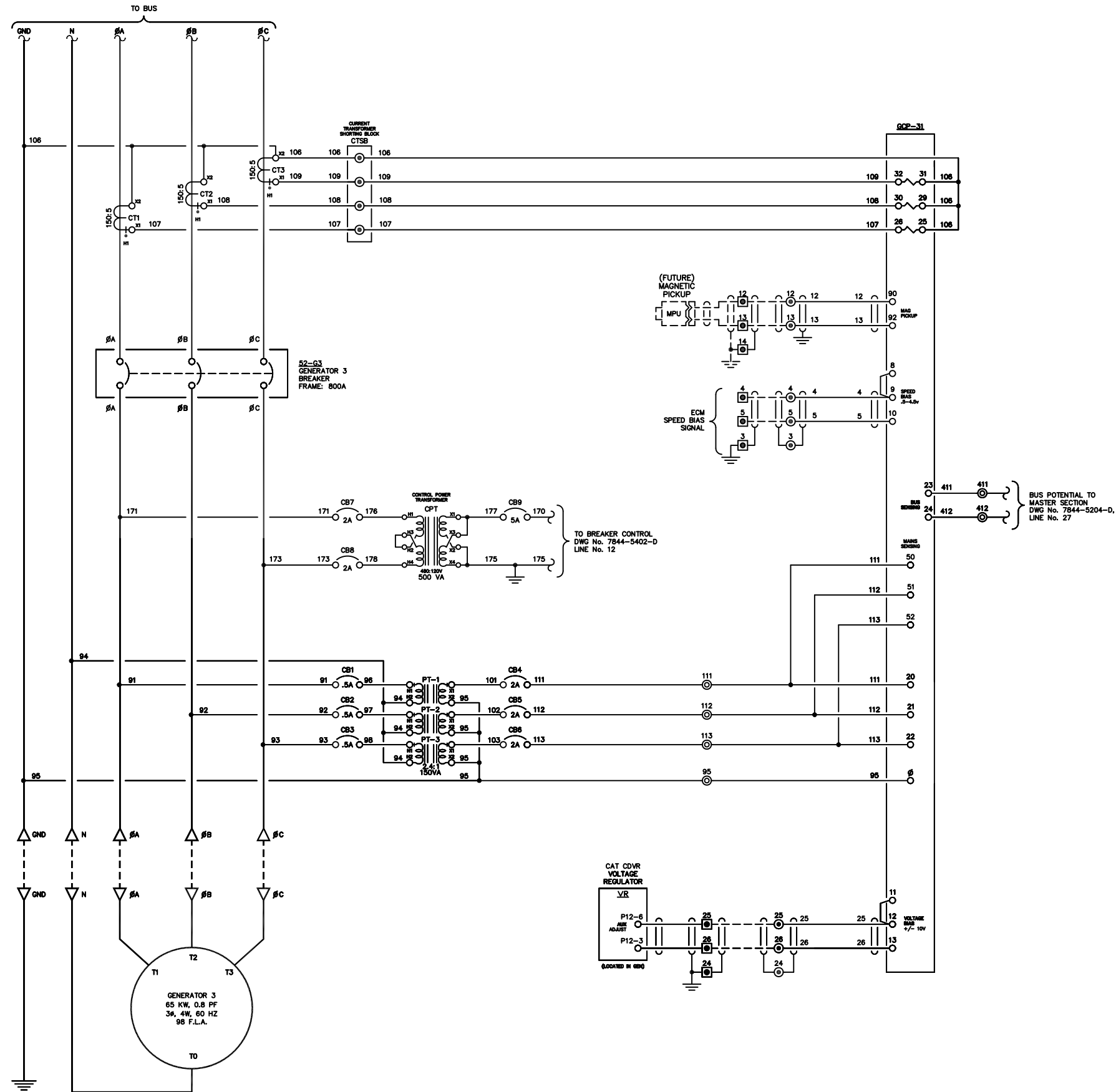
AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844
 TITLE: GENERATOR 2 AC THREE LINE, SCHEMATIC DIAGRAM

SCALE: NONE DATE: 08-26-13 DWN. BY: GPN
 DWG. No: 7844-5202-D SHEET: 1 OF 1 CKD. BY: JMD
 JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

REV.	DATE	DESCRIPTION	BY
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844
TITLE: GENERATOR 3 AC THREE LINE, SCHEMATIC DIAGRAM

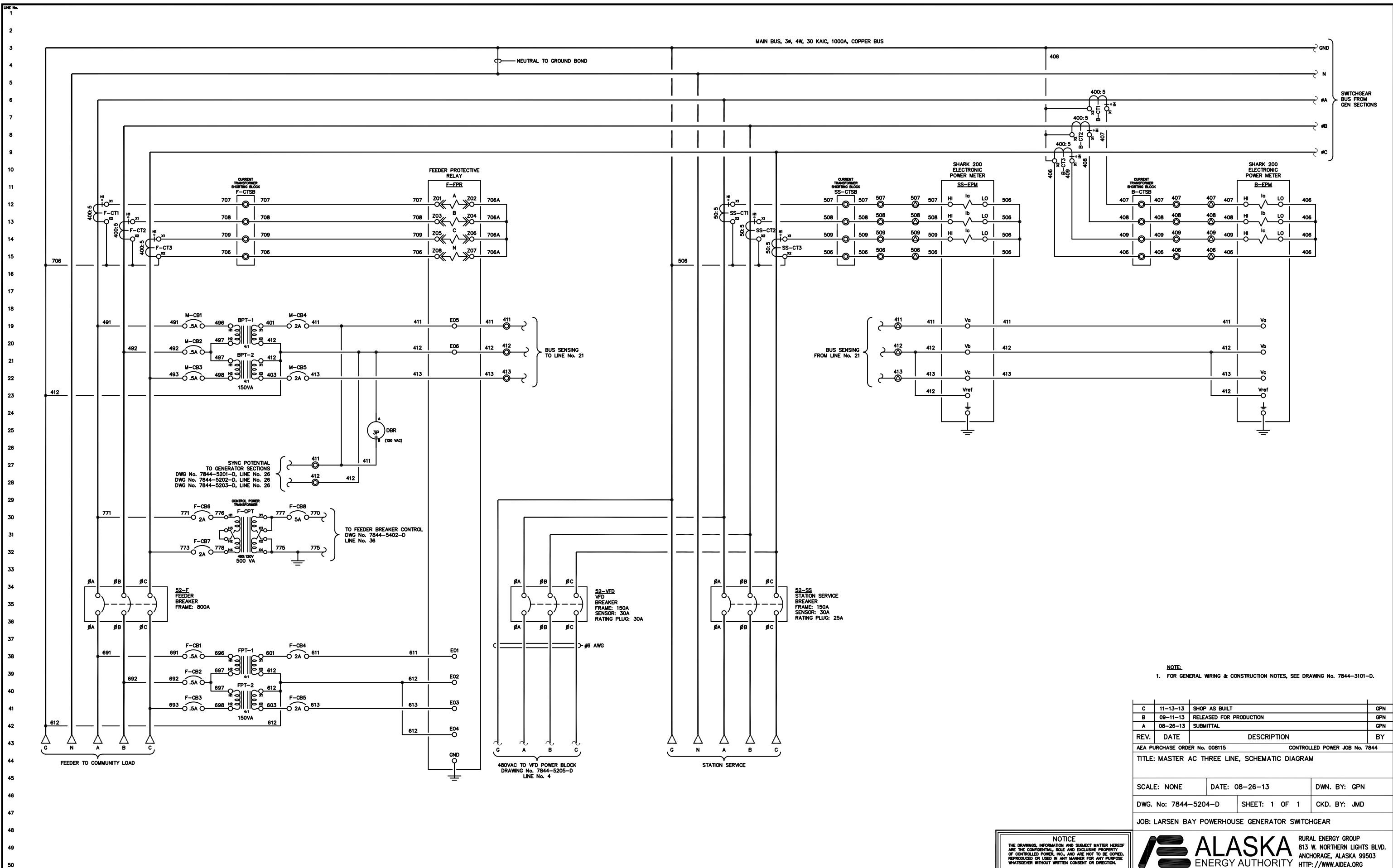
SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5203-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: MASTER AC THREE LINE, SCHEMATIC DIAGRAM

SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

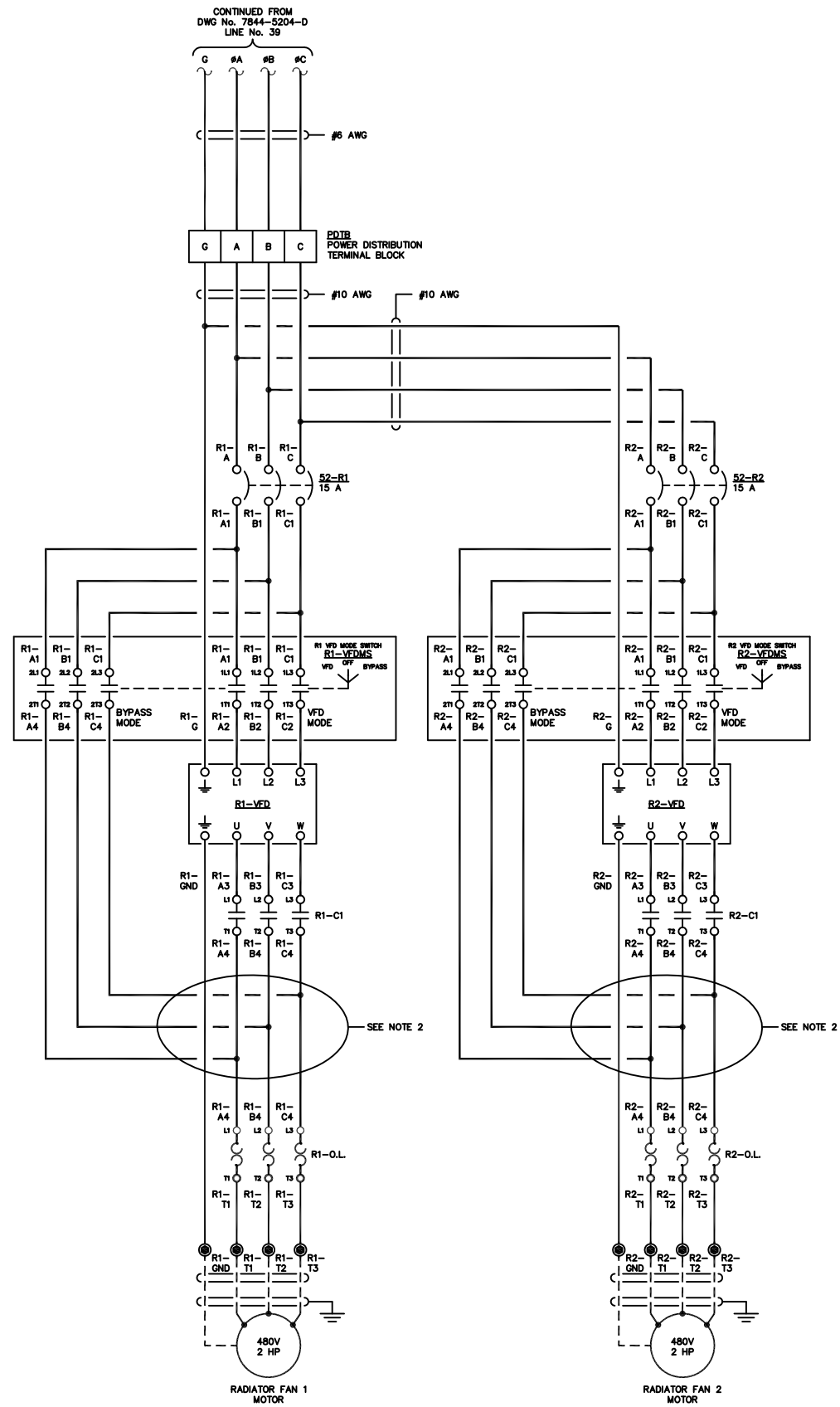
DWG. No: 7844-5204-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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- NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.
 2. VFD LOAD WIRES SHALL BE ROUTED SEPARATE FROM ALL OTHER WIRING OR SHIELDED TO AVOID RF INTERFERENCE.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844
TITLE: VFD AC THREE LINE, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-26-13	DWN. BY: GPN
DWG. No: 7844-5205-D	SHEET: 1 OF 1	CKD. BY: JMD
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR		

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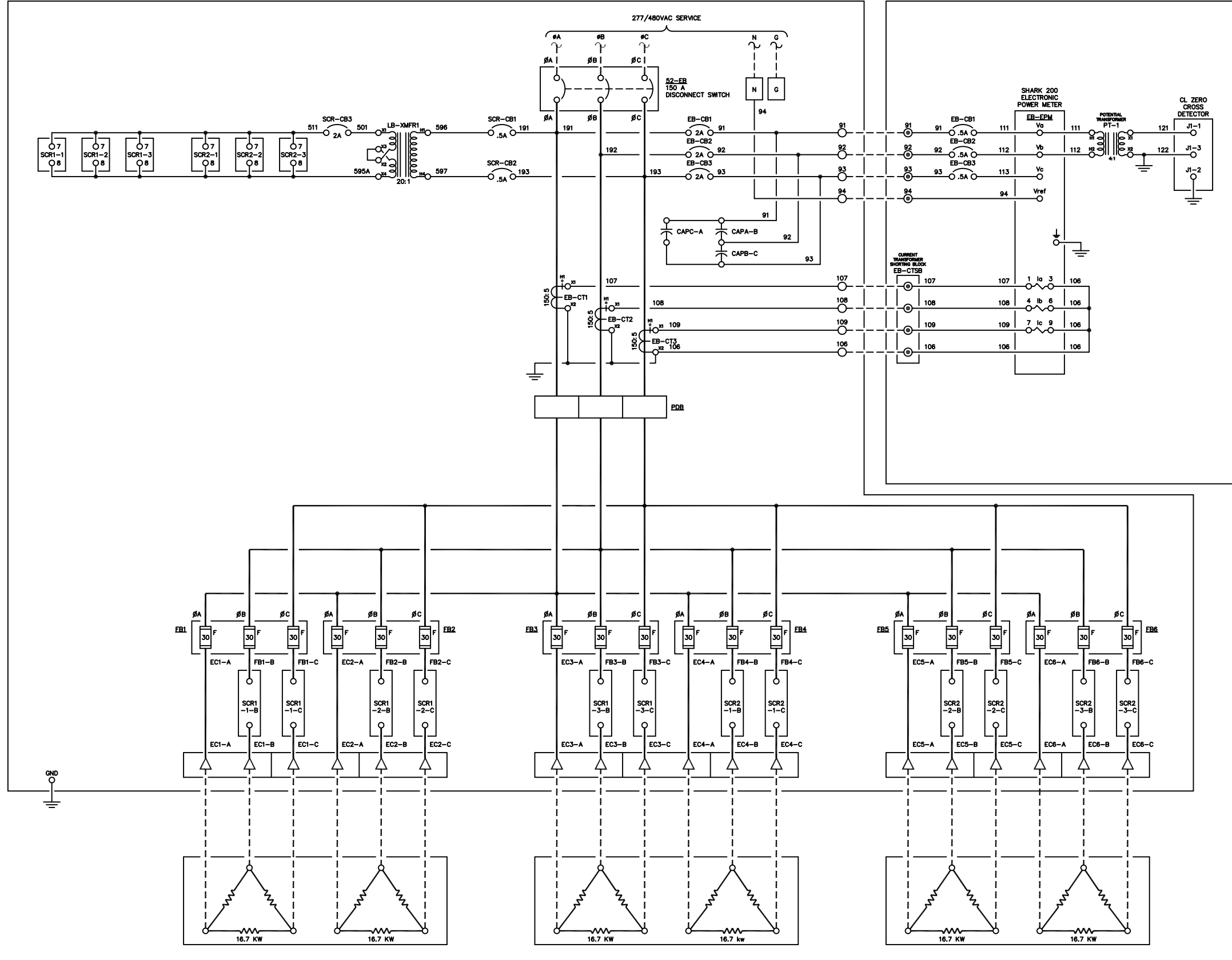
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ELECTRICAL BOILER DISCONNECT / SCR PANEL

ELECTRIC BOILER CONTROL PANEL



- NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.
 2. VFD LOAD WIRES SHALL BE ROUTED SEPARATE FROM ALL OTHER WIRING OR SHIELDED TO AVOID RF INTERFERENCE.

REV.	DATE	DESCRIPTION	BY
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: ELECTRIC BOILER AC THREE LINE, SCHEMATIC DIAGRAM

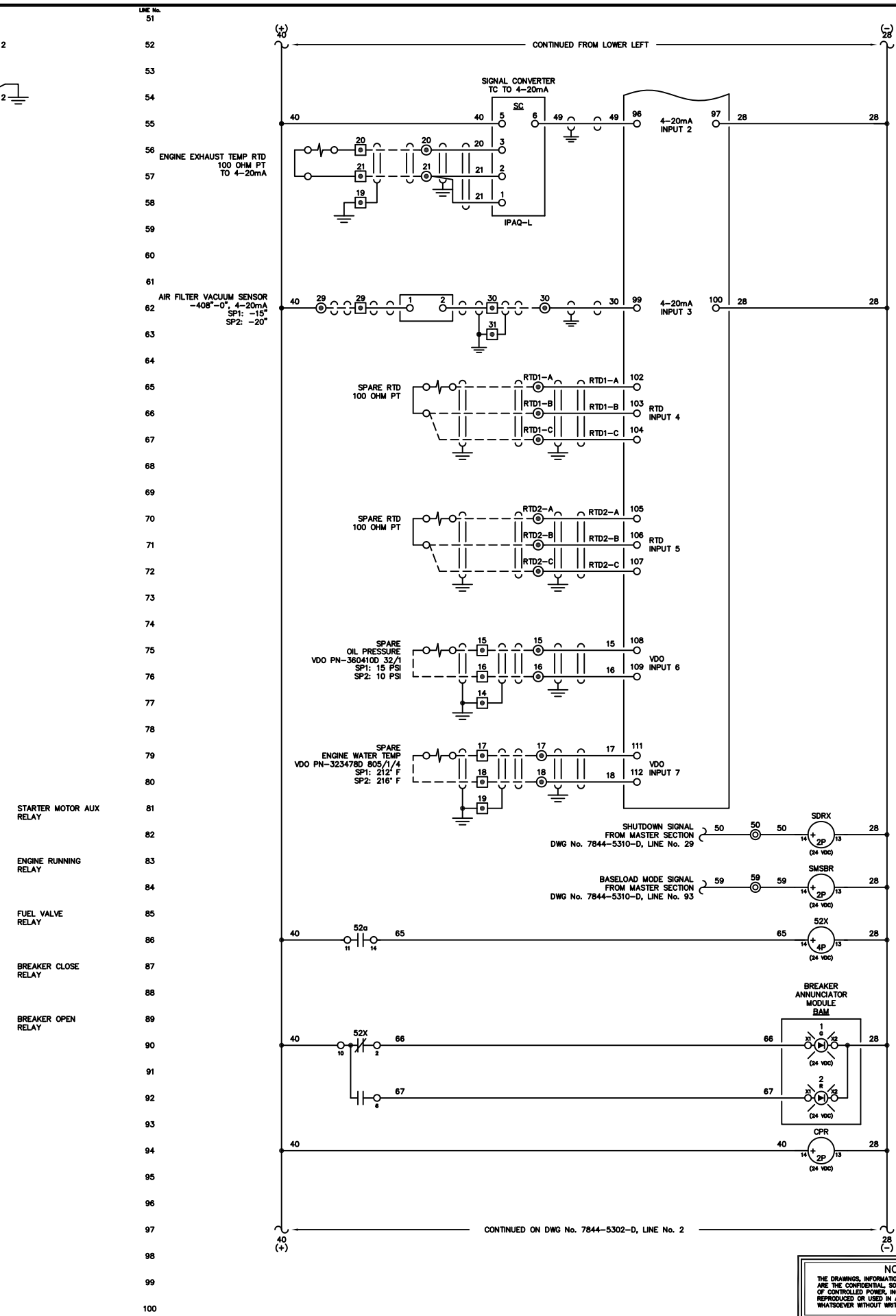
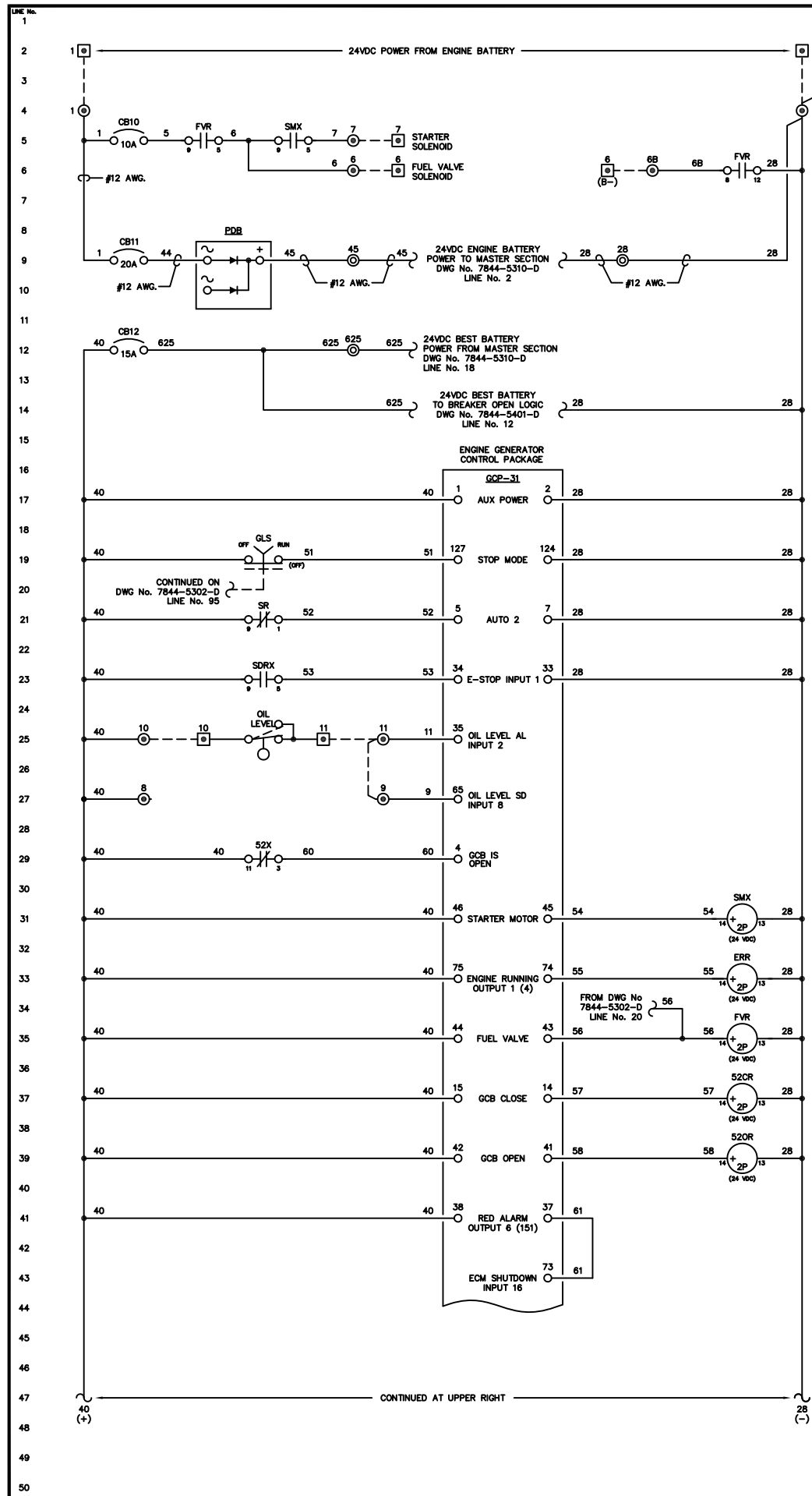
SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5206-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: GENERATOR 1 DC CONTROL, SCHEMATIC DIAGRAM

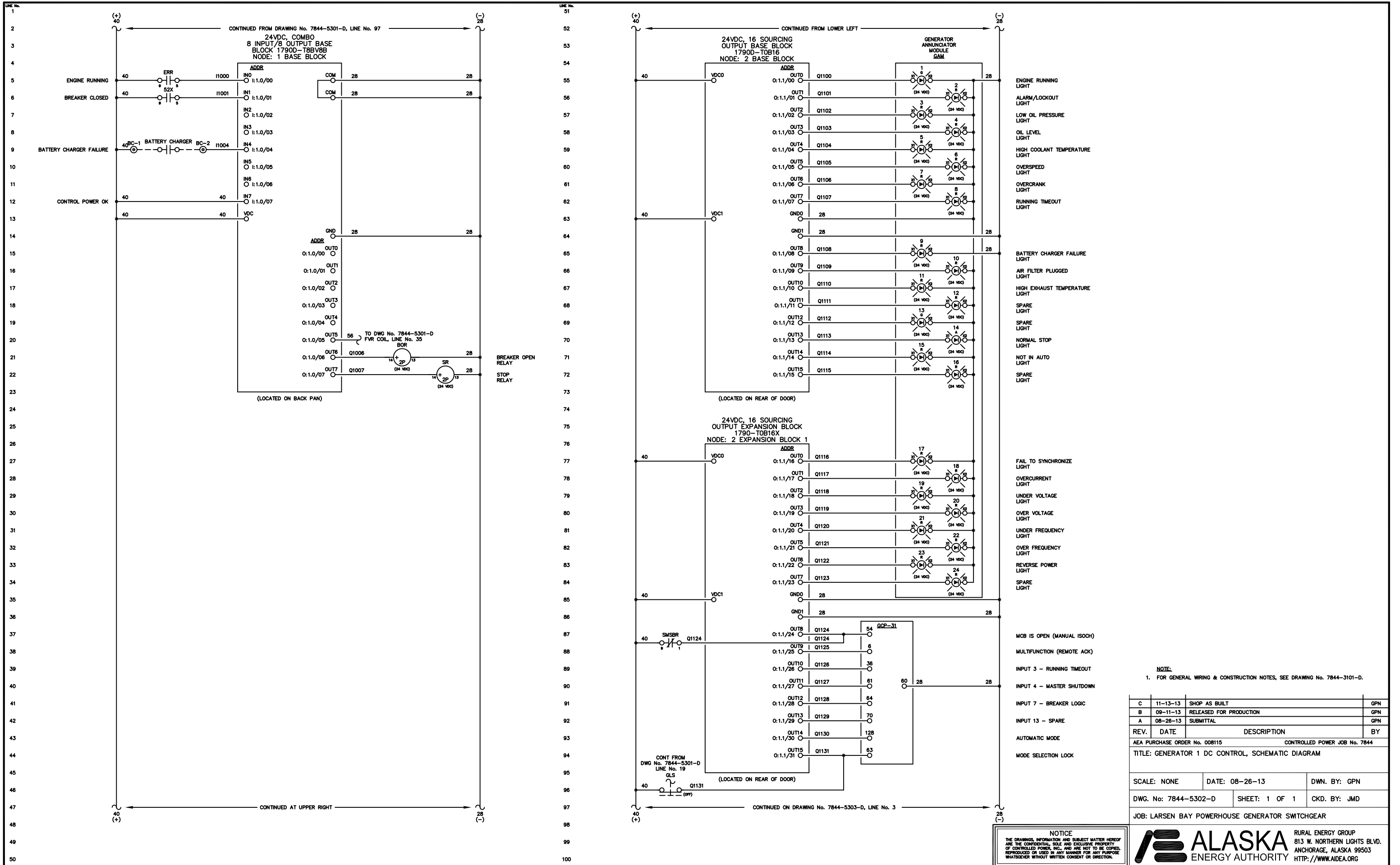
SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5301-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

REV.	DATE	DESCRIPTION	BY
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B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN

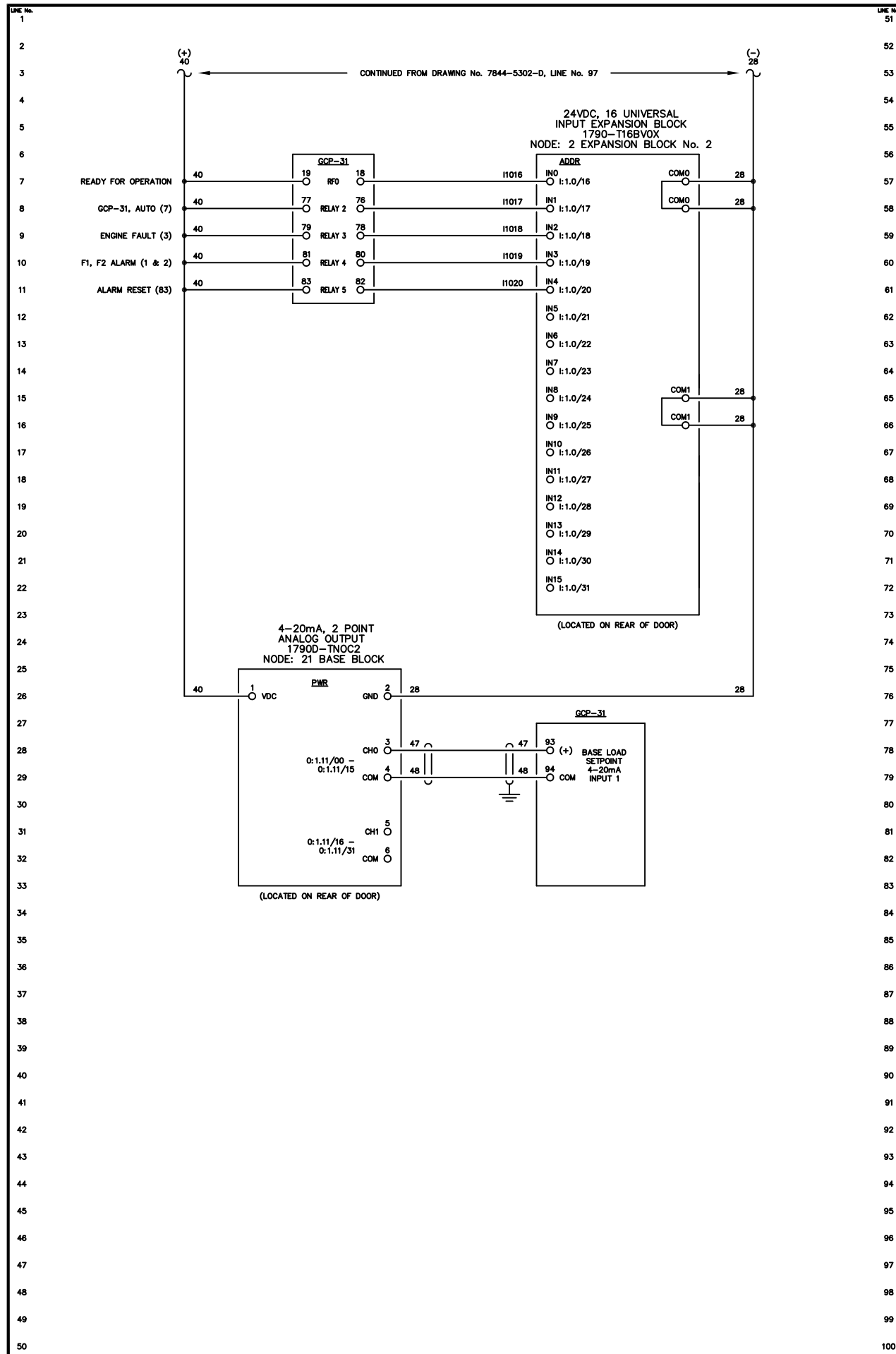
AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844
TITLE: GENERATOR 1 DC CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5302-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR





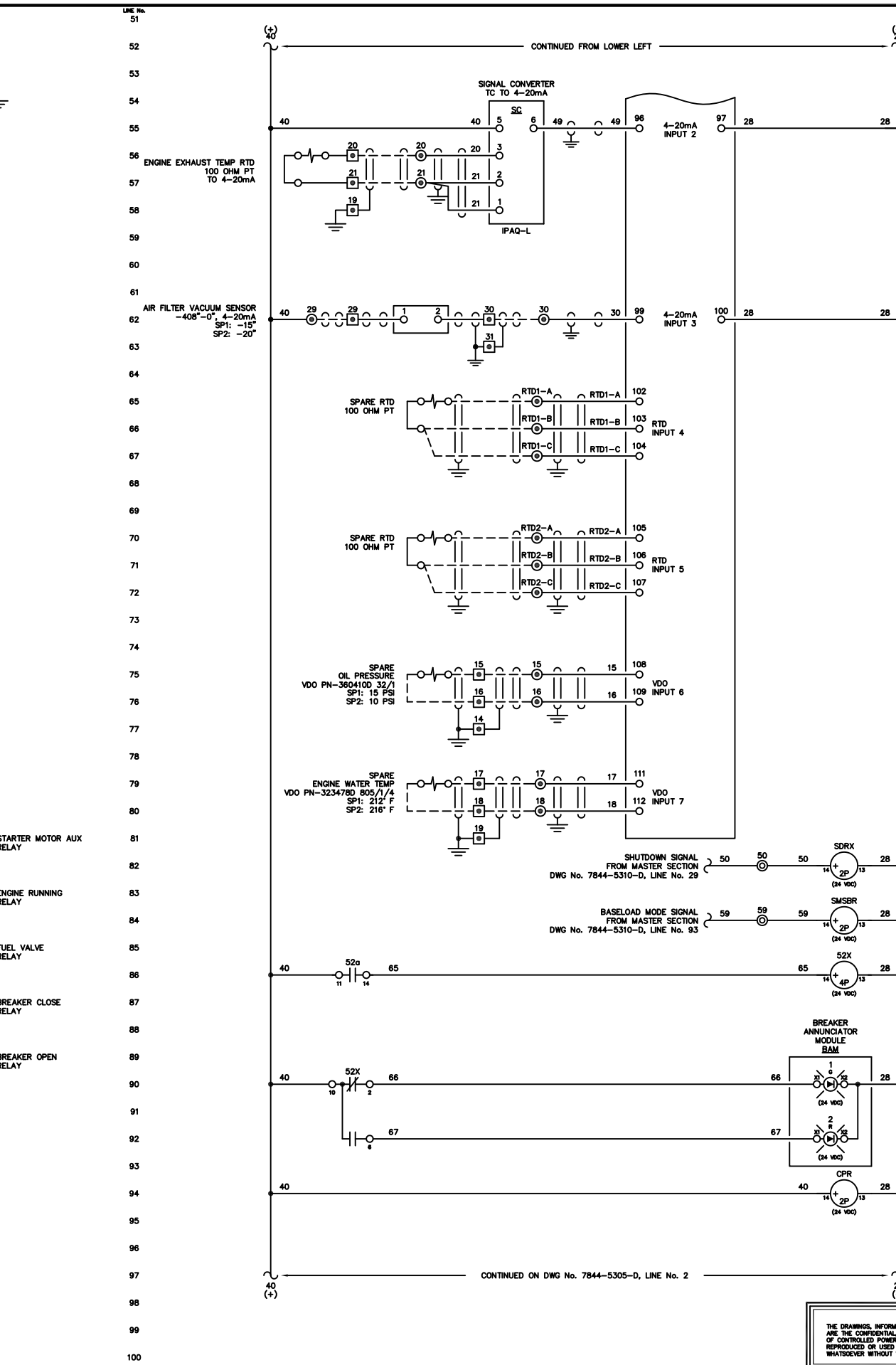
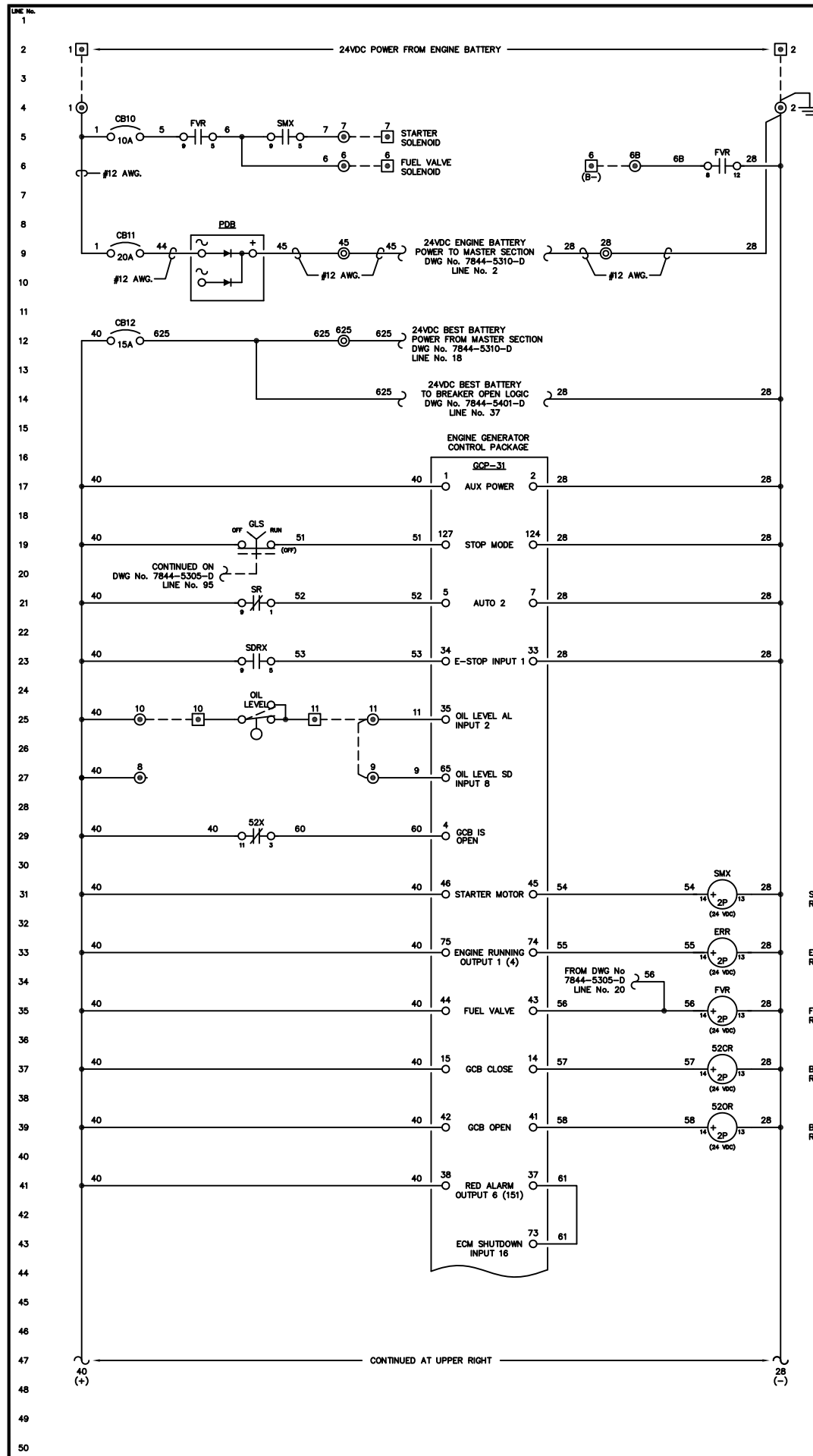
NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY
AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844			
TITLE: GENERATOR 1 DC CONTROL, SCHEMATIC DIAGRAM			
SCALE: NONE	DATE: 08-26-13	DWN. BY: GPN	
DWG. No: 7844-5303-D	SHEET: 1 OF 1	CKD. BY: JMD	
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR			

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: GENERATOR 2 DC CONTROL, SCHEMATIC DIAGRAM

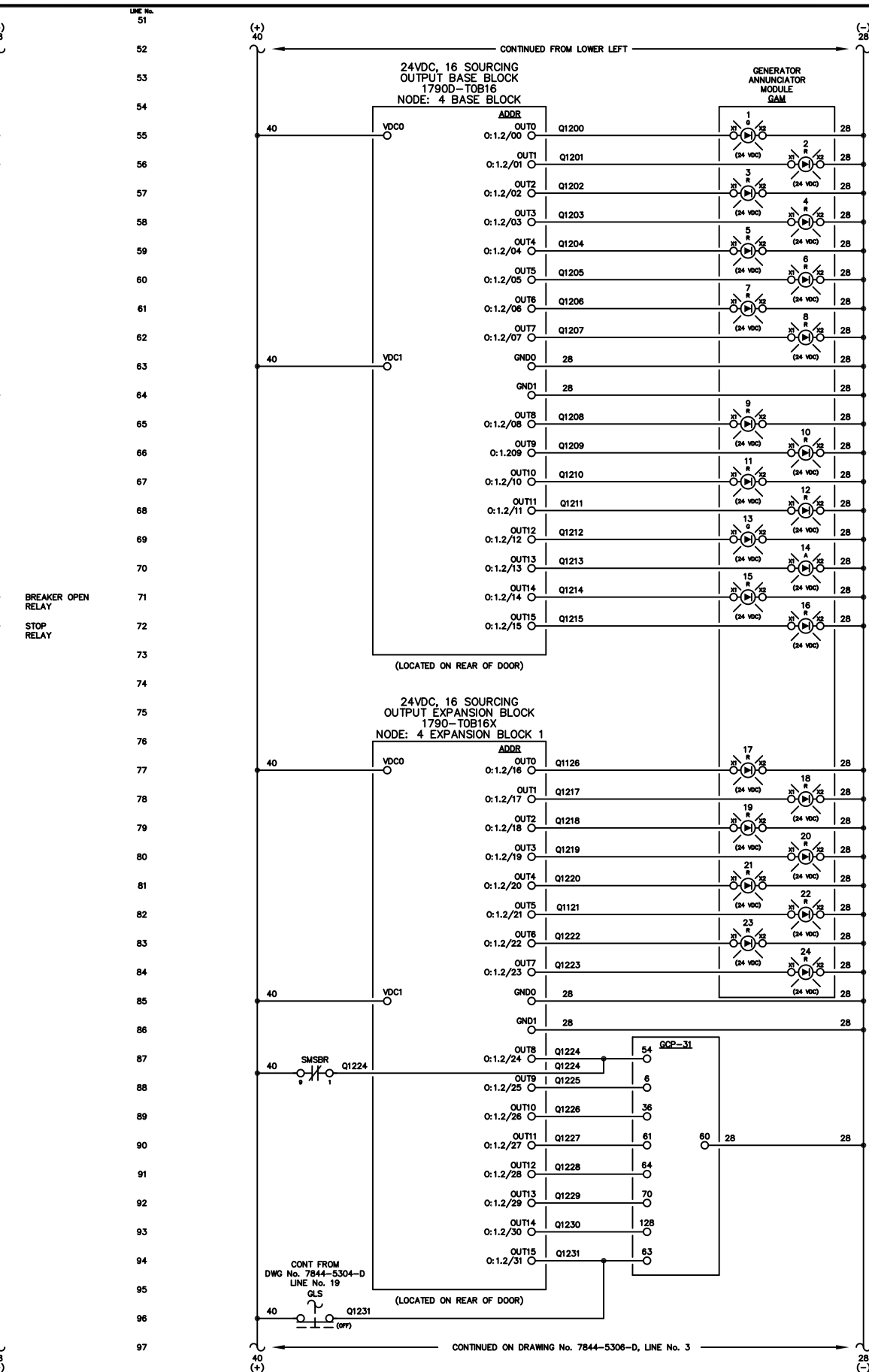
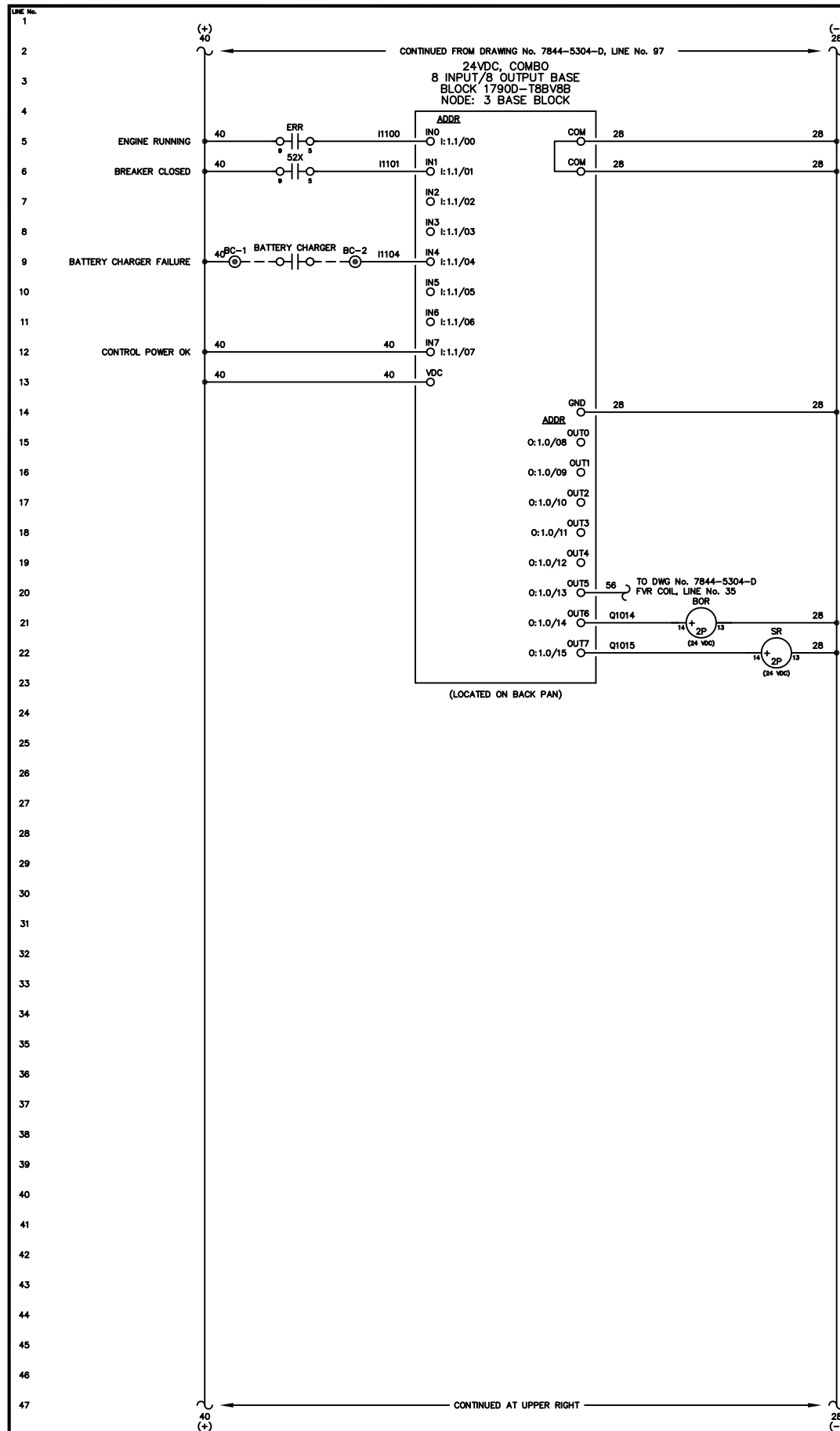
SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5304-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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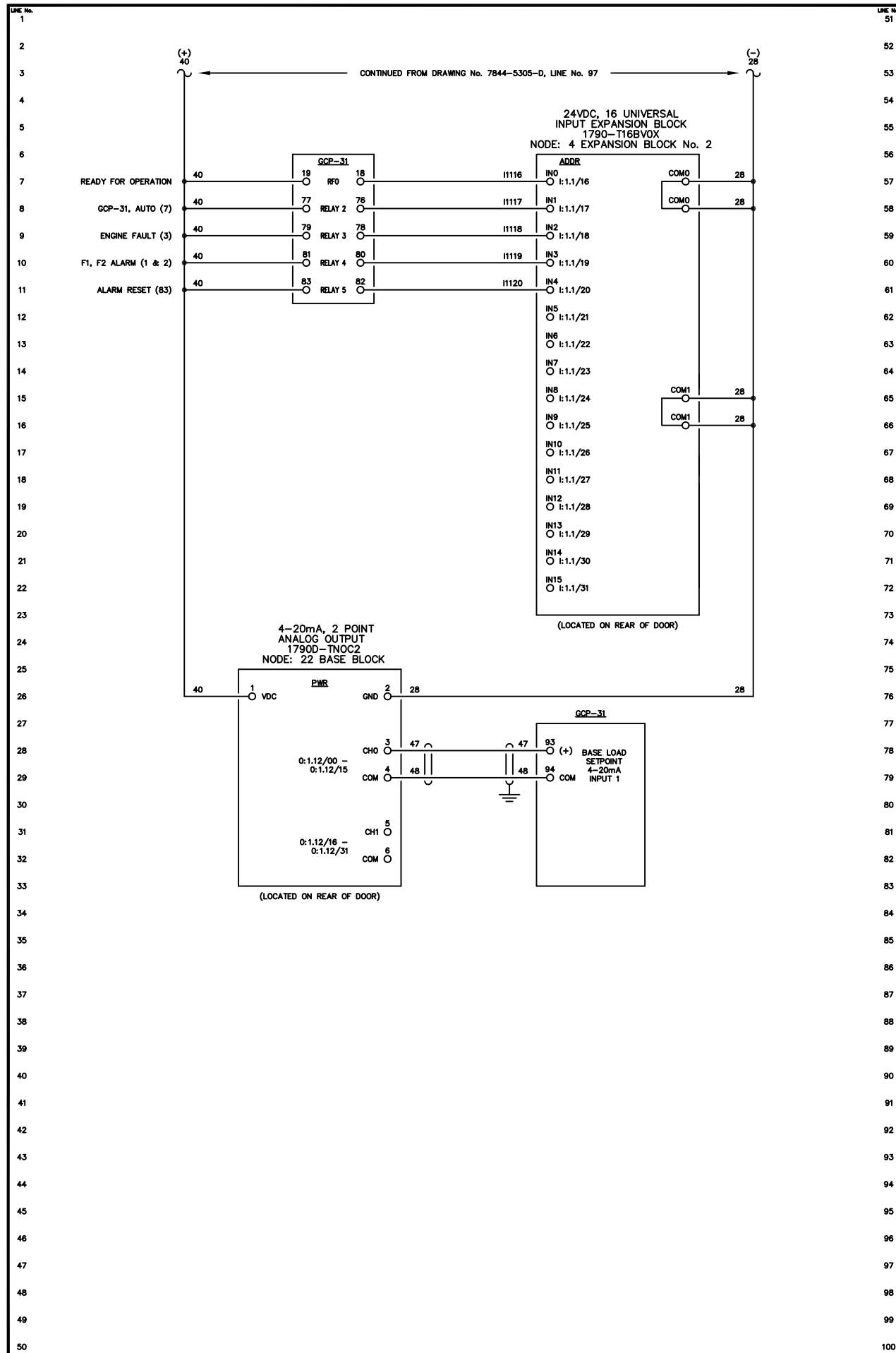
NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	BY

REV.	DATE	DESCRIPTION	BY
AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844			
TITLE: GENERATOR 2 DC CONTROL, SCHEMATIC DIAGRAM			
SCALE: NONE	DATE: 08-26-13	DWN. BY: GPN	
DWG. No: 7844-5305-D	SHEET: 1 OF 1	CKD. BY: JMD	
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR			

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

REV.	DATE	DESCRIPTION	BY
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: GENERATOR 2 DC CONTROL, SCHEMATIC DIAGRAM

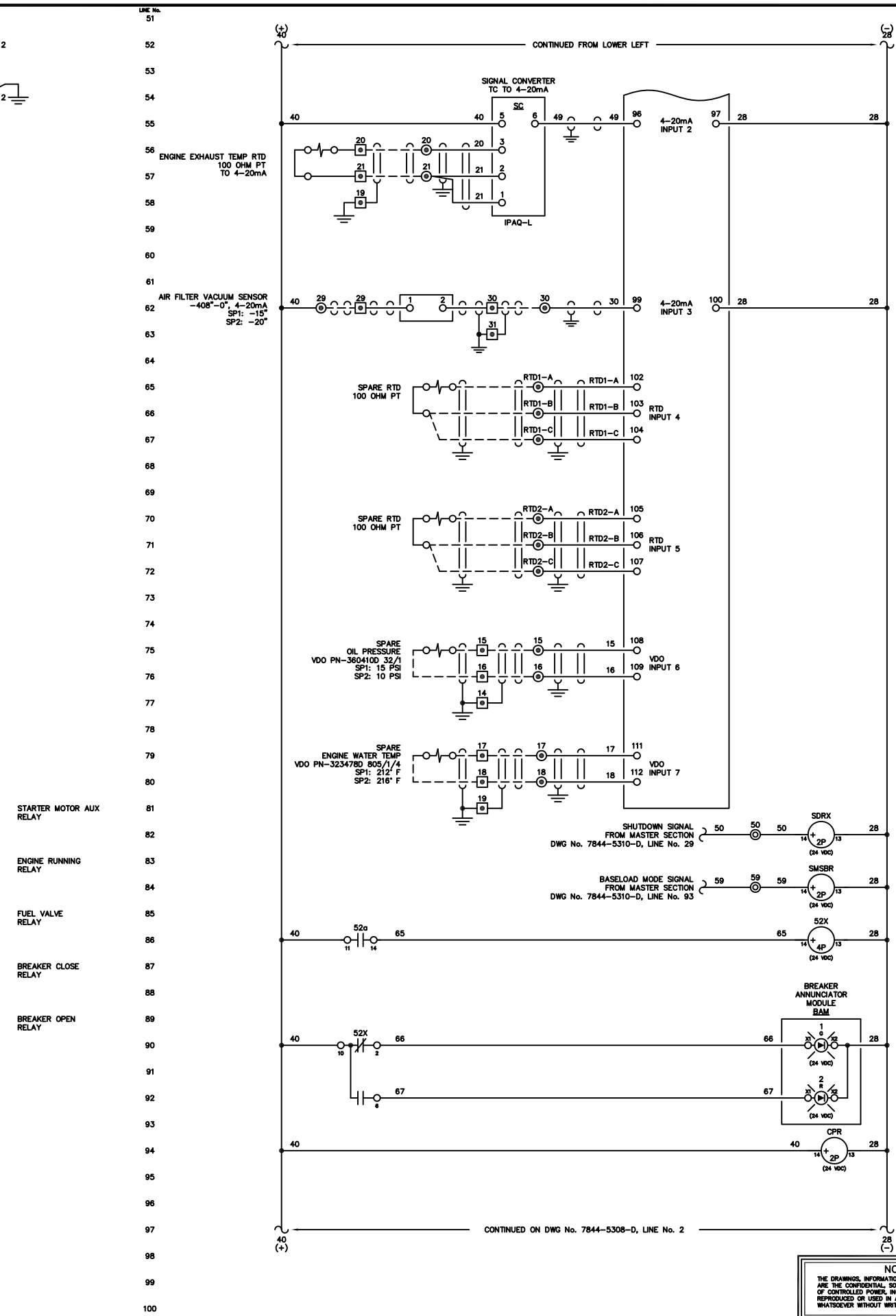
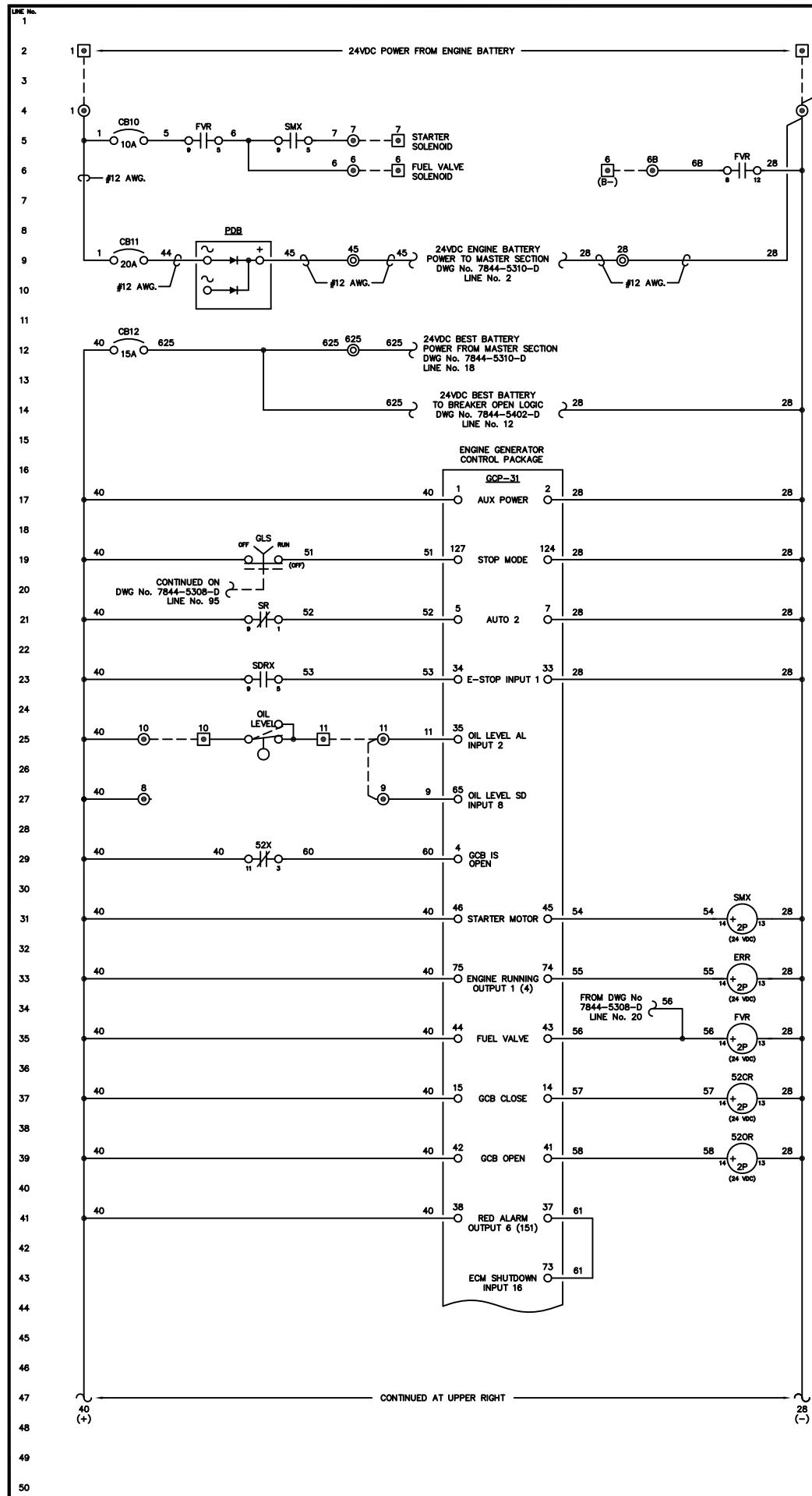
SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5306-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: GENERATOR 3 DC CONTROL, SCHEMATIC DIAGRAM

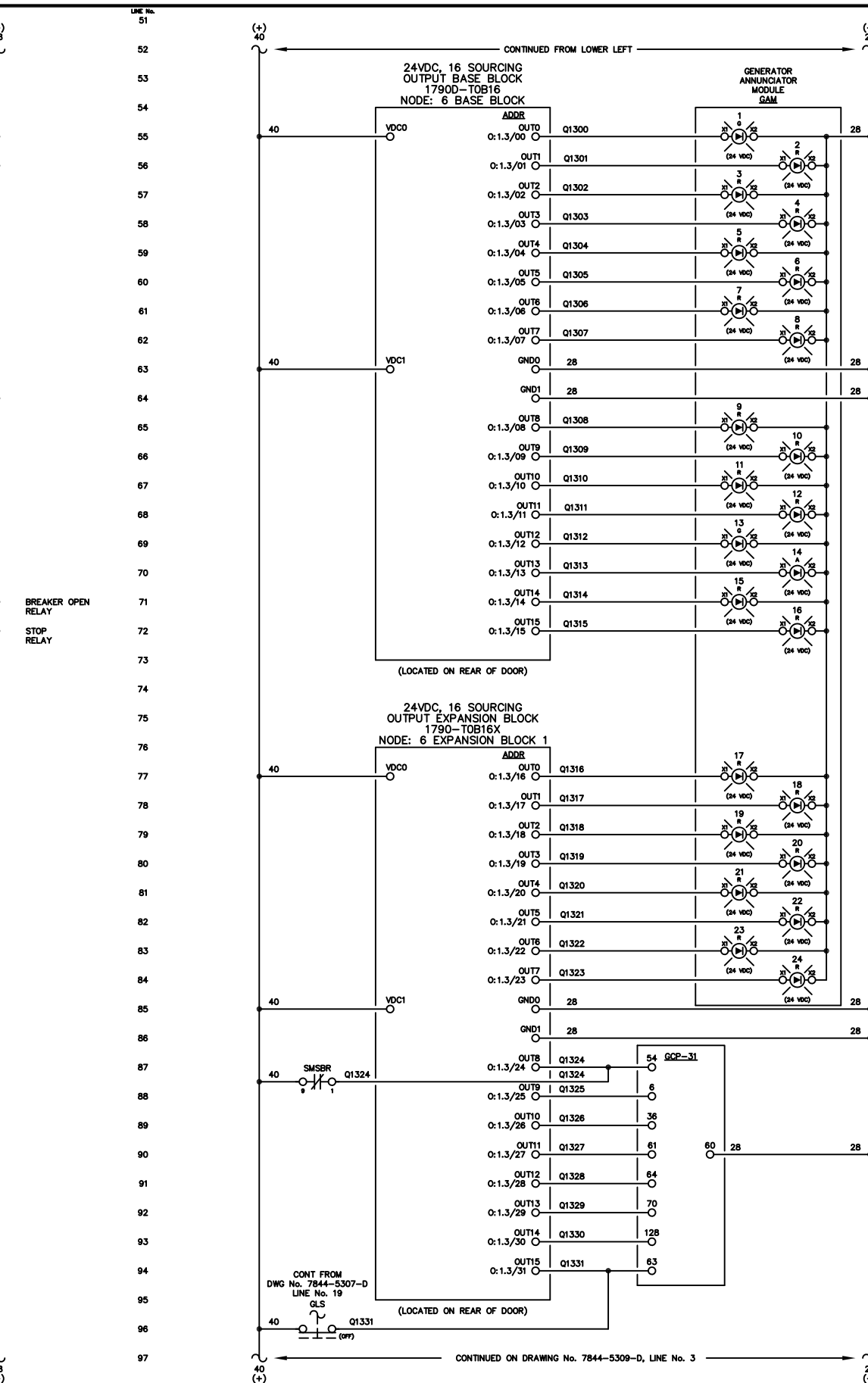
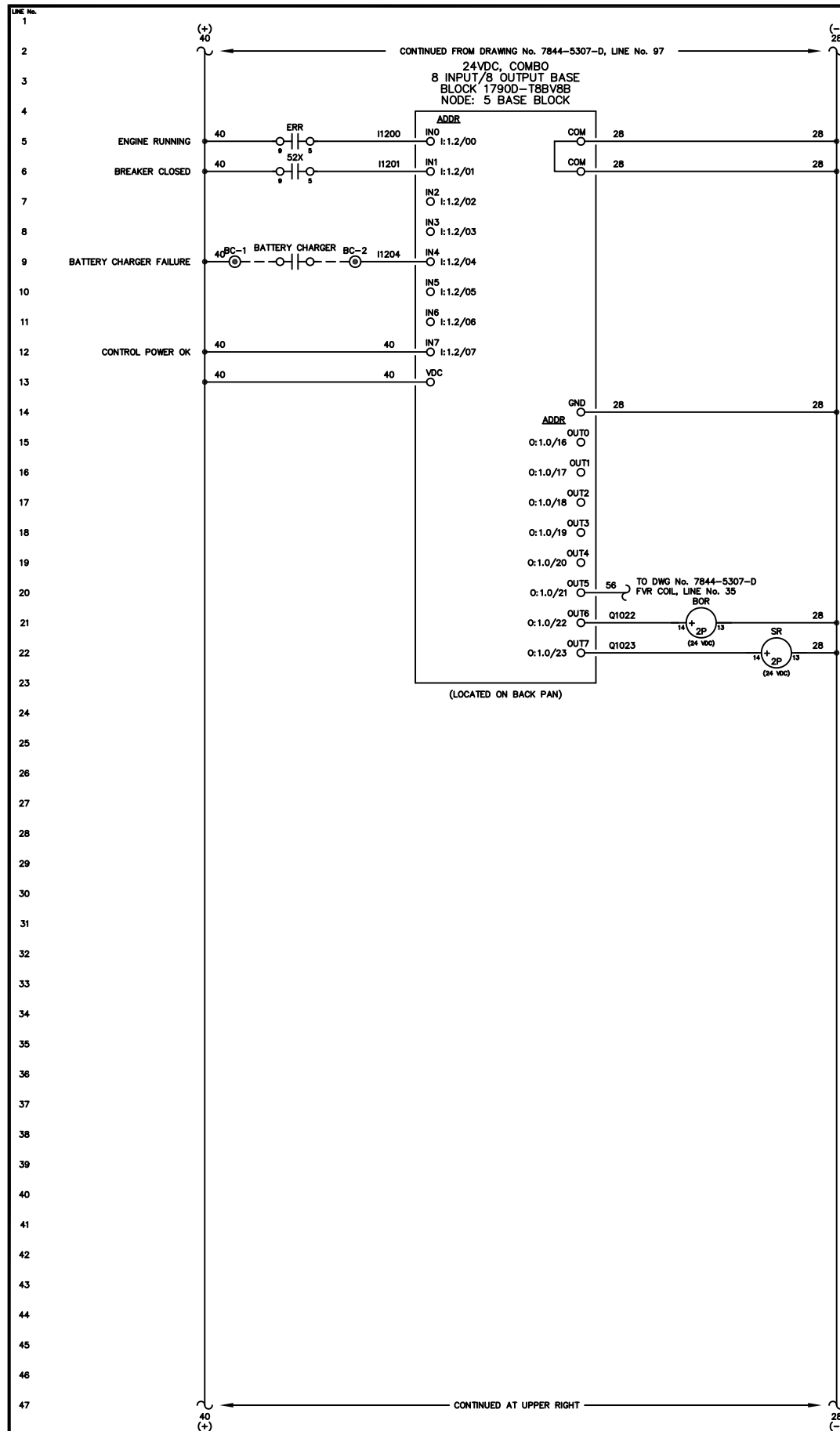
SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5307-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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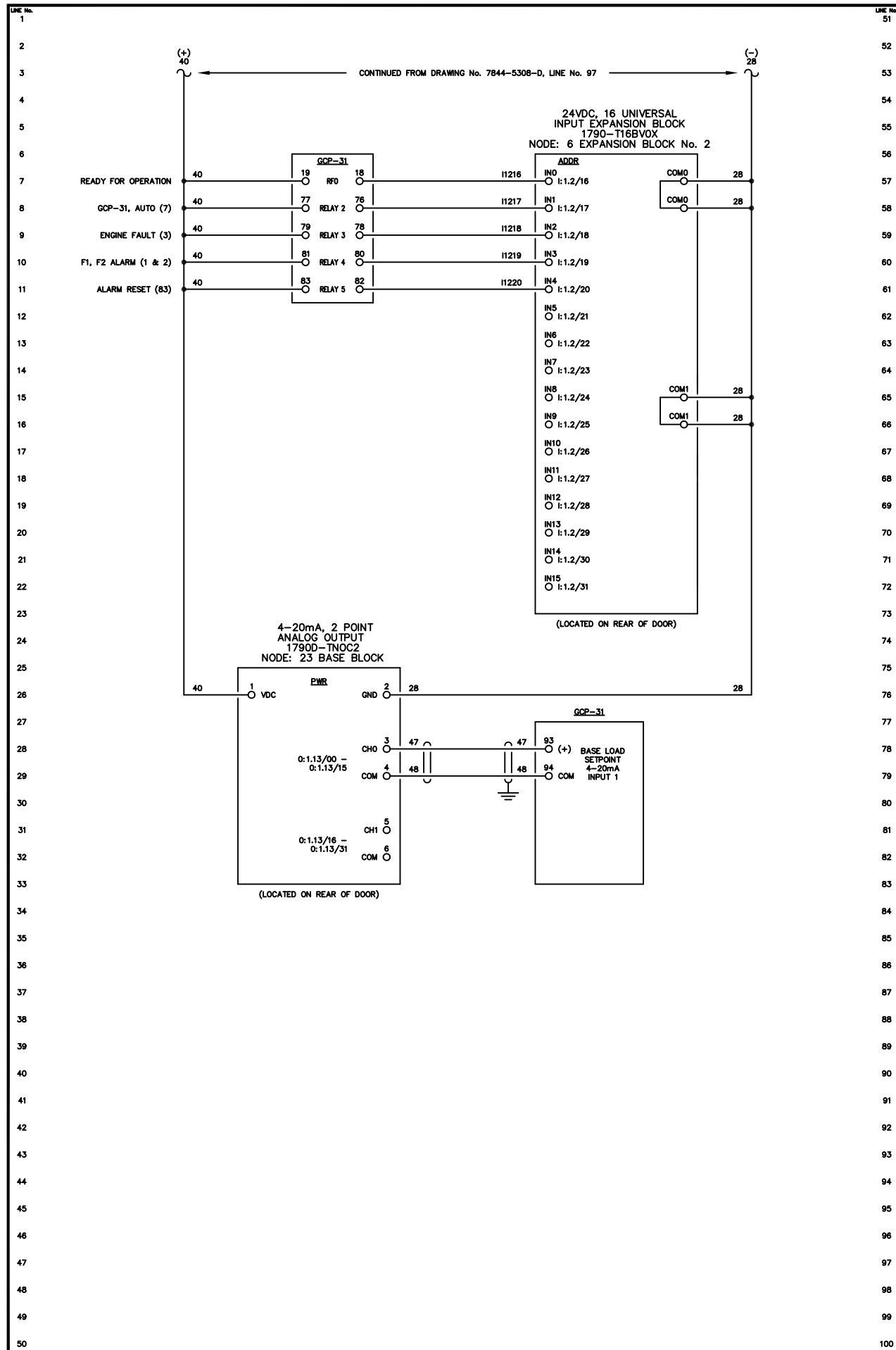


NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY
AEA PURCHASE ORDER No. 008115		CONTROLLED POWER JOB No. 7844	
TITLE: GENERATOR 3 DC CONTROL, SCHEMATIC DIAGRAM			
SCALE: NONE	DATE: 08-26-13	DWN. BY: GPN	
DWG. No: 7844-5308-D	SHEET: 1 OF 1	CKD. BY: JMD	
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR			

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

REV.	DATE	DESCRIPTION	BY
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: GENERATOR 3 DC CONTROL, SCHEMATIC DIAGRAM

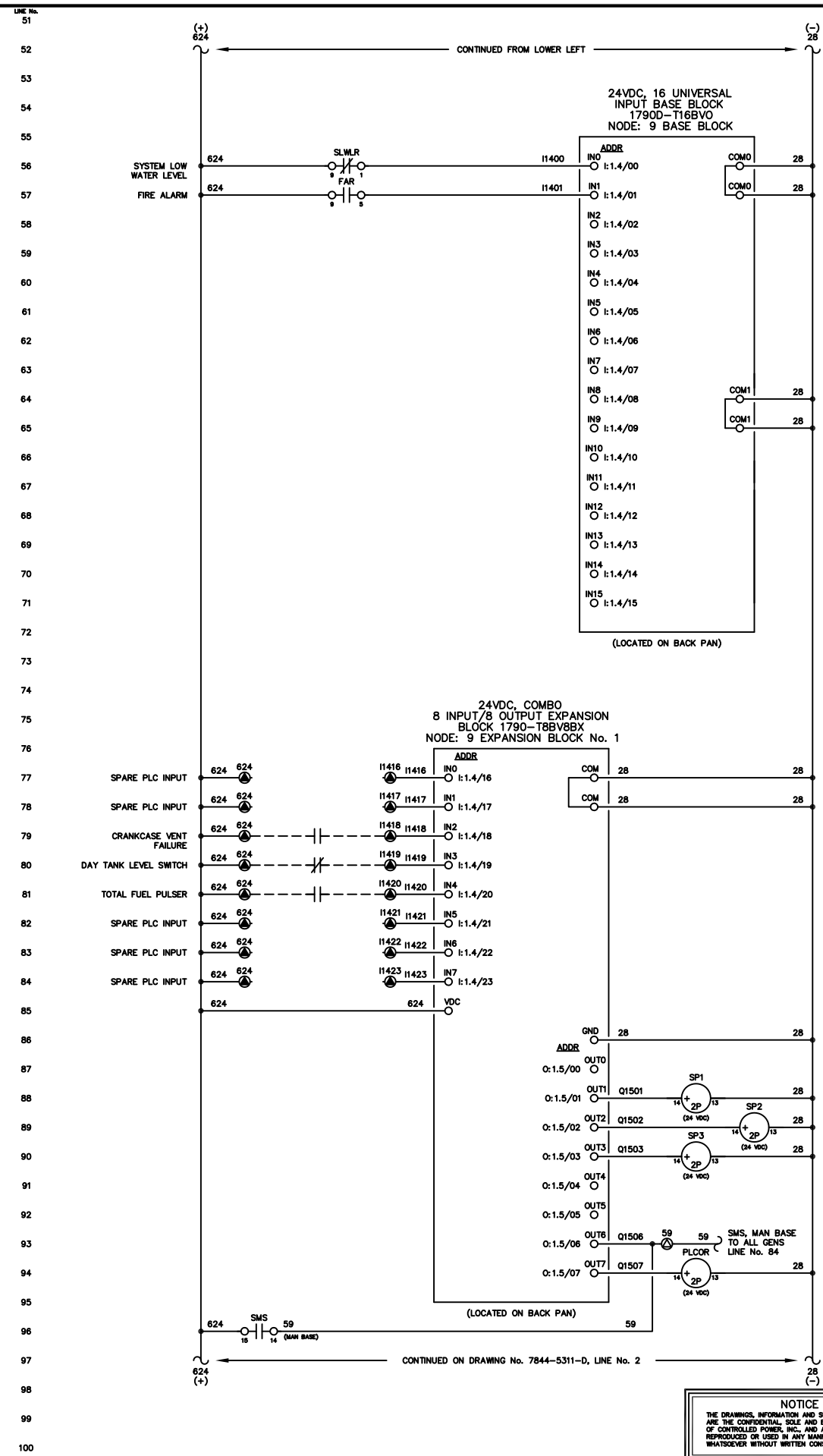
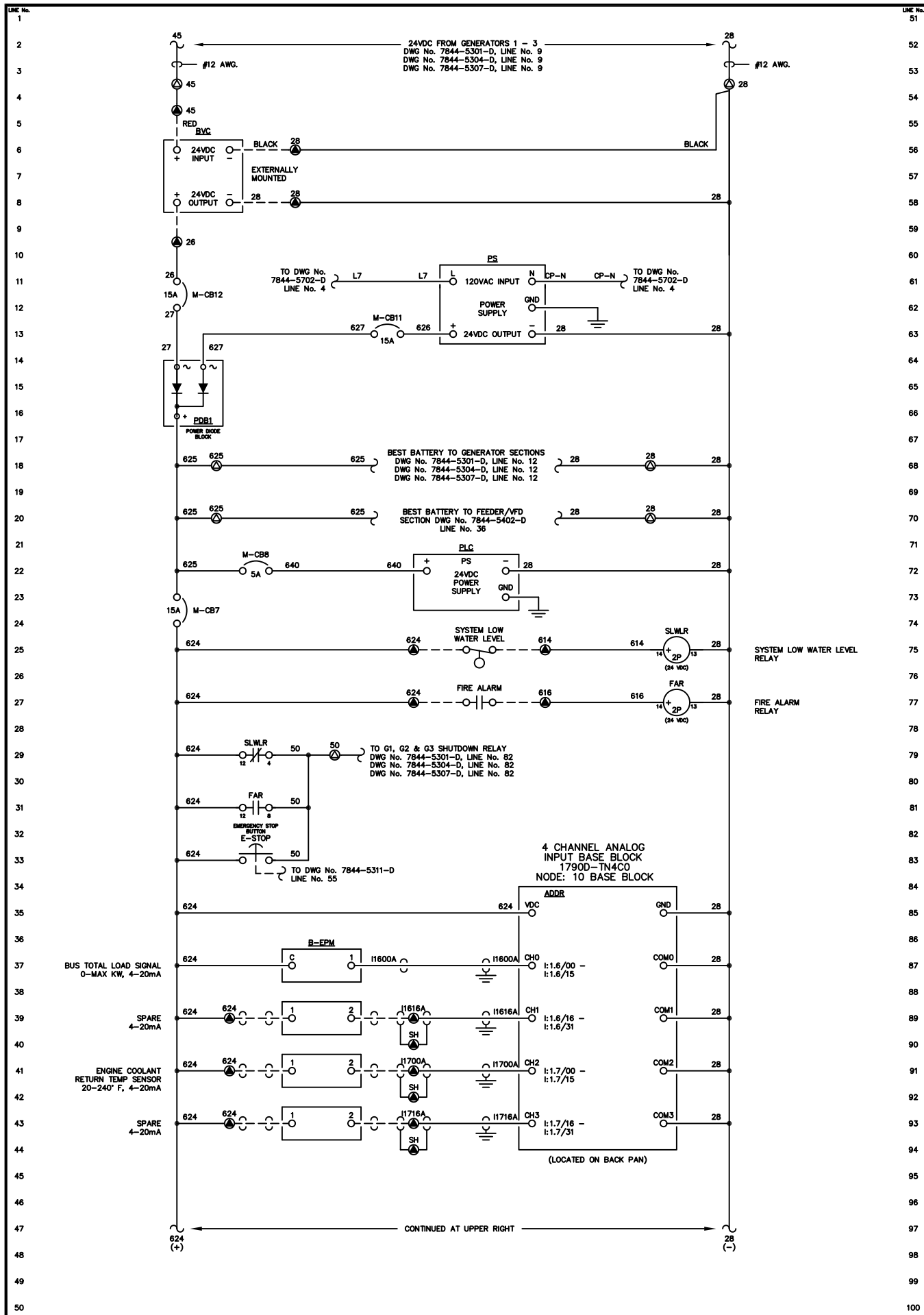
SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5309-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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HTTP://WWW.AIDEA.ORG



NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

REV.	DATE	DESCRIPTION	BY
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN

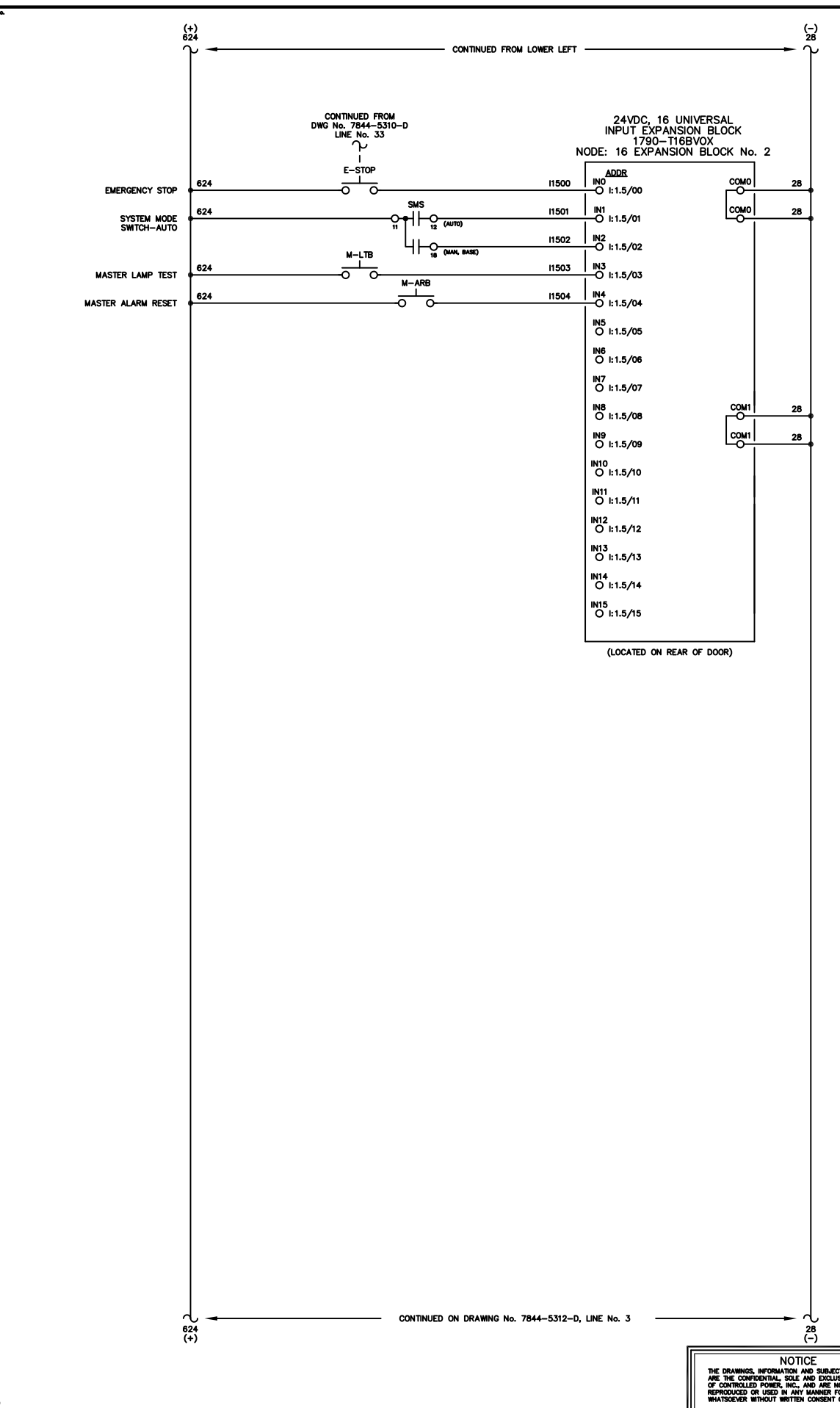
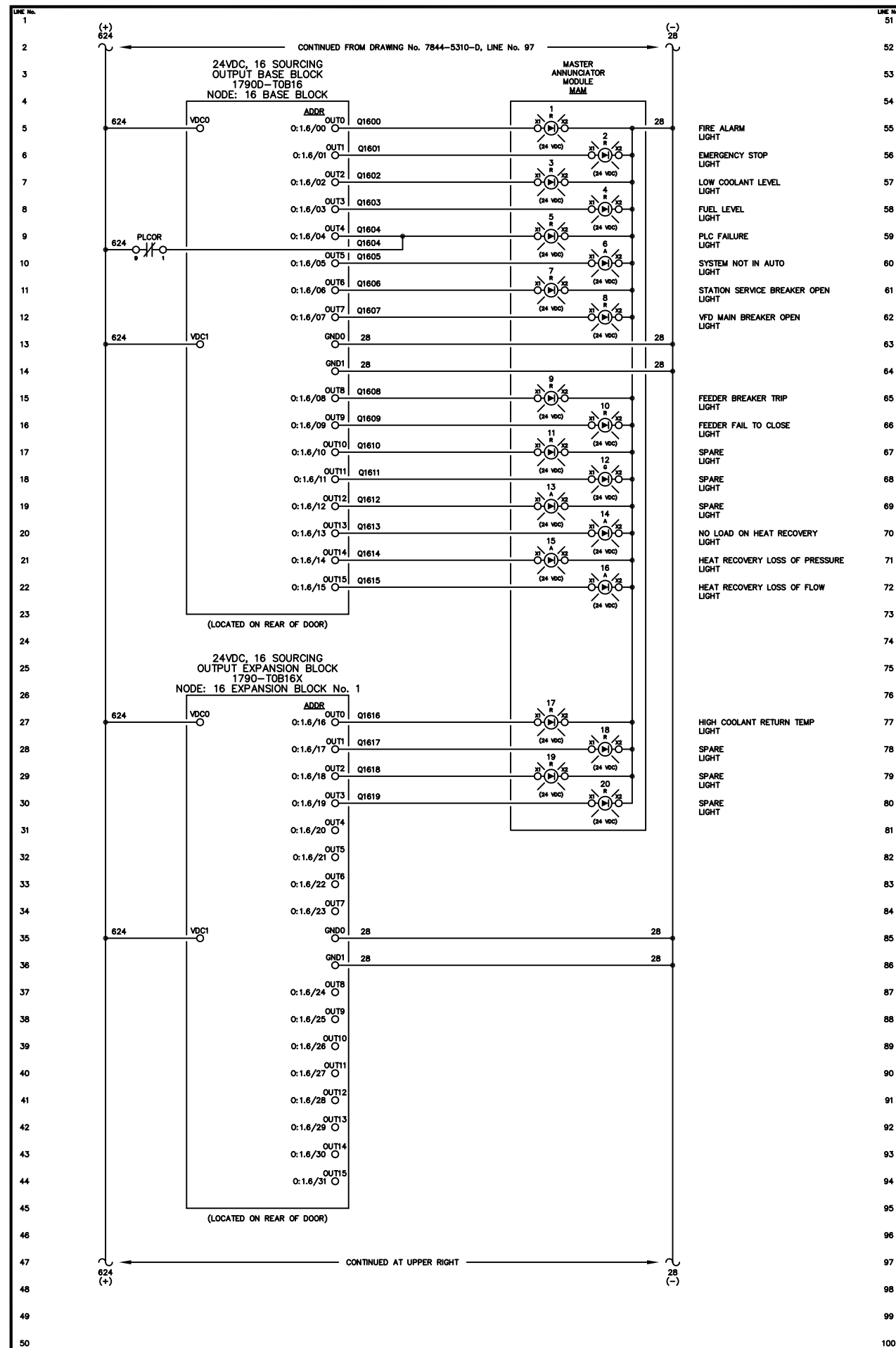
AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: MASTER DC CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-26-13	DWN. BY: GPN
DWG. No: 7844-5310-D	SHEET: 1 OF 1	CKD. BY: JMD
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR		

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- 55 FIRE ALARM LIGHT
- 56 EMERGENCY STOP LIGHT
- 57 LOW COOLANT LEVEL LIGHT
- 58 FUEL LEVEL LIGHT
- 59 PLC FAILURE LIGHT
- 60 SYSTEM NOT IN AUTO LIGHT
- 61 STATION SERVICE BREAKER OPEN LIGHT
- 62 VFD MAIN BREAKER OPEN LIGHT
- 63
- 64
- 65 FEEDER BREAKER TRIP LIGHT
- 66 FEEDER FAIL TO CLOSE LIGHT
- 67 SPARE LIGHT
- 68 SPARE LIGHT
- 69 SPARE LIGHT
- 70 NO LOAD ON HEAT RECOVERY LIGHT
- 71 HEAT RECOVERY LOSS OF PRESSURE LIGHT
- 72 HEAT RECOVERY LOSS OF FLOW LIGHT
- 73
- 74
- 75
- 76
- 77 HIGH COOLANT RETURN TEMP LIGHT
- 78 SPARE LIGHT
- 79 SPARE LIGHT
- 80 SPARE LIGHT
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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: MASTER DC CONTROL, SCHEMATIC DIAGRAM

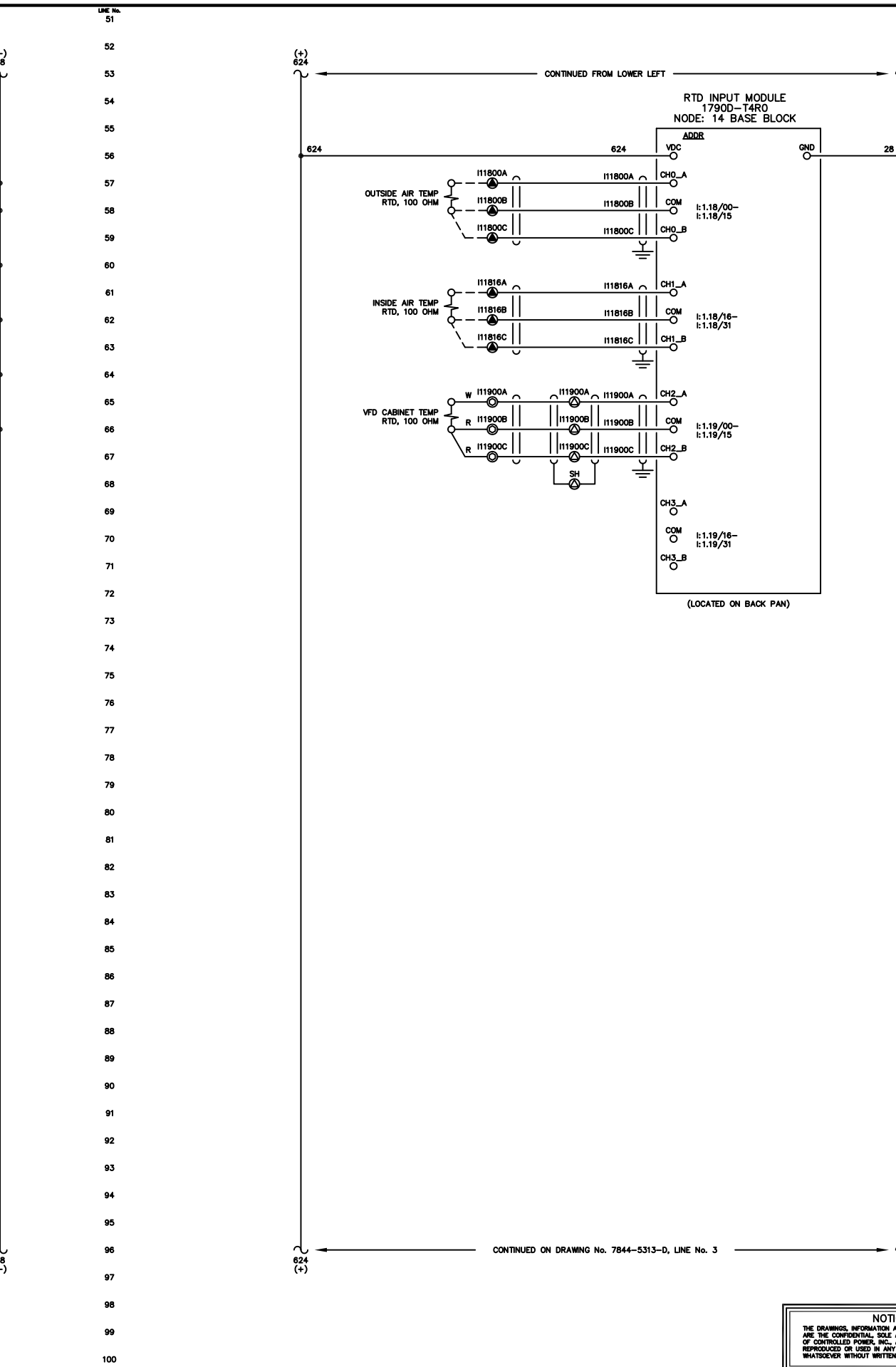
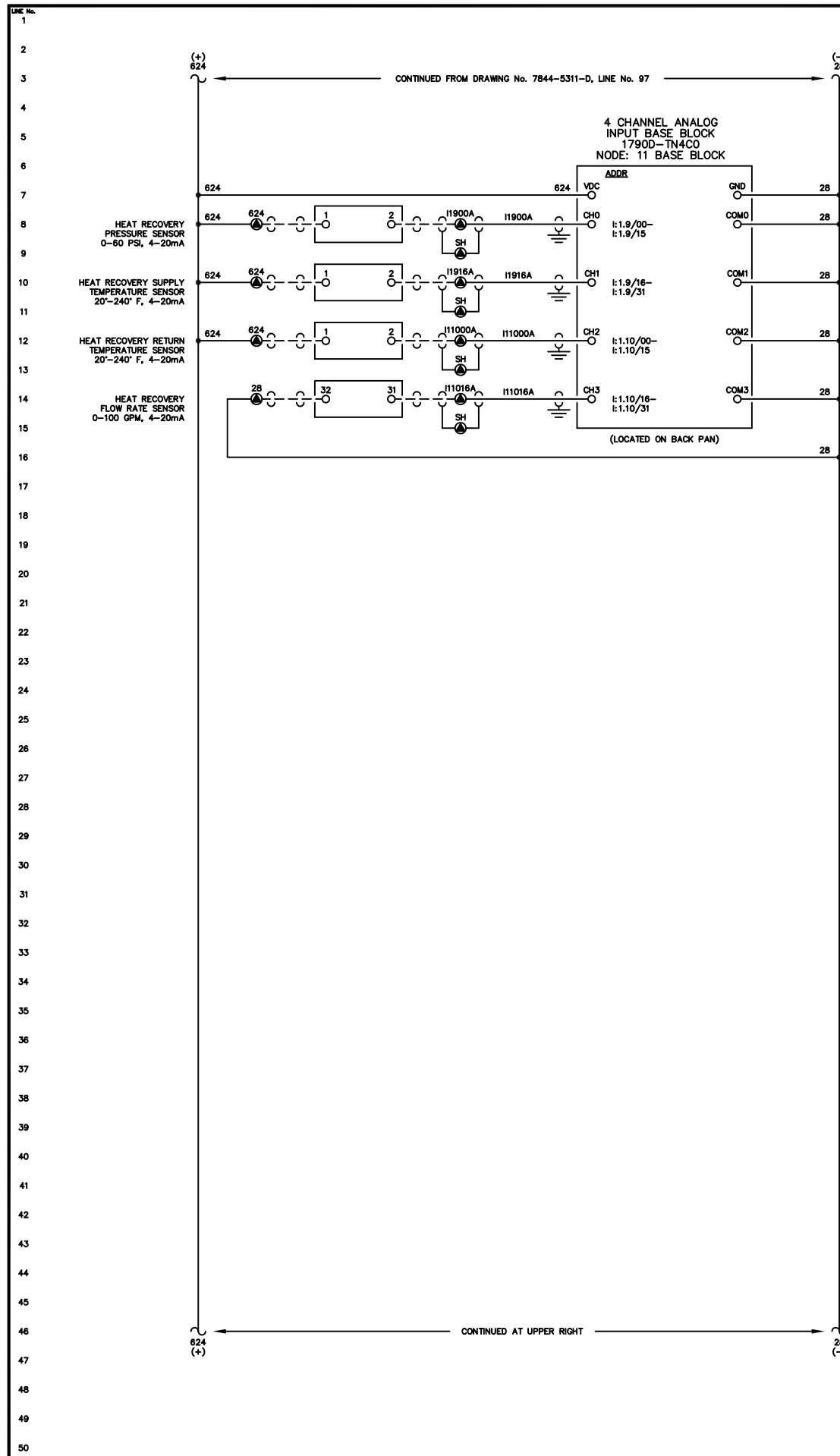
SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5311-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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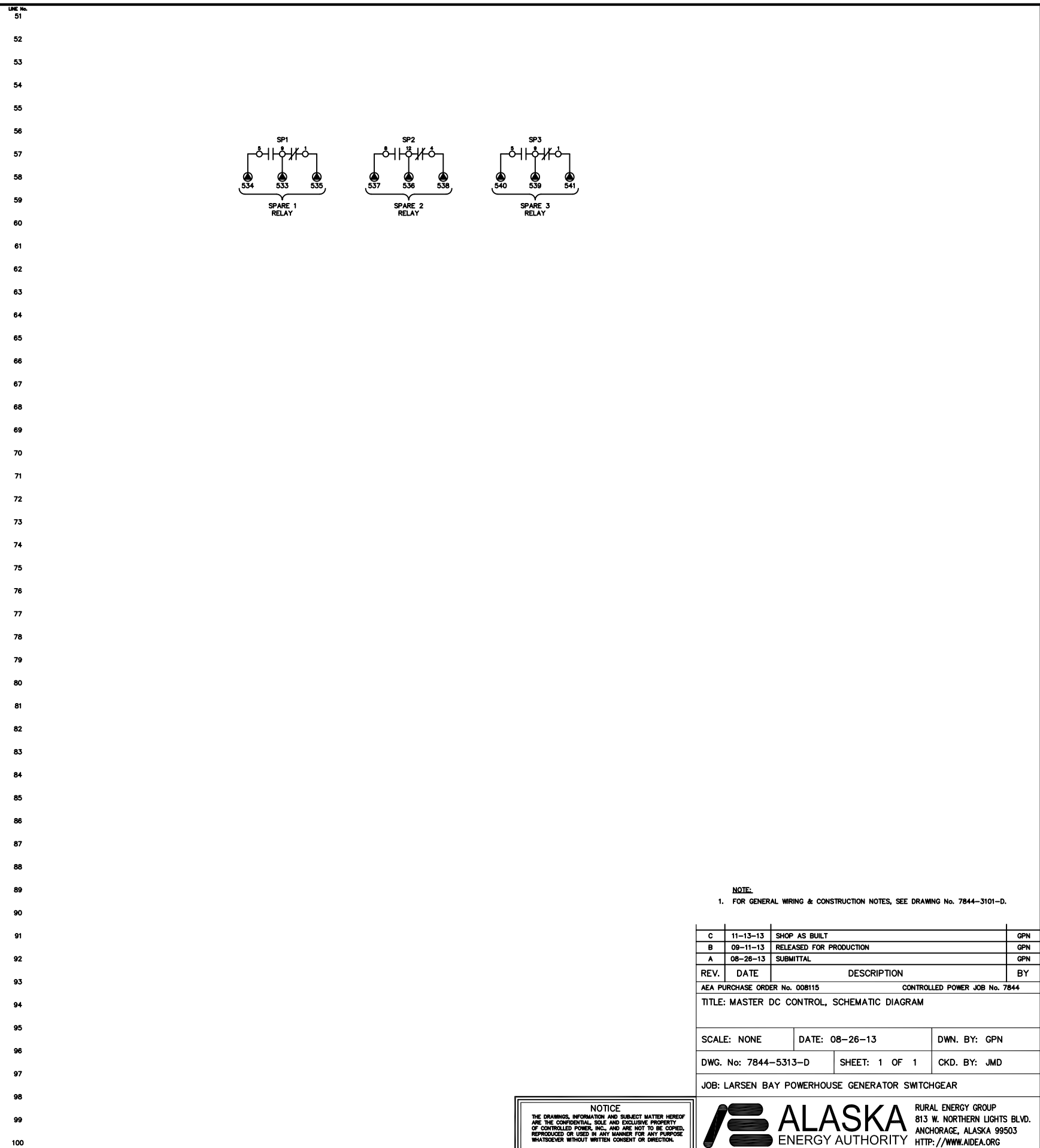
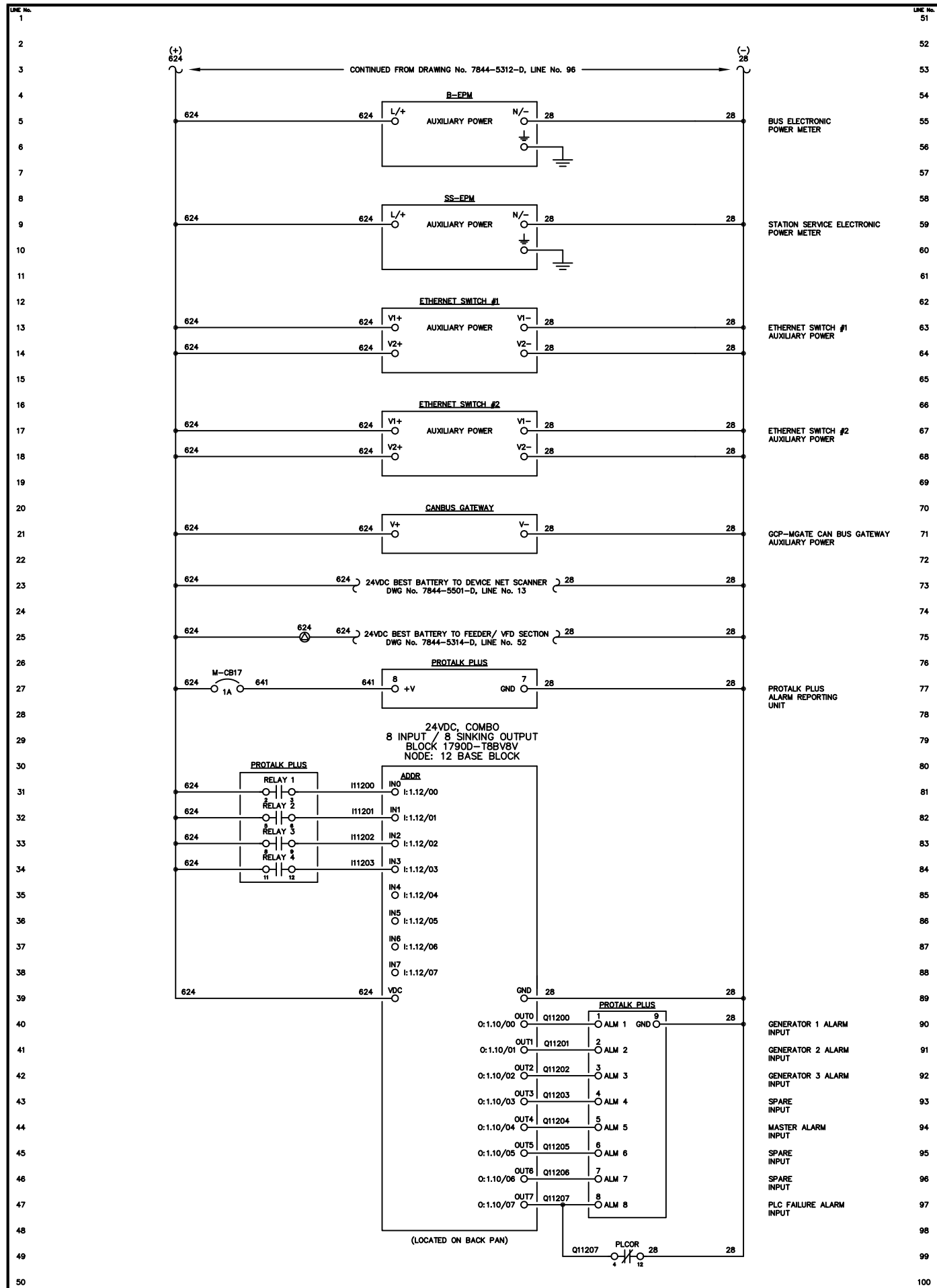


NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-27-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY
AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844			
TITLE: MASTER DC CONTROL, SCHEMATIC DIAGRAM			
SCALE: NONE	DATE: 08-26-13	DWN. BY: GPN	
DWG. No: 7844-5312-D	SHEET: 1 OF 1	CKD. BY: JMD	
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR			

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: MASTER DC CONTROL, SCHEMATIC DIAGRAM

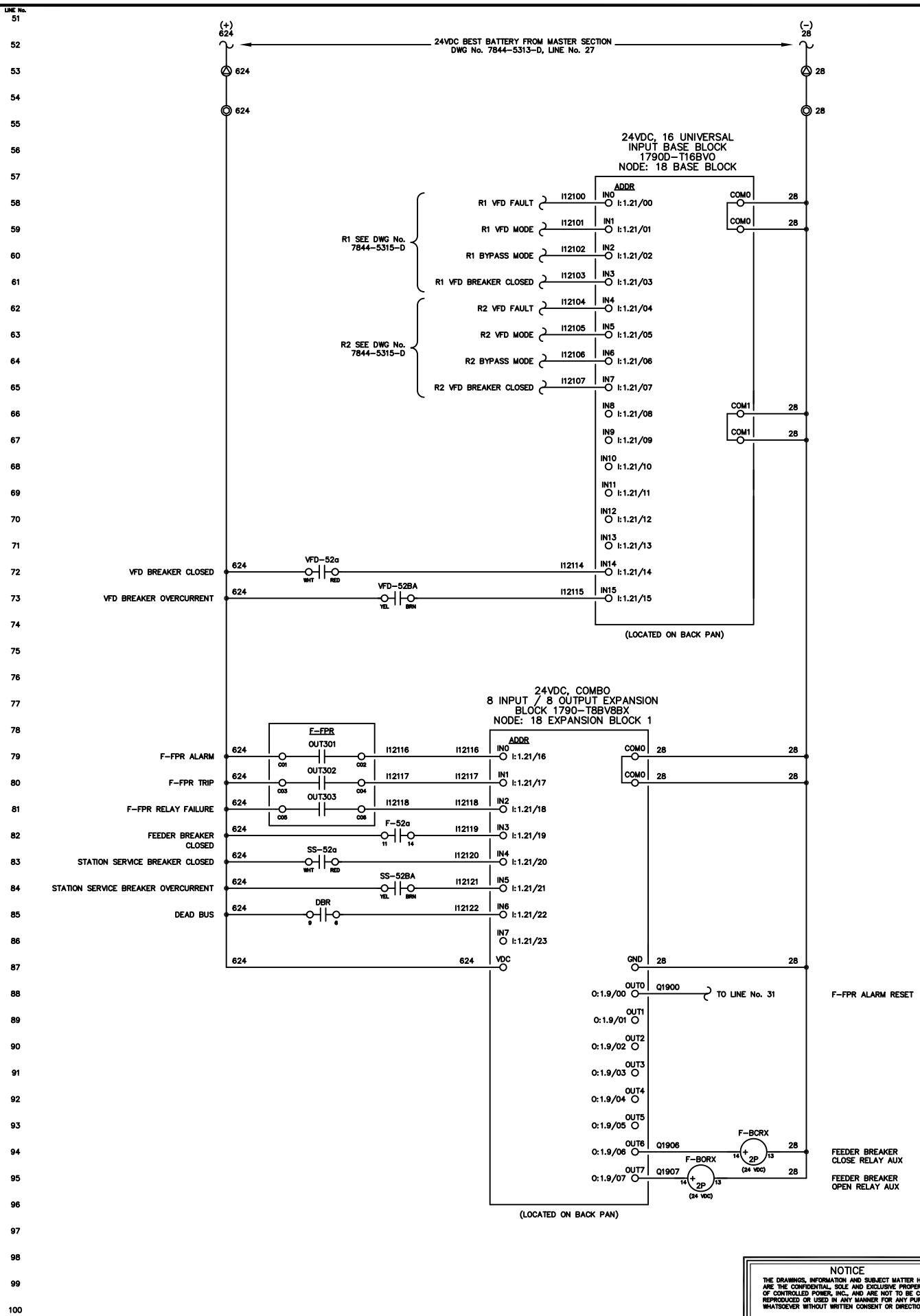
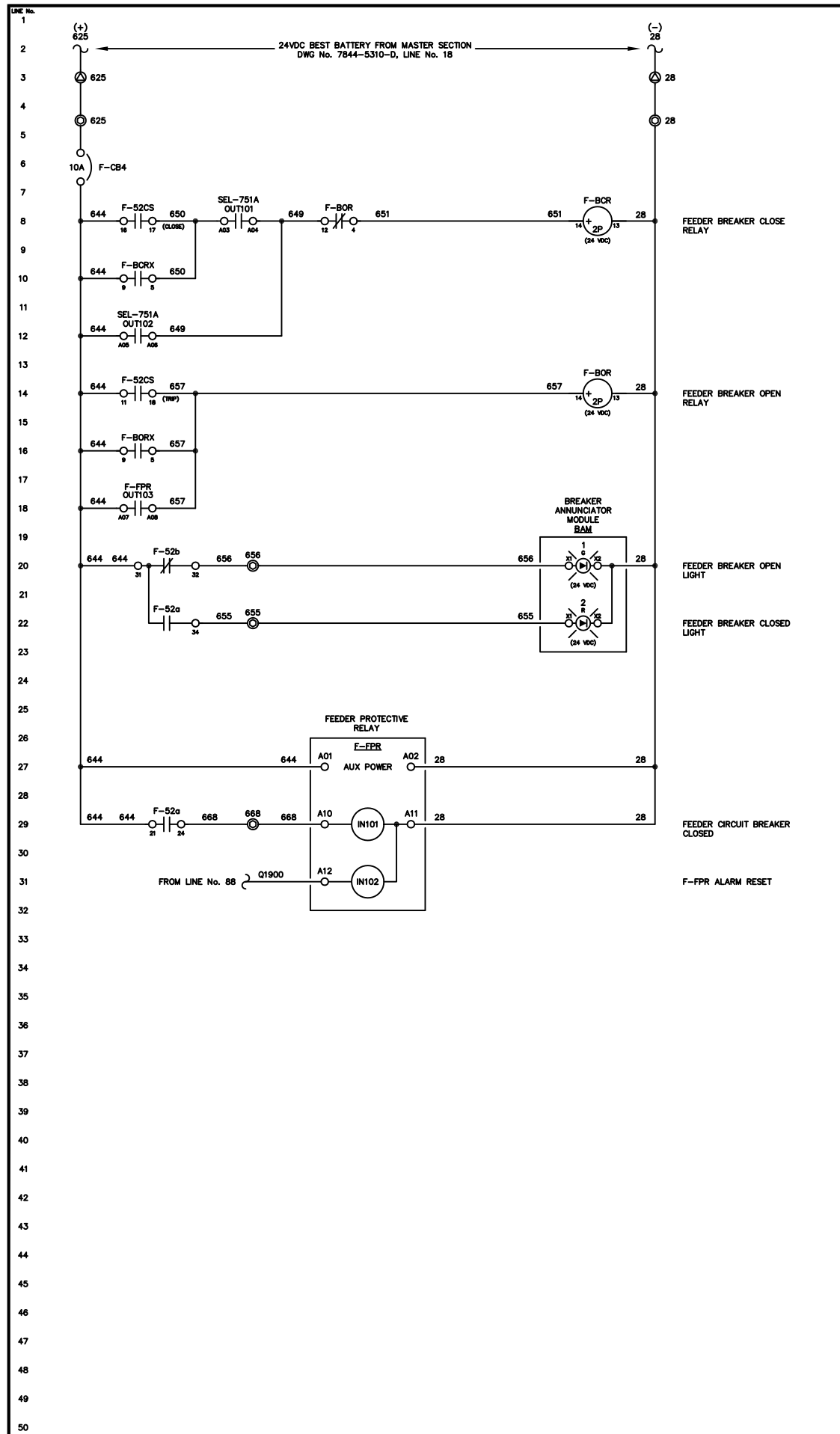
SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5313-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

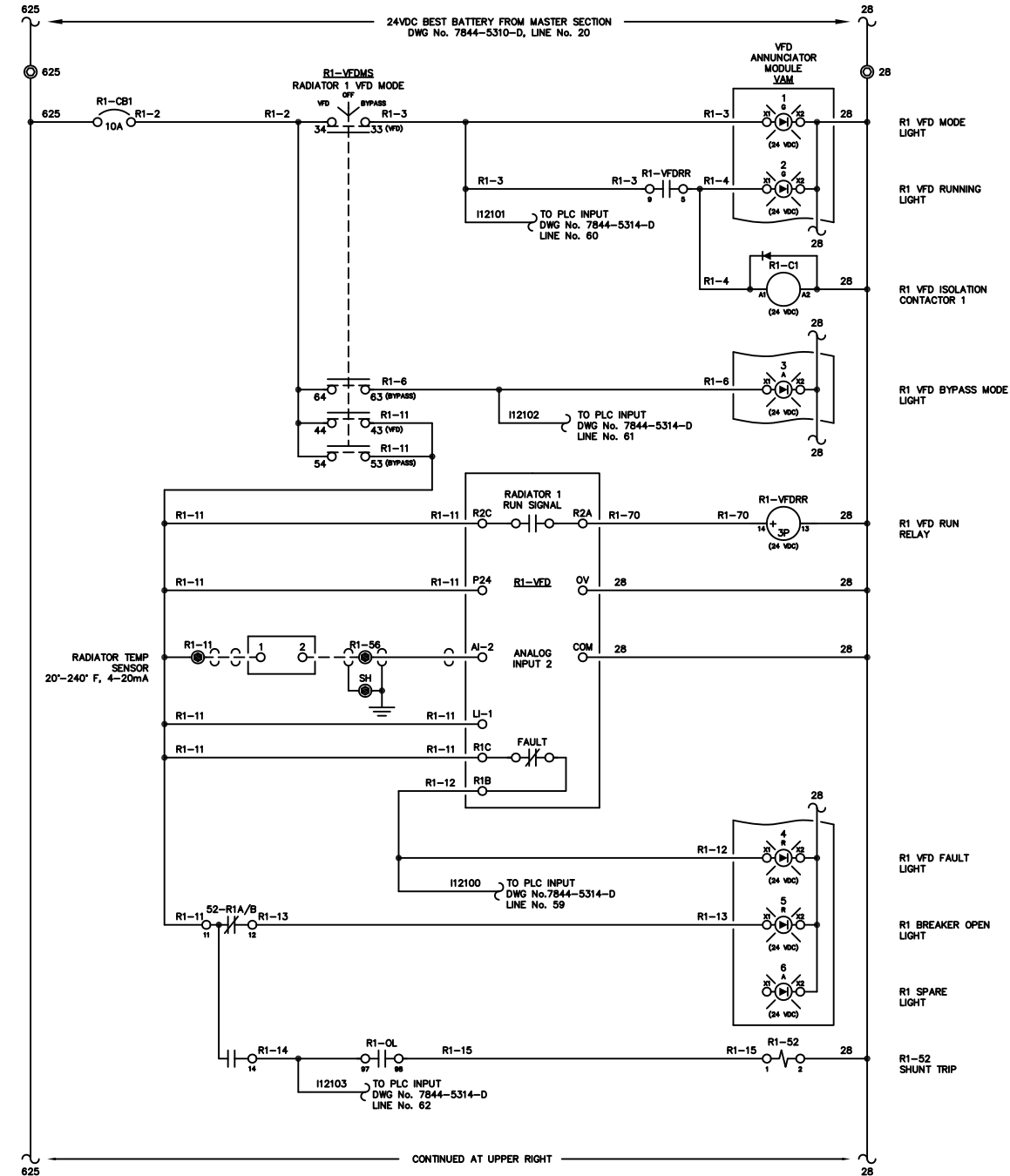
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B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY
AEA PURCHASE ORDER No. 008115		CONTROLLED POWER JOB No. 7844	
TITLE: FEEDER DC CONTROL, SCHEMATIC DIAGRAM			
SCALE: NONE	DATE: 08-26-13	DWN. BY: GPN	
DWG. No: 7844-5314-D	SHEET: 1 OF 1	CKD. BY: JMD	
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR			

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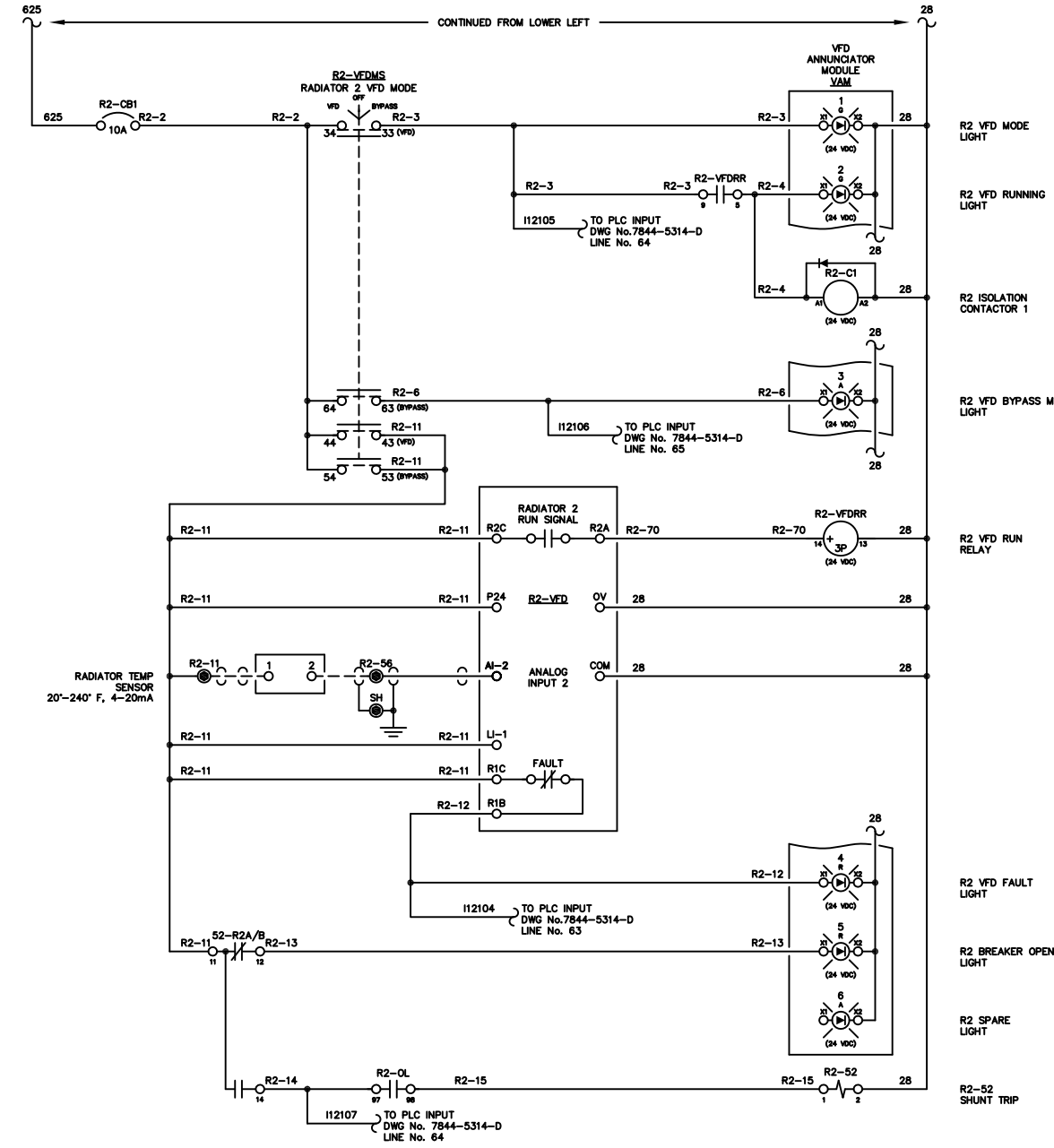
Plot date: 2013/11/15 - 10:28

RADIATOR 1 VFD
R1



CONTINUED AT UPPER RIGHT

RADIATOR 2 VFD
R2



CONTINUED FROM LOWER LEFT

NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY
AEA PURCHASE ORDER No. 008115		CONTROLLED POWER JOB No. 7844	

TITLE: VFD DC CONTROL, SCHEMATIC DIAGRAM

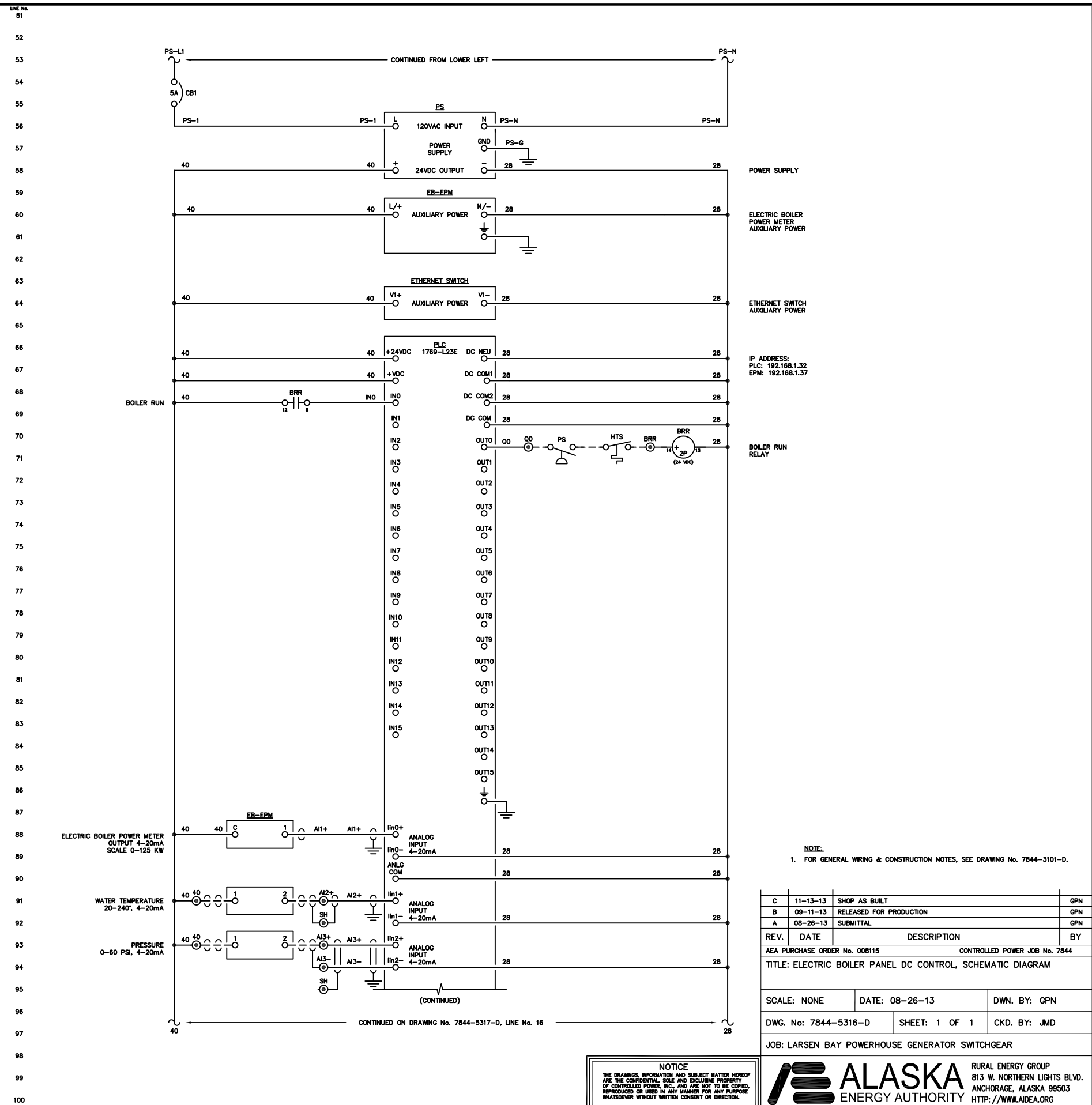
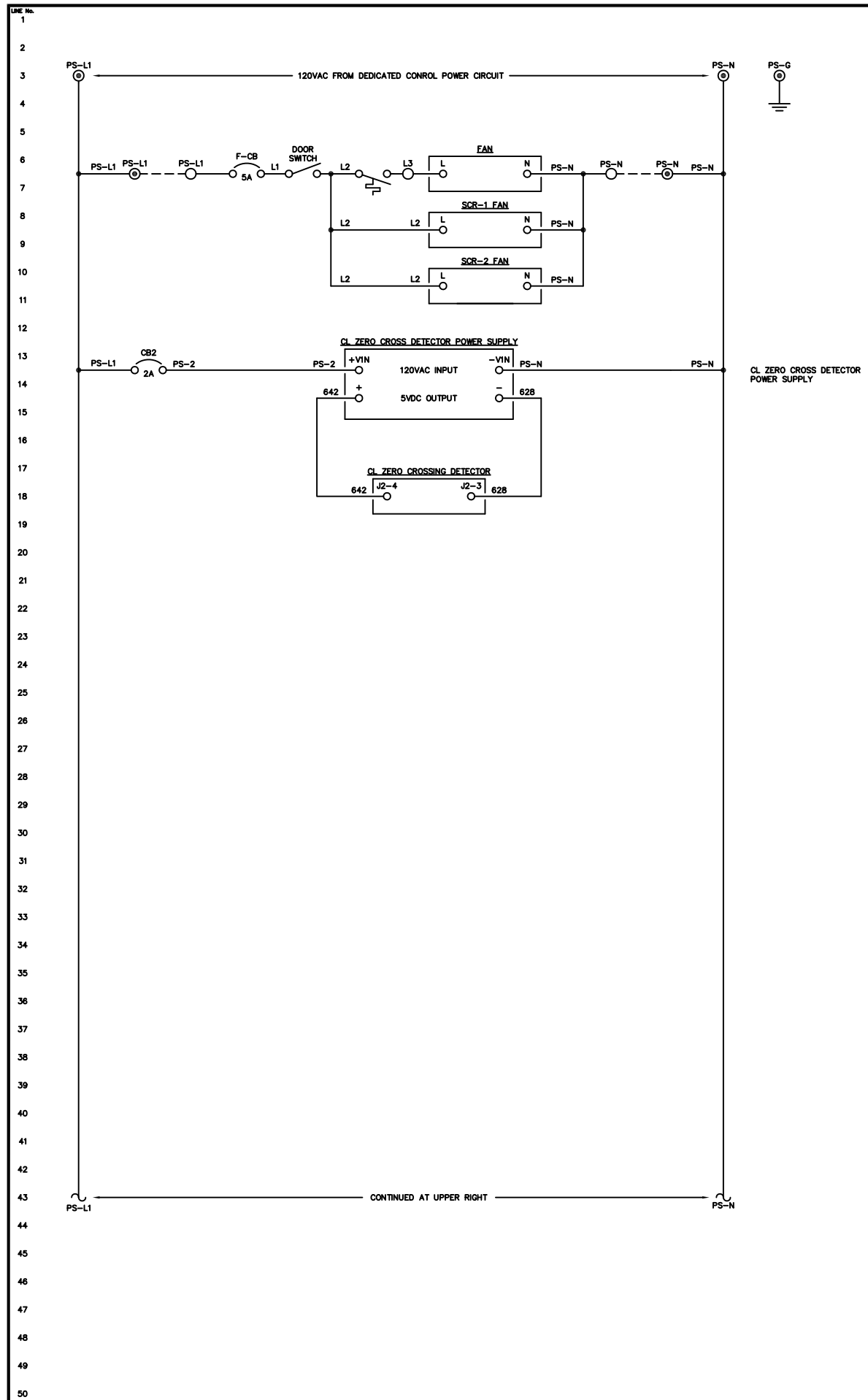
SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5315-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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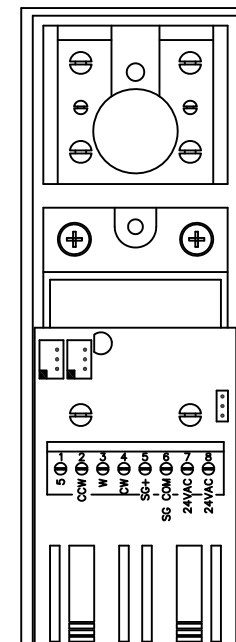
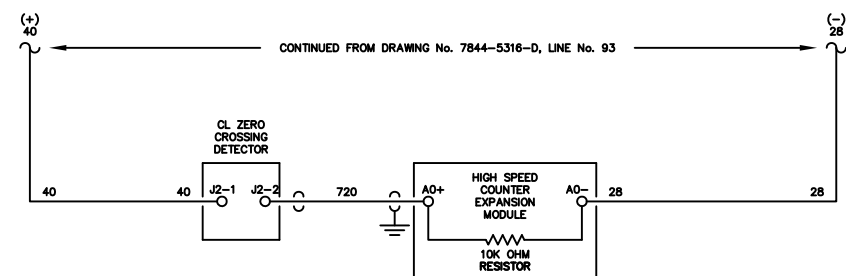
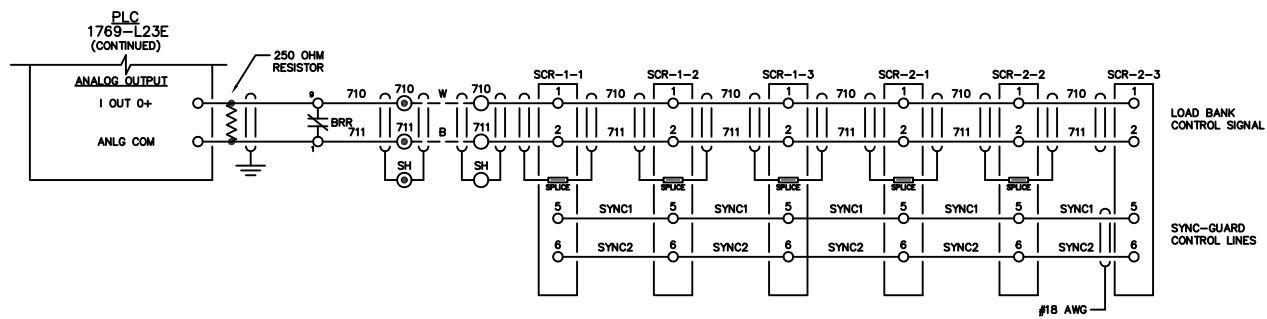


NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY
AEA PURCHASE ORDER No. 008115		CONTROLLED POWER JOB No. 7844	
TITLE: ELECTRIC BOILER PANEL DC CONTROL, SCHEMATIC DIAGRAM			
SCALE: NONE	DATE: 08-26-13	DWN. BY: GPN	
DWG. No: 7844-5316-D	SHEET: 1 OF 1	CKD. BY: JMD	
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR			

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SCR DETAIL

NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

REV.	DATE	DESCRIPTION	BY
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: ELECTRIC BOILER PANEL DC CONTROL, SCHEMATIC DIAGRAM

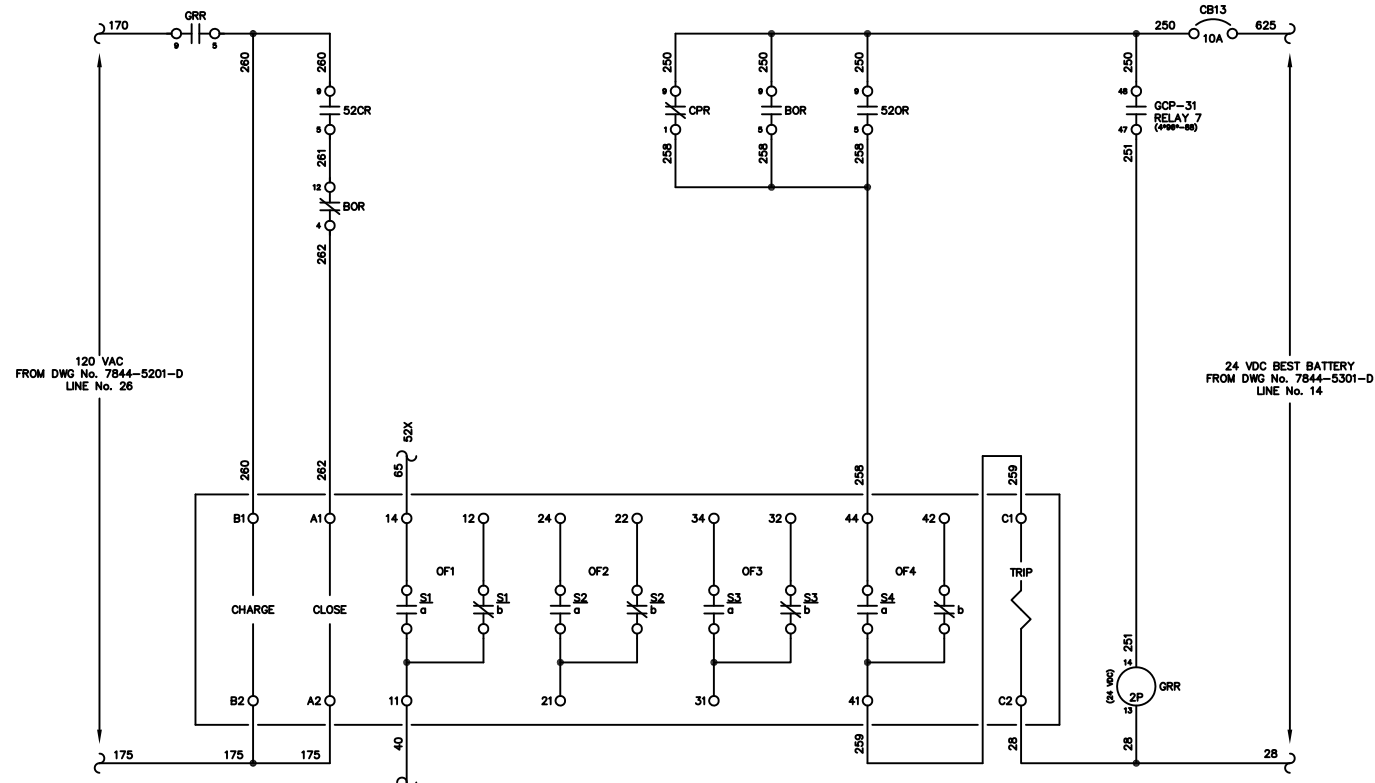
SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5317-D SHEET: 1 OF 1 CKD. BY: JMD

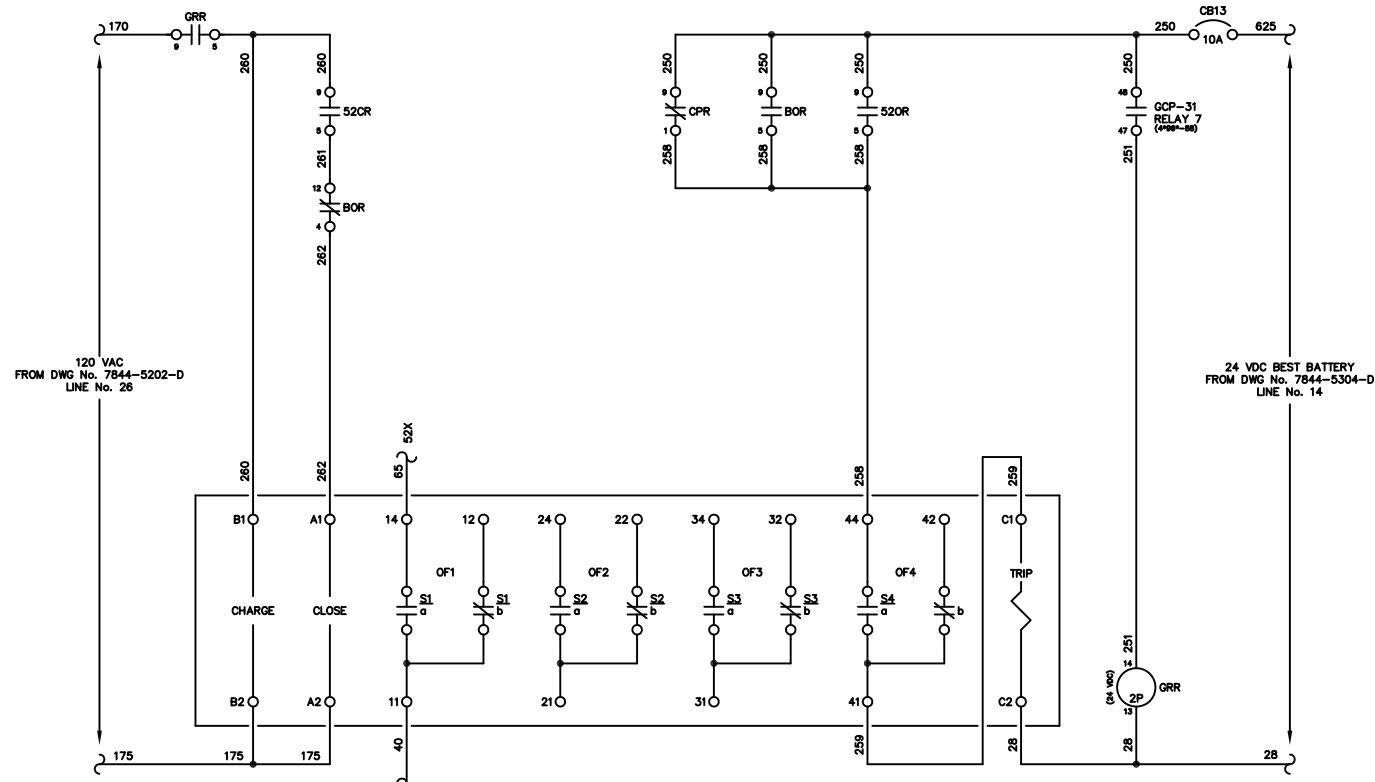
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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GENERATOR 1 BREAKER
SQUARE D MASTERPACT NT



GENERATOR 2 BREAKER
SQUARE D MASTERPACT NT

NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

REV.	DATE	DESCRIPTION	BY
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844
TITLE: GENERATOR 1 & 2 CIRCUIT BREAKER CONTROL, SCHEMATIC DIAGRAM

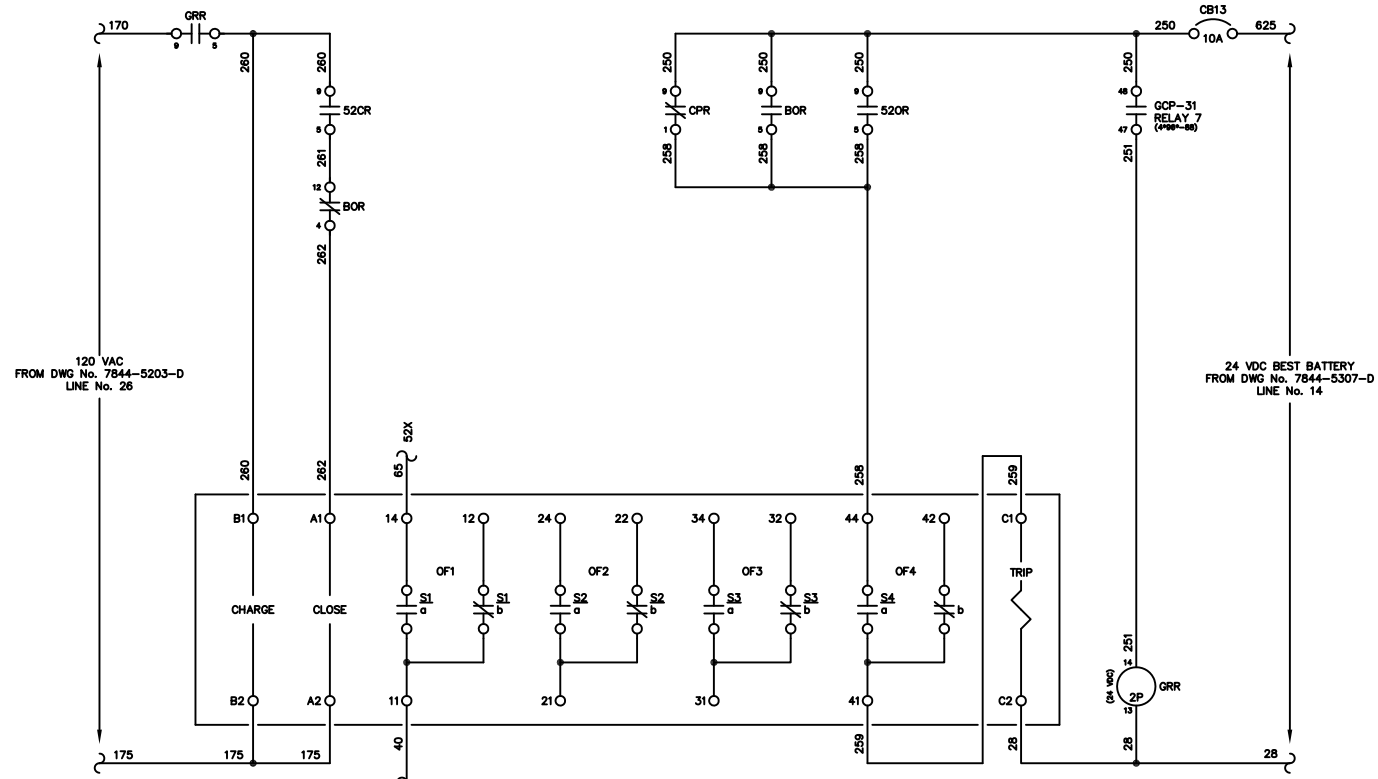
SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5401-D SHEET: 1 OF 1 CKD. BY: JMD

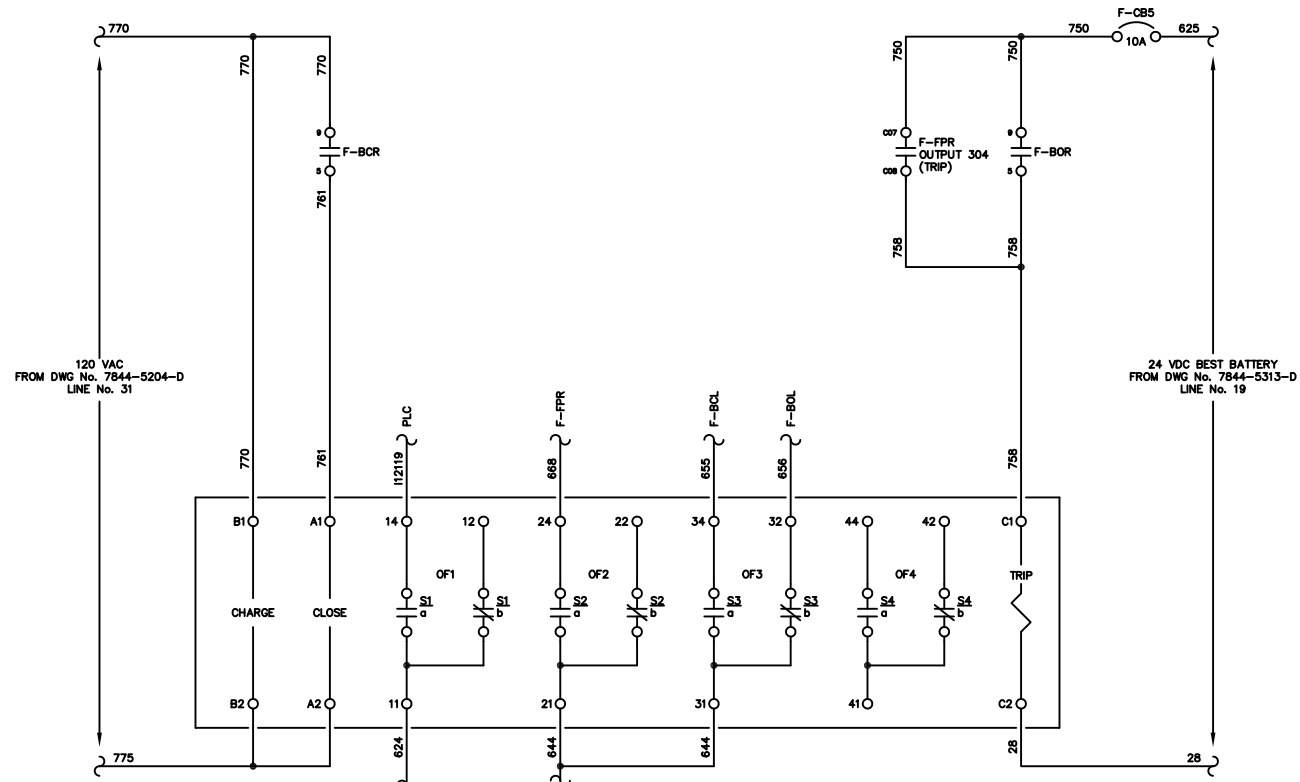
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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GENERATOR 3 BREAKER
SQUARE D MASTERPACT NT



FEEDER BREAKER
SQUARE D MASTERPACT NT

NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

REV.	DATE	DESCRIPTION	BY
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844
TITLE: GENERATOR 3 & FEEDER BREAKER CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

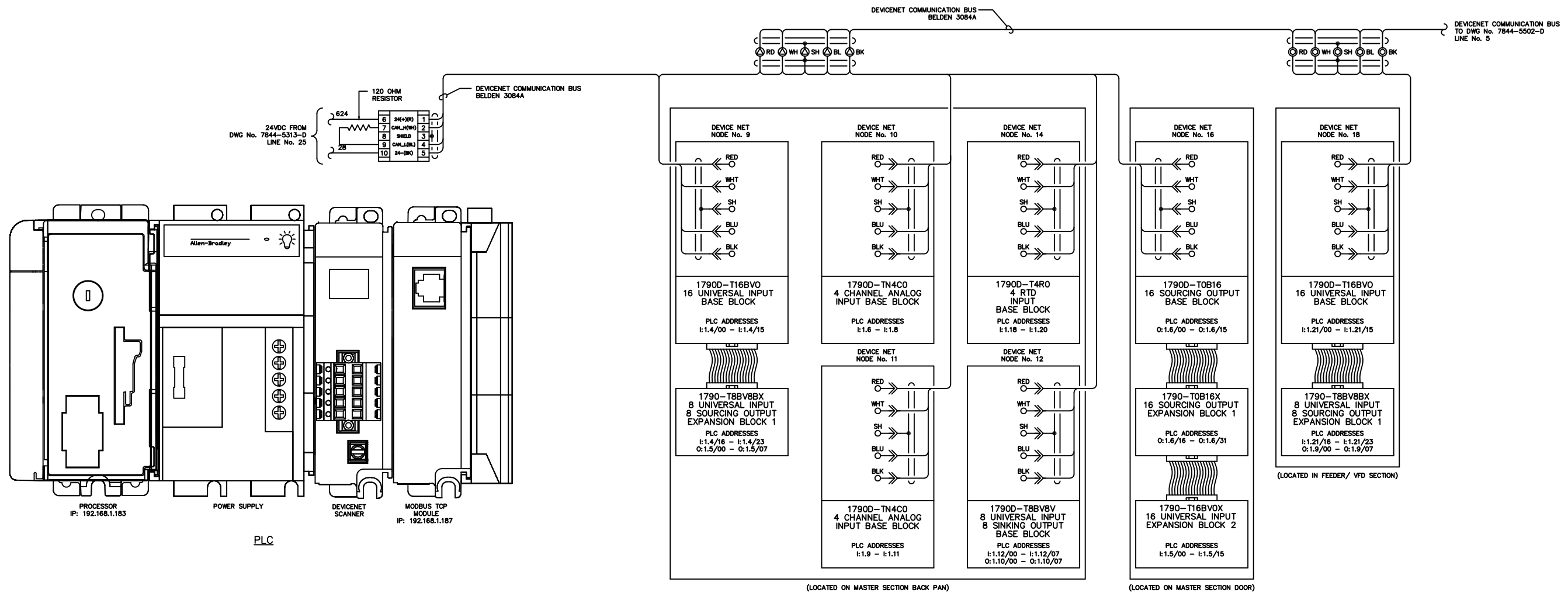
DWG. No: 7844-5402-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: PLC COMMUNICATION, SCHEMATIC DIAGRAM

SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5501-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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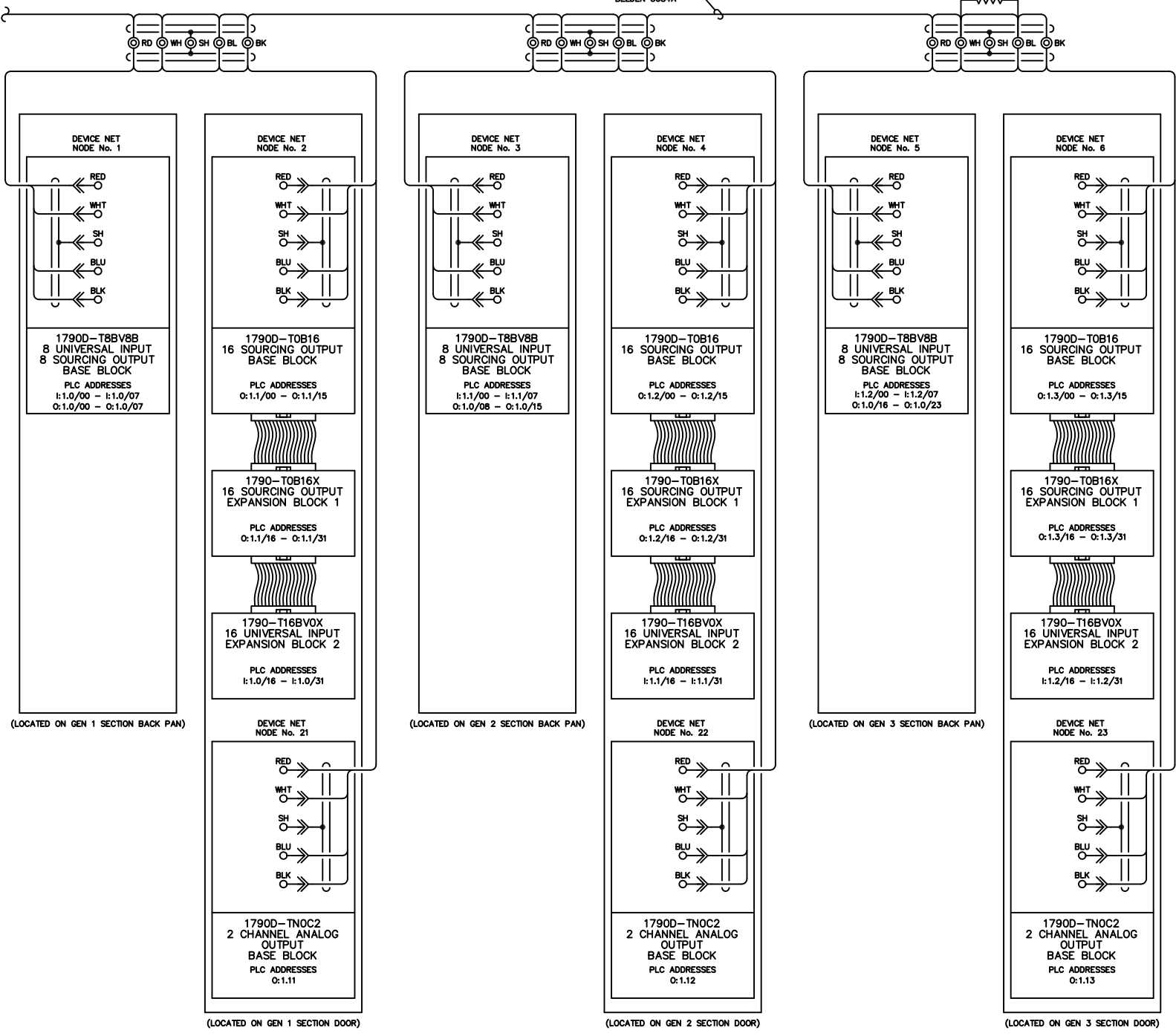
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DEVICENET COMMUNICATION BUS
FROM DWG No. 7844-5501-D
LINE No. 9

DEVICENET COMMUNICATION BUS
BELDEN 3084A

120 OHM
RESISTOR



NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: PLC COMMUNICATION, SCHEMATIC DIAGRAM

SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5502-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

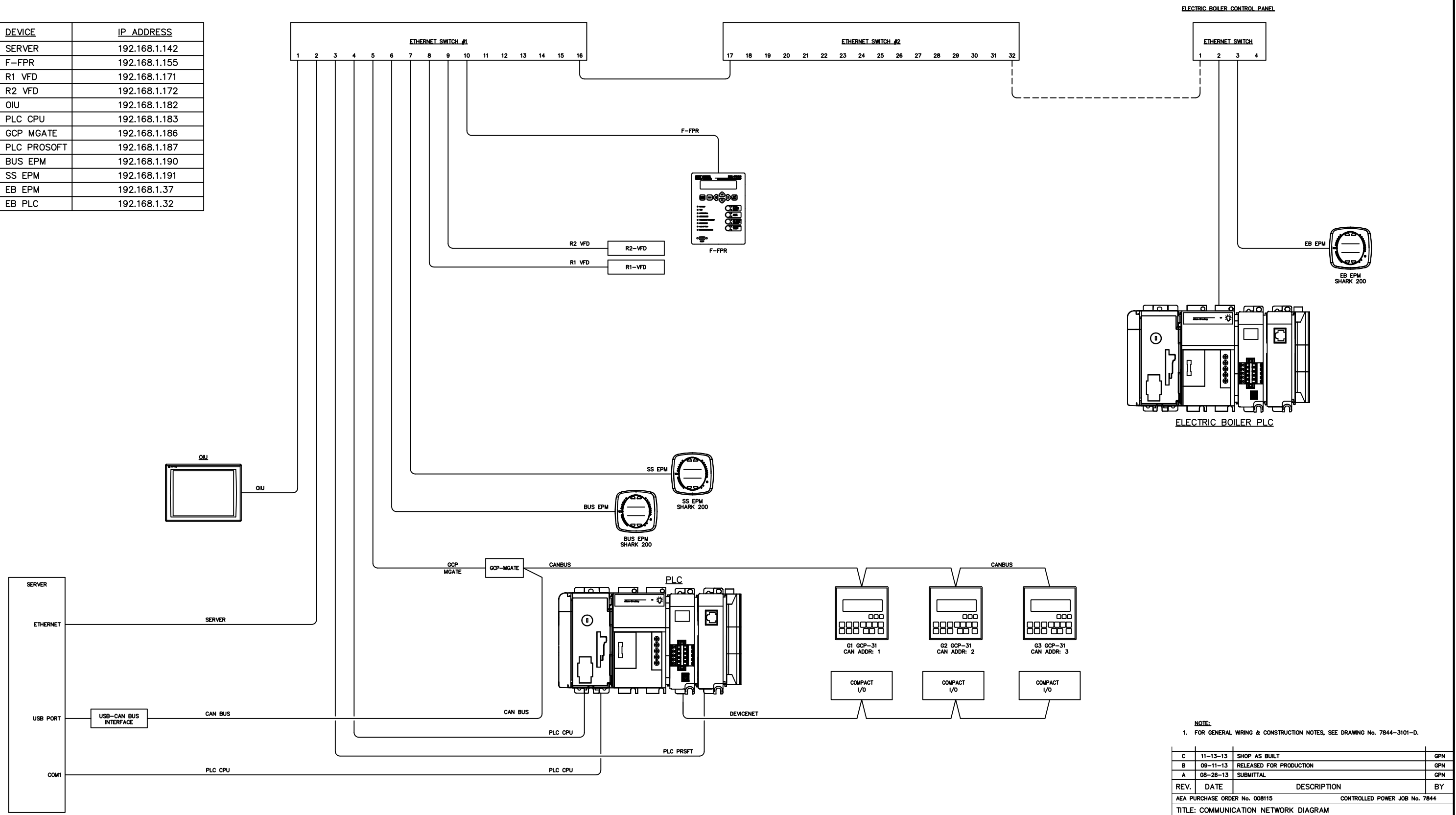
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DEVICE	IP ADDRESS
SERVER	192.168.1.142
F-FPR	192.168.1.155
R1 VFD	192.168.1.171
R2 VFD	192.168.1.172
OIU	192.168.1.182
PLC CPU	192.168.1.183
GCP MGATE	192.168.1.186
PLC PROSOFT	192.168.1.187
BUS EPM	192.168.1.190
SS EPM	192.168.1.191
EB EPM	192.168.1.37
EB PLC	192.168.1.32



NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

REV.	DATE	DESCRIPTION	BY
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: COMMUNICATION NETWORK DIAGRAM

SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

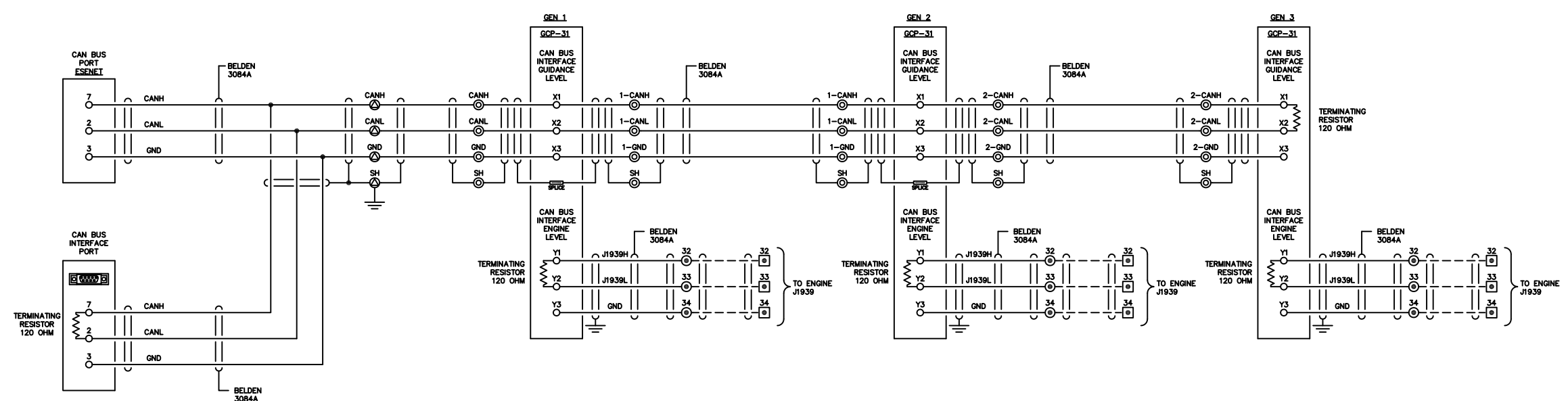
DWG. No: 7844-5601-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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NOTE:
 1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: COMMUNICATION NETWORK DIAGRAM

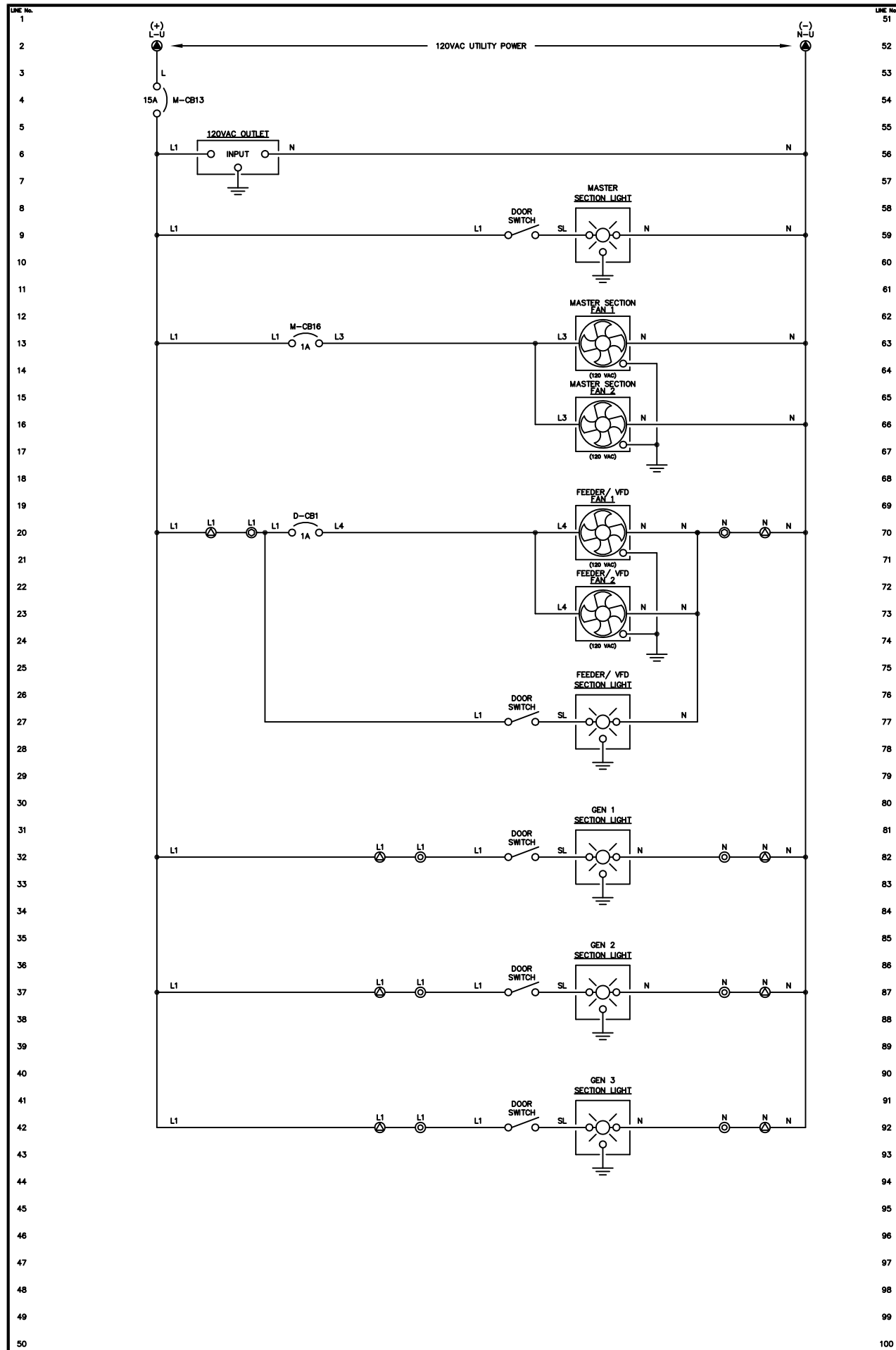
SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-5602-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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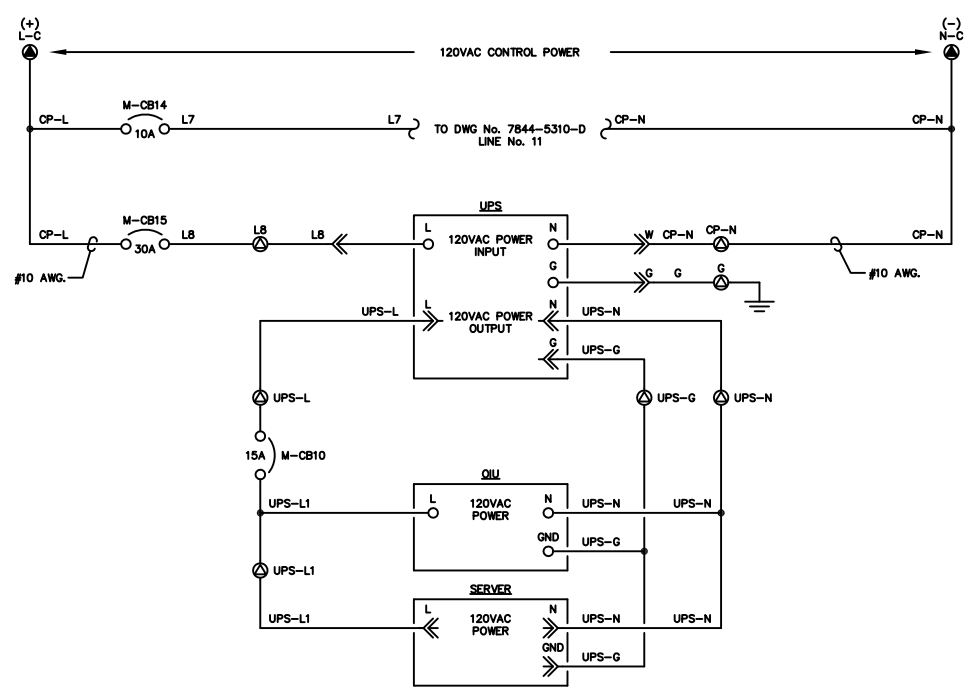


NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY
AEA PURCHASE ORDER No. 008115		CONTROLLED POWER JOB No. 7844	
TITLE: AC SERVICE, LIGHTING & FAN CONTROL, SCHEMATIC DIAGRAM			
SCALE: NONE	DATE: 08-26-13	DWN. BY: GPN	
DWG. No: 7844-5701-D	SHEET: 1 OF 1	CKD. BY: JMD	
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR			

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NOTE:
 1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: AC CONTROL POWER, SCHEMATIC DIAGRAM

SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

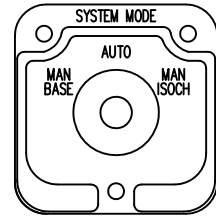
DWG. No: 7844-5702-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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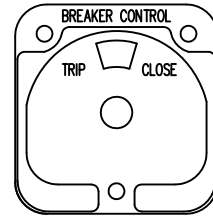
SYSTEM MODE SWITCH – SMS



(ELECTROSWITCH 24201C)
KNURLED HANDLE
QTY 1

DECK	CONTACTS			POS.		
	MAN BASE	AUTO	MAN ISOCH	MAN BASE	AUTO	MAN ISOCH
1	12	11	13	X		
	16	15	17	X		
1	11	18	12	X		
	15	14	16	X		

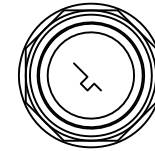
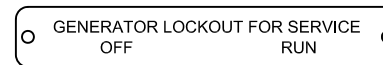
BREAKER CONTROL SWITCH – 52CS



(ELECTROSWITCH 2438D)
PISTOL GRIP HANDLE
SPRING RETURN TO CENTER
QTY 1

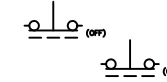
DECK	CONTACTS			POS.		
	TRIP	TRIP INHIBIT	CLOSE	TRIP	TRIP INHIBIT	CLOSE
1	11	18	17	X		
	16	17	18	X		

GENERATOR LOCKOUT SWITCH – GLS



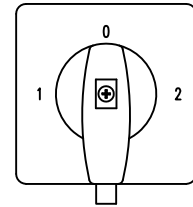
KEY OPERATED
2 POS MAINTAINED
QTY 3

POS
OFF
ON



VARIABLE FREQUENCY DRIVE MODE SWITCH – VFDMS

VFD OFF BYPASS



3 POS MAINTAINED
QTY 2

71322		44	34	1L1	1L2	1L3	2L1	2L2	2L3	53	63	
POSITION												POSITION
SMD	1	MD		1T1	1T2	1T3	2T1	2T2	2T3	54	64	2
71300												

NOTE:

- FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

REV.	DATE	DESCRIPTION	BY
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: CONTROL SWITCH TARGET DIAGRAM

SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-6101-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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MANUFACTURED BY:
 **CONTROLLED POWER, INC.**
 17909 BOTHELL EVERETT HWY. S.E. #102
 BOTHELL, WA. 98012
 (425)-485-1778
 SERIAL NUMBER: 7844

TEXT 1/4"
 QUANTITY 1
 SCALE 1/1
 SEE NOTE 4

MASTER CONTROL

TEXT 1/2"
 QUANTITY 1
 SCALE 1/1

GENERATOR 1

TEXT 1/2"
 QUANTITY 1
 SCALE 1/1

GENERATOR 2

TEXT 1/2"
 QUANTITY 1
 SCALE 1/1

GENERATOR 3

TEXT 1/2"
 QUANTITY 1
 SCALE 1/1

FEEDER/ VFD

TEXT 1/2"
 QUANTITY 1
 SCALE 1/1

BOILER CONTROL

TEXT 1/2"
 QUANTITY 1
 SCALE 1/1

BOILER SCR CONTROL

TEXT 1/2"
 QUANTITY 1
 SCALE 1/1

210 KW

TEXT 1/2"
 QUANTITY 1
 SCALE 1/1

TEXT 1/2"
 QUANTITY 2
 SCALE 1/1

65 KW

RADIATOR FAN 1

TEXT 1/8"
 QUANTITY 1
 SCALE 1/1

RADIATOR FAN 2

TEXT 1/8"
 QUANTITY 1
 SCALE 1/1

GENERATOR LOCKOUT FOR SERVICE
 OFF RUN

TEXT 1/8"
 QUANTITY 3
 SCALE 1/1

GENERATOR 1

TEXT 3/16"
 QUANTITY 1
 SCALE 1/1

GENERATOR 2

TEXT 3/16"
 QUANTITY 1
 SCALE 1/1

GENERATOR 3

TEXT 3/16"
 QUANTITY 1
 SCALE 1/1

FEEDER

TEXT 3/16"
 QUANTITY 1
 SCALE 1/1

STATION SERVICE

TEXT 3/16"
 QUANTITY 1
 SCALE 1/1

VFD MAIN

TEXT 3/16"
 QUANTITY 1
 SCALE 1/1

LAMP TEST EMERGENCY STOP ALARM RESET

TEXT 1/8"
 QUANTITY 1
 SCALE 1/1

BUS TOTALIZING

TEXT 1/8"
 QUANTITY 1
 SCALE 1/1

STATION SERVICE

TEXT 1/8"
 QUANTITY 1
 SCALE 1/1


RADIATOR FAN 1
 VFD OFF BYPASS

TEXT 1/8"
 QUANTITY 1
 SCALE 1/1

RADIATOR FAN 2
 VFD OFF BYPASS

TEXT 1/8"
 QUANTITY 1
 SCALE 1/1

TEXT 1/8"
 QUANTITY 2
 SCALE 1/1
 SEE NOTE 4

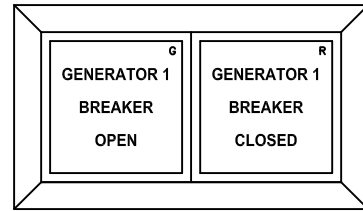
MANUFACTURED BY:
 **CONTROLLED POWER, INC.**
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 (425)-485-1778
 SERIAL NUMBER: 7844

- NOTES:
1. ALL NAMEPLATES SHALL BE BLACK FACE WITH WHITE LETTERS EXCEPT AS NOTED.
 2. ALL NAMEPLATES SHALL HAVE PRESSURE SENSITIVE ADHESIVE ON BACK, 100 % COVERAGE.
 3. ALL NAMEPLATES SHALL HAVE MOUNTING HOLES DRILLED AS INDICATED.
- ▲ INDICATES THAT NAMEPLATE SHALL BE BRUSHED ALUMINUM WITH BLACK ENGRAVED LETTERS.

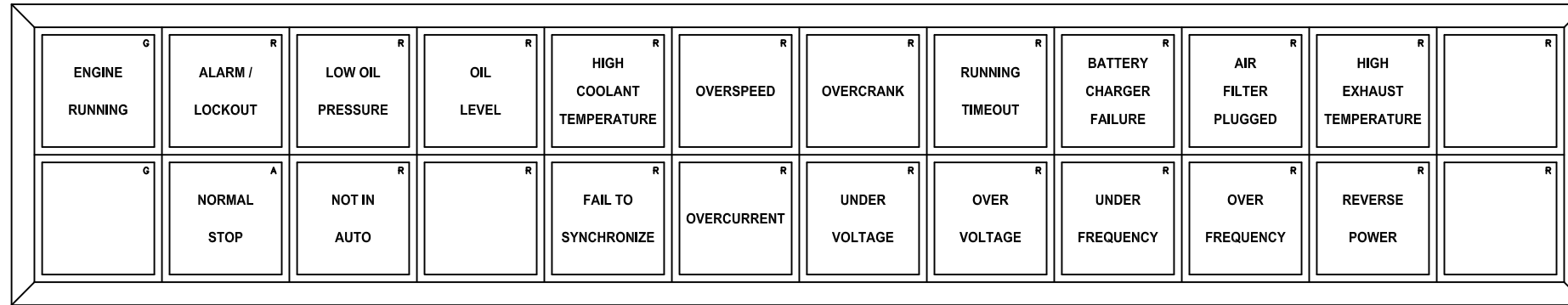
C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY
AEA PURCHASE ORDER No. 008115		CONTROLLED POWER JOB No. 7844	
TITLE: NAMEPLATE ENGRAVING SCHEDULE, FABRICATION DIAGRAM			
SCALE: NONE	DATE: 08-26-13	DWN. BY: GPN	
DWG. No: 7844-6201-D	SHEET: 1 OF 1	CKD. BY: JMD	
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR			

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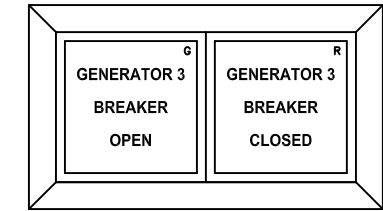
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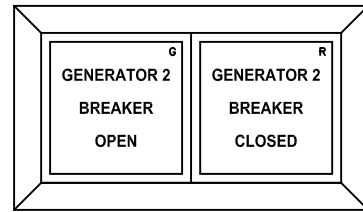
GEN 1 BREAKER ANNUNCIATOR
QTY 1



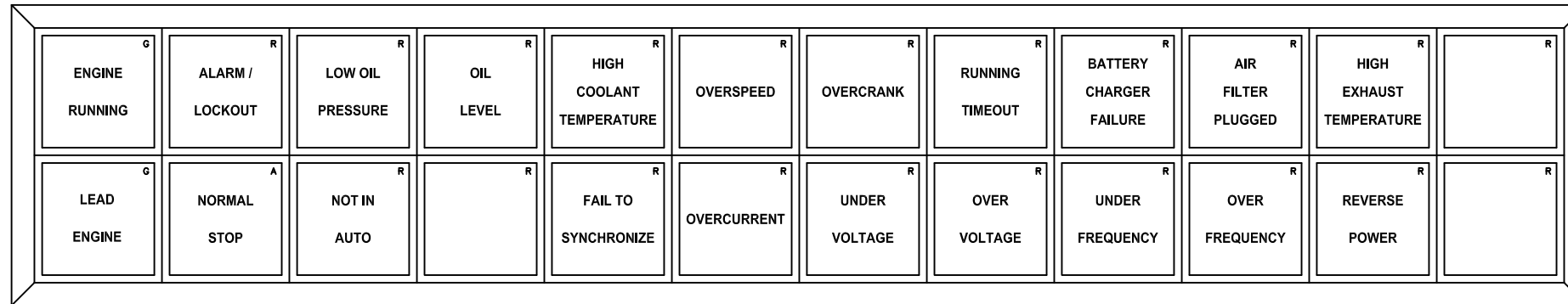
GENERATOR 1 ANNUNCIATOR
QTY 1



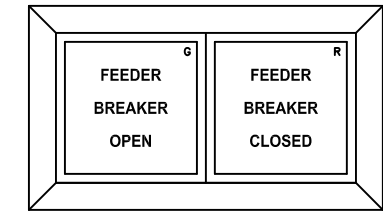
GEN 3 BREAKER ANNUNCIATOR
QTY 1



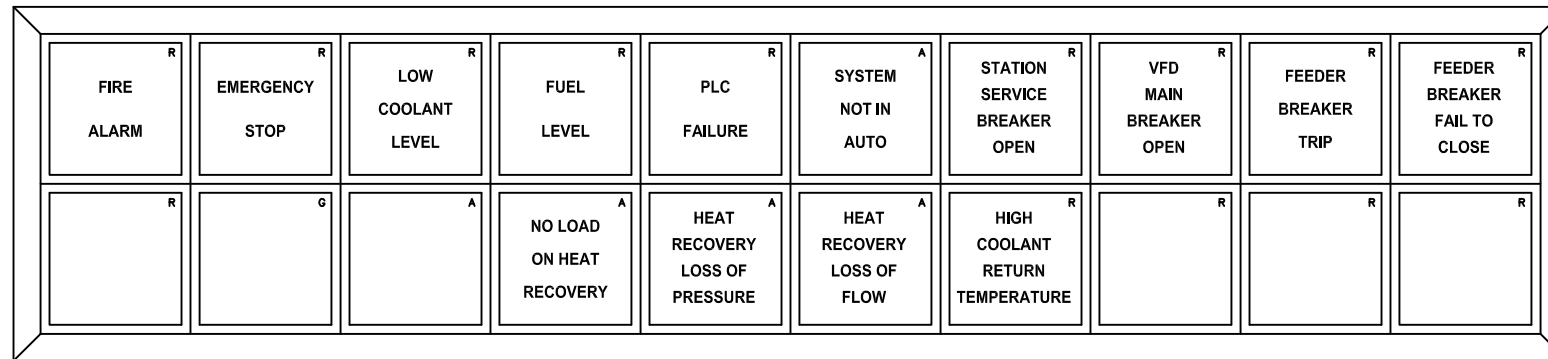
GEN 2 BREAKER ANNUNCIATOR
QTY 1



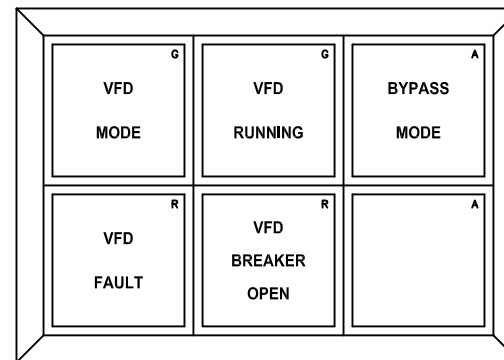
GENERATOR 2 & 3 ANNUNCIATOR
QTY 2



FEEDER 1 BREAKER ANNUNCIATOR
QTY 1



MASTER ANNUNCIATOR
QTY 1



VFD ANNUNCIATOR
QTY 2

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844
TITLE: ANNUNCIATOR WINDOWS, FABRICATION DIAGRAM

SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

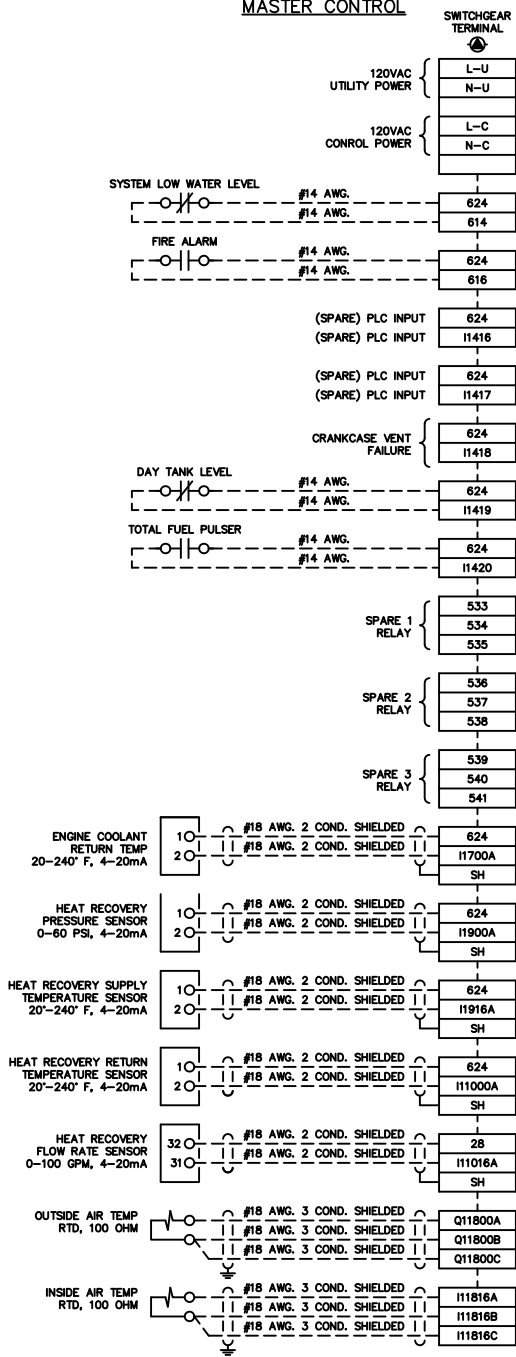
DWG. No: 7844-6202-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

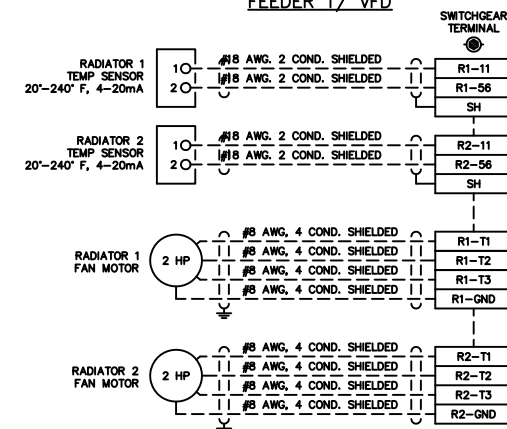
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MASTER CONTROL



FEEDER 1/ VFD



NOTE:
 1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: INTERCONNECTION DIAGRAM

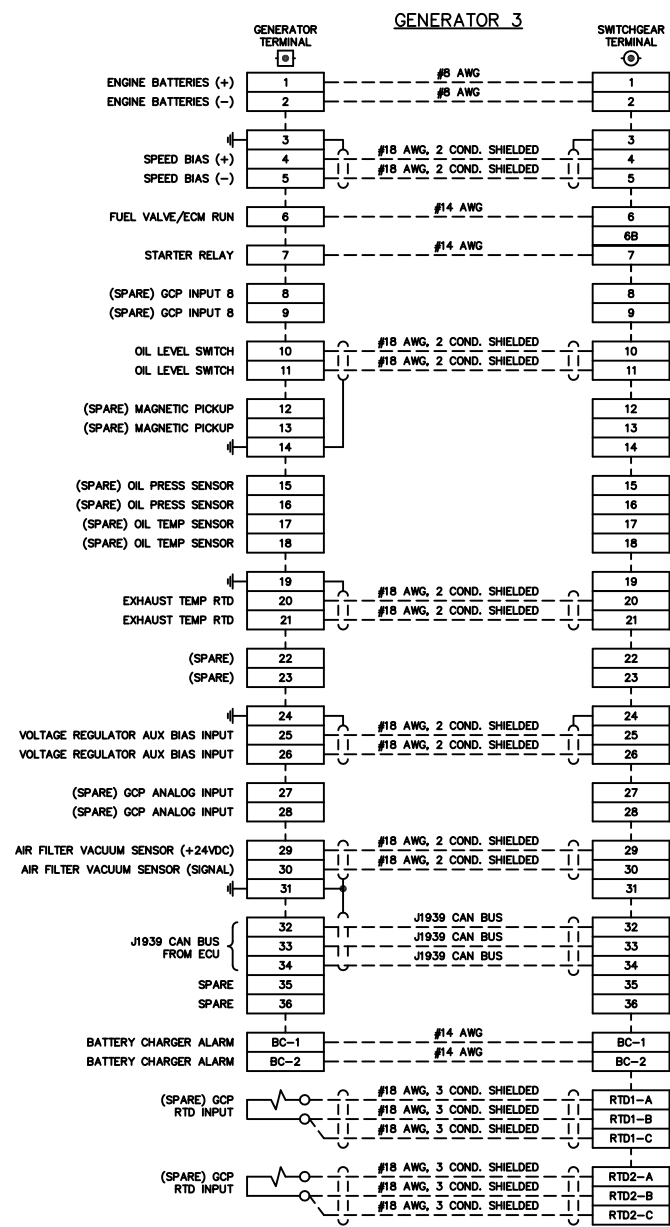
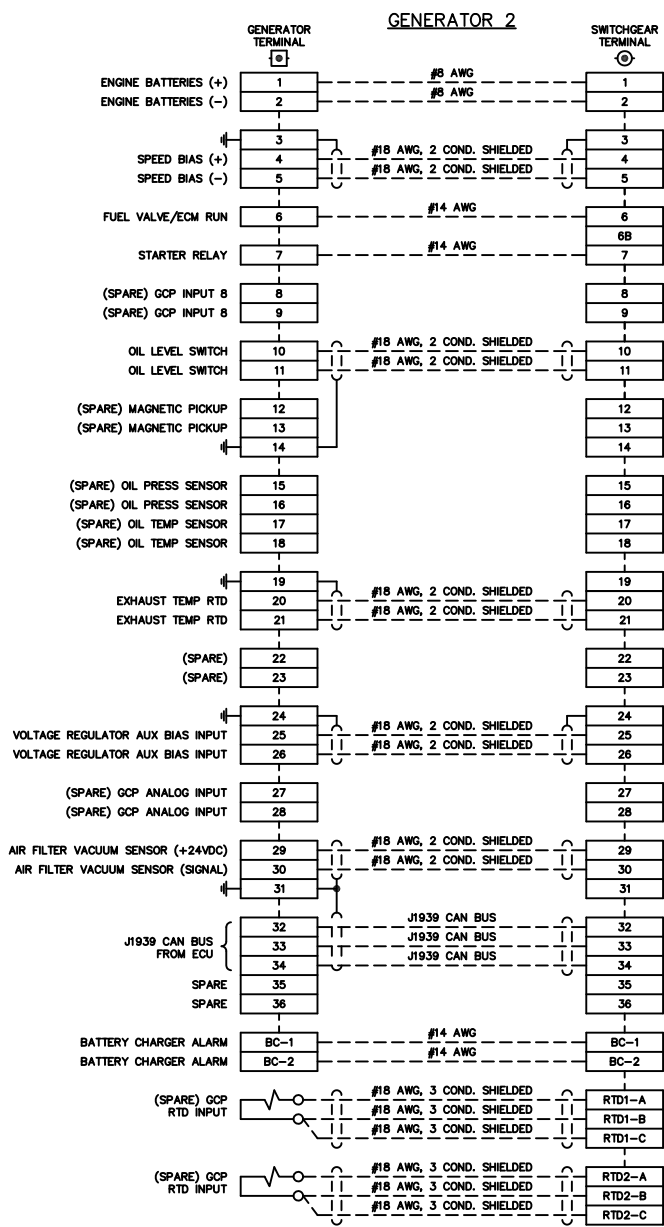
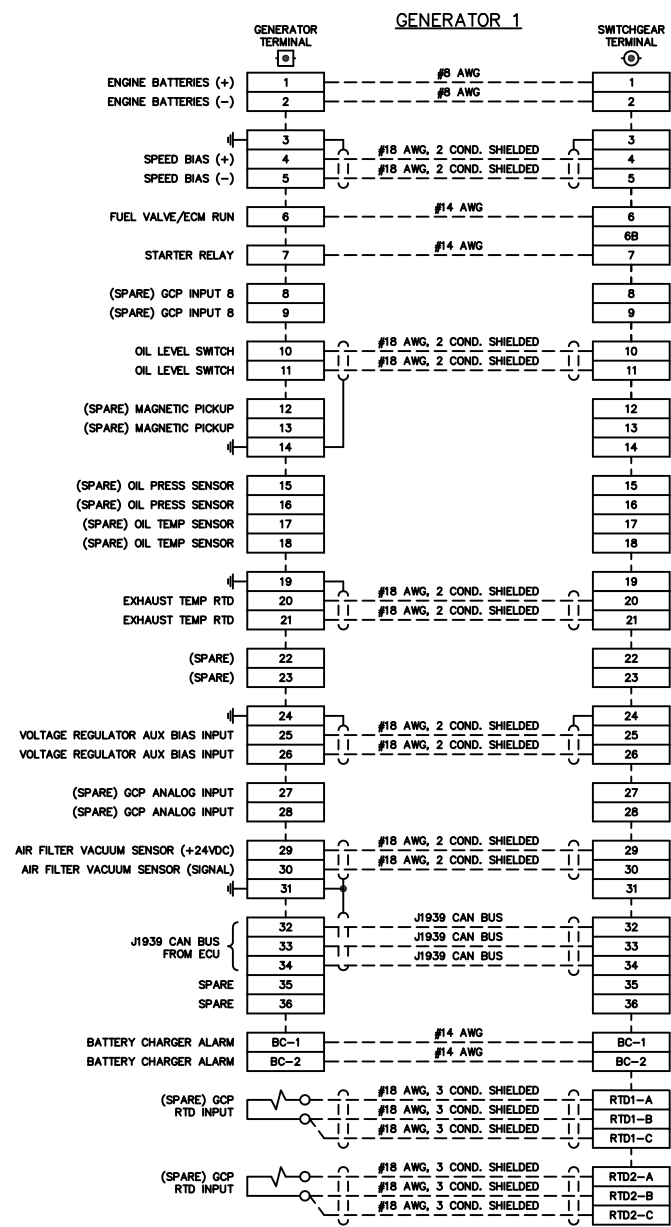
SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-7101-D SHEET: 1 OF 1 CKD. BY: JMD

JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 7844-3101-D.

C	11-13-13	SHOP AS BUILT	GPN
B	09-11-13	RELEASED FOR PRODUCTION	GPN
A	08-26-13	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY

AEA PURCHASE ORDER No. 008115 CONTROLLED POWER JOB No. 7844

TITLE: INTERCONNECTION DIAGRAM

SCALE: NONE DATE: 08-26-13 DWN. BY: GPN

DWG. No: 7844-7102-D SHEET: 1 OF 1 CKD. BY: JMD

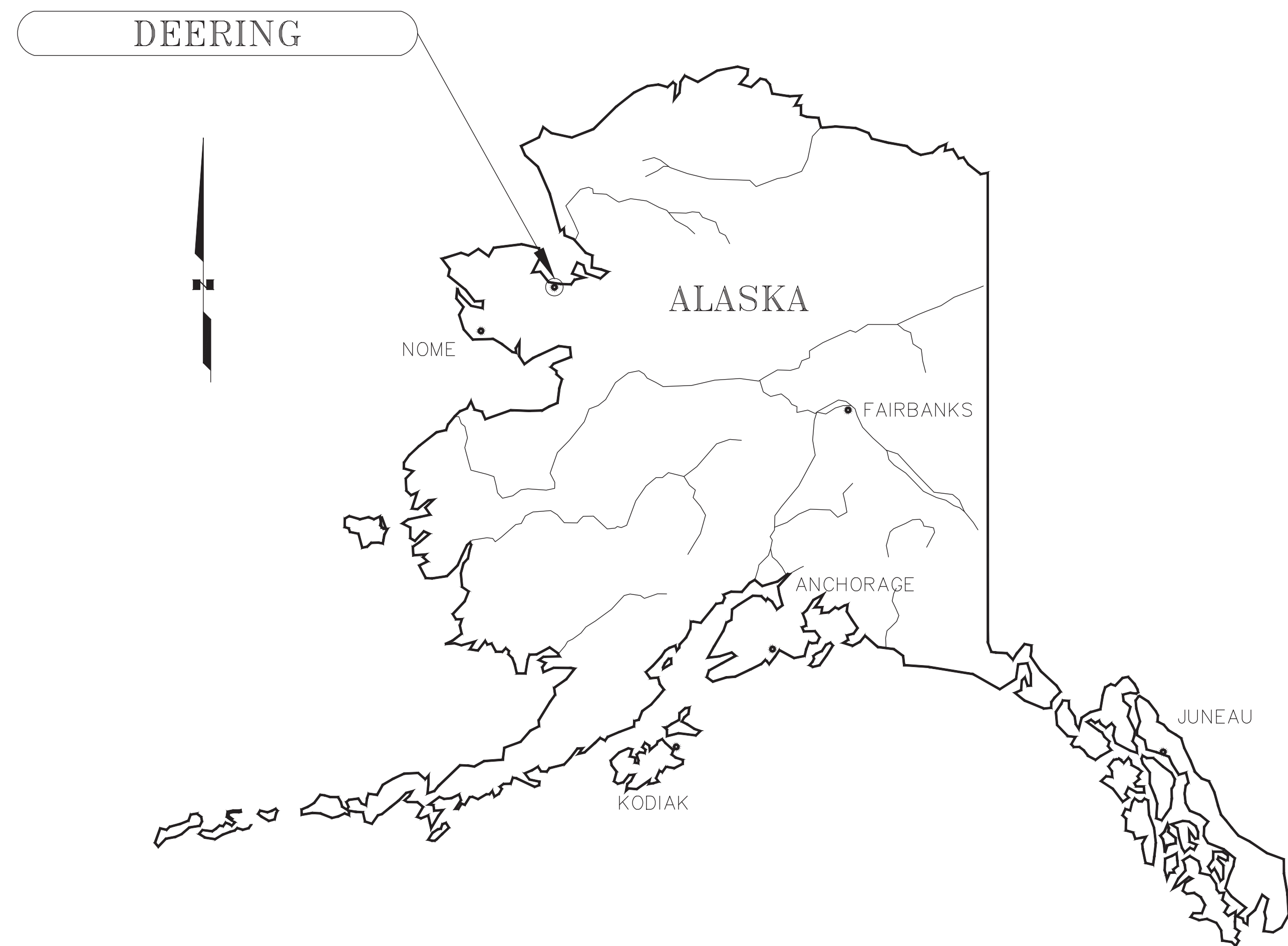
JOB: LARSEN BAY POWERHOUSE GENERATOR SWITCHGEAR

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STG DEERING SCADA UPDATE PROJECT NO. 14-0670

CALL BEFORE YOU DIG!
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 ANCHORAGE AREA..... 278-3121
 STATEWIDE..... 800-478-3121
 AT&T ALASCOM INC. 264-8465
 ALASKA RAILROAD UTILITIES..... 265-2457
 ALYESKA CABLE TV (GIRDWOOD)..... 783-2982
 KULIS AIR BASE..... 249-1499
 MILITARY PETROLEUM FUEL LINES..... 552-2334
 OR 552-5342
 STATE STORM DRAINS & STREET LIGHTS..... 333-2411



DRAWING INDEX				
TITLE	DRAWING NUMBER	SHEET	REVISION	NOTES
SINGLE LINE SCHEMATIC DIAGRAM	DCU-EL-0010	1	1	
SCADA NETWORK COMMUNICATIONS SYSTEM OVERVIEW	DCU-EL-0020	1	1	
GENERATOR 1 & 2 THREE LINE SCHEMATIC DIAGRAM	DCU-EL-0100	1	1	
GENERATOR 3 & 4 THREE LINE SCHEMATIC DIAGRAM	DCU-EL-0101	1	1	
FEEDER & MISCELLANEOUS THREE LINE SCHEMATIC DIAGRAM	DCU-EL-0102	1	1	
CHROMOLOX ERH CONTROL PANEL THREE LINE SCHEMATIC DIAGRAM	DCU-EL-0103	1	0	
CHROMOLOX ERH CONTROL PANEL THREE LINE SCHEMATIC DIAGRAM	DCU-EL-0103	2	0	
GENERATOR 1 DC CONTROL SCHEMATIC DIAGRAM	DCU-EL-2001	1	1	
GENERATOR 2 DC CONTROL SCHEMATIC DIAGRAM	DCU-EL-2002	1	1	
GENERATOR 3 DC CONTROL SCHEMATIC DIAGRAM	DCU-EL-2003	1	1	
GENERATOR 4 DC CONTROL SCHEMATIC DIAGRAM	DCU-EL-2004	1	1	
GENERATOR SWITCHGEAR PLC AUTOMATION SCHEMATIC DIAGRAM	DCU-EL-2005	1	1	
GENERATOR SWITCHGEAR PLC AUTOMATION SCHEMATIC DIAGRAM	DCU-EL-2006	1	1	
GENERATOR SWITCHGEAR NAMEPLATE ENGRAVING SCHEDULE FABRICATION DIAGRAM	DCU-EL-4000	1	1	
ELECTRICAL LAYOUT	DCU-EL-4100	1	1	
GENERATOR SWITCHGEAR PANEL ELEVATION	DCU-EL-4500	1	1	
ENERGY RECOVERY HEATER MECHANICAL LAYOUT	DCU-ME-2000	1	1	
ENERGY RECOVERY HEATER AC/DC SCHEMATIC DIAGRAM	DCU-EQ-0001	1	0	
ENERGY RECOVERY HEATER AC/DC SCHEMATIC DIAGRAM	DCU-EQ-0001	2	0	
ENERGY RECOVERY HEATER AC/DC SCHEMATIC DIAGRAM	DCU-EQ-0001	3	0	
ENERGY RECOVERY HEATER AC/DC SCHEMATIC DIAGRAM	DCU-EQ-0001	4	0	
ENERGY RECOVERY HEATER AC/DC SCHEMATIC DIAGRAM	DCU-EQ-0001	5	0	

PROJECT: DEERING SCADA UPGRADE		
DESIGNER/PROJECT ENGINEER: JASON ROWLAND/BILL BRIMSTEIN - EPS		
JOB #: 14-0670		ENG. STAMP
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE
0	ISSUED FOR CONSTRUCTION	XJH/06-02-2015
1	AS-BUILT	KER/11-30-2015

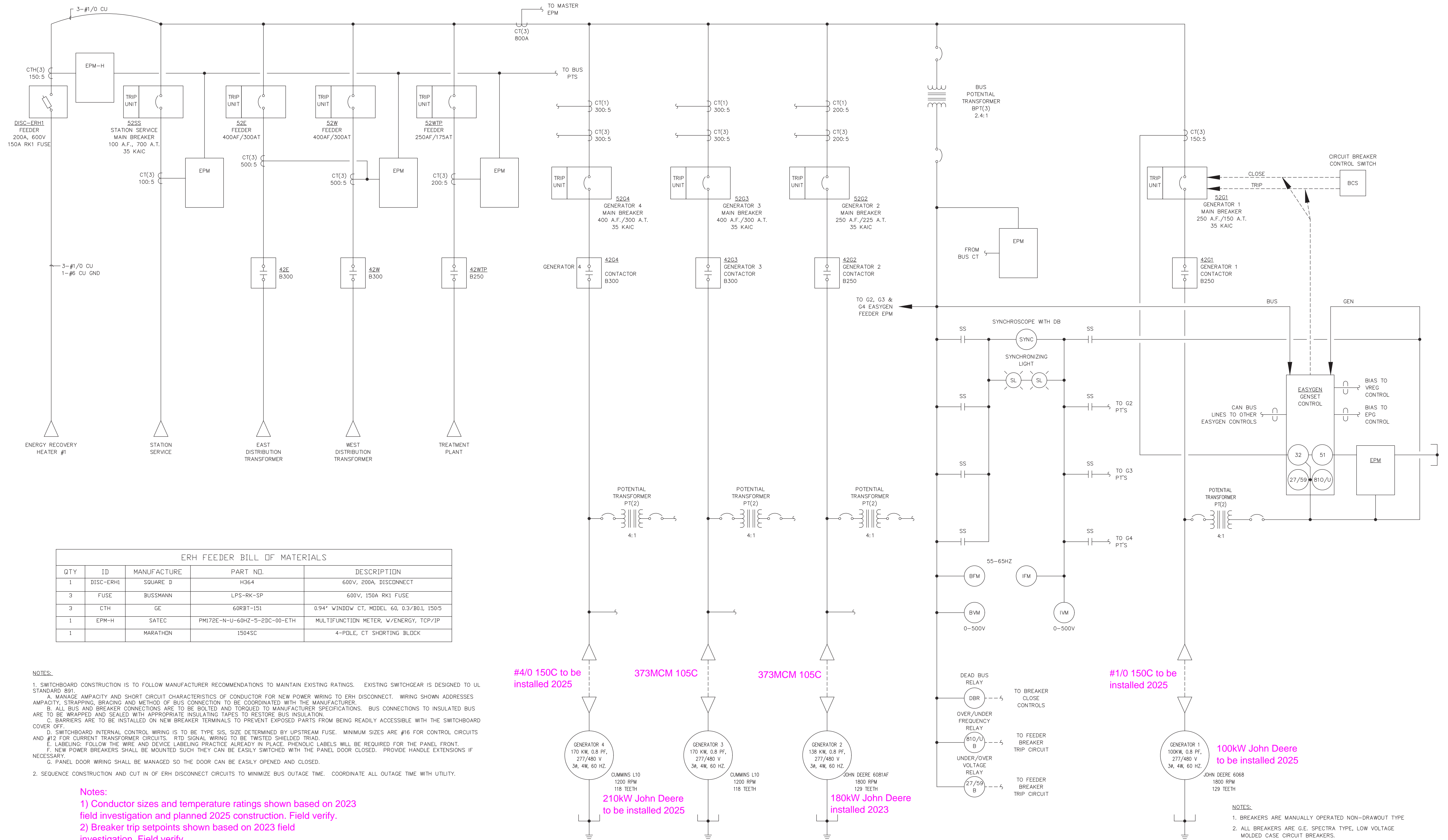
Electric Power Systems Inc.
 Consulting Engineers
 TEL: (907) 522-1953
 FAX: (907) 522-1182
 WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

DRAWING NAME:	DEERING SCADA UPGRADE COVER SHEET & DRAWING INDEX	
REF DWG(S):		
DRAWING NO.:	DCU-PR-0001	SHEET 1 OF 1

dcu-pr-0001-1.dwg

MAIN BUS 3Ø, 4Ø, 10 KAIC, 1000 A, COPPER BUS



ERH FEEDER BILL OF MATERIALS				
QTY	ID	MANUFACTURE	PART NO.	DESCRIPTION
1	DISC-ERH1	SQUARE D	H364	600V, 200A, DISCONNECT
3	FUSE	BUSSMANN	LPS-RK-SP	600V, 150A RK1 FUSE
3	CTH	GE	60RBT-151	0.94" WINDDW CT, MODEL 60, 0.3/B01, 150/5
1	EPM-H	SATEC	PM172E-N-U-60HZ-5-2DC-00-ETH	MULTIFUNCTION METER, W/ENERGY, TCP/IP
1		MARATHON	1504SC	4-PDLE, CT SHORTING BLOCK

- NOTES:**
- SWITCHBOARD CONSTRUCTION IS TO FOLLOW MANUFACTURER RECOMMENDATIONS TO MAINTAIN EXISTING RATINGS. EXISTING SWITCHGEAR IS DESIGNED TO UL STANDARD 891.
 - A. MANAGE AMPACITY AND SHORT CIRCUIT CHARACTERISTICS OF CONDUCTOR FOR NEW POWER WIRING TO ERH DISCONNECT. WIRING SHOWN ADDRESSES AMPACITY, STRAPPING, BRACING AND METHOD OF BUS CONNECTION TO BE COORDINATED WITH THE MANUFACTURER.
 - B. ALL BUS AND BREAKER CONNECTIONS ARE TO BE BOLTED AND TORQUED TO MANUFACTURER SPECIFICATIONS. BUS CONNECTIONS TO INSULATED BUS ARE TO BE WRAPPED AND SEALED WITH APPROPRIATE INSULATING TAPES TO RESTORE BUS INSULATION.
 - C. BARRIERS ARE TO BE INSTALLED ON NEW BREAKER TERMINALS TO PREVENT EXPOSED PARTS FROM BEING READILY ACCESSIBLE WITH THE SWITCHBOARD COVER OFF.
 - D. SWITCHBOARD INTERNAL CONTROL WIRING IS TO BE TYPE SIS, SIZE DETERMINED BY UPSTREAM FUSE. MINIMUM SIZES ARE #16 FOR CONTROL CIRCUITS AND #12 FOR CURRENT TRANSFORMER CIRCUITS. RTD SIGNAL WIRING TO BE TWISTED SHIELDED TRIAD.
 - E. LABELING: FOLLOW THE WIRE AND DEVICE LABELING PRACTICE ALREADY IN PLACE. PHENOLIC LABELS WILL BE REQUIRED FOR THE PANEL FRONT.
 - F. NEW POWER BREAKERS SHALL BE MOUNTED SUCH THEY CAN BE EASILY SWITCHED WITH THE PANEL DOOR CLOSED. PROVIDE HANDLE EXTENSIONS IF NECESSARY.
 - G. PANEL DOOR WIRING SHALL BE MANAGED SO THE DOOR CAN BE EASILY OPENED AND CLOSED.
 - SEQUENCE CONSTRUCTION AND CUT IN OF ERH DISCONNECT CIRCUITS TO MINIMIZE BUS OUTAGE TIME. COORDINATE ALL OUTAGE TIME WITH UTILITY.

- Notes:**
- Conductor sizes and temperature ratings shown based on 2023 field investigation and planned 2025 construction. Field verify.
 - Breaker trip setpoints shown based on 2023 field investigation. Field verify.

#4/0 150C to be installed 2025

373MCM 105C

373MCM 105C

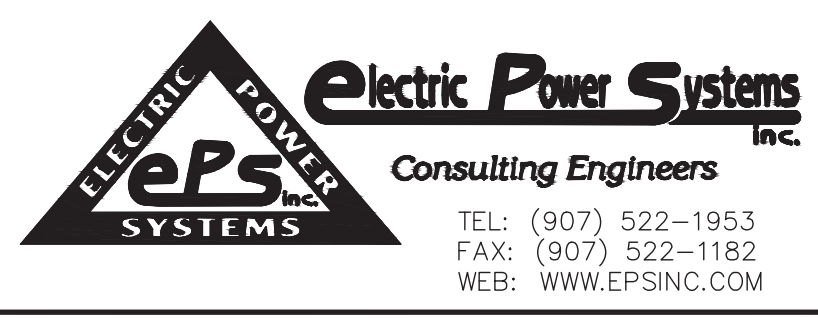
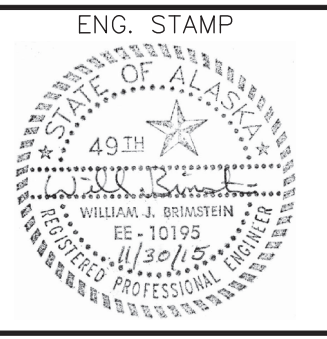
210kW John Deere to be installed 2025

180kW John Deere installed 2023

#1/0 150C to be installed 2025

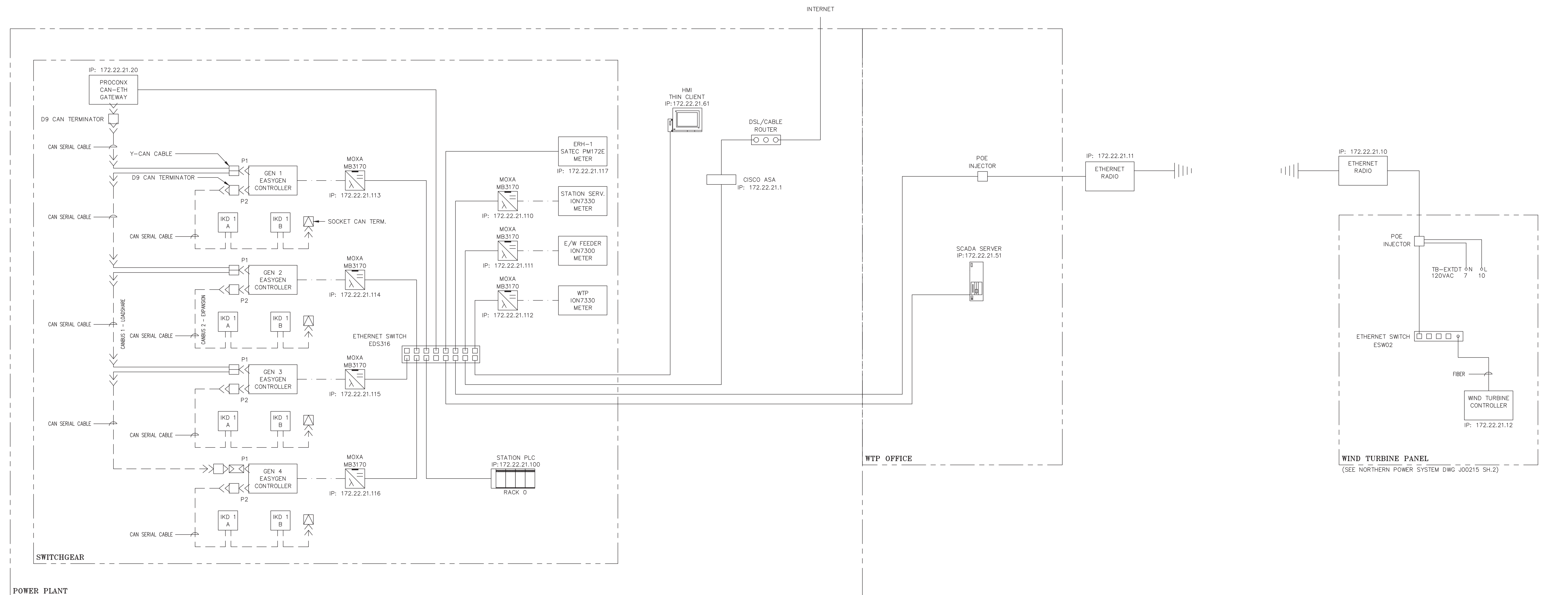
100kW John Deere to be installed 2025

PROJECT: DEERING SCADA UPGRADE		JOB #: 14-0670	
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN			
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	ISSUED FOR CONSTRUCTION	XJH/06-02-2015	WJB/06-02-2015
1	AS-BUILT	KER/11-30-2015	WJB/11-30-2015



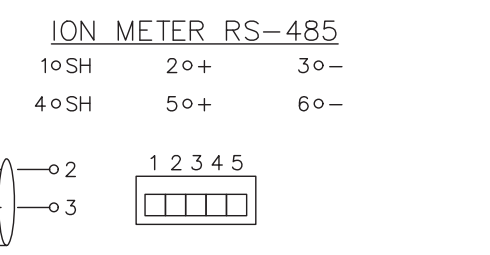
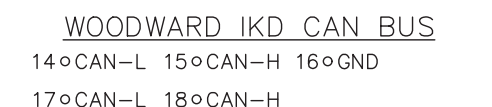
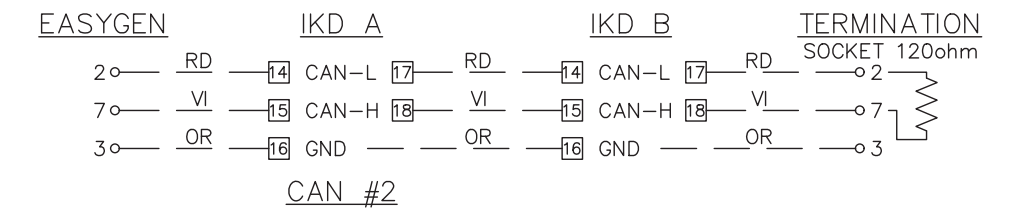
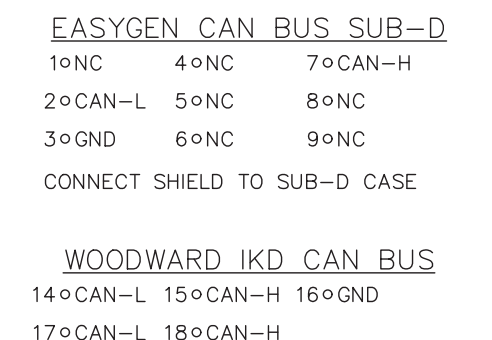
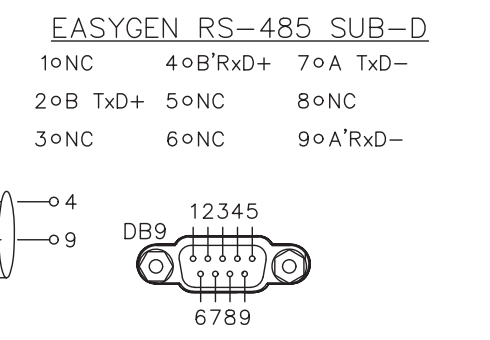
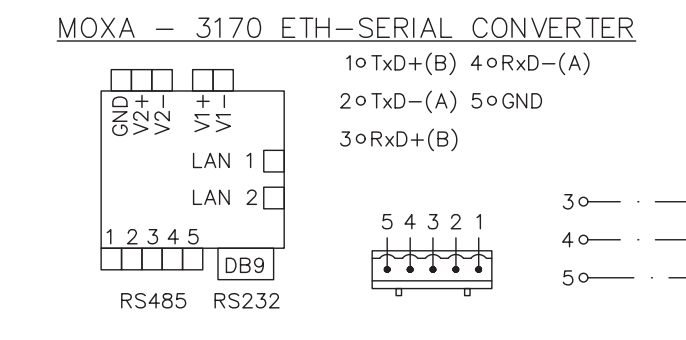
NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

DRAWING NAME: DEERING SCADA UPGRADE SINGLE LINE SCHEMATIC DIAGRAM	
REF DWG(S): CASCADE DIESEL ENGINE COMPANY, LLC, DWG. 9320 SHEET 1	DCU-EL-0010_1.dwg
DRAWING NO.: DCU-EL-0010	SHEET 1 OF 1



LEGEND:

- SERIAL
- ETHERNET
- CANBUS
- Y-CAN CABLE
- SUB D9 CAN TERM.
- SOCKET CAN TERM.
- GENDER CHANGER
- WTP WATER TREATMENT PLANT
- RS-485, 4-WIRE SHIELDED - BELDEN 3107A
- ETHERNET CAT 5E, FTP WITH SHIELD - BELDEN 7939A



CAN1 BUS EQUIPMENT LIST

NAME	QTY	MANF	DESCRIPTION	PART
D9 CAN TERMINATOR	10	IXXAT	SUB-D9 CONNECTOR WITH CAN TERMINATION. 120Ω MALE TO FEMALE	1.04.0075.03000
SOCKET CAN TERMINATOR	6	IXXAT	SOCKET CAN TERMINATION. 120Ω FEMALE	1.04.0075.01000
Y-CAN CABLE	4	IXXAT	SUB-D9 FEMALE TO SUB D9 FEMALE/MALE	1.04.0076.00001
CAN SERIAL CABLE	10	IXXAT	2 METER, SUB-D9 FEMALE TO MALE	1.04.0076.00180

NOTE:

1. DRAWING SHOWS SCHEMATIC CONNECTIONS ONLY. ACTUAL CONDUCTOR ROUTING SHALL BE VERIFIED IN THE FIELD.
2. ROUTER AND INTERNET CONNECTION TO BE PROVIDED WITH STATIC IP ADDRESS FOR REMOTE ACCESS.

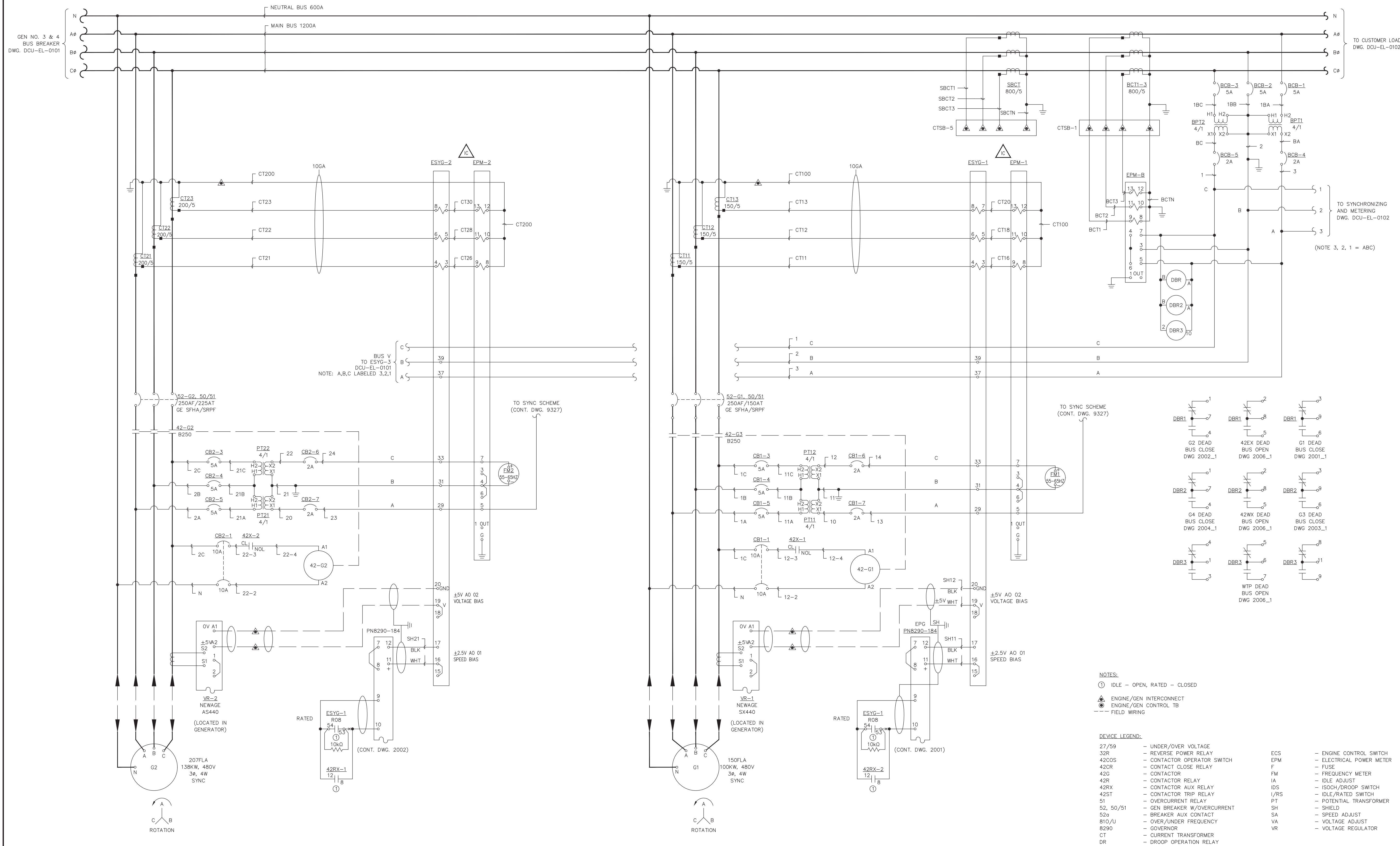
PROJECT: DEERING SCADA UPGRADE			
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN			
JOB #: 14-0670		ENG. STAMP	
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	ISSUED FOR CONSTRUCTION	XJH/06-02-2015	WJB/06-02-2015
0A	UPDATED FOR WIND TURBINE CONNECTIONS	WJB/10-09-2015	
1	AS-BUILT	KER/11-30-2015	WJB/11-30-2015

NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

DRAWING NAME: **DEERING SCADA UPGRADE SCADA NETWORK COMMUNICATIONS SYSTEM OVERVIEW**

REF DWG(S): dcu-el-0020_1.dwg

DRAWING NO.: **DCU-EL-0020** SHEET **1** OF **1**



PROJECT: DEERING SCADA UPGRADE		
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN		
JOB #: 14-0670		
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE
0	ISSUED FOR CONSTRUCTION	XJH/06-02-2015
1	AS-BUILT	KER/11-30-2015
		REVIEWED BY/DATE
		WJB/06-02-2015
		WJB/11-30-2015

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers

TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

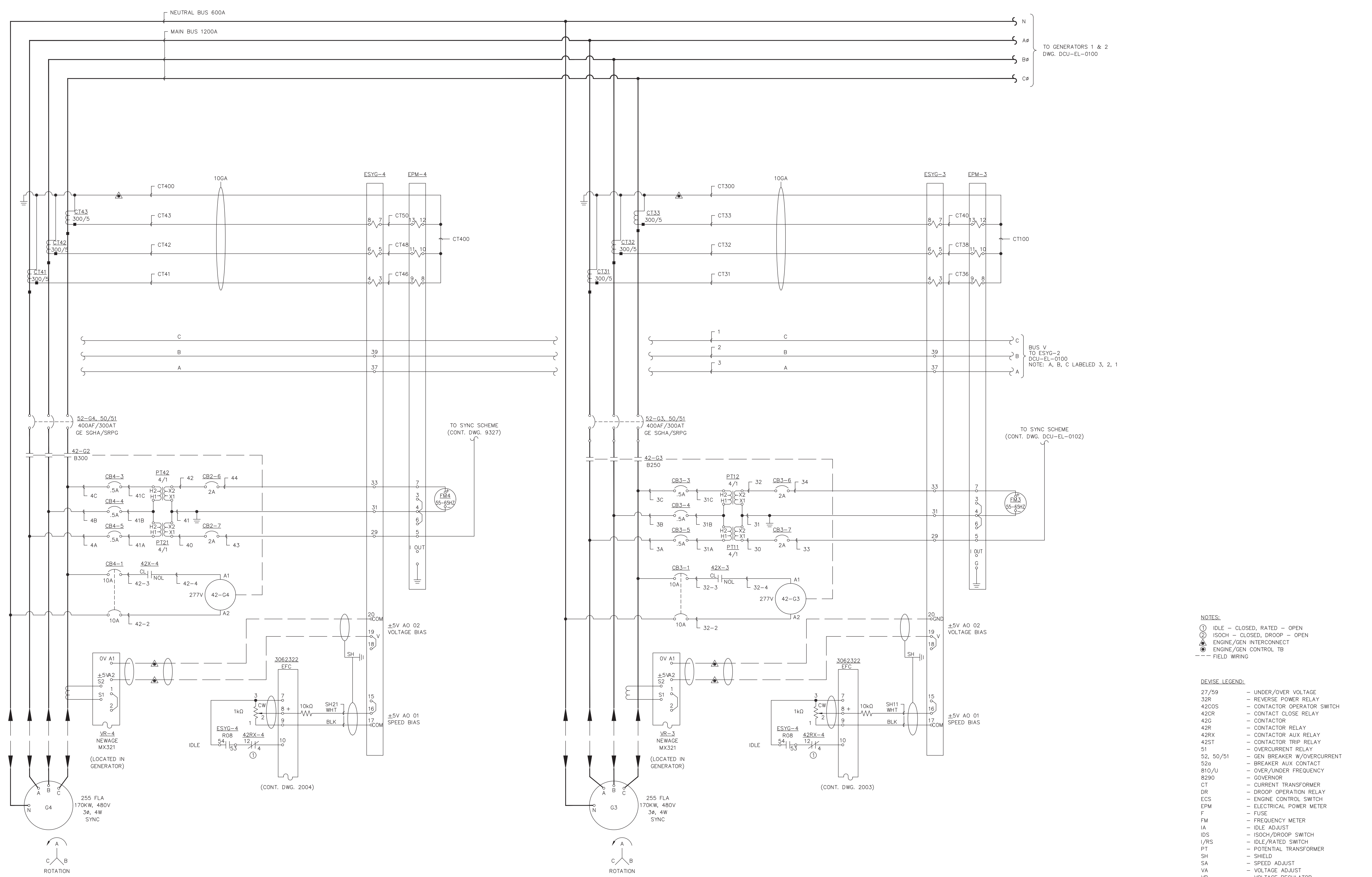
NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

DRAWING NAME:
**DEERING SCADA UPGRADE
GENERATOR 1 & 2
THREE LINE
SCHEMATIC DIAGRAM**

REF DWGS:
CASCADE DIESEL ENGINE COMPANY, LLC, DWG. 9326, SHEET 1

DRAWING NO.: **DCU-EL-0100**

SHEET 1 OF 1



TO GENERATORS 1 & 2
DWG. DCU-EL-0100

BUS V
TO ESYG-2
DCU-EL-0100
NOTE: A, B, C LABELED 3, 2, 1

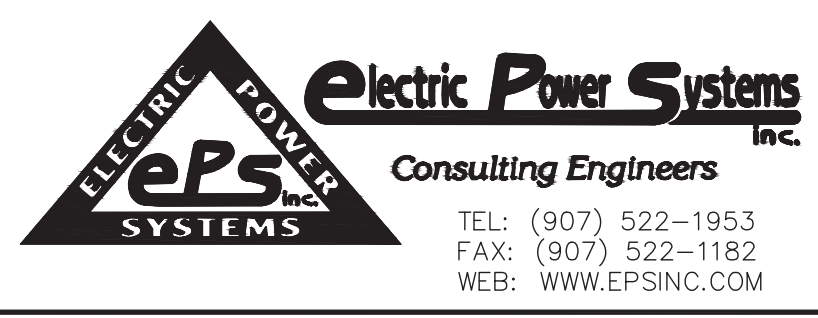
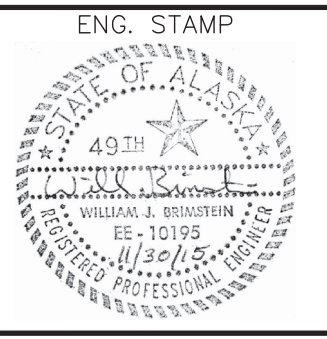
TO SYNC SCHEME
(CONT. DWG. 9327)

TO SYNC SCHEME
(CONT. DWG. DCU-EL-0102)

- NOTES:
- ① IDLE - CLOSED, RATED - OPEN
 - ② ISOCH - CLOSED, DROOP - OPEN
 - ⊕ ENGINE/GEN INTERCONNECT
 - ⊙ ENGINE/GEN CONTROL TB
 - FIELD WIRING

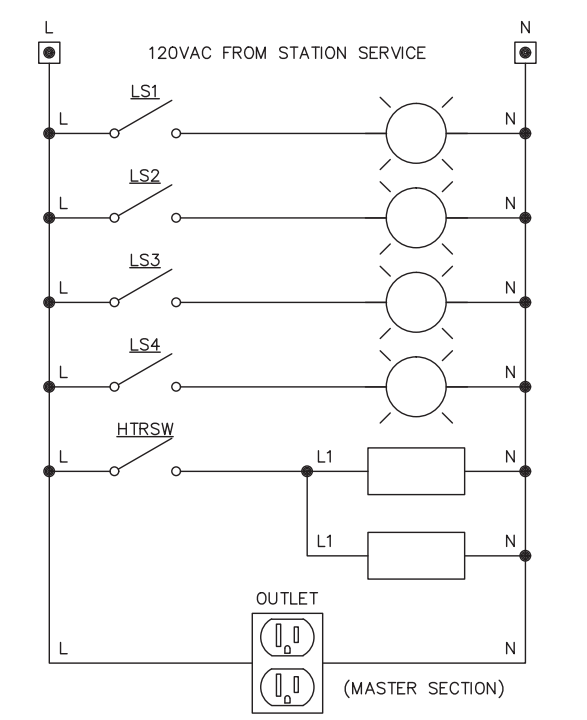
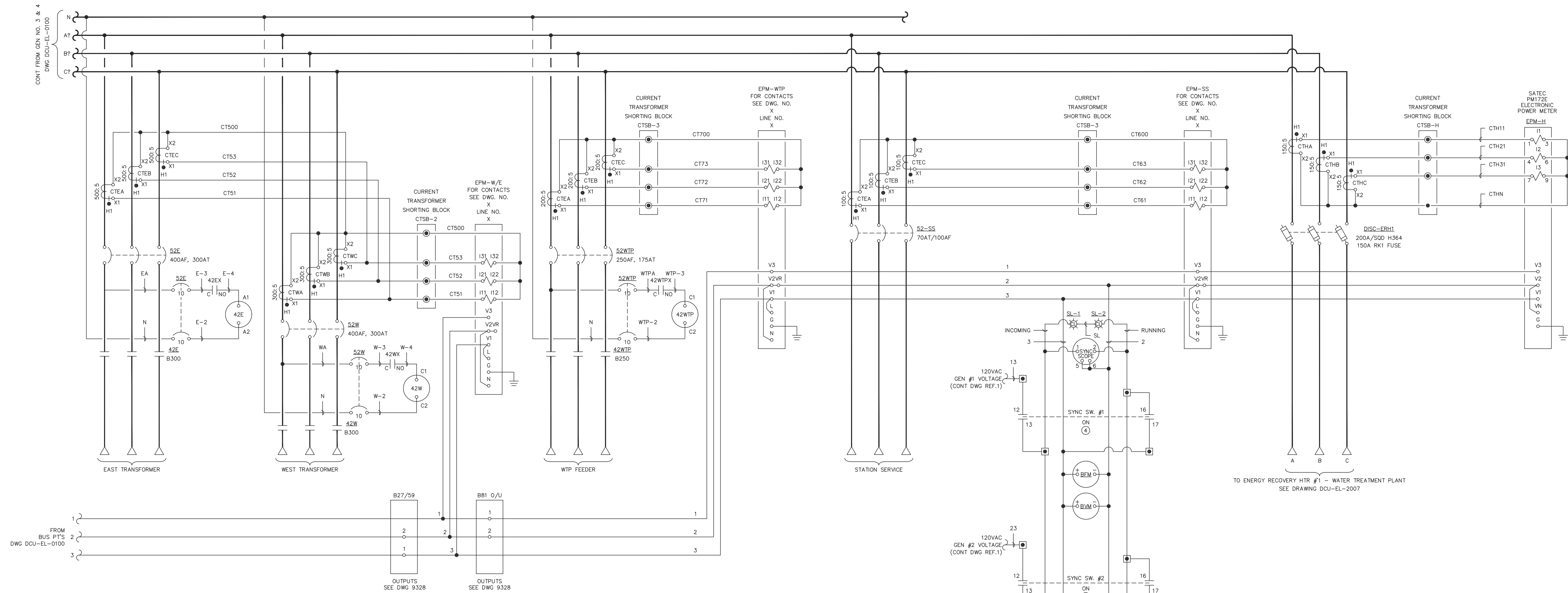
- DEVICE LEGEND:
- 27/59 - UNDER/OVER VOLTAGE
 - 32R - REVERSE POWER RELAY
 - 42COS - CONTACTOR OPERATOR SWITCH
 - 42CR - CONTACTOR CLOSE RELAY
 - 42G - CONTACTOR
 - 42R - CONTACTOR RELAY
 - 42RX - CONTACTOR AUX RELAY
 - 42ST - CONTACTOR TRIP RELAY
 - 51 - OVERCURRENT RELAY
 - 52, 50/51 - GEN BREAKER W/OVERCURRENT
 - 52a - BREAKER AUX CONTACT
 - 810/U - OVER/UNDER FREQUENCY
 - 829D - GOVERNOR
 - CT - CURRENT TRANSFORMER
 - DR - DROOP OPERATION RELAY
 - ECS - ENGINE CONTROL SWITCH
 - EPM - ELECTRICAL POWER METER
 - F - FUSE
 - FM - FREQUENCY METER
 - IA - IDLE ADJUST
 - IDS - ISOCH/DROOP SWITCH
 - I/RS - IDLE/RATED SWITCH
 - PT - POTENTIAL TRANSFORMER
 - SH - SHIELD
 - SA - SPEED ADJUST
 - VA - VOLTAGE ADJUST
 - VR - VOLTAGE REGULATOR

PROJECT: DEERING SCADA UPGRADE		
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN		
JOB #: 14-0670		
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE
0	ISSUED FOR CONSTRUCTION	XJH/06-02-2015
1	AS-BUILT	WJB/06-02-2015
		REVIEWED BY/DATE
		KER/11-30-2015
		WJB/11-30-2015



NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

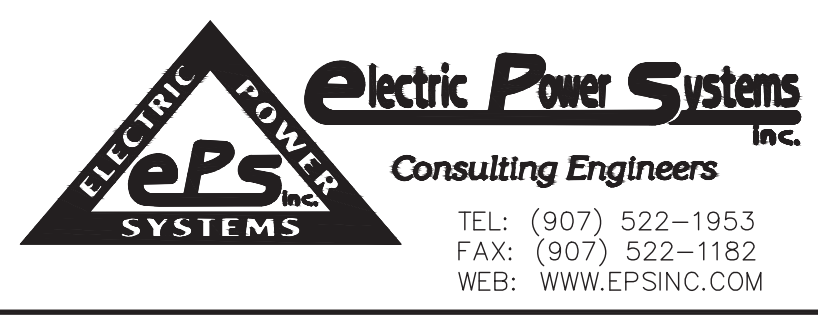
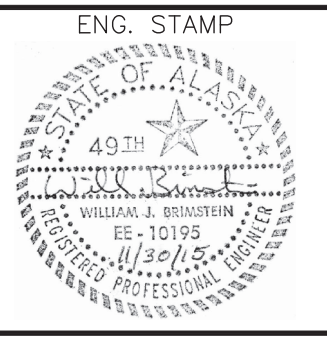
DRAWING NAME:		DEERING SCADA UPGRADE
		GENERATOR 3 & 4
		THREE LINE
		SCHEMATIC DIAGRAM
REF DWG(S):	CASCADE DIESEL ENGINE COMPANY, LLC, DWG. 9325, SHEET 1	
DRAWING NO.:	DCU-EL-0101	
	SHEET	1 OF 1



- NOTES:**
- ① IDLE - OPEN, RATED - CLOSED
 - ② ISOCH - CLOSED, DROOP - OPEN
 - ③ SYNC MC LOCATED ON GEN DOORS
 - ④ SS LOCATED ON GEN DOORS
 - MASTER CONTROL TERMINAL BLOCK
 - ENGINE/GEN CONTROL TERMINAL BLOCK
 - - - FIELD WIRING

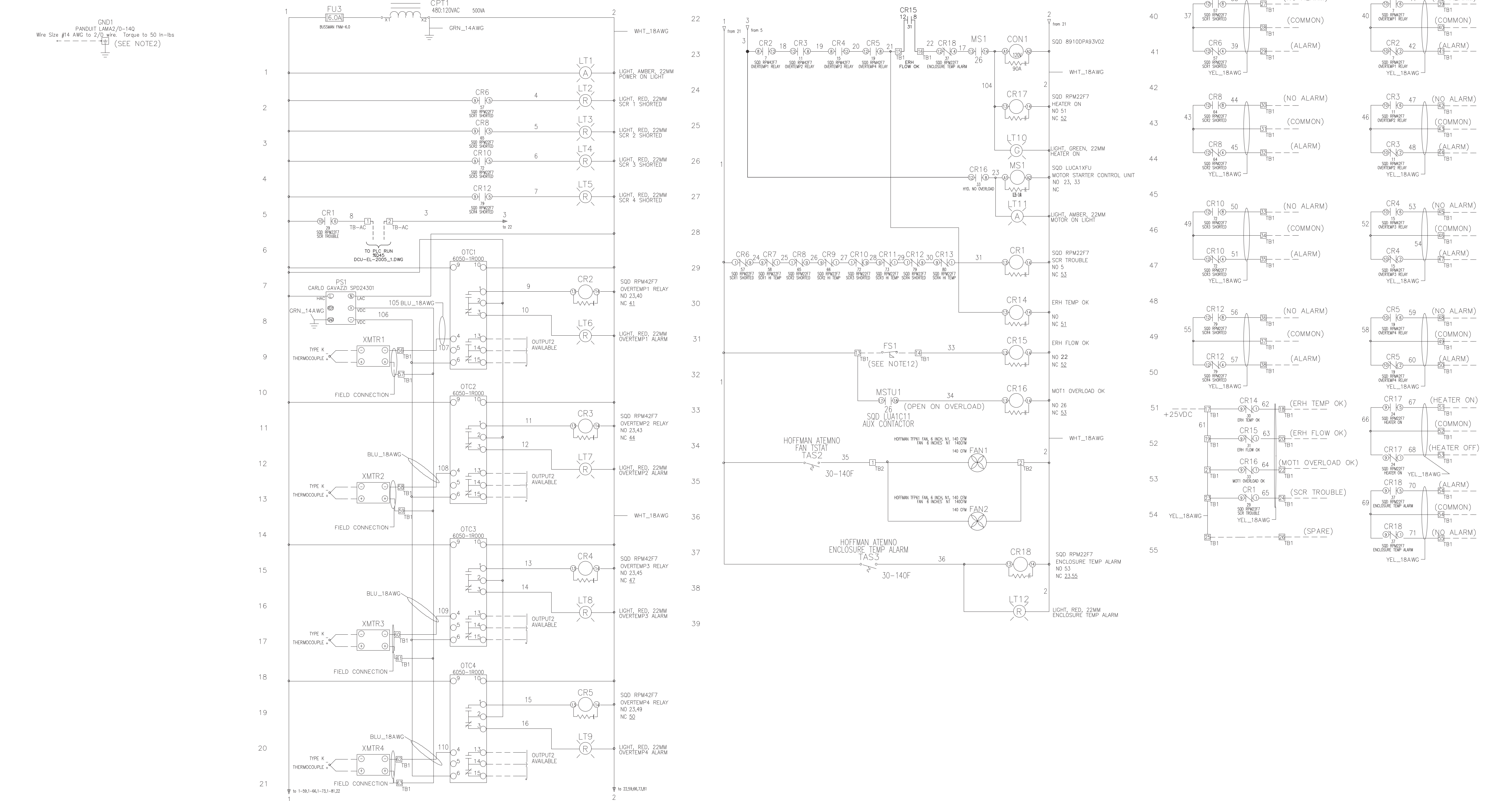
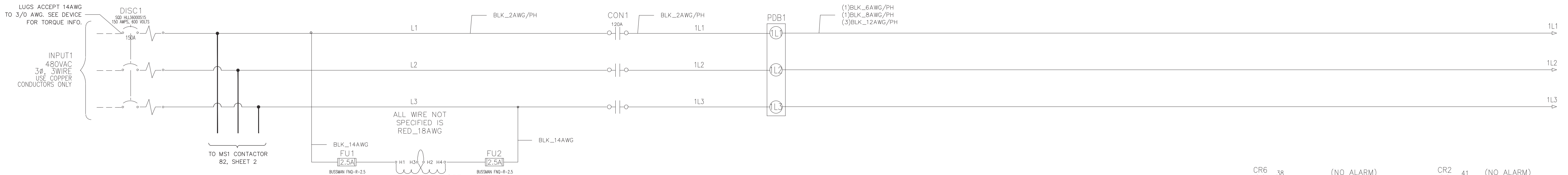
- DEVISE LEGEND:**
- 1712 - GOVERNOR
 - 27/59 - UNDER/OVER VOLTAGE
 - 32R - REVERSE POWER RELAY
 - 3720 - COMBINED VOLT/AMP/KW METER
 - 52 - CIRCUIT BREAKER
 - C - CONTACTOR
 - M - MAIN DIST. CIRCUIT BREAKER
 - 52CR - CONTACTOR CLOSE RELAY
 - 52CS - CONTACTOR CONTROL SWITCH
 - 52COS - CONTACTOR OPERATOR SWITCH
 - 52R - CONTACTOR RELAY
 - 52ST - CONTACTOR TRIP RELAY
 - 810/U - OVER/UNDER FREQUENCY
 - BCT - BUS CURRENT TRANSFORMERS
 - BFM - BUS FREQUENCY METER
 - BPT - BUT POTENTIAL TRANSFORMERS
 - BVM - BUS VOLTMETER
 - C4CR - CONTACTOR 4 CLOSING RELAY
 - C4TR - CONTACTOR 4 TRIPPING RELAY
 - CPT - CONTROL POWER TRANSFORMER
 - CT - CURRENT TRANSFORMER
 - ECS - ENGINE CONTROL SWITCH
 - F - FUSE
 - FM - FREQUENCY METER
 - IDS - ISOCH/DROOP SWITCH
 - I/RS - IDLE/RATED SWITCH
 - IWM - INCOMING VOLTMETER
 - MSC - MASTER CONTROL SWITCH
 - PM - PARALLEL MODULE
 - PT - POTENTIAL TRANSFORMER
 - SH - SHIELD
 - SL - SYNC LIGHT
 - SPM - SYNCHRONIZER
 - SSC - SYNCHROSCOPE
 - SA - SPEED ADJUST
 - SYNC MS - SYNC MODE SWITCH
 - VA - VOLTAGE ADJUST
 - VR - VOLTAGE REGULATOR

PROJECT: DEERING SCADA UPGRADE			
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN		JOB #: 14-0670	
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	ISSUED FOR CONSTRUCTION	XJH/06-02-2015	WJB/06-02-2015
1	AS-BUILT	KER/11-30-2015	WJB/11-30-2015

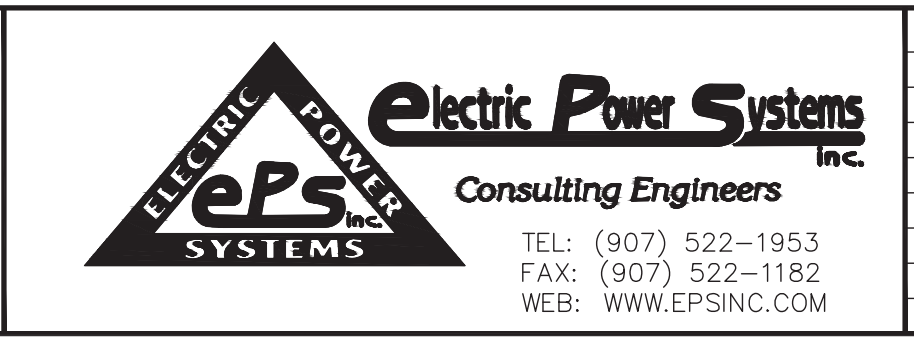
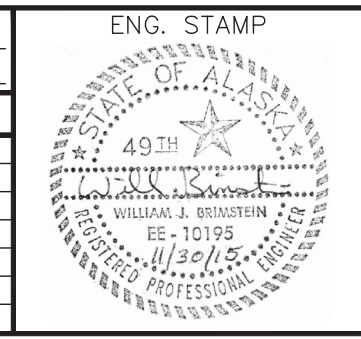


NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION
1	DCU-EL-0100/1	GENERATOR 1 & 2 THREE LINE DIAGRAM
2	DCU-EL-0101/1	GENERATOR 3 & 4 THREE LINE DIAGRAM

DRAWING NAME:		DEERING SCADA UPGRADE FEEDER & MISCELLANEOUS THREE LINE SCHEMATIC DIAGRAM
REF DWG(S):	CASCADE DIESEL ENGINE COMPANY, LLC, DWG. 9327, SHEET 1	
DRAWING NO.:	DCU-EL-0102	
SHEET		1 OF 1

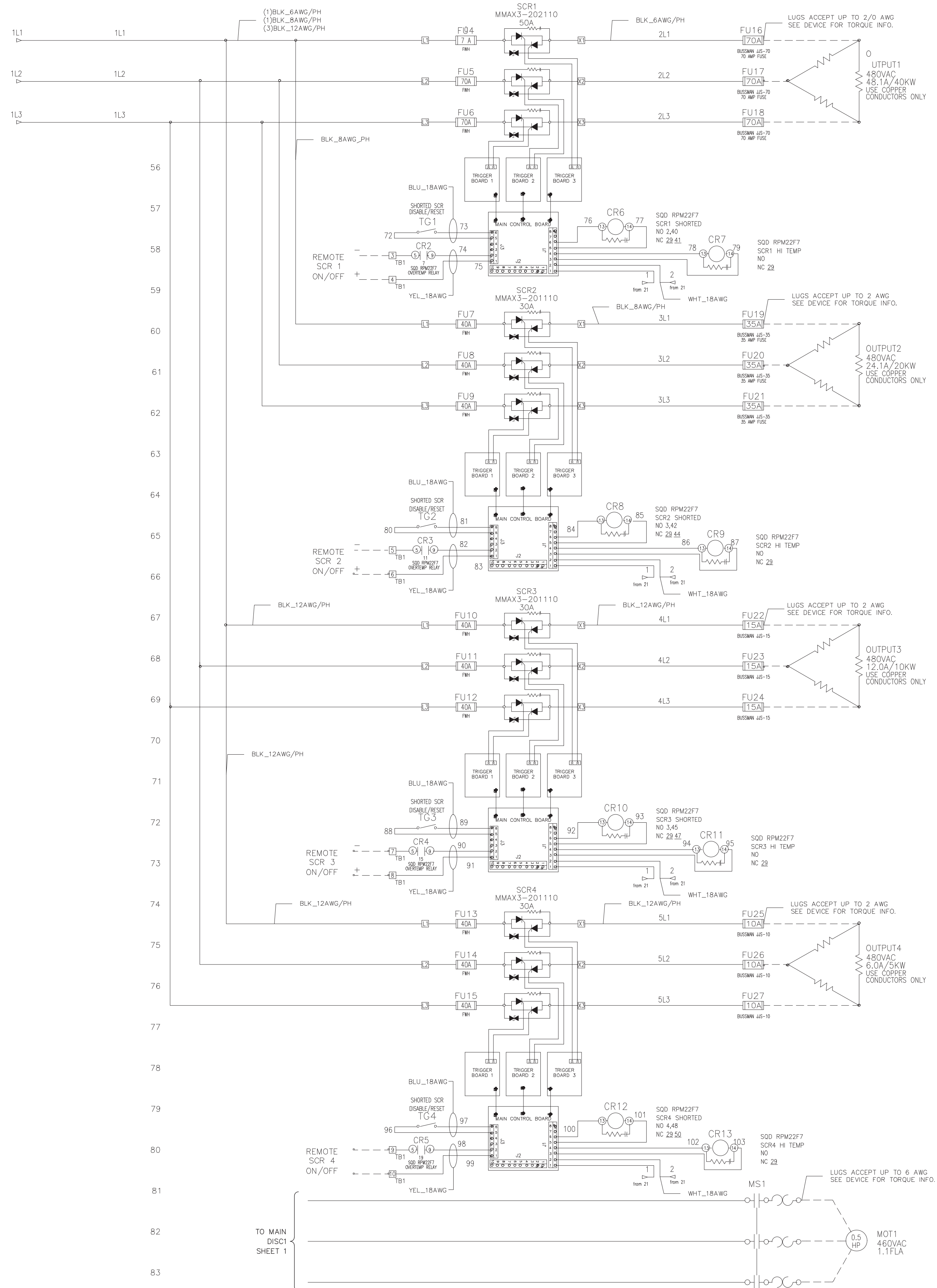


PROJECT: DEERING SCADA UPGRADE			
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN			
NO. AS-BUILT		JOB #: 14-0670	
DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE	
	KER/11-30-2015	WJB/11-30-2015	

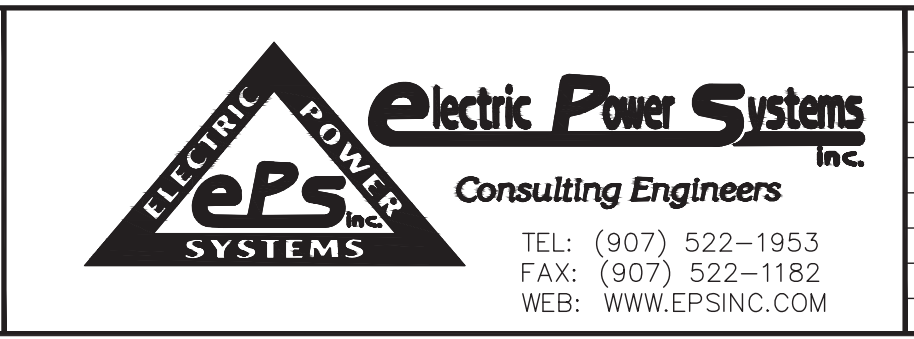
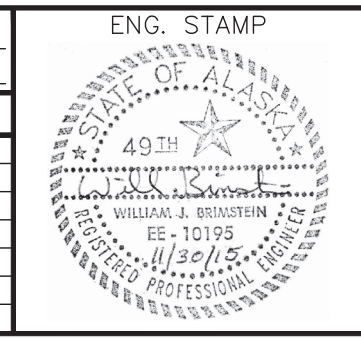


NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

DRAWING NAME:		DEERING SCADA UPGRADE
		CHROMOLOX ERH CONTROL PANEL
		THREE LINE
		SCHEMATIC DIAGRAM
REF DWG(S):	CHROMOLOX ASSEMBLY/WIRE DWG NO. 4239-23474-3, SH.3 OF 4	
DRAWING NO.:	DCU-EL-0103	
	SHEET	1 OF 2

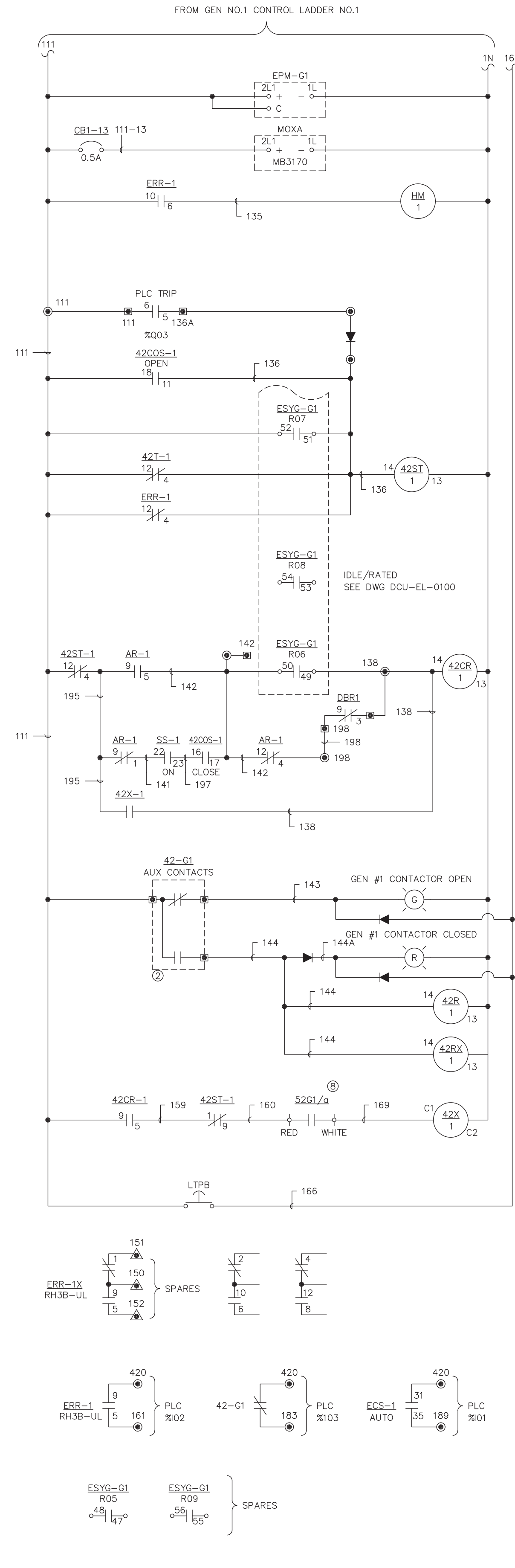
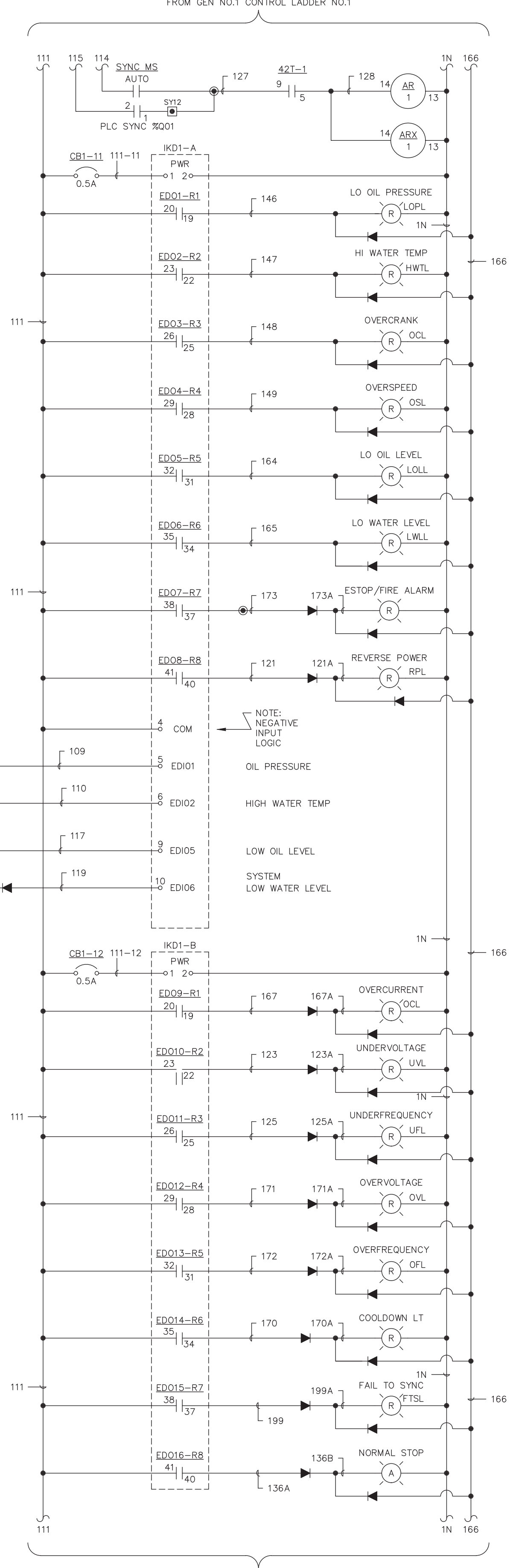
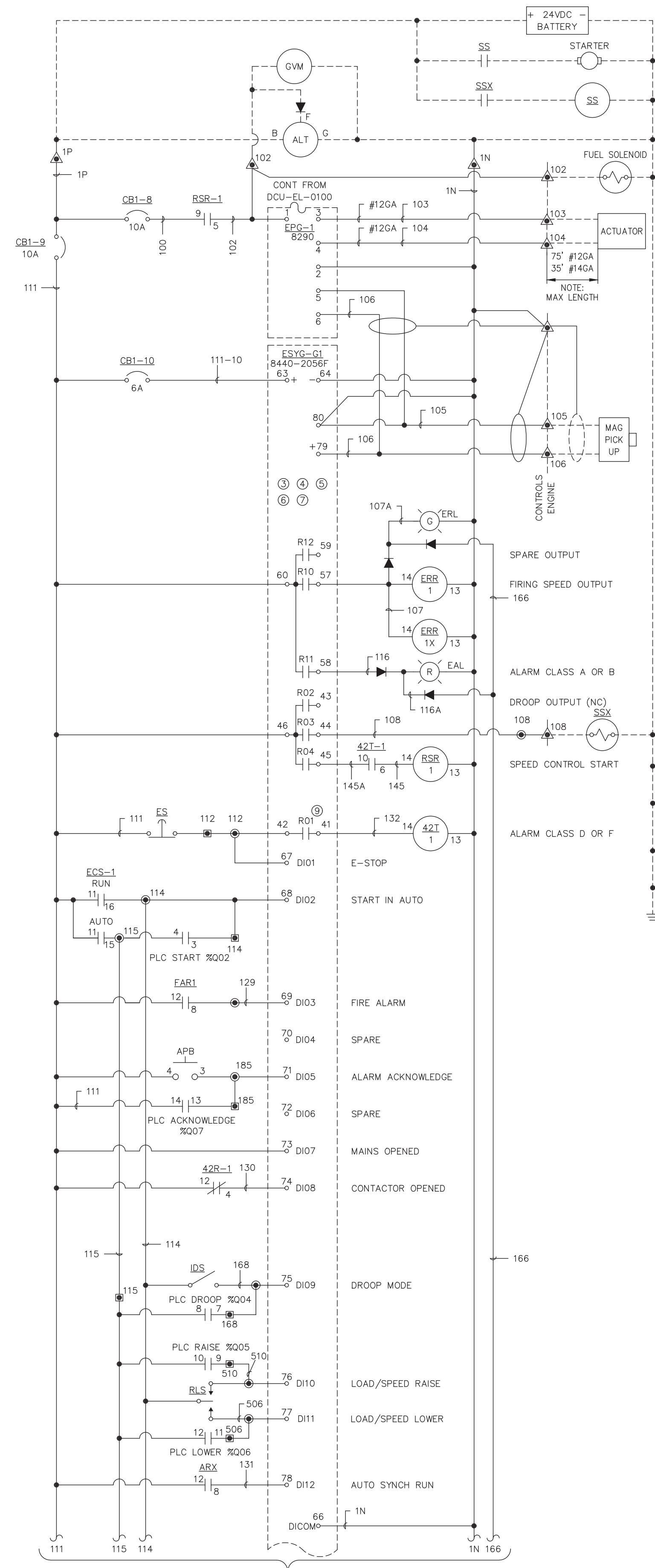


PROJECT: DEERING SCADA UPGRADE		JOB #: 14-0670	
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN			
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	AS-BUILT	KER/11-30-2015	WJB/11-30-2015



NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

DRAWING NAME:	
DEERING SCADA UPGRADE CHROMOLOX ERH CONTROL PANEL THREE LINE SCHEMATIC DIAGRAM	
REF DWG(S):	CHROMOLOX ASSEMBLY/WIRE DWG NO. 4239-23474-4, SH.4 OF 4
DRAWING NO.:	DCU-EL-0103
SHEET:	2 OF 2



- DEVICE LEGEND:**
- 27/59 - UNDER/OVER VOLTAGE
 - 32R - REVERSE POWER RELAY
 - 42COS - CONTACTOR OPERATOR SWITCH
 - 42CR - CONTACTOR CLOSE RELAY
 - 42C - CONTACTOR
 - 42R - CONTACTOR RELAY
 - 42RX - CONTACTOR AUX RELAY
 - 42ST - CONTACTOR TRIP RELAY
 - 51 - OVERCURRENT RELAY
 - 52, 50/51 - GEN BREAKER W/OVERCURRENT
 - 52Z - BREAKER AUX CONTACT
 - 810/U - OVER/UNDER FREQUENCY
 - 8290 - GOVERNOR
 - ALT - ALTERNATOR
 - APB - ACKNOWLEDGE PUSHBUTTON
 - AR - AUTO RELAY
 - ASR - AUTO START RELAY
 - CDL - COOL DOWN LIGHT
 - CT - CURRENT TRANSFORMER
 - DR - DROOP OPERATION RELAY
 - EAL - ENGINE ALARM LIGHT
 - ECS - ENGINE CONTROL SWITCH
 - EPG - ELECT POWERED GOVERNOR (WOODWARD)
 - EPM - ELECTRICAL POWER METER (WOODWARD)
 - ERR - ENGINE RUNNING RELAY
 - ESYG - EASYGEN (WOODWARD)
 - F - FUSE
 - FAR - FIRE ALARM RELAY
 - FM - FREQUENCY METER
 - GVM - GENERATOR VOLTMETER
 - HM - HOURMETER
 - HWTL - HIGH WATER TEMP LIGHT
 - IA - IDLE ADJUST
 - IDS - ISOCH/DROOP SWITCH
 - I/R/S - IDLE/RATED SWITCH
 - LOLL - LOW OIL LEVEL LIGHT
 - LOPL - LOW OIL PRESSURE LIGHT
 - LWLL - LOW WATER LEVEL LIGHT
 - LTPB - LAMP TEST PUSHBUTTON
 - OCL - OVER CRANK LIGHT
 - OFL - OVER FREQUENCY LIGHT
 - OSL - OVER SPEED LIGHT
 - OVL - OVER VOLTAGE LIGHT
 - PT - POTENTIAL TRANSFORMER
 - RLS - RAISE/LOWER SWITCH
 - RPL - REVERSE POWER LIGHT
 - RSR - RACK SOLENOID RELAY
 - SH - SHIELD
 - SA - SPEED ADJUST
 - SS - STARTER SOLENOID
 - SSX - START SOLENOID SLAVE RELAY
 - VA - VOLTAGE ADJUST
 - VR - VOLTAGE REGULATOR
- NOTES:**
- ① - CONT FROM DWG DCU-EL-0100
 - ② - LOCATED IN CONTACTOR C3
 - ③ - UPTD SET AT 5 SEC.
 - ④ - OPTD SET AT 5 SEC.
 - ⑤ - UVIDT SET AT 5 SEC.
 - ⑥ - OVIDT SET AT 5 SEC.
 - ⑦ - COOLDOWN SET FOR 3 MIN.
 - ⑧ - LOCATED IN GENERATOR MAIN BREAKER
 - ⑨ - R01 CLOSED DURING NORMAL OPERATION
- ⊙ - ENGINE/GEN CONTROL TERMINAL BLOCK
 - ⊚ - ENGINE/GEN INTERCONNECT TERMINAL BLOCK
 - ⊛ - MASTER CONTROL TERMINAL BLOCK
 -

PROJECT: DEERING SCADA UPGRADE
 DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN
 JOB #: 14-0670

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	ISSUED FOR CONSTRUCTION	XJH/06-02-2015	WJB/06-02-2015
1	AS-BUILT	KER/11-30-2015	WJB/11-30-2015

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 Consulting Engineers

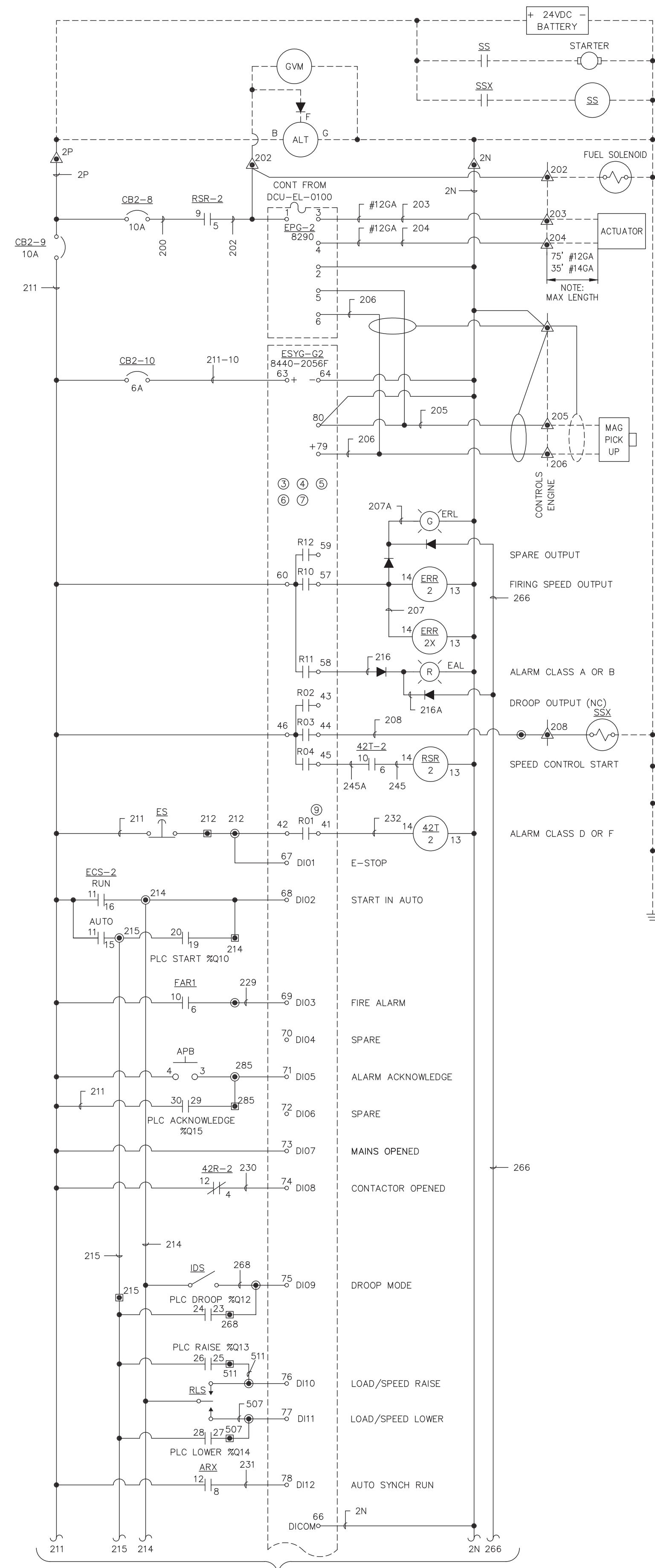
TEL: (907) 522-1953
 FAX: (907) 522-1182
 WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

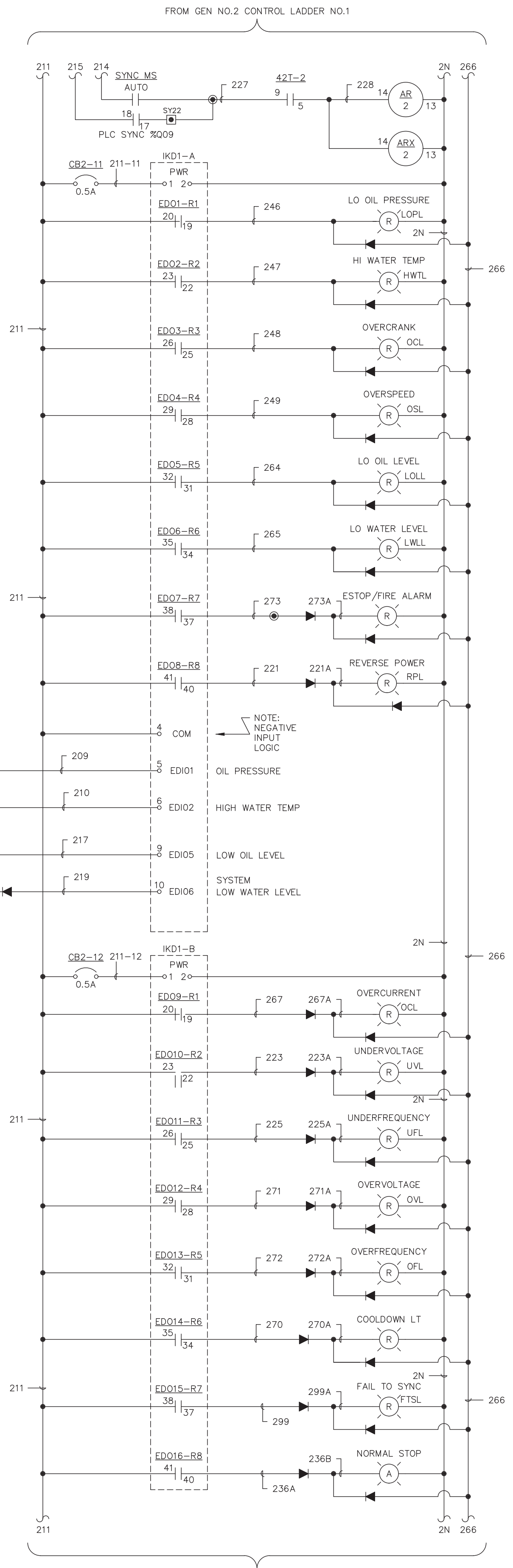
DRAWING NAME: DEERING SCADA UPGRADE
 GENERATOR 1
 DC CONTROL
 SCHEMATIC DIAGRAM

REF DWG(S): CASCADE DIESEL ENGINE COMPANY, LLC, DWG. 9321, SHEET 1
 DRAWING NO.: DCU-EL-2001

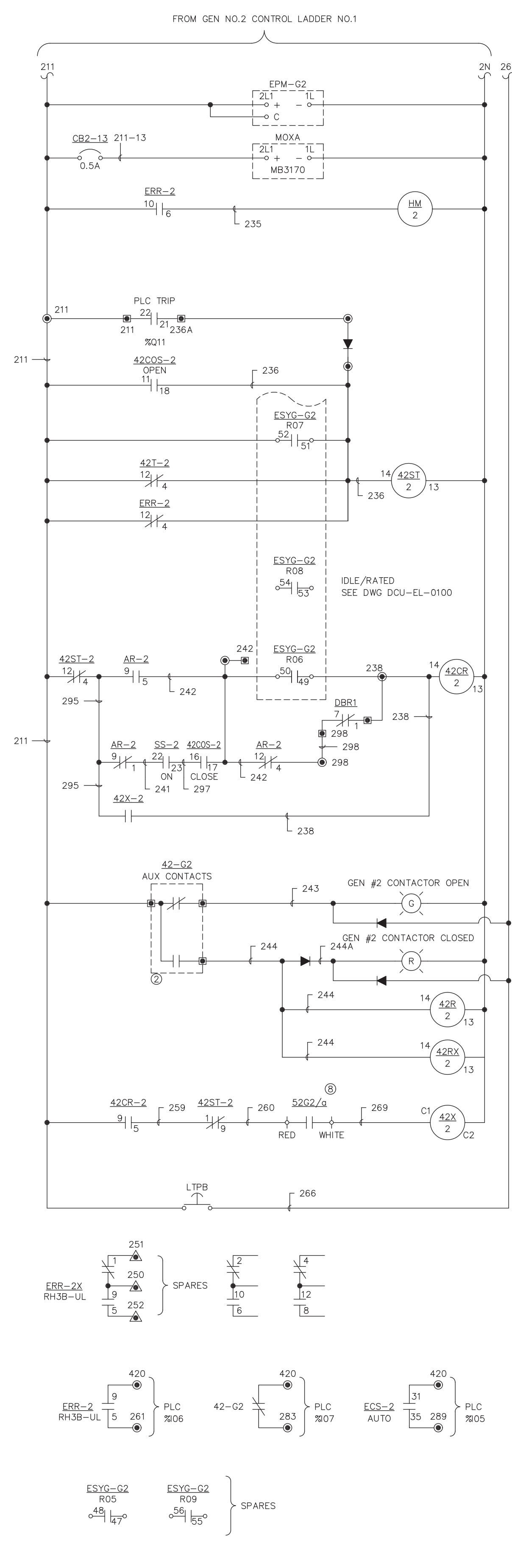
SHEET 1 OF 1



TO GEN NO.2 CONTROL LADDER NO.1



FROM GEN NO.2 CONTROL LADDER NO.1



HOUR METER

TRIP RELAY (ENERGIZE TO TRIP)

CLOSE RELAY (ENERGIZED FOR CLOSED CONTACTOR)

CONTACTOR STATUS

CONTACTOR CLOSE SQD 8501CD016V53

- DEVICE LEGEND:**
- 27/59 - UNDER/OVER VOLTAGE
 - 32R - REVERSE POWER RELAY
 - 42COS - CONTACTOR OPERATOR SWITCH
 - 42CR - CONTACTOR CLOSE RELAY
 - 42C - CONTACTOR
 - 42R - CONTACTOR RELAY
 - 42RX - CONTACTOR AUX RELAY
 - 42ST - CONTACTOR TRIP RELAY
 - 51 - OVERCURRENT RELAY
 - 52, 50/51 - GEN BREAKER W/OVERCURRENT
 - 52 - BREAKER AUX CONTACT
 - 810/U - OVER/UNDER FREQUENCY
 - 8290 - GOVERNOR
 - ALT - ALTERNATOR
 - APB - ACKNOWLEDGE PUSHBUTTON
 - AR - AUTO RELAY
 - ASR - AUTO START RELAY
 - CDL - COOL DOWN LIGHT
 - CT - CURRENT TRANSFORMER
 - DR - DROOP OPERATION RELAY
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 - ESYG - EASYGEN (WOODWARD)
 - F - FUSE
 - FAR - FIRE ALARM RELAY
 - FM - FREQUENCY METER
 - GVM - GENERATOR VOLTMETER
 - HM - HOURMETER
 - HWTL - HIGH WATER TEMP LIGHT
 - IA - IDLE ADJUST
 - IDS - ISOCH/DROOP SWITCH
 - I/R5 - IDLE/RATED SWITCH
 - LOLL - LOW OIL LEVEL LIGHT
 - LOPL - LOW OIL PRESSURE LIGHT
 - LWLL - LOW WATER LEVEL LIGHT
 - LTPB - LAMP TEST PUSHBUTTON
 - OCL - OVER CRANK LIGHT
 - OFL - OVER FREQUENCY LIGHT
 - OSL - OVER SPEED LIGHT
 - OVL - OVER VOLTAGE LIGHT
 - PT - POTENTIAL TRANSFORMER
 - RLS - RAISE/LOWER SWITCH
 - RPL - REVERSE POWER LIGHT
 - RSR - RACK SOLENOID RELAY
 - SH - SHIELD
 - SA - SPEED ADJUST
 - SS - STARTER SOLENOID
 - SSX - START SOLENOID SLAVE RELAY
 - VA - VOLTAGE ADJUST
 - VR - VOLTAGE REGULATOR
- NOTES:**
- ① - CONT FROM DWG DCU-EL-0100
 - ② - LOCATED IN CONTACTOR C3
 - ③ - UFTD SET AT 5 SEC.
 - ④ - OFTD SET AT 5 SEC.
 - ⑤ - UVTD SET AT 5 SEC.
 - ⑥ - OVID SET AT 5 SEC.
 - ⑦ - COOLDOWN SET FOR 3 MIN.
 - ⑧ - LOCATED IN GENERATOR MAIN BREAKER
 - ⑨ - R01 CLOSED DURING NORMAL OPERATION
 - ⊙ - ENGINE/GEN CONTROL TERMINAL BLOCK
 - ⊙ - ENGINE/GEN INTERCONNECT TERMINAL BLOCK
 - ⊙ - MASTER CONTROL TERMINAL BLOCK
 - - ENGINE/GEN FIELD WIRING

PROJECT: DEERING SCADA UPGRADE		DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN		JOB #: 14-0670	
DESIGN/CONSTRUCTION/ASBUILT REVISION		DWN BY/DATE		REVIEWED BY/DATE	
0	ISSUED FOR CONSTRUCTION	XJH/06-02-2015	WJB/06-02-2015		
1	AS-BUILT	KER/11-30-2015	WJB/11-30-2015		

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FAX: (907) 522-1182
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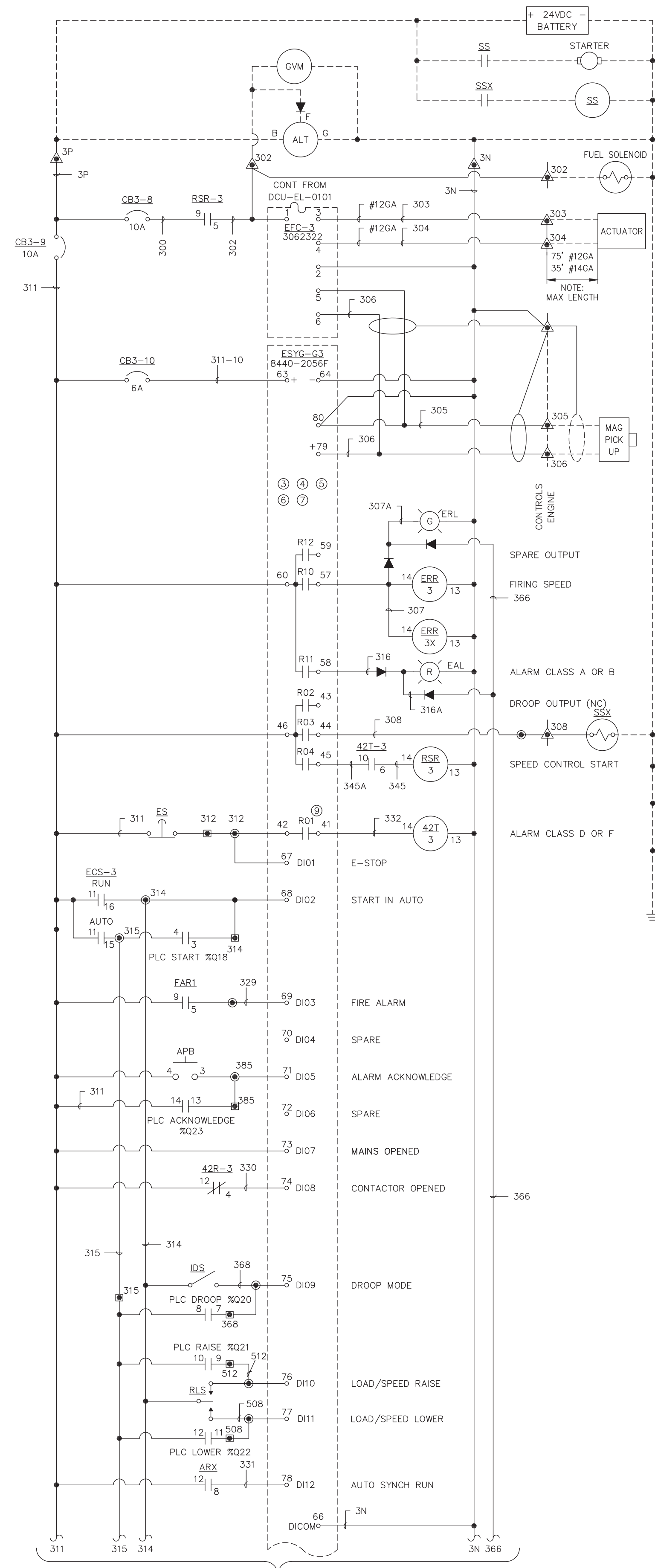
NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

DRAWING NAME: DEERING SCADA UPGRADE GENERATOR 2 DC CONTROL SCHEMATIC DIAGRAM

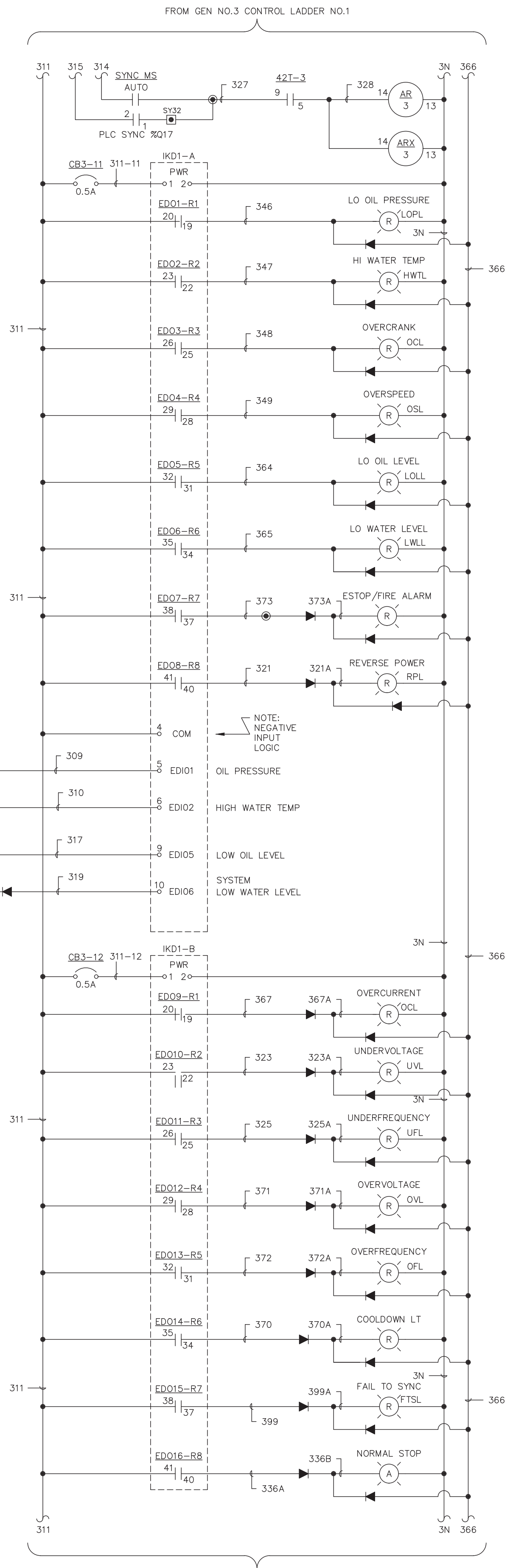
REF DWG(S): CASCADE DIESEL ENGINE COMPANY, LLC, DWG. 9322, SHEET 1

DRAWING NO.: DCU-EL-2002

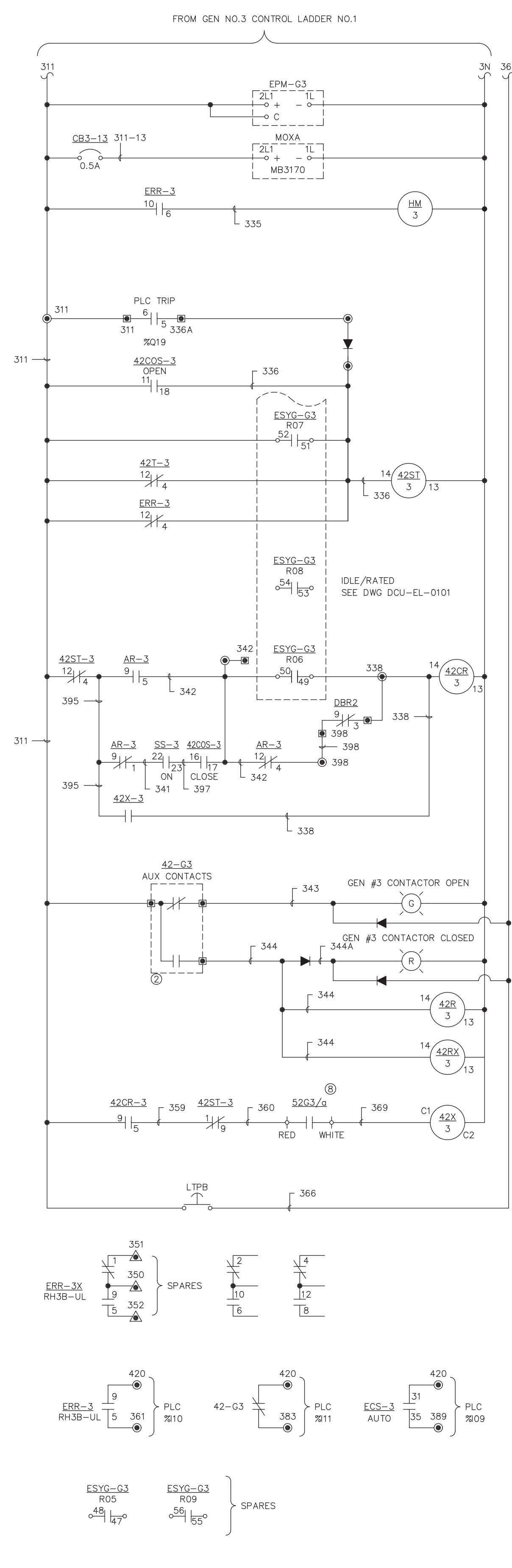
SHEET 1 OF 1



TO GEN NO.3 CONTROL LADDER NO.1



FROM GEN NO.3 CONTROL LADDER NO.1



HOUR METER

TRIP RELAY (ENERGIZE TO TRIP)

CLOSE RELAY (ENERGIZED FOR CLOSED CONTACTOR)

CONTACTOR STATUS

CONTACTOR CLOSE SQD 8501CD016V53

- DEVICE LEGEND:**
- 27/59 - UNDER/OVER VOLTAGE
 - 32R - REVERSE POWER RELAY
 - 42COS - CONTACTOR OPERATOR SWITCH
 - 42CR - CONTACTOR CLOSE RELAY
 - 42C - CONTACTOR
 - 42R - CONTACTOR RELAY
 - 42RX - CONTACTOR AUX RELAY
 - 42ST - CONTACTOR TRIP RELAY
 - 51 - OVERCURRENT RELAY
 - 52, 50/51 - GEN BREAKER W/OVERCURRENT BREAKER AUX CONTACT
 - 810/U - OVER/UNDER FREQUENCY
 - 8290 - GOVERNOR
 - ALT - ALTERNATOR
 - APB - ACKNOWLEDGE PUSHBUTTON
 - AR - AUTO RELAY
 - ASR - AUTO START RELAY
 - CDL - COOL DOWN LIGHT
 - CT - CURRENT TRANSFORMER
 - DR - DROOP OPERATION RELAY
 - EAL - ENGINE ALARM LIGHT
 - ECS - ENGINE CONTROL SWITCH
 - EFC - ELECTRONIC FUEL CONTROL (CUMMINS)
 - EPM - ELECTRICAL POWER METER
 - ERR - ENGINE RUNNING RELAY
 - ESYG - EASYGEN (WOODWARD)
 - F - FUSE
 - FAR - FIRE ALARM RELAY
 - FM - FREQUENCY METER
 - GVM - GENERATOR VOLTMETER
 - HM - HOURMETER
 - HWTL - HIGH WATER TEMP LIGHT
 - IA - IDLE ADJUST
 - IDS - ISOCH/DROOP SWITCH
 - I/R/S - IDLE/RATED SWITCH
 - LOLL - LOW OIL LEVEL LIGHT
 - LOPL - LOW OIL PRESSURE LIGHT
 - LWLL - LOW WATER LEVEL LIGHT
 - LTPB - LAMP TEST PUSHBUTTON
 - OCL - OVER CRANK LIGHT
 - OFL - OVER FREQUENCY LIGHT
 - OSL - OVER SPEED LIGHT
 - OVL - OVER VOLTAGE LIGHT
 - PT - POTENTIAL TRANSFORMER
 - RLS - RAISE/LOWER SWITCH
 - RPL - REVERSE POWER LIGHT
 - RSR - RACK SOLENOID RELAY
 - SH - SHIELD
 - SA - SPEED ADJUST
 - SS - STARTER SOLENOID
 - SSX - START SOLENOID SLAVE RELAY
 - VA - VOLTAGE ADJUST
 - VR - VOLTAGE REGULATOR
- NOTES:**
- ① - CONT FROM DWG DCU-EL-0100
 - ② - LOCATED IN CONTACTOR C3
 - ③ - UFTD SET AT 5 SEC.
 - ④ - OFTD SET AT 5 SEC.
 - ⑤ - UVTD SET AT 5 SEC.
 - ⑥ - OVTD SET AT 5 SEC.
 - ⑦ - COOLDOWN SET FOR 3 MIN.
 - ⑧ - LOCATED IN GENERATOR MAIN BREAKER
 - ⑨ - R01 CLOSED DURING NORMAL OPERATION
- ⊙ - ENGINE/GEN CONTROL TERMINAL BLOCK
 - ⊕ - ENGINE/GEN INTERCONNECT TERMINAL BLOCK
 - ⊖ - MASTER CONTROL TERMINAL BLOCK
 - - ENGINE/GEN FIELD WIRING

PROJECT: DEERING SCADA UPGRADE			
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN			
JOB #: 14-0670			
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	ISSUED FOR CONSTRUCTION	XJH/06-02-2015	WJB/06-02-2015
1	AS-BUILT	KER/11-30-2015	WJB/11-30-2015

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Consulting Engineers

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WEB: WWW.EPSSINC.COM

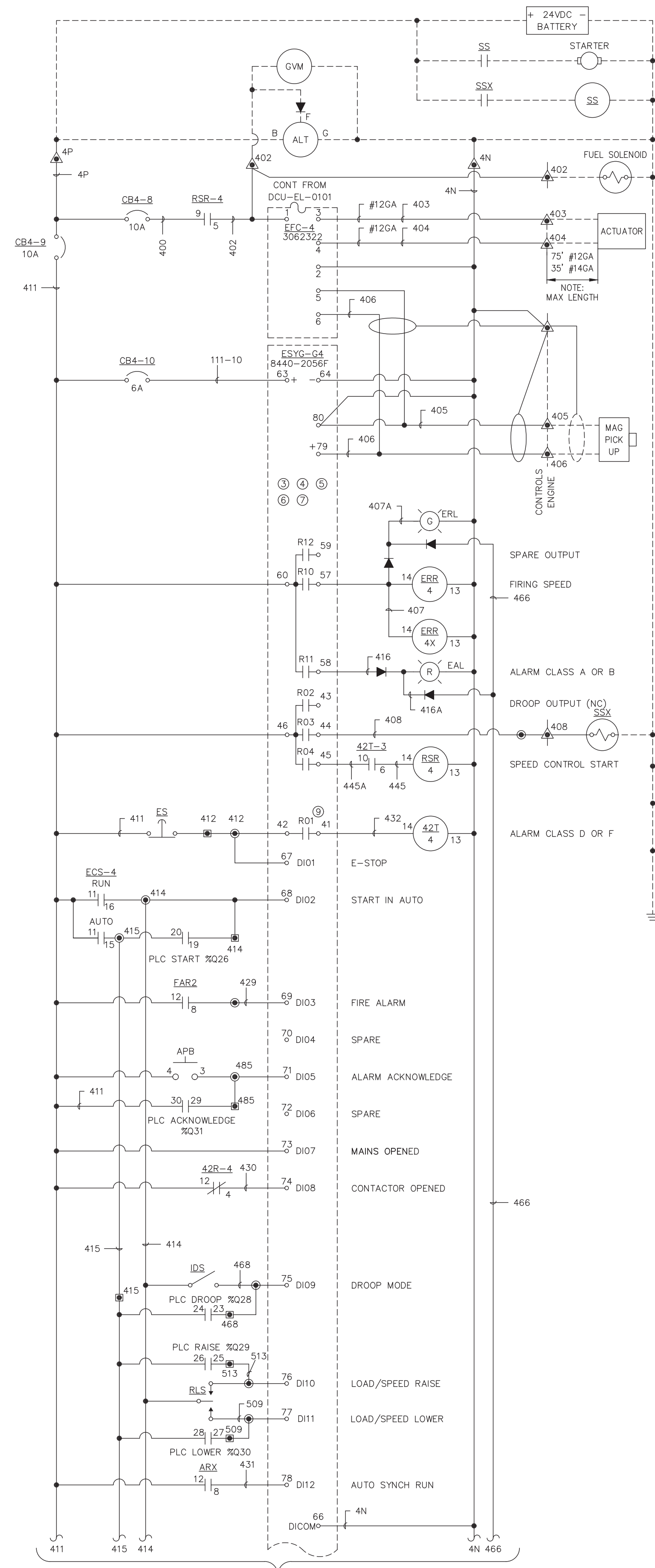
NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

DRAWING NAME: DEERING SCADA UPGRADE GENERATOR 3 DC CONTROL SCHEMATIC DIAGRAM

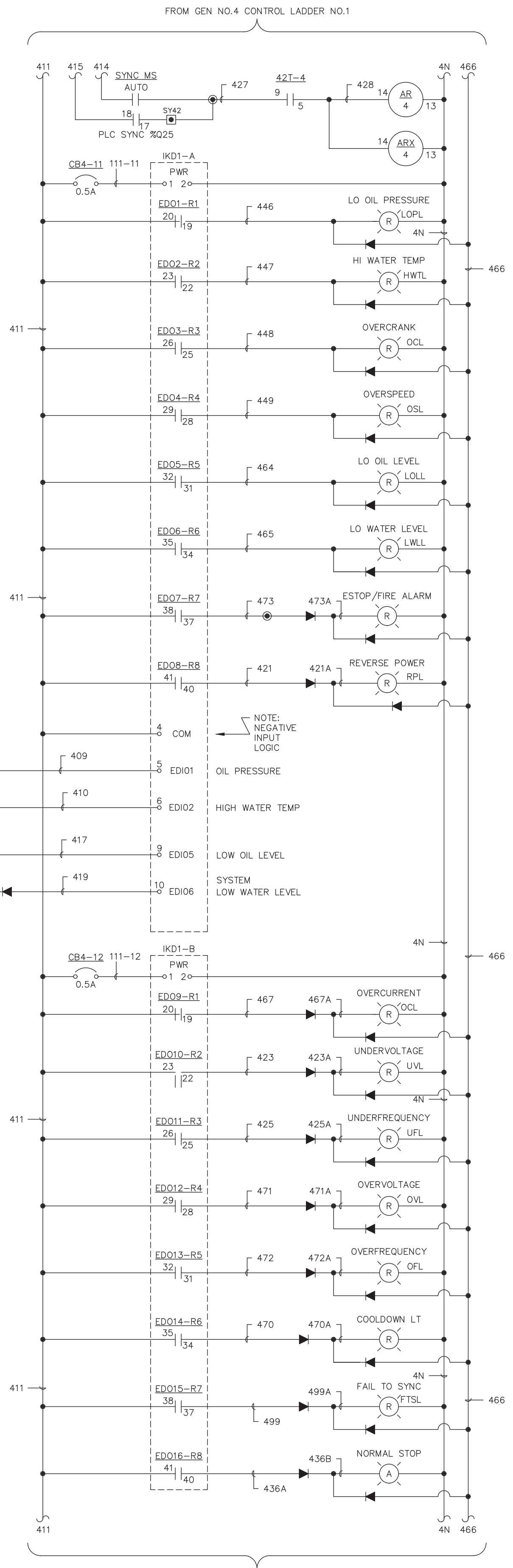
REF DWG(S): CASCADE DIESEL ENGINE COMPANY, LLC, DWG. 9323, SHEET 1

DRAWING NO.: DCU-EL-2003

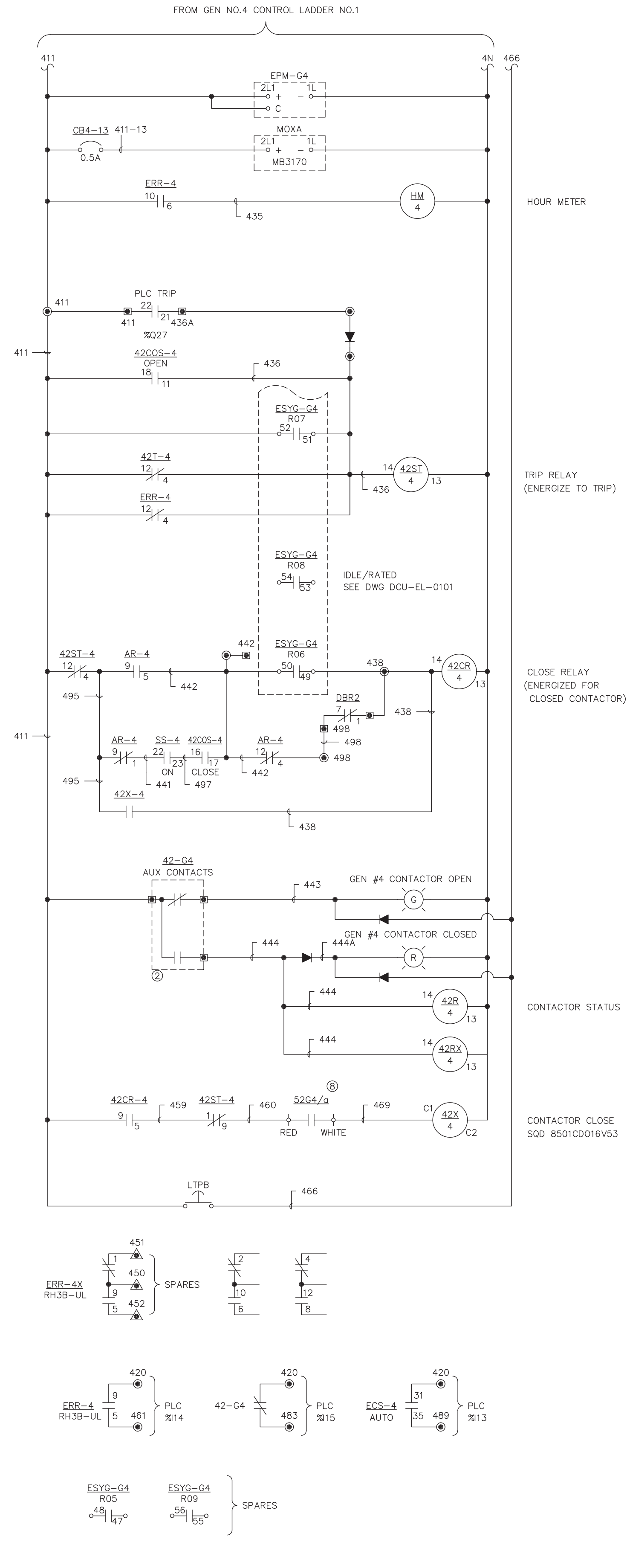
SHEET 1 OF 1



TO GEN NO.4 CONTROL LADDER NO.1



FROM GEN NO.4 CONTROL LADDER NO.1



- DEVICE LEGEND:**
- 27/59 - UNDER/OVER VOLTAGE
 - 32R - REVERSE POWER RELAY
 - 42COS - CONTACTOR OPERATOR SWITCH
 - 42CR - CONTACT CLOSE RELAY
 - 42C - CONTACTOR
 - 42R - CONTACTOR RELAY
 - 42RX - CONTACTOR AUX RELAY
 - 42ST - CONTACTOR TRIP RELAY
 - 51 - OVERCURRENT RELAY
 - 52, 50/51 - GEN BREAKER W/OVERCURRENT BREAKER AUX CONTACT
 - 810/U - OVER/UNDER FREQUENCY
 - 8290 - GOVERNOR
 - ALT - ALTERNATOR
 - APB - ACKNOWLEDGE PUSHBUTTON
 - AR - AUTO RELAY
 - ASR - AUTO START RELAY
 - CDL - COOL DOWN LIGHT
 - CT - CURRENT TRANSFORMER
 - DR - DROOP OPERATION RELAY
 - EAL - ENGINE ALARM LIGHT
 - ECS - ENGINE CONTROL SWITCH
 - EFC - ELECTRONIC FUEL CONTROL (CUMMINS)
 - EPM - ELECTRICAL POWER METER
 - ERR - ENGINE RUNNING RELAY
 - ESYG - EASYGEN (WOODWARD)
 - F - FUSE
 - FAR - FIRE ALARM RELAY
 - FM - FREQUENCY METER
 - GVM - GENERATOR VOLTMETER
 - HM - HOURMETER
 - HWTL - HIGH WATER TEMP LIGHT
 - IA - IDLE ADJUST
 - IDS - ISOCH/DROOP SWITCH
 - I/R/S - IDLE/RATED SWITCH
 - LOLL - LOW OIL LEVEL LIGHT
 - LOPL - LOW OIL PRESSURE LIGHT
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 - PT - POTENTIAL TRANSFORMER
 - RLS - RAISE/LOWER SWITCH
 - RPL - REVERSE POWER LIGHT
 - RSR - RACK SOLENOID RELAY
 - SH - SHIELD
 - SA - SPEED ADJUST
 - SS - STARTER SOLENOID
 - SSX - START SOLENOID SLAVE RELAY
 - VA - VOLTAGE ADJUST
 - VR - VOLTAGE REGULATOR
- NOTES:**
- (1) - CONT FROM DWG DCU-EL-0100
 - (2) - LOCATED IN CONTACTOR C3
 - (3) - UFTD SET AT 5 SEC.
 - (4) - OFTD SET AT 5 SEC.
 - (5) - UVTD SET AT 5 SEC.
 - (6) - OVRTD SET AT 5 SEC.
 - (7) - COOLDOWN SET FOR 3 MIN.
 - (8) - LOCATED IN GENERATOR MAIN BREAKER
 - (9) - R01 CLOSED DURING NORMAL OPERATION
- ⊕ - ENGINE/GEN CONTROL TERMINAL BLOCK
 ⚡ - ENGINE/GEN INTERCONNECT TERMINAL BLOCK
 ⚡ - MASTER CONTROL TERMINAL BLOCK
 --- - ENGINE/GEN FIELD WIRING

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	ISSUED FOR CONSTRUCTION	XJH/06-02-2015	WJB/06-02-2015
1	AS-BUILT	KER/11-30-2015	WJB/11-30-2015

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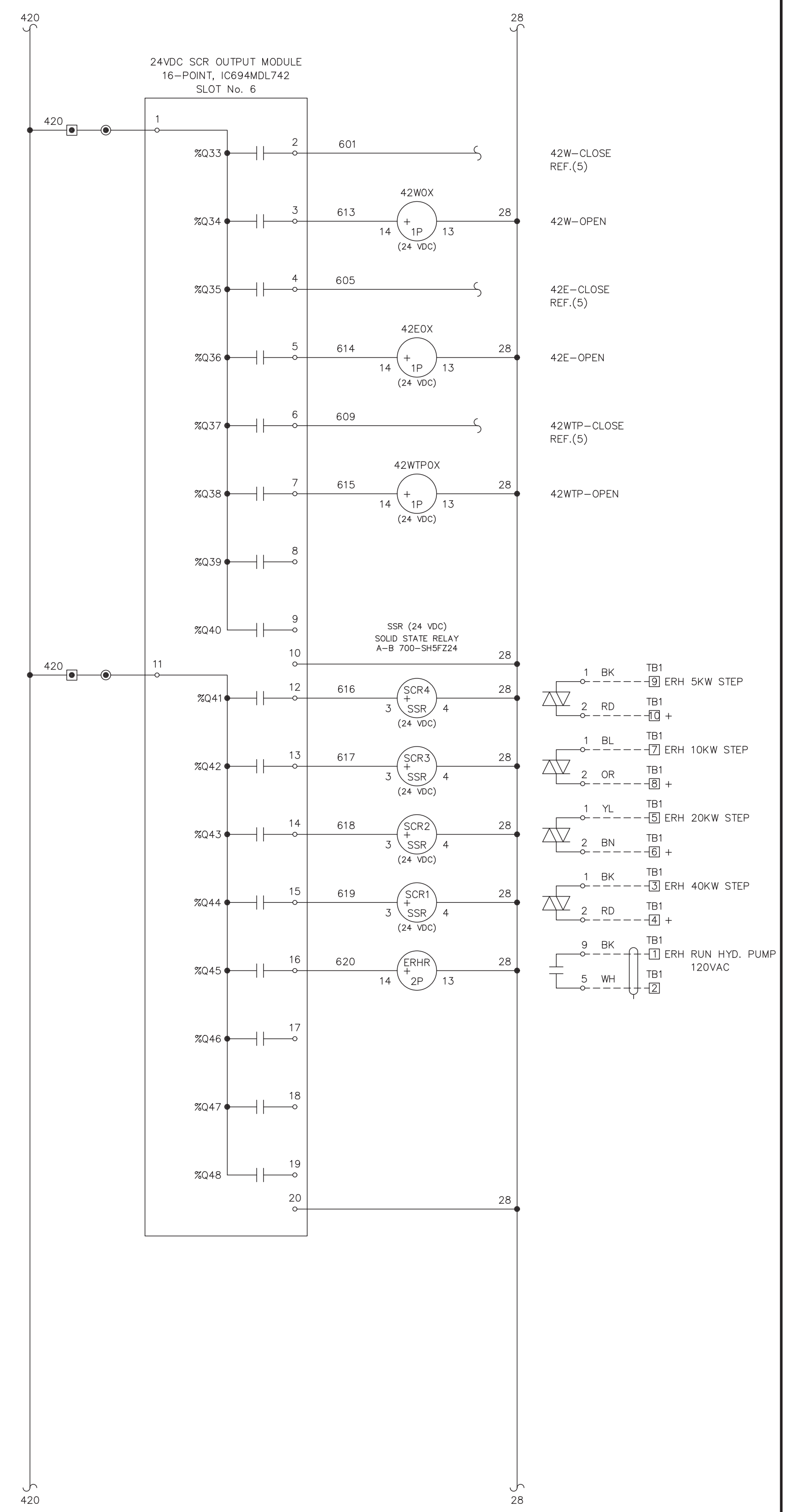
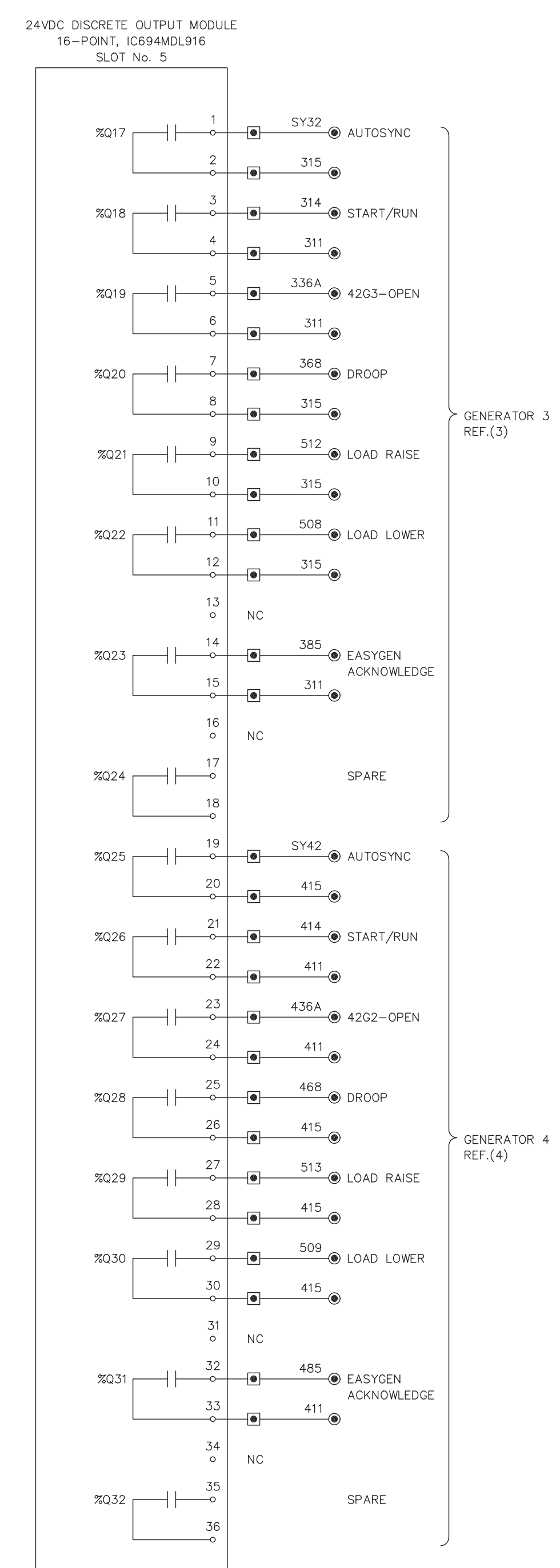
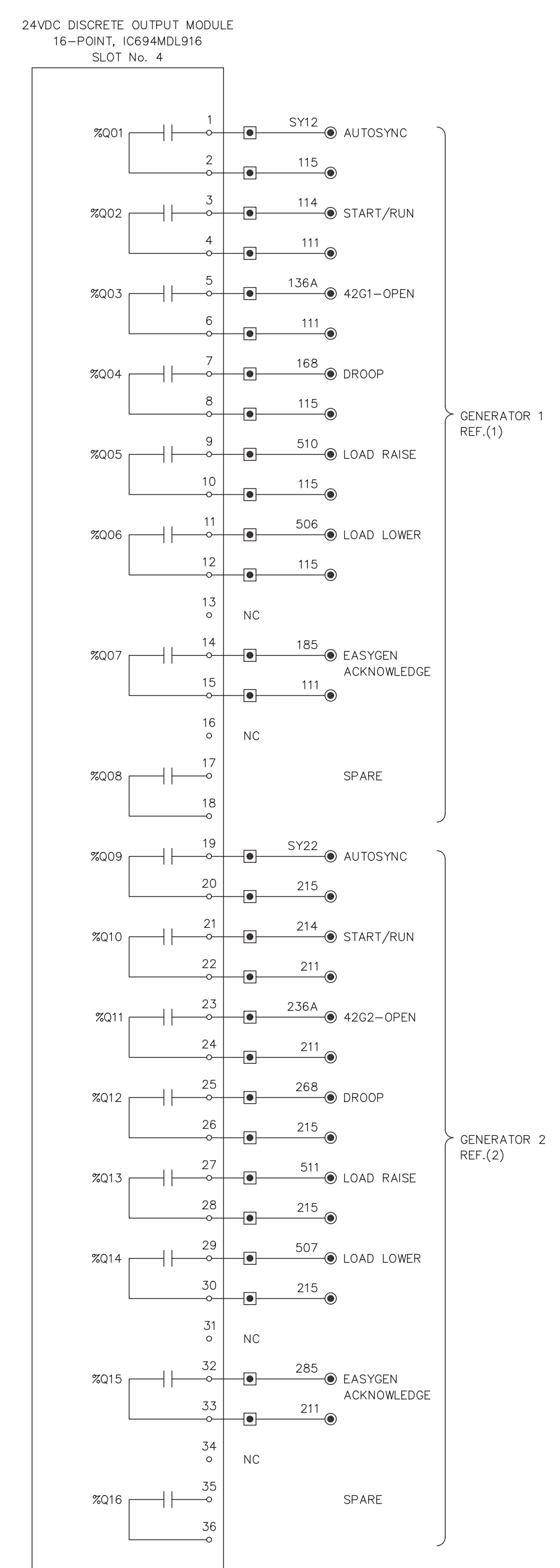
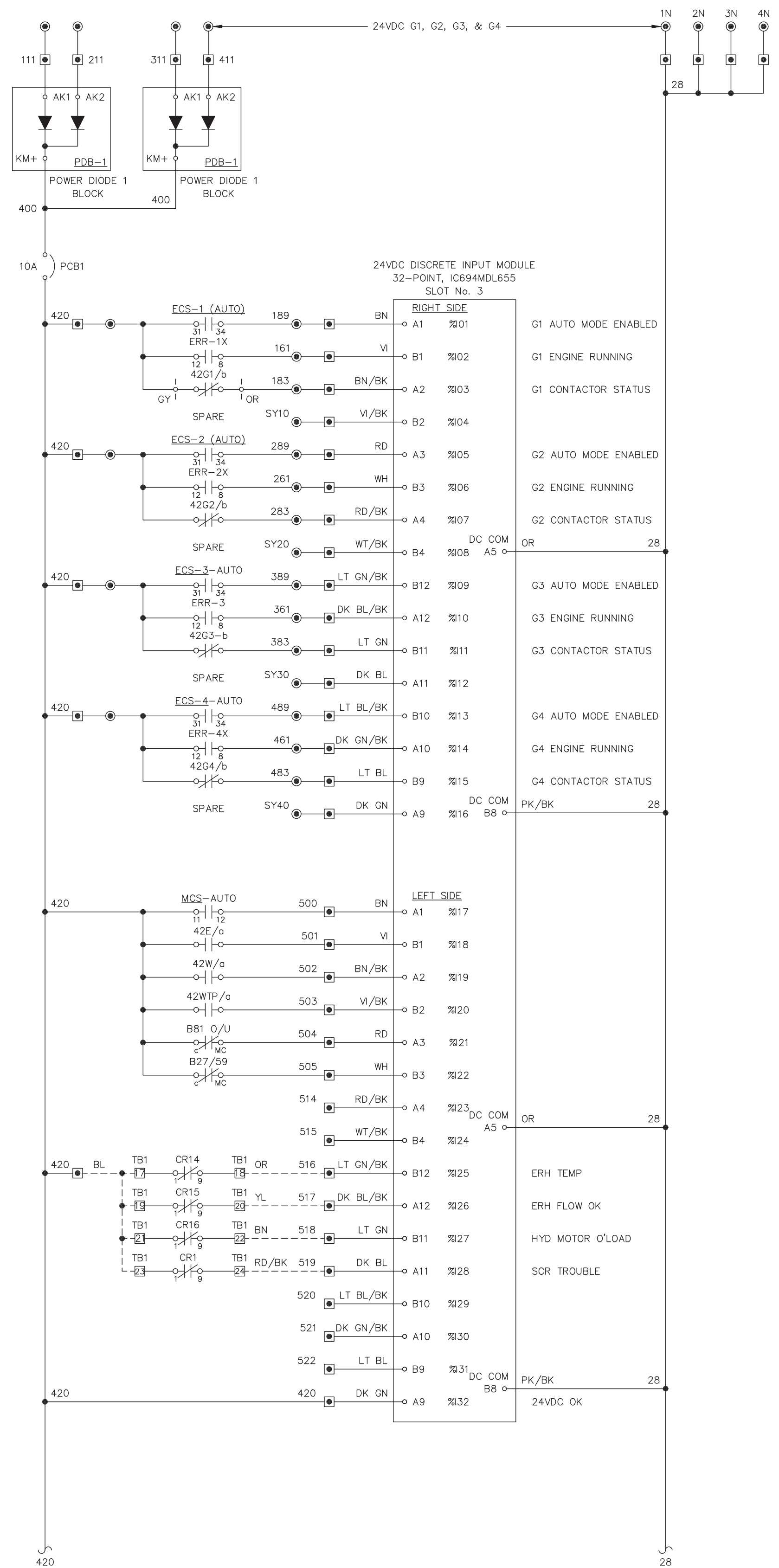
WILLIAM J. BRIMSTEIN
 LICENSE NO. 49111
 PROFESSIONAL ENGINEER
 ELECTRICAL ENGINEERING
 STATE OF OREGON

electric POWER SYSTEMS INC.
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 TEL: (907) 522-1953
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 WEB: WWW.EPSSINC.COM

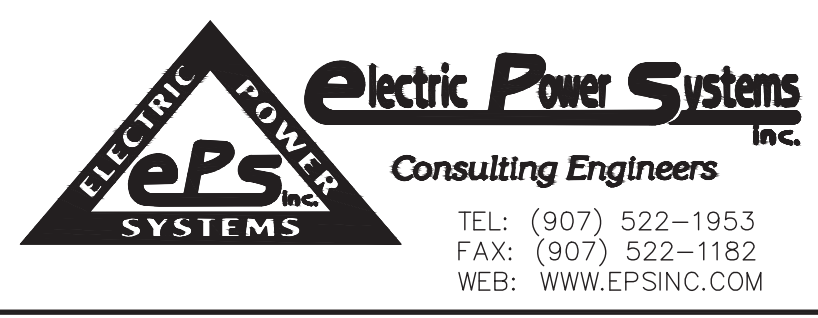
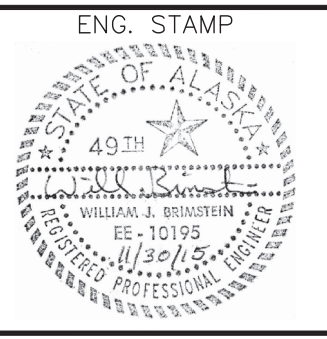
NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

**DEERING SCADA UPGRADE
 GENERATOR 4
 DC CONTROL
 SCHEMATIC DIAGRAM**

REF DWG(S): CASCADE DIESEL ENGINE COMPANY, LLC, DWG. 9324, SHEET 1
 DRAWING NO.: DCU-EL-2004
 SHEET 1 OF 1

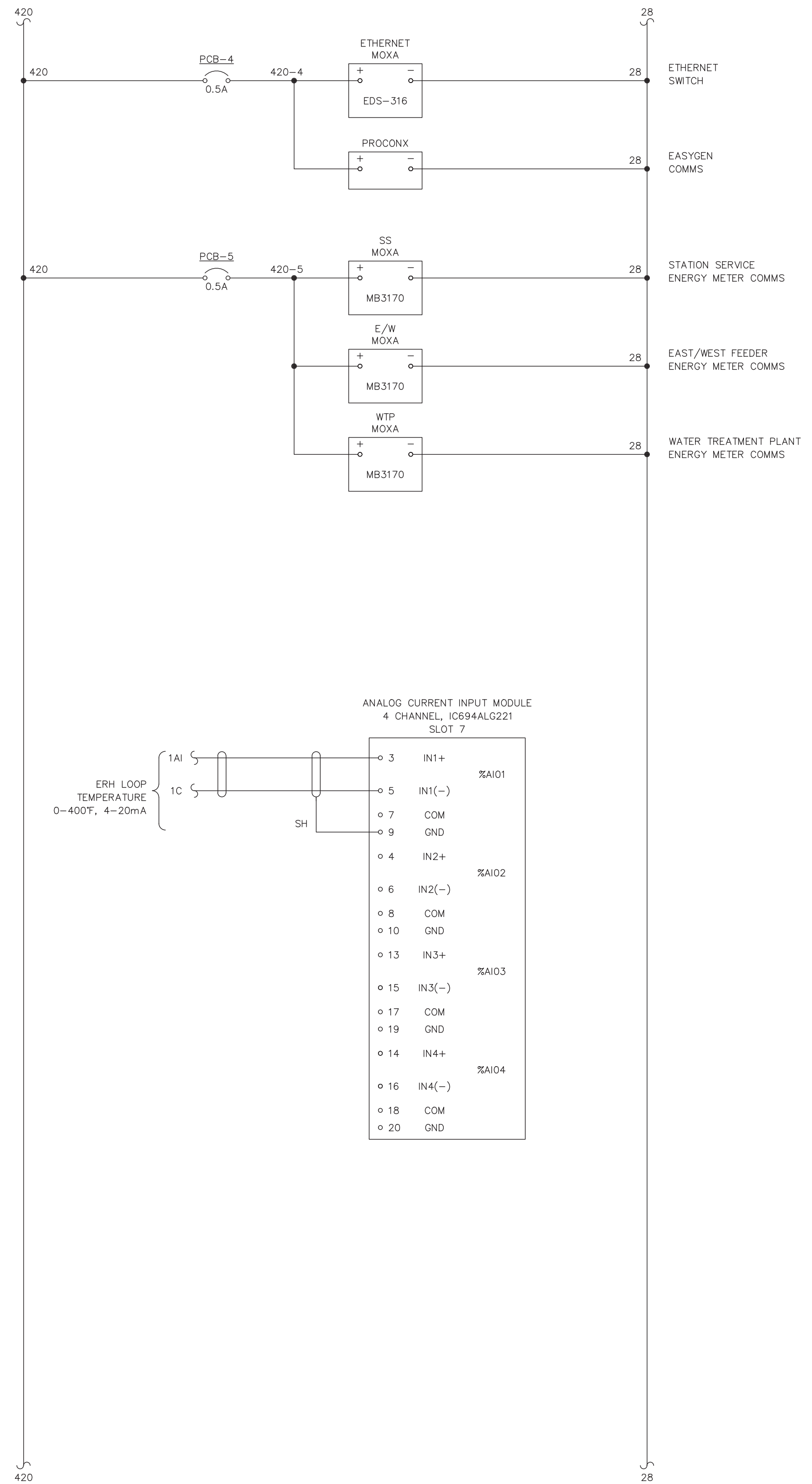
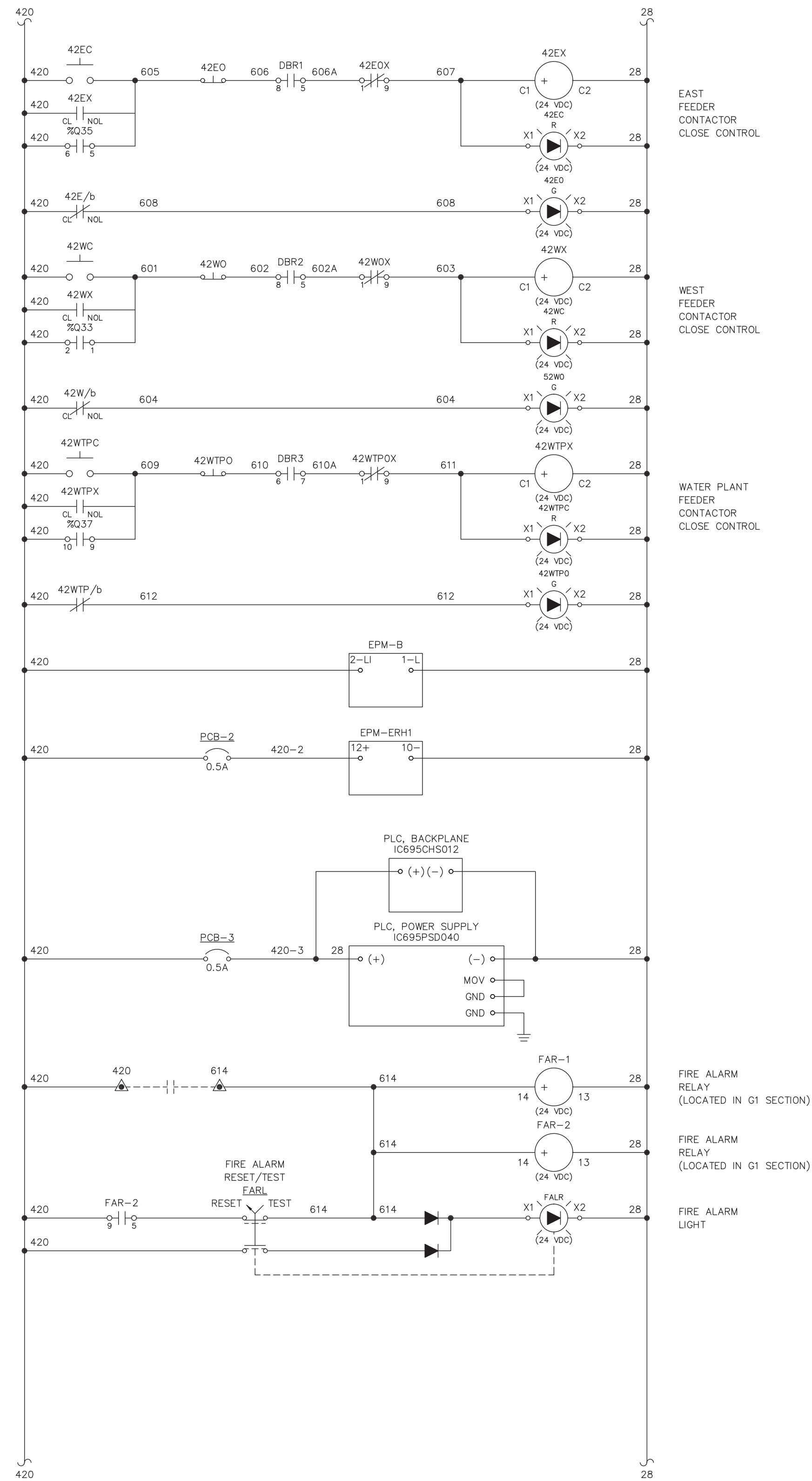


PROJECT: DEERING SCADA UPGRADE			
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN			
JOB #: 14-0670			
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	ISSUED FOR CONSTRUCTION	XJH/07-14-2015	WJB/07-14-2015
1	AS-BUILT	KER/11-30-2015	WJB/11-30-2015

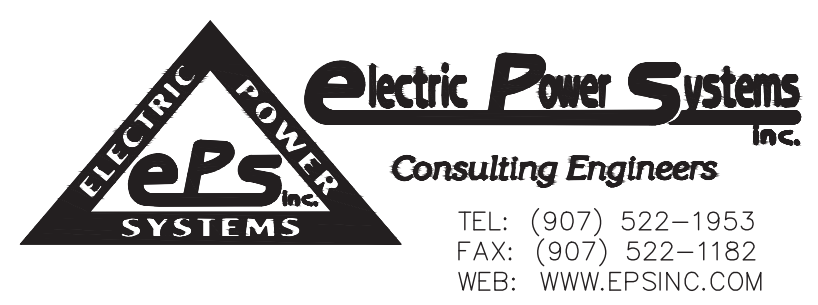
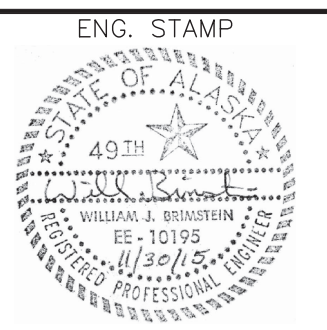


NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION
1	DCU-EL-2001/1	GENERATOR 1 DC CONTROL SCHEMATIC DIAGRAM
2	DCU-EL-2002/1	GENERATOR 2 DC CONTROL SCHEMATIC DIAGRAM
3	DCU-EL-2003/1	GENERATOR 3 DC CONTROL SCHEMATIC DIAGRAM
4	DCU-EL-2004/1	GENERATOR 4 DC CONTROL SCHEMATIC DIAGRAM
5	DCU-EL-2006/1	PLC AUTOMATION SCHEMATIC DIAGRAM

DRAWING NAME:		DEERING SCADA UPGRADE GENERATOR SWITCHGEAR PLC AUTOMATION SCHEMATIC DIAGRAM
REF DWGS:	CASCADE DIESEL ENGINE COMPANY, LLC, DWG. 9328, SHEET 1	
DRAWING NO.:	DCU-EL-2005	
SHEET		1 OF 1

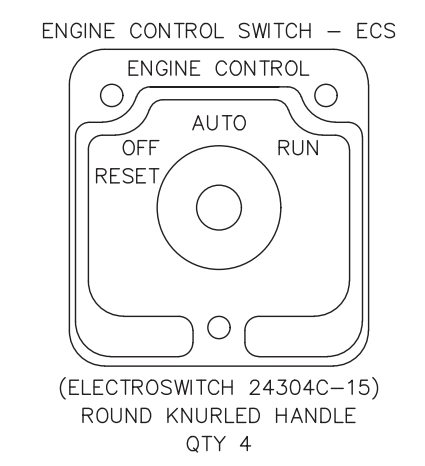
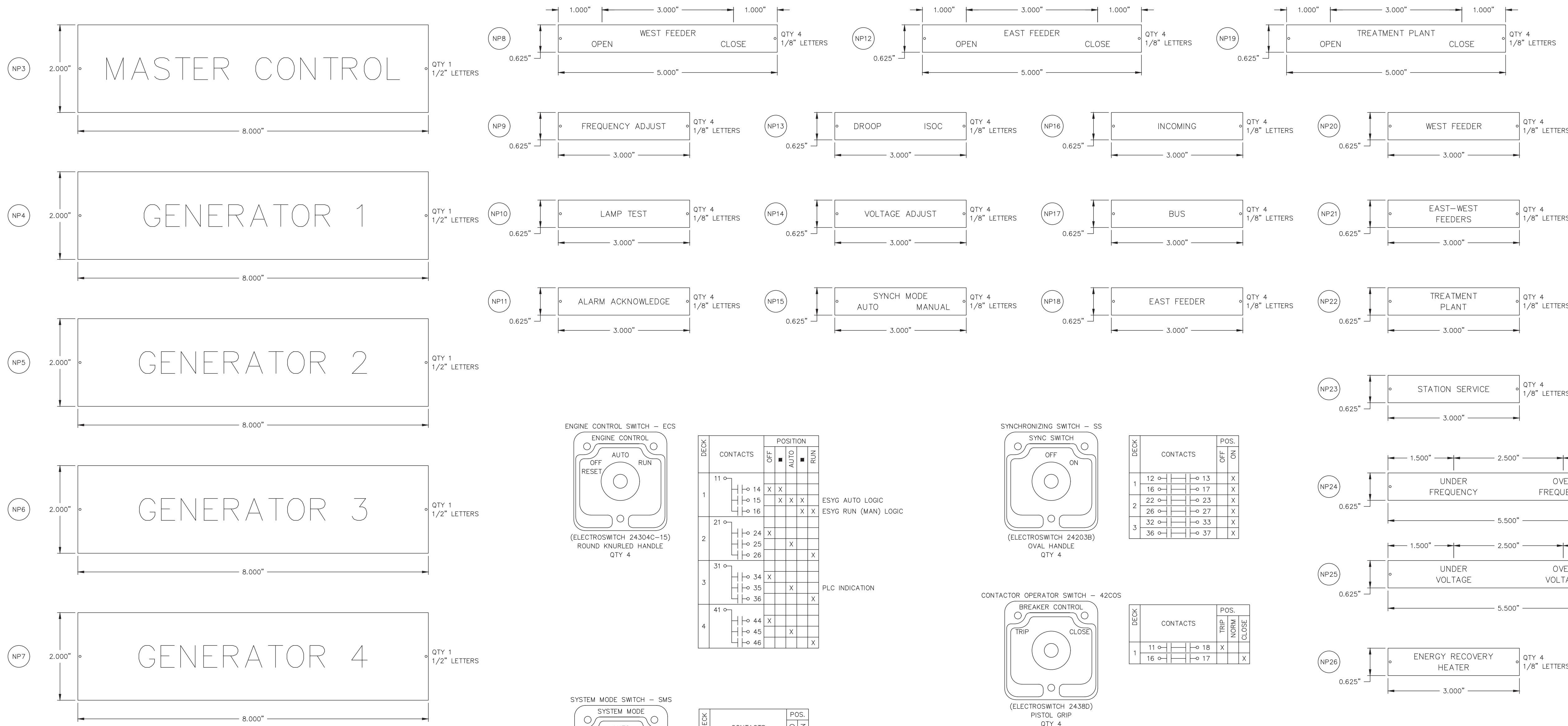
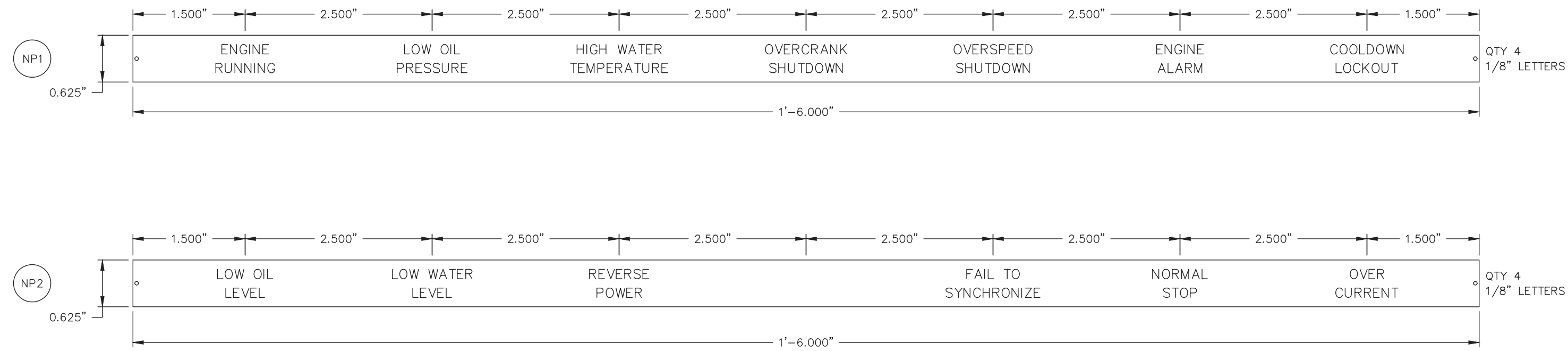


PROJECT: DEERING SCADA UPGRADE			
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN		JOB #: 14-0670	
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	ISSUED FOR CONSTRUCTION	XJH/06-02-2015	WJB/06-02-2015
1	AS-BUILT	KER/11-30-2015	WJB/11-30-2015

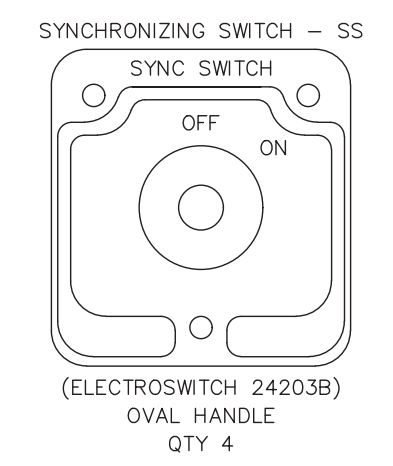


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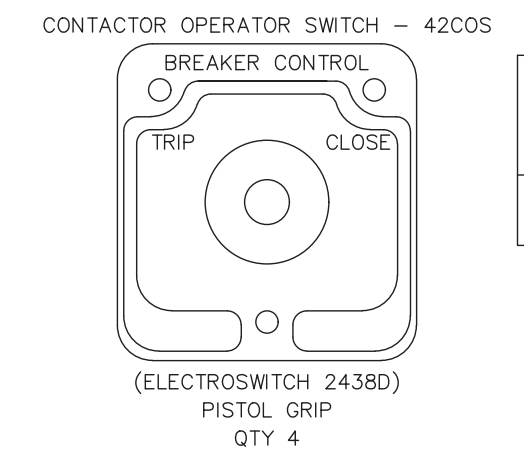
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REF DWG(S):		CASCADE DIESEL ENGINE COMPANY, LLC, DWG. 9329, SHEET 1
DRAWING NO.:		DCU-EL-2006
SHEET		1 OF 1



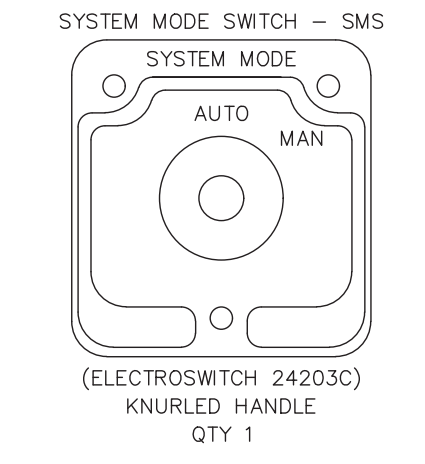
DECK	CONTACTS	POSITION		
		OFF	ON	
1	11		X	ESYG AUTO LOGIC ESYG RUN (MAN) LOGIC
	14	X		
	15	X	X	
	16	X	X	
2	21		X	PLC INDICATION
	24	X		
	25		X	
3	31		X	
	34	X		
	35		X	
	36		X	
4	41		X	
	44	X		
	45		X	
	46		X	



DECK	CONTACTS	POS.		
		OFF	ON	
1	12		X	
	16		X	
	22		X	
2	26		X	
	27		X	
3	32		X	
	37		X	



DECK	CONTACTS	POS.			
		TRIP	NORM	CLOSE	
1	11		X		
	16		X		



DECK	CONTACTS	POS.		
		AUTO	MAN	
1	12		X	
	13		X	
	16		X	
2	22		X	
	23		X	
	25	X		
	27	X		
3	32		X	
	33		X	
	35		X	
	37		X	

PROJECT: DEERING SCADA UPGRADE			
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN		JOB #: 14-0670	
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	ISSUED FOR CONSTRUCTION	XJH/06-02-2015	WJB/06-02-2015
1	AS-BUILT	KER/11-30-2015	WJB/11-30-2015

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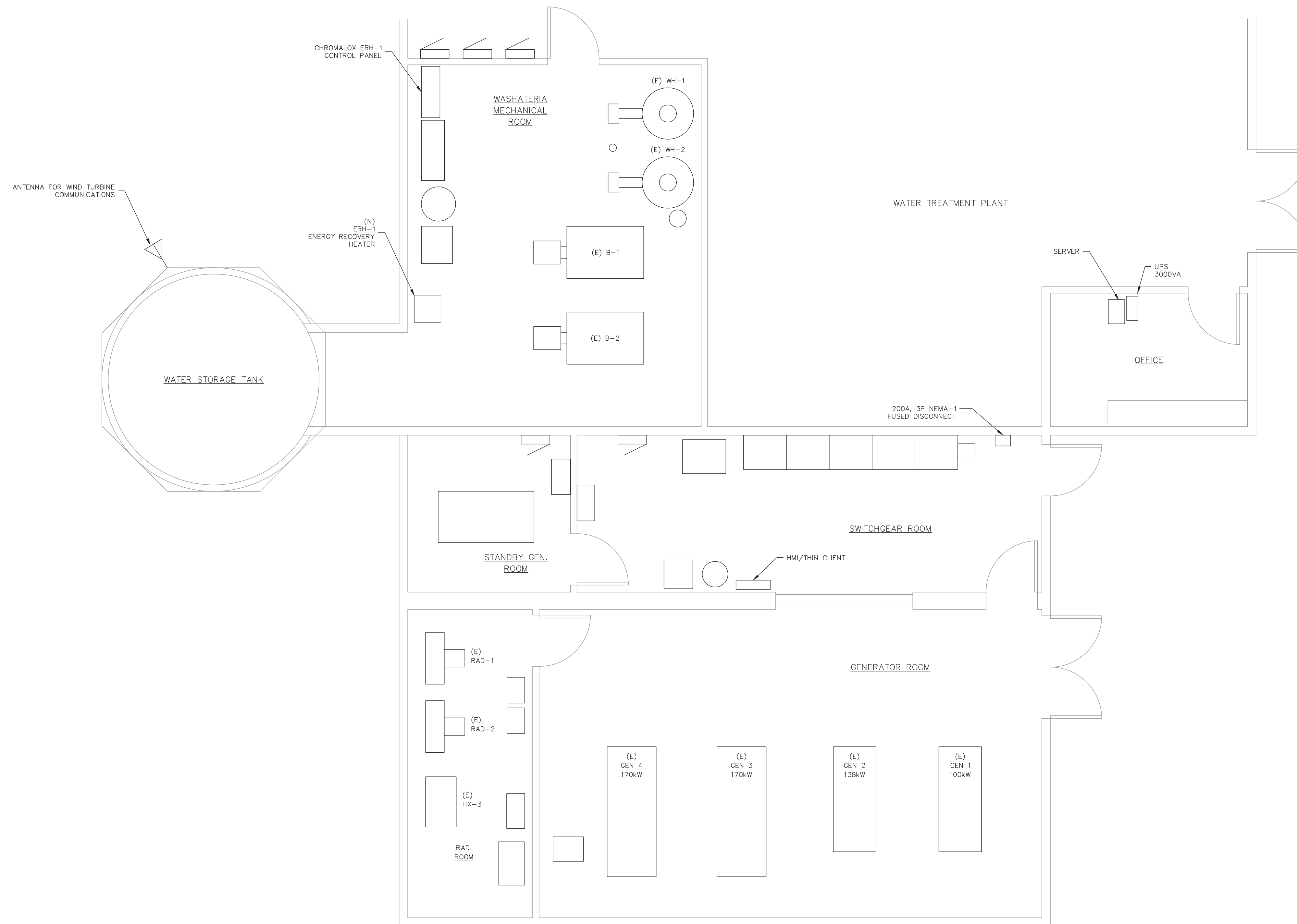
NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

DRAWING NAME: DEERING SCADA UPGRADE GENERATOR SWITCHGEAR NAMEPLATE ENGRAVING SCHEDULE FABRICATION DIAGRAM

REF DWG(S): CASCADE DIESEL ENGINE COMPANY, LLC, DWG. 9331, SHEET 1

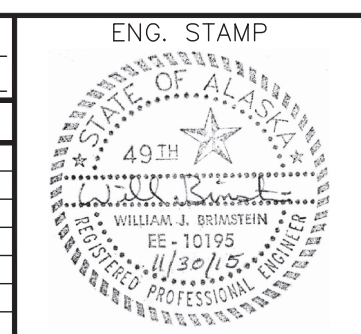
DRAWING NO.: DCU-EL-4000

SHEET 1 OF 1



1 ELECTRICAL LAYOUT
SCALE: 3/8" = 1'-0"

PROJECT: DEERING SCADA UPGRADE			
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN		JOB #: 14-0670	
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	ISSUED FOR CONSTRUCTION	XJH/06-02-2015	WJB/06-02-2015
1	AS-BUILT	KER/11-30-2015	WJB/11-30-2015



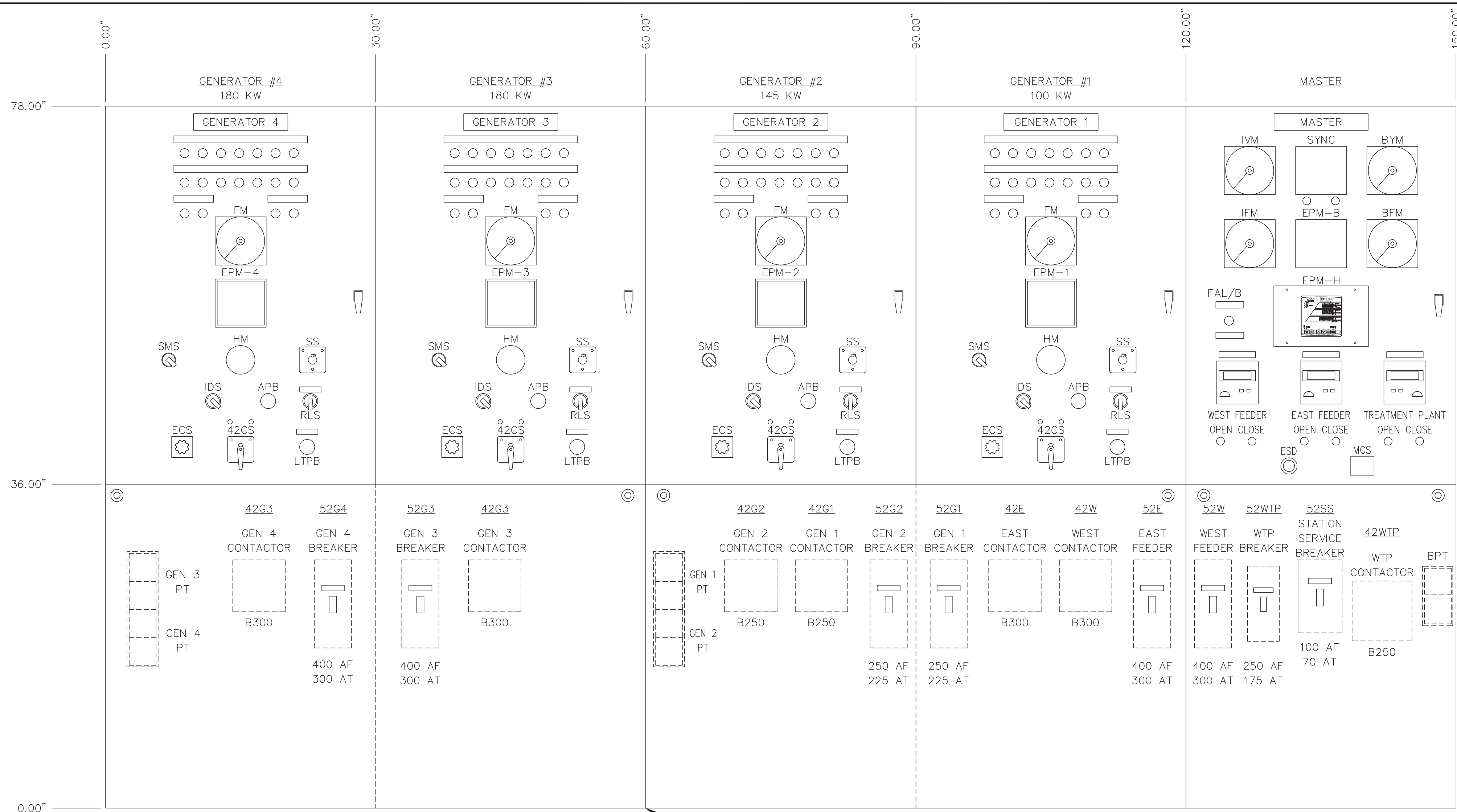
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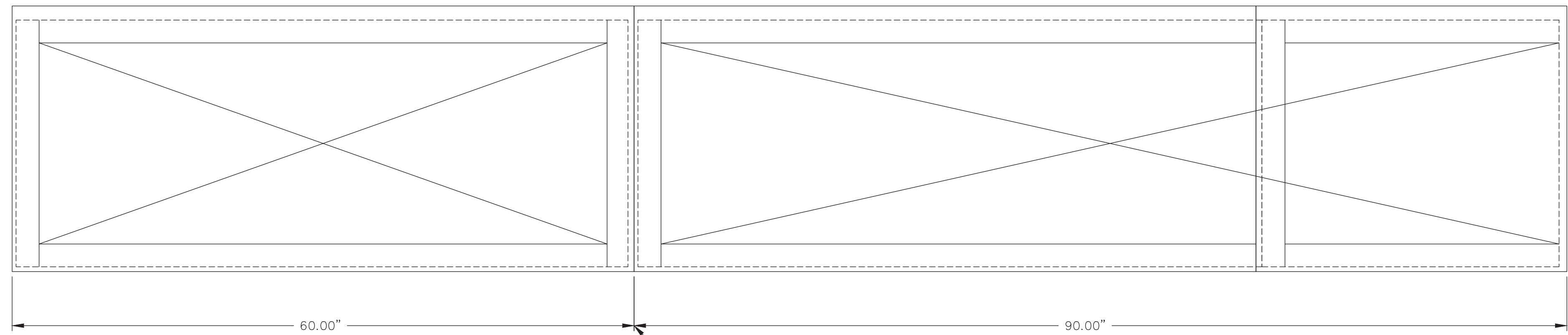
NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

DRAWING NAME: DEERING SCADA UPGRADE ELECTRICAL LAYOUT	
REF DWG(S):	
DRAWING NO.: DCU-EL-4100	
SHEET 1 OF 1	

dcu-el-4100-1.dwg

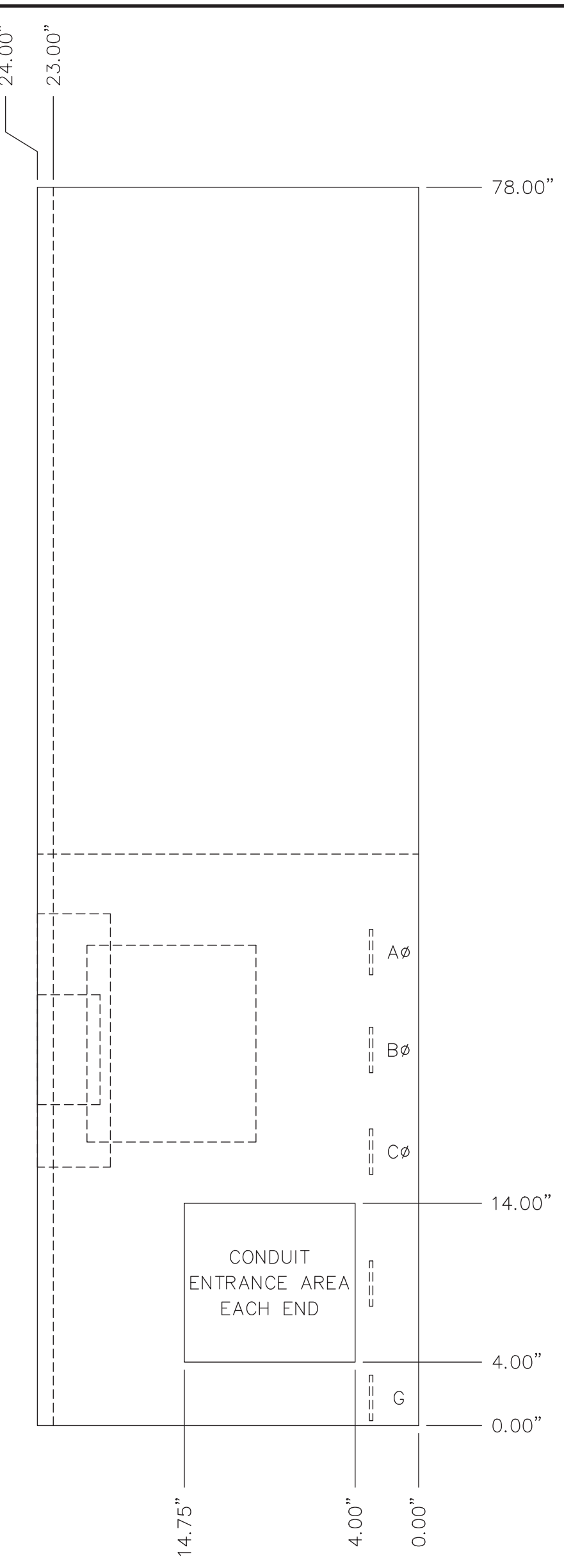


GENERATOR SWITCHGEAR - FRONT VIEW
SHIPPING SPLIT



PLAN VIEW
SHIPPING SPLIT

FAULT ANNUNCIATOR LIGHTS	
1 - ENGINE RUN	10 - REVERSE POWER
2 - LOW OIL PRESSURE	11 - ESTOP/FIRE ALARM
3 - HIGH WATER TEMP	12 - FAIL TO SYNCH
4 - OVER CRANK	13 - NORMAL STOP
5 - OVER SPEED	14 - OVER CURRENT
6 - ENGINE ALARM	15 - UNDER VOLTAGE
7 - COOL DOWN/LOCKOUT	16 - OVER VOLTAGE
8 - LOW OIL LEVEL	17 - UNDER FREQUENCY
9 - LOWER WATER LEVEL	18 - OVER FREQUENCY



SIDE VIEW

SYMBOL:	NOMENCLATURE DESCRIPTION:
APB	ACKNOWLEDGE PUSHBUTTON
BFM	BUS FREQUENCY METER
BVM	BUS VOLTMETER
ECS	ENGINE CONTROL SWITCH
EPM	ELECTRONIC POWER METER
EPM-B-BUS	TOTALIZING POWER METER
EPM-SS	STATION SERVICE POWER METER
EPM-W/E	WEST/EAST FEEDER POWER METER
EPM-WTP	WATER TREATMENT PLANT POWER METER
EPM-H	ENERGY RECOVERY HEATER POWER METER
ESB	EMERGENCY STOP BUTTON
FA	FREQUENCY ADJUST POTENTIOMETER
FAL/B	FIRE ALARM LIGHT/RESET PB
FM	FREQUENCY METER
HM	HOUR METER
IDS	IDLE/RATED SWITCH
IFM	INCOMING FREQUENCY METER
IRS	IDLE RATED SWITCH
IVM	INCOMING VOLTMETER
LTPB	LAMP TEST PUSHBUTTON
MCS	SYSTEM MODE SWITCH
OIU	OPERATOR INTERFACE UNIT
SMS	SYNCH MODE SWITCH
SS	SYNCHROSCOPE SWITCH
SYNC	SYNCHROSCOPE
VA	VOLTAGE ADJUST POTENTIOMETER
42CS	CONTACTOR CONTROL SWITCH

PROJECT: DEERING SCADA UPGRADE		JOB #: 14-0670	
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN			
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	ISSUED FOR CONSTRUCTION	XJH/06-02-2015	WJB/06-02-2015
1	AS-BUILT	KER/11-30-2015	WJB/11-30-2015

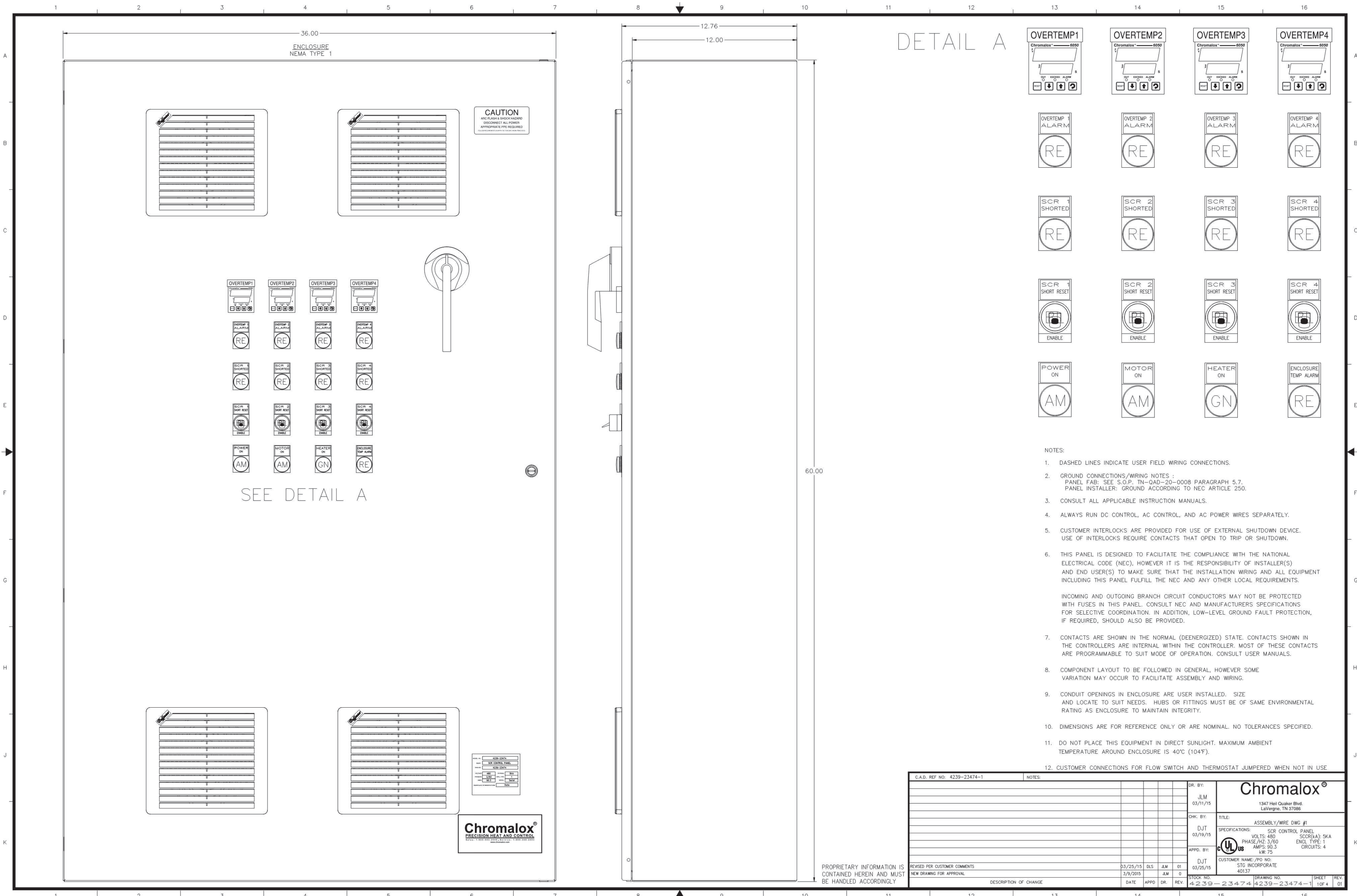
ENG. STAMP

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Consulting Engineers

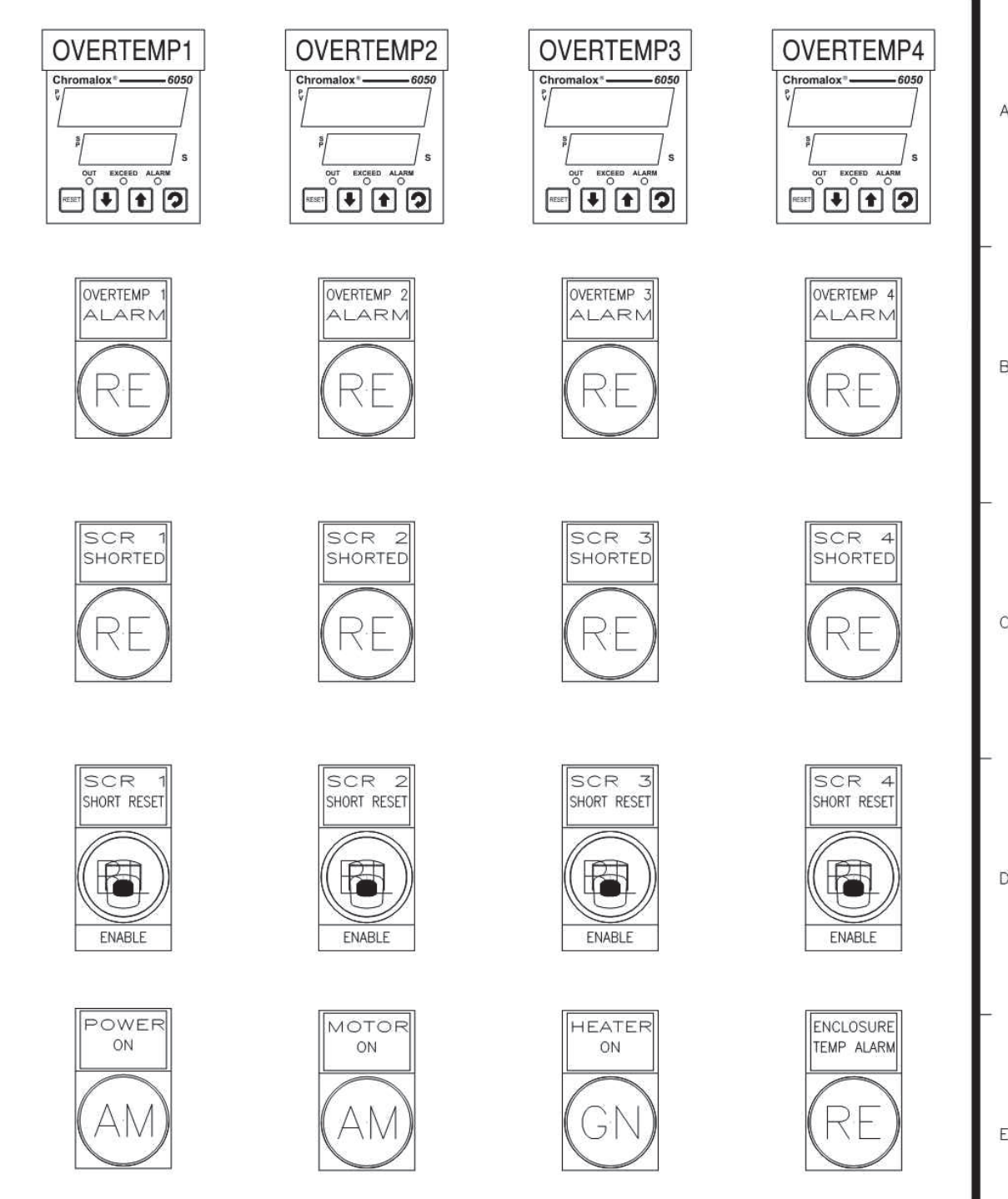
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FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

DRAWING NAME:	DEERING SCADA UPGRADE GENERATOR SWITCHGEAR PANEL ELEVATION
REF DWG(S):	CASCADE DIESEL ENGINE COMPANY, LLC, DWG. 9319, SHEET 1
DRAWING NO.:	DCU-EL-4500
SHEET	1 OF 1



DETAIL A



- NOTES:
- DASHED LINES INDICATE USER FIELD WIRING CONNECTIONS.
 - GROUND CONNECTIONS/WIRING NOTES: PANEL FAB: SEE S.O.P. TN-040-20-0008 PARAGRAPH 5.7. PANEL INSTALLER: GROUND ACCORDING TO NEC ARTICLE 250.
 - CONSULT ALL APPLICABLE INSTRUCTION MANUALS.
 - ALWAYS RUN DC CONTROL, AC CONTROL, AND AC POWER WIRES SEPARATELY.
 - CUSTOMER INTERLOCKS ARE PROVIDED FOR USE OF EXTERNAL SHUTDOWN DEVICE. USE OF INTERLOCKS REQUIRE CONTACTS THAT OPEN TO TRIP OR SHUTDOWN.
 - THIS PANEL IS DESIGNED TO FACILITATE THE COMPLIANCE WITH THE NATIONAL ELECTRICAL CODE (NEC), HOWEVER IT IS THE RESPONSIBILITY OF INSTALLER(S) AND END USER(S) TO MAKE SURE THAT THE INSTALLATION WIRING AND ALL EQUIPMENT INCLUDING THIS PANEL FULFILL THE NEC AND ANY OTHER LOCAL REQUIREMENTS.
- INCOMING AND OUTGOING BRANCH CIRCUIT CONDUCTORS MAY NOT BE PROTECTED WITH FUSES IN THIS PANEL. CONSULT NEC AND MANUFACTURERS SPECIFICATIONS FOR SELECTIVE COORDINATION. IN ADDITION, LOW-LEVEL GROUND FAULT PROTECTION, IF REQUIRED, SHOULD ALSO BE PROVIDED.
- CONTACTS ARE SHOWN IN THE NORMAL (DEENERGIZED) STATE. CONTACTS SHOWN IN THE CONTROLLERS ARE INTERNAL WITHIN THE CONTROLLER. MOST OF THESE CONTACTS ARE PROGRAMMABLE TO SUIT MODE OF OPERATION. CONSULT USER MANUALS.
 - COMPONENT LAYOUT TO BE FOLLOWED IN GENERAL, HOWEVER SOME VARIATION MAY OCCUR TO FACILITATE ASSEMBLY AND WIRING.
 - CONDUIT OPENINGS IN ENCLOSURE ARE USER INSTALLED. SIZE AND LOCATE TO SUIT NEEDS. HUBS OR FITTINGS MUST BE OF SAME ENVIRONMENTAL RATING AS ENCLOSURE TO MAINTAIN INTEGRITY.
 - DIMENSIONS ARE FOR REFERENCE ONLY OR ARE NOMINAL. NO TOLERANCES SPECIFIED.
 - DO NOT PLACE THIS EQUIPMENT IN DIRECT SUNLIGHT. MAXIMUM AMBIENT TEMPERATURE AROUND ENCLOSURE IS 40°C (104°F).
 - CUSTOMER CONNECTIONS FOR FLOW SWITCH AND THERMOSTAT JUMPERED WHEN NOT IN USE

C.A.D. REF NO: 4239-23474-1		NOTES	
DR. BY:	JLM	DATE:	03/11/15
CHK. BY:	DJT	DATE:	03/19/15
APPRO. BY:	DJT	DATE:	03/25/15
REVISED FOR CUSTOMER COMMENTS	03/25/15	DLS	AM
NEW DRAWING FOR APPROVAL	3/9/2015	AM	0
DESCRIPTION OF CHANGE	DATE	APPRO	DR. REV.
	4-2-15	GP	2-3-4-7-4
			14-2-3-5-2-3-4-7-4-1
			106-4
			01

Chromalox®
 1347 Hill Quaker Blvd.
 La Vergne, TN 37086

TITLE: ASSEMBLY/WIRE DWG #1

SPECIFICATIONS: SCR CONTROL PANEL
 VOLTS: 480 SCRT(A): SKA
 PHASE/FREQ: 3/60 ENCL TYPE: 1
 AMPS: 99.3 CIRCUITS: 4
 KW: 75

CUSTOMER NAME/PRO NO: STD INCORPORATE 40137

DRAWING NO: DCU-EQ-0001

SHEET REV: 1 OF 1

PROJECT: DEERING SCADA UPGRADE		DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN		JOB #: 14-0670	
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE		
0	MANUFACTURER'S DRAWING	03-25-2015			

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 WEB: WWW.EPSINC.COM

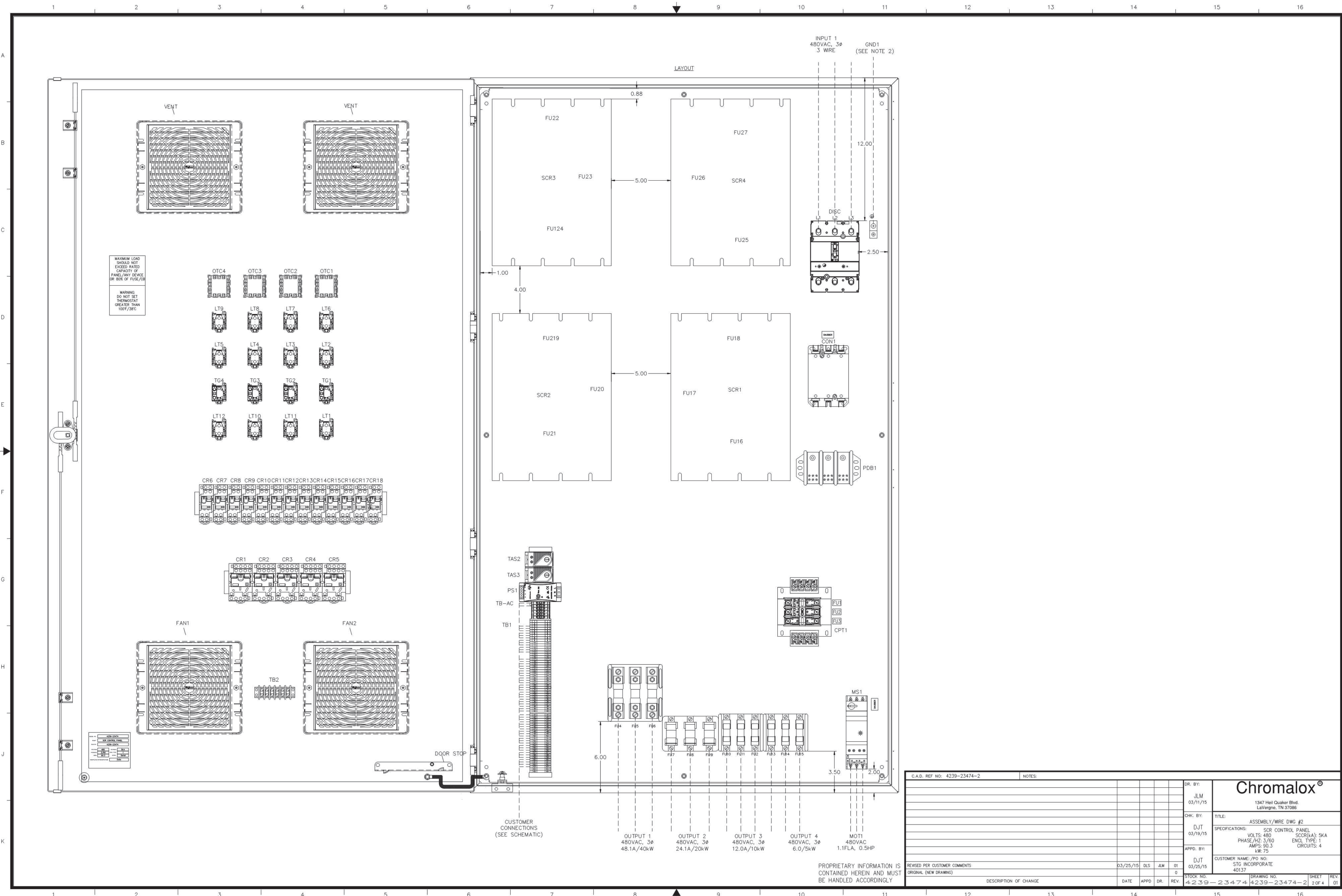
NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

DRAWING NAME: DEERING SCADA UPGRADE ENERGY RECOVERY HEATER AC/DC SCHEMATIC DIAGRAM

REF DWG(S):

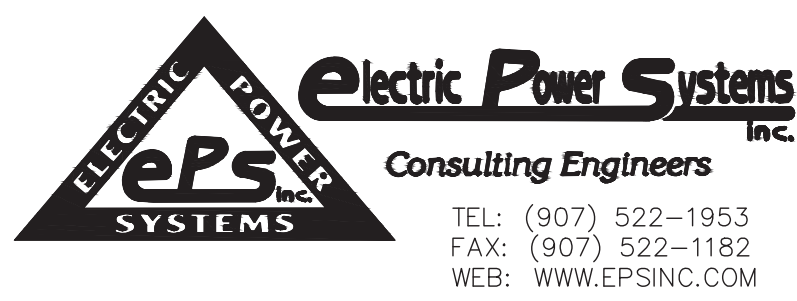
DRAWING NO.: DCU-EQ-0001

SHEET 1 OF 5



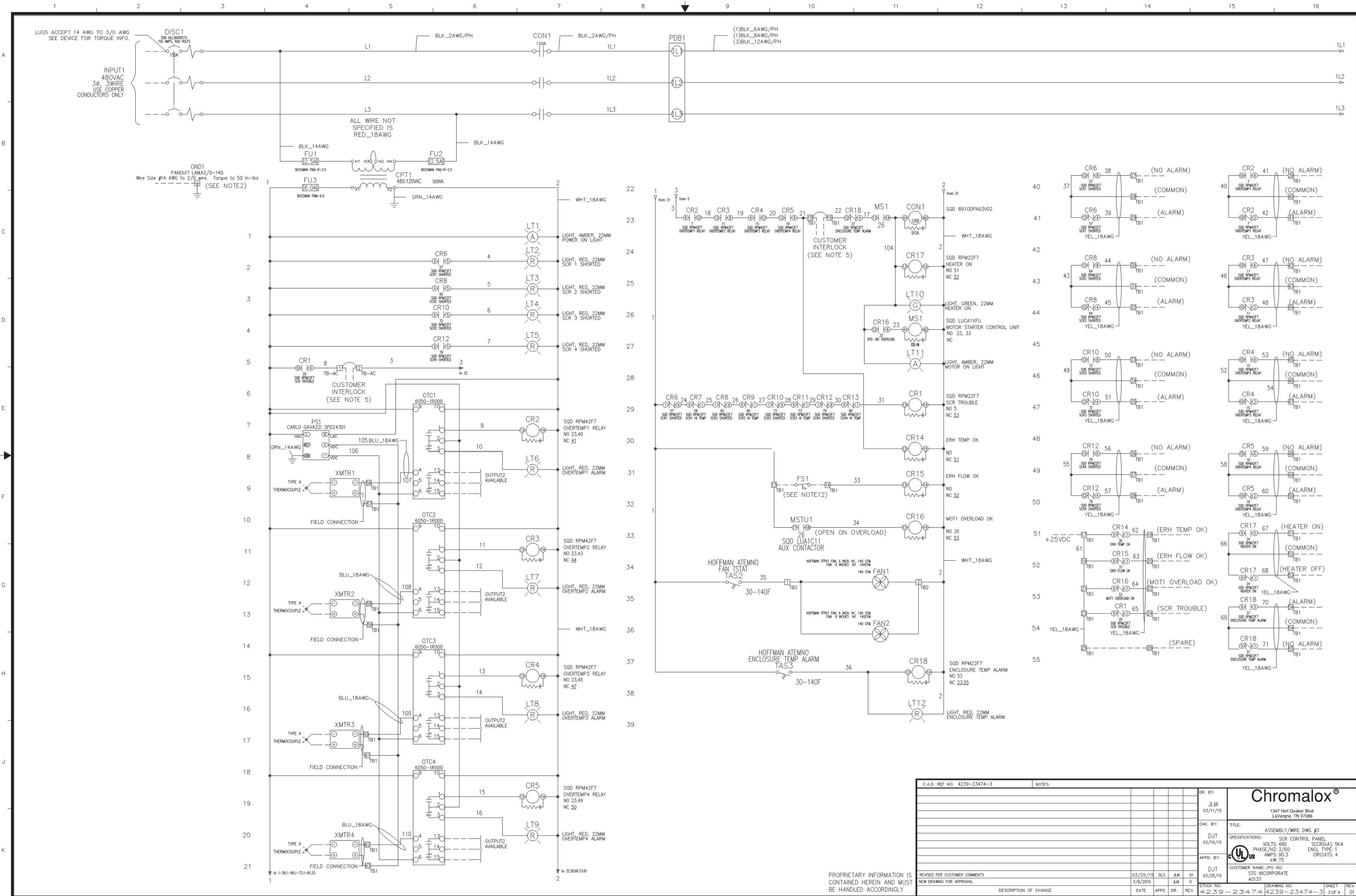
PROJECT: DEERING SCADA UPGRADE			
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN			
JOB #: 14-0670			
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	MANUFACTURER'S DRAWING	03-25-2015	

ENG. STAMP



NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

DRAWING NAME:		DEERING SCADA UPGRADE ENERGY RECOVERY HEATER AC/DC SCHEMATIC DIAGRAM	
REF DWG(S):		dcu-eq-0001_2.dwg	
DRAWING NO.:		DCU-EQ-0001	
SHEET		2 OF 5	



CAD REF NO: 4239-23474-3	NOTES:	DR. BY: JLM 03/11/15	Chromalox® 1347 Hill Duaker Blvd. LaVergne, TN 37086
		CHK. BY: DJT 03/19/15	
		APP. BY: DJT 03/25/15	TITLE: ASSEMBLY/WIRE DWG #3 SPECIFICATIONS: SCR CONTROL PANEL VOLTAGE: 480V PHASE: 3/3/0 AMPS: 30.3 CIRCUITS: 4 ENCL. TYPE: 1 LAW: 75
		REVISED PER CUSTOMER COMMENTS	CUSTOMER NAME / PO NO: STG INCORPORATE 40137
		NEW DRAWING FOR APPROVAL	DATE: 03/25/15
			DRAWING NO: 40137
			STOCK NO: 42-239-23474-3
			REV: 1

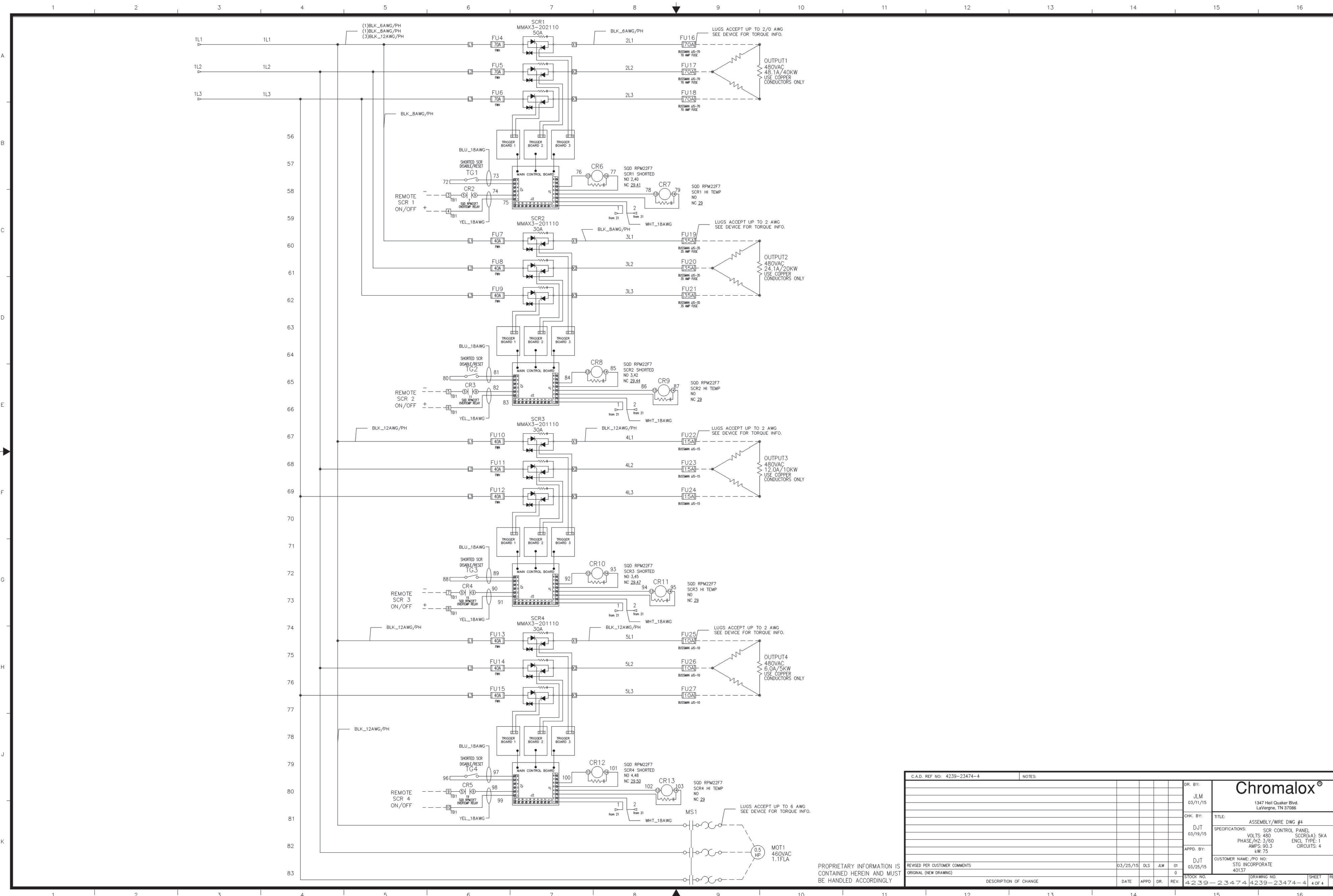
PROJECT: DEERING SCADA UPGRADE		JOB #: 14-0670	
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN			
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	MANUFACTURER'S DRAWING	03-25-2015	

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

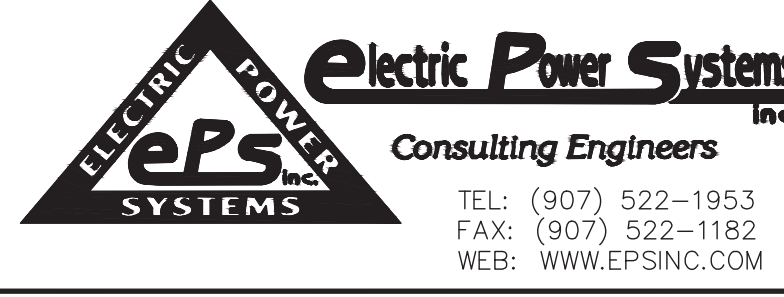
DRAWING NAME:	DEERING SCADA UPGRADE ENERGY RECOVERY HEATER AC/DC SCHEMATIC DIAGRAM
REF DWG(S):	dcu-eq-0001_3.dwg
DRAWING NO.:	DCU-EQ-0001
SHEET	3 OF 5



C.A.D. REF NO: 4239-23474-4		NOTES:
DR. BY:	JLM	Chromalox® 1347 Hill Quaker Blvd Lawrence, TN 37056
CHK. BY:	DJT	
APPR. BY:	DJT	
REVISED PER CUSTOMER COMMENTS	03/25/15	
ORIGINAL (NEW DRAWING)	03/25/15	DR. BY: JLM CHK. BY: DJT APPR. BY: DJT DATE: 03/25/15 APPD: DR: REV: 0 DESCRIPTION OF CHANGE:

PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY

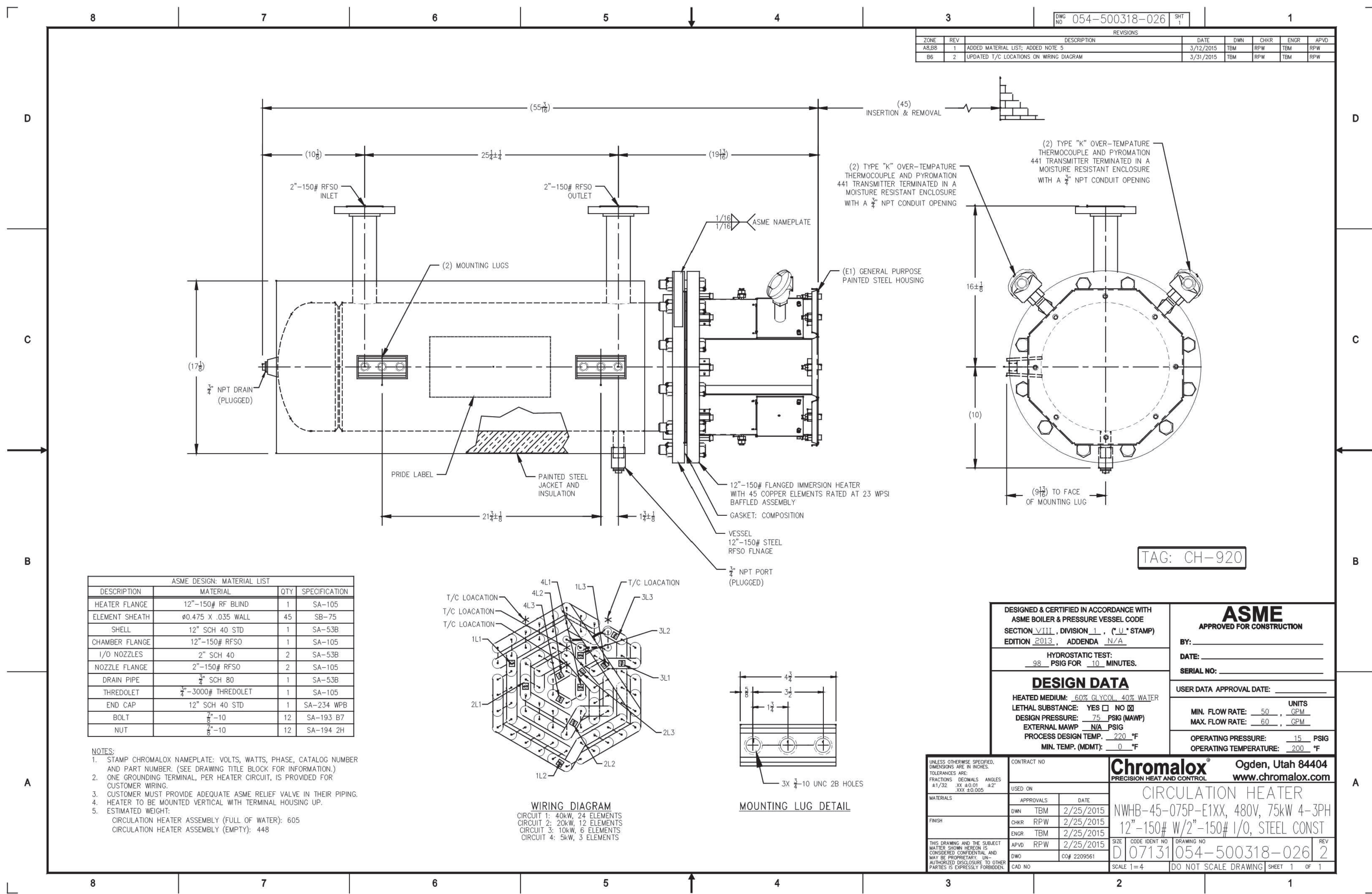
PROJECT: DEERING SCADA UPGRADE		JOB #: 14-0670	
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN		ENG. STAMP	
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	MANUFACTURER'S DRAWING	03-25-2015	



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NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

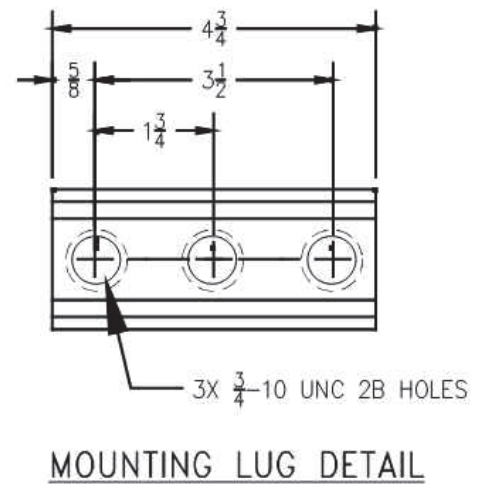
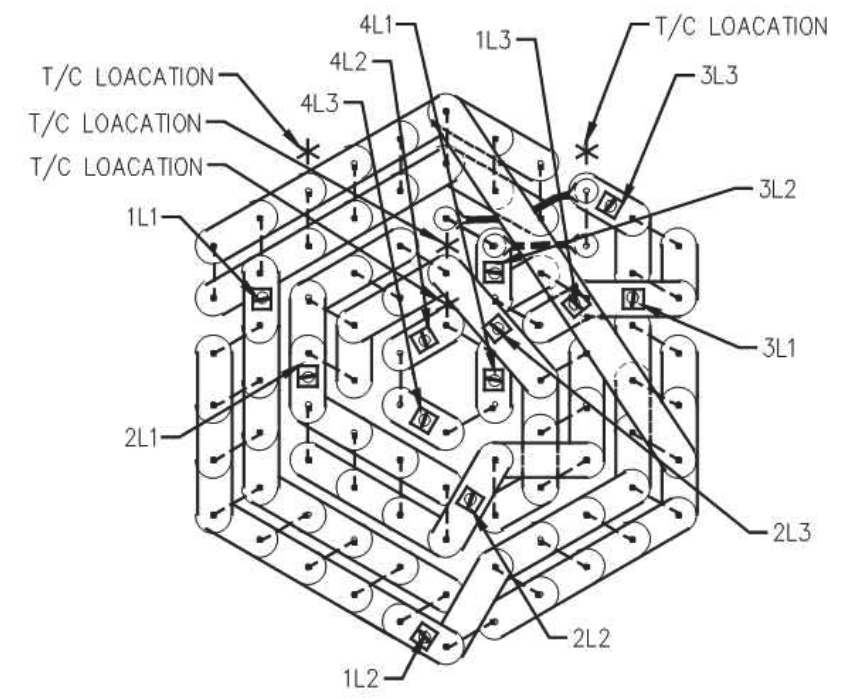
DRAWING NAME:		DEERING SCADA UPGRADE
		ENERGY RECOVERY HEATER
		AC/DC
		SCHEMATIC DIAGRAM
REF DWG(S):		dcu-eq-0001_4.dwg
DRAWING NO.:		DCU-EQ-0001
		SHEET 4 OF 5



ZONE		REV	DESCRIPTION	DATE	DWN	CHKR	ENGR	APVD
A8,B8	1	ADDED MATERIAL LIST; ADDED NOTE 5		3/12/2015	TBM	RPW	TBM	RPW
B6	2	UPDATED T/C LOCATIONS ON WIRING DIAGRAM		3/31/2015	TBM	RPW	TBM	RPW

ASME DESIGN: MATERIAL LIST			
DESCRIPTION	MATERIAL	QTY	SPECIFICATION
HEATER FLANGE	12"-150# RF BLIND	1	SA-105
ELEMENT SHEATH	Ø0.475 X .035 WALL	45	SB-75
SHELL	12" SCH 40 STD	1	SA-53B
CHAMBER FLANGE	12"-150# RFSO	1	SA-105
I/O NOZZLES	2" SCH 40	2	SA-53B
NOZZLE FLANGE	2"-150# RFSO	2	SA-105
DRAIN PIPE	3/4" SCH 80	1	SA-53B
THREDOLET	3/4"-3000# THREDOLET	1	SA-105
END CAP	12" SCH 40 STD	1	SA-234 WPB
BOLT	3/8"-10	12	SA-193 B7
NUT	3/8"-10	12	SA-194 2H

- NOTES:
1. STAMP CHROMALOX NAMEPLATE: VOLTS, WATTS, PHASE, CATALOG NUMBER AND PART NUMBER. (SEE DRAWING TITLE BLOCK FOR INFORMATION.)
 2. ONE GROUNDING TERMINAL, PER HEATER CIRCUIT, IS PROVIDED FOR CUSTOMER WIRING.
 3. CUSTOMER MUST PROVIDE ADEQUATE ASME RELIEF VALVE IN THEIR PIPING.
 4. HEATER TO BE MOUNTED VERTICAL WITH TERMINAL HOUSING UP.
 5. ESTIMATED WEIGHT:
CIRCULATION HEATER ASSEMBLY (FULL OF WATER): 605
CIRCULATION HEATER ASSEMBLY (EMPTY): 448



<p>DESIGNED & CERTIFIED IN ACCORDANCE WITH ASME BOILER & PRESSURE VESSEL CODE SECTION VIII, DIVISION 1, ("U" STAMP) EDITION 2013, ADDENDA N/A</p> <p>HYDROSTATIC TEST: 98 PSIG FOR 10 MINUTES.</p> <p>DESIGN DATA</p> <p>HEATED MEDIUM: 60% GLYCOL, 40% WATER LETHAL SUBSTANCE: YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> DESIGN PRESSURE: 75 PSIG (MAWP) EXTERNAL MAWP: N/A PSIG PROCESS DESIGN TEMP: 220 °F MIN. TEMP. (MDMT): 0 °F</p>	<p>ASME APPROVED FOR CONSTRUCTION</p> <p>BY: _____ DATE: _____ SERIAL NO: _____</p> <p>USER DATA APPROVAL DATE: _____</p> <p>UNITS MIN. FLOW RATE: 50 GPM MAX. FLOW RATE: 60 GPM</p> <p>OPERATING PRESSURE: 15 PSIG OPERATING TEMPERATURE: 200 °F</p>
<p>CONTRACT NO _____</p> <p>USED ON _____</p> <p>APPROVALS: _____ DATE: 2/25/2015</p> <p>DWN TBM 2/25/2015 CHKR RPW 2/25/2015 ENGR TBM 2/25/2015</p> <p>APVD RPW 2/25/2015</p> <p>DWG CO# 2209561</p> <p>CAD NO _____</p>	<p>Chromalox Ogden, Utah 84404 www.chromalox.com</p> <p>CIRCULATION HEATER NWHB-45-075P-E1XX, 480V, 75kW 4-3PH 12"-150# W/2"-150# I/O, STEEL CONST</p> <p>SIZE: 12" x 12" x 12" DRAWING NO: D107131 CODE IDENT NO: 054-500318-026 REV: 2</p> <p>SCALE 1=4 DO NOT SCALE DRAWING SHEET 1 OF 1</p>

PROJECT: DEERING SCADA UPGRADE		JOB #: 14-0670	
DESIGNER/PROJECT ENGINEER: BILL BRIMSTEIN		ENGR. STAMP	
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	MANUFACTURER'S DRAWING	03-31-2015	

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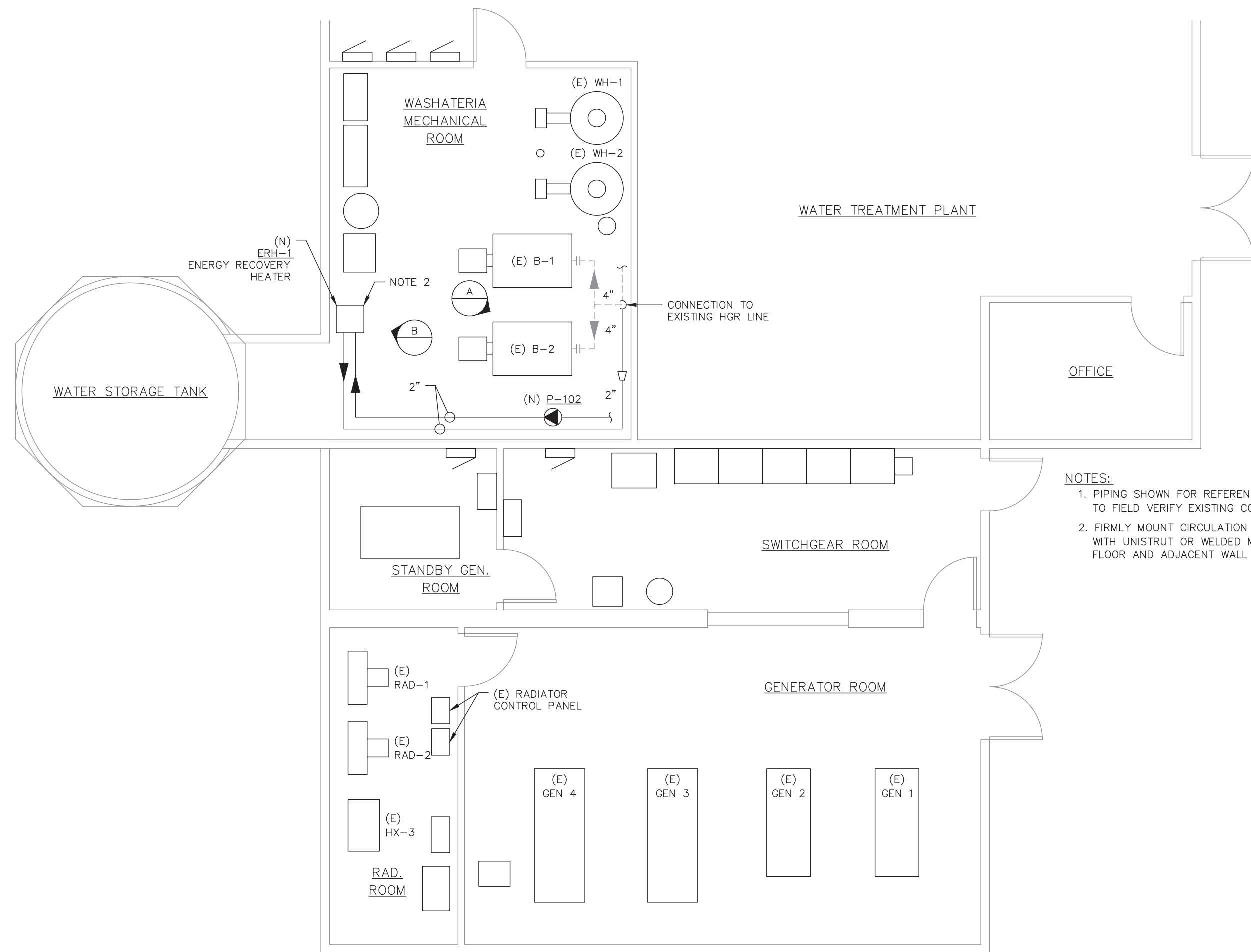
NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

DRAWING NAME: DEERING SCADA UPGRADE ENERGY RECOVERY HEATER AC/DC SCHEMATIC DIAGRAM

REF DWG(S):

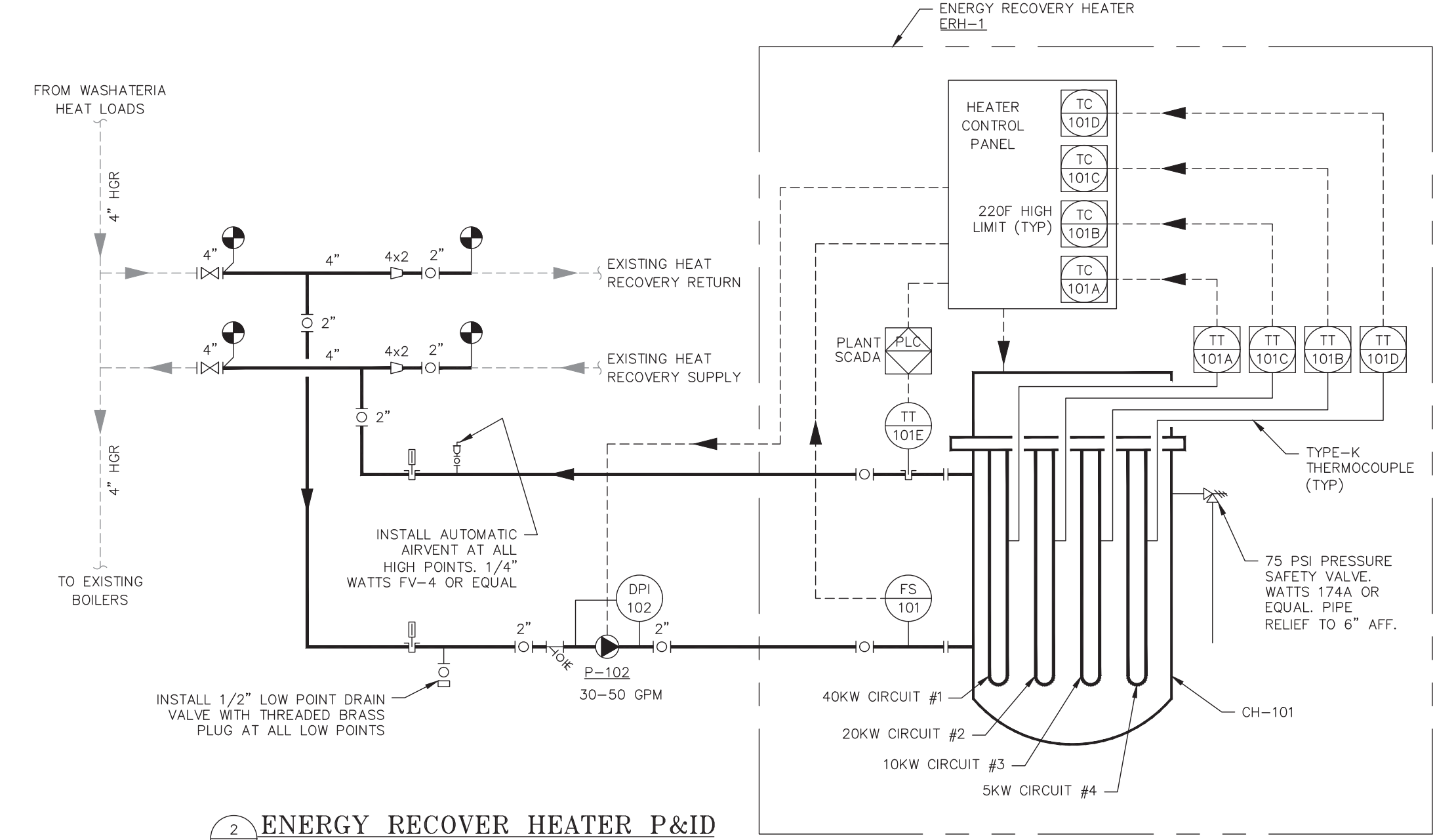
DRAWING NO.: DCU-EQ-0001

SHEET 5 OF 5



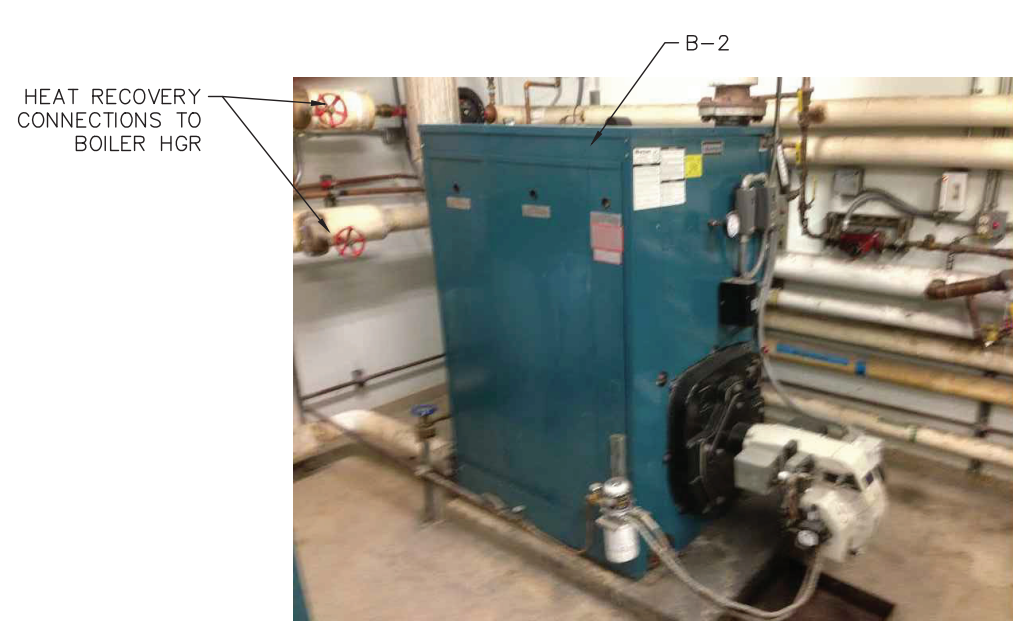
NOTES:
 1. PIPING SHOWN FOR REFERENCE ONLY. CONTRACTOR TO FIELD VERIFY EXISTING CONDITIONS.
 2. FIRMLY MOUNT CIRCULATION HEATER CH-101 WITH UNISTRUT OR WELDED METAL FRAMING TO FLOOR AND ADJACENT WALL FRAMING.

1 ERH PIPING AND EQUIPMENT LAYOUT
 SCALE: 1/4" = 1'-0"



2 ENERGY RECOVER HEATER P&ID
 SCALE: N.T.S.

NEW EQUIPMENT/INSTRUMENT SCHEDULE						
CODE	SEQUENCE	DESCRIPTION	SERVICE	MAKE	MODEL	REMARKS
ERH	1	ENERGY RECOVERY HEATER ASSEMBLY	GLYCOL/WATER	-	-	CONTRACTOR ASSEMBLED PER DRAWINGS
CH	101	CIRCULATION HEATER, 75KW 480V 3PH, 15 CIRCUIT/45 ELEMENT	GLYCOL/WATER	CHROMALOX	PER SPEC	CARBON STEEL/COPPER WETTED MATERIALS
FS	101	FLOW SWITCH, 120VAC, 8-15 GPM ACTUATION RANGE	GLYCOL/WATER	DWYER	V4	OR EQUAL
TT	101A, 101B, 101C, 101D	TEMPERATURE TRANSMITTER, TYPE-K THERMOCOUPLE, 4-20mA OUTPUT	-	PYROMATION	441	TO BE FACTORY INSTALLED AND CONFIGURED
TT	101E	TEMPERATURE TRANSMITTER, RTD, 0-400F, 4-20mA OUTPUT	GLYCOL/WATER	MURPHY	RTDT-225-400-100	OR EQUAL
TC	101A, 101B, 101C, 101D	TEMPERATURE CONTROLLER - HIGH LIMIT, 4-20mA INPUT	-	CHROMALOX	6050	TO BE FACTORY INSTALLED AND CONFIGURED IN HEATER CONTROL PANEL
P	102	CIRCULATION PUMP, 40 GPM @ 8.5 FT, 1/3 HP 480VAC 3-PHASE	GLYCOL/WATER	GRUNDFOS	UPS 40-40/4	OR EQUAL
DPI	102	DIFFERENTIAL PRESSURE INDICATOR, 0-5 PSI, 2-1/2" DIAL	GLYCOL/WATER	ASHROFT	1131	OR EQUAL



A HEAT RECOVERY LOOP CONNECTIONS
 SCALE: N.T.S.



B CIRCULATION HEATER MOUNTING LOCATION
 SCALE: N.T.S.

P&ID LEGEND

- NEW PIPING
- - - EXISTING PIPING
- ELECTRICAL SIGNAL
- CIRCULATING OR TRANSFER PUMP
- FLANGE - (SYMBOL)
- BALL VALVE
- BALANCE / SHUTOFF VALVE
- GATE VALVE
- Y STRAINER - (W/ BLOWDOWN)
- PRESSURE SAFETY VALVE
- THERMOWELL
- REDUCER - (CONCENTRIC)
- THERMOMETER - (LIQUID GLASS)

INSTRUMENT SYMBOLS - P&ID

LOCATION / ACCESSIBILITY	DISCRETE INSTRUMENTS	SHARED DISPLAY AND CONTROL (DCS)	PLC
FIELD MOUNTED	X	XX	XX
PRIMARY LOCATION: NORMALLY ACCESSIBLE TO AN OPERATOR	X	XX	XX

NOTE: MULTIPLE LOCATIONS OF THE SAME TYPE CAN BE DISTINGUISHED BY ADDING A TEXT LABEL OR NOTE.

GENERAL SPECIFICATIONS

- THE CONSTRUCTOR SHALL VERIFY SITE CONDITIONS, DIMENSIONS AND DETAILS PRIOR TO THE START OF CONSTRUCTION.
- ALL PIPING AND EQUIPMENT IS TO BE SEISMICALLY RESTRAINED ACCORDING TO THE LATEST ADOPTED INTERNATIONAL BUILDING CODE AND ASCE/SEI 7.
- AVOID DISTURBING, ALTERING THE FUNCTION OF, OR LIMITING ACCESS TO EXISTING EQUIPMENT IN THE WORK AREAS. REPAIR OR REPLACE EXISTING EQUIPMENT IF DAMAGED DURING CONSTRUCTION.
- DESIGN, CONSTRUCTION, INSPECTION AND TESTING OF ALL PRESSURE PIPING SHALL COMPLY WITH ASME B31.9 "BUILDING SERVICES PIPING" AND THE LATEST ADOPTED UNIFORM PLUMBING CODE OR INTERNATIONAL MECHANICAL CODE AS APPLICABLE.
- THE CONSTRUCTOR SHALL PROVIDE AND MAINTAIN ALL SIGNS, BARRICADES AND WARNING LIGHTS AND OTHER PROTECTIVE DEVICES NECESSARY FOR SAFETY.
- ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH U.S. ENVIRONMENTAL PROTECTION AGENCY, ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION AND STATE AND FEDERAL OCCUPATIONAL HEALTH AND SAFETY REGULATIONS.
- THE CONSTRUCTOR SHALL BE RESPONSIBLE FOR COORDINATING WORK WITH OTHER CONTRACTORS, THE OWNER, AND STATE AND FEDERAL AUTHORITIES.
- THE PURPOSE OF SPECIFYING A NAME BRAND PRODUCT IS TO PROVIDE A BASIS OF DESIGN AND IS NOT A PRODUCT ENDORSEMENT. SUBMIT SUBSTITUTIONS IN WRITING FOR APPROVAL.
- THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS AND SUBMITTALS TO THE ENGINEER AT LEAST 2-WEEKS PRIOR TO PROCUREMENT.

HYDRONIC PIPING SPECIFICATIONS

- ALL PIPING SHALL BE COPPER TYPE L ASTM B88.
- PROVIDE HYDRONIC PIPING INSULATION IN ACCORDANCE WITH THE INTERNATIONAL MECHANICAL CODE.
- 150 PSI @ 220F MINIMUM WORKING PRESSURE FOR ALL HYDRONIC PIPING, FITTINGS AND GASKETS.
- USE SOLDER JOINED ASME 16.22 WROUGHT COPPER FITTINGS WHEREVER POSSIBLE. ALTERNATIVELY, USE COPPER OR COPPER ALLOY THREADED OR CLASS 150 FLANGED FITTINGS THAT MEET THE APPLICABLE ASME B16 DESIGN SPECIFICATION.
- FLANGE STUDS AND NUTS: ASME B18.2.1, CARBON STEEL
- FLANGE GASKET: ASME B16.21 NON-METALLIC, FLAT, ASBESTOS FREE, 1/8-INCH MIN THICKNESS. RATED FOR -40F SERVICE.
- SOLDER: ASTM B 32 LEAD-FREE ALLOYS
- 2-WAY VALVES: 2.5 INCH AND LARGER SHALL BE CLASS 150 FLANGED GATE VALVES. VALVES 2 INCH AND SMALLER SHALL BE 2-PIECE BRONZE BALL OR GATE VALVES WITH SOLDER CONNECTIONS WHERE POSSIBLE.
- PROVIDE DIELECTRIC NIPPLE, UNIONS OR FLANGE KITS FOR COPPER TO STEEL TRANSITIONS.
- CONTRACTOR TO PERFORM 1-HOUR 100 PSI HYDRO TEST TO VERIFY INTEGRITY OF PIPING. RETEST AFTER REPAIRING LEAKS USING THE SAME METHOD.
- ADEQUATELY SUPPORT PIPING USING APPROPRIATE UNISTRUT, B-LINE, ANVIL OR EQUIVALENT PIPING RESTRAINT PRODUCTS. EVALUATE AND ALLOW FOR SUFFICIENT THERMAL EXPANSION AND SEISMIC RESTRAINT.
- CLEANING: PREVENT ENTRY OF FOREIGN MATTER DURING CONSTRUCTION TO THE EXTENT POSSIBLE. FLUSH NEWLY INSTALLED PIPING AND USE A NEUTRAL PH CLEANING SOLUTION THAT IS CAPABLE OF REMOVING OIL AND GREASE. BASIS OF DESIGN: HERCULES BOILER AND HEATING SYSTEM CLEANER.

CIRCULATION HEATER CH-101 SPECIFICATIONS

- THE EQUIPMENT MANUFACTURE TO PROVIDE A CIRCULATION HEATER THAT MEETS THE MINIMUM SPECIFICATIONS LISTED BELOW.
- PRESSURE VESSEL TO BE ASME STAMPED.
- HEATER BODY TO BE CONSTRUCTED OF UNCOATED CARBON STEEL. HEATER ELEMENTS TO BE CONSTRUCTED OF COPPER WETTED MATERIALS.
- BASIS OF DESIGN: CHROMALOX OR WATLOW
- ELECTRICAL CLASSIFICATION: NEMA 1
- POWER: 480V, 3PH
- INTEGRAL CIRCUITS (4)
 CIRCUIT 1: 40kW, 24 ELEMENTS
 CIRCUIT 2: 20kW, 12 ELEMENTS
 CIRCUIT 3: 10kW, 6 ELEMENTS
 CIRCUIT 4: 5kW, 3 ELEMENTS
- ELEMENTS: 45 TOTAL ELEMENTS, 23 WATTS PER SQUARE INCH MAXIMUM HEAT DENSITY.
- TEMPERATURE LIMIT CONTROLS: THE FACTORY IS TO PROVIDE AN ELEMENT SHEATH MOUNTED TYPE-K THERMOCOUPLE, A 4-20mA SIGNAL CONVERTER, AND A MANUAL RESET LIMIT CONTROLLER FOR EACH OF THE FOUR (4) CIRCUITS. THE THERMOCOUPLE AND SIGNAL CONVERTER IS TO BE MOUNTED TO THE HEATER AND CONFIGURED BY THE FACTORY. PROVIDE A CHROMALOX 6050 TEMPERATURE LIMIT CONTROLLER PRE-PROGRAMMED FOR 220F. THE LIMIT CONTROLLER IS TO BE MOUNTED IN A SEPARATE CONTROL PANEL.
- OPERATING PRESSURE: 30 PSI
- OPERATING TEMPERATURE (INLET): 180 F
- MAX DESIGN PRESSURE: 100 PSI
- MAX DESIGN TEMPERATURE: 220F, 190F MAX AT INLET
- MINIMUM DESIGN TEMPERATURE: 0F
- DESIGN FLOW: 30-50 GPM
- FLUID TYPE: 60/40 PROPYLENE GLYCOL/WATER
- ORIENTATION: VERTICAL WITH ELECTRICAL ENCLOSURE ON TOP
- INLET AND OUTLET CONNECTIONS: 2" CLASS 150 FLANGE ON SAME SIDE
- DRAIN: 3/4" NPT CLASS 3000 WELDOLET ON BOTTOM
- PRESSURE RELIEF PORT: 3/4" NPT AT THE TOP SIDE OF THE PRESSURE VESSEL OPPOSITE THE OUTLET CONNECTION.
- INSULATION: 1" INCH GLASS FIBER INSULATION, CARBON STEEL JACKETED. MANUFACTURE'S STANDARD PAINT ON JACKET.
- MOUNTING: MANUFACTURE TO PROVIDE RIDGED MOUNTING POINTS FOR SECURING TO A CONTRACTOR PROVIDED METAL FRAME.

PROJECT: **DEERING SCADA UPGRADE**
 DESIGNER/PROJECT ENGINEER: **JASON ROWLAND** JOB #: **14-0670**

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	ISSUED FOR CONSTRUCTION	XJH/06-02-2015	JRR/06-02-2015
1	AS-BUILT	KER/11-30-2015	JRR/11-30-2015

ENG. STAMP

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 FAX: (907) 522-1182
 WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING/DETAIL/PLAN/SECTION DESCRIPTION

DRAWING NAME: **DEERING SCADA UPGRADE ENERGY RECOVERY HEATER MECHANICAL LAYOUT**

REF DWG(S):

DRAWING NO.: **DCU-ME-2000** SHEET **1** OF **1**

dcu-me-2000_1.dwg