

CIRCUIT ANALYSIS WORKSHEET

Example #1

Component ID: **AOV-1 (SOV-1)** Component Type: **AOV**

Component Description: **Power Operated Relief Valve**

BE Code: **AOV-1_TO (PORV AOV-1 TRANSFERS OPEN)**

Required Position: **CLOSED**
Functional State

Normal Position: **CLOSED**

Failed Electrical Position: **CLOSED**

Failed Air Position: **CLOSED**

High Consequence Component Yes No

Power Supplies: Vital-A Breaker: 3

_____ Breaker: _____

Cable Analysis:

Cable ID	Required?	Function	Fault Consequence	Comments
VA3A	N	Power	LOP	
VA3B	Y	Control	SO-Open	Hot Short between conductors GDD and SVC can cause Valve to cycle open-shut repeatedly
VA3C	Y	Control	SO-Open	

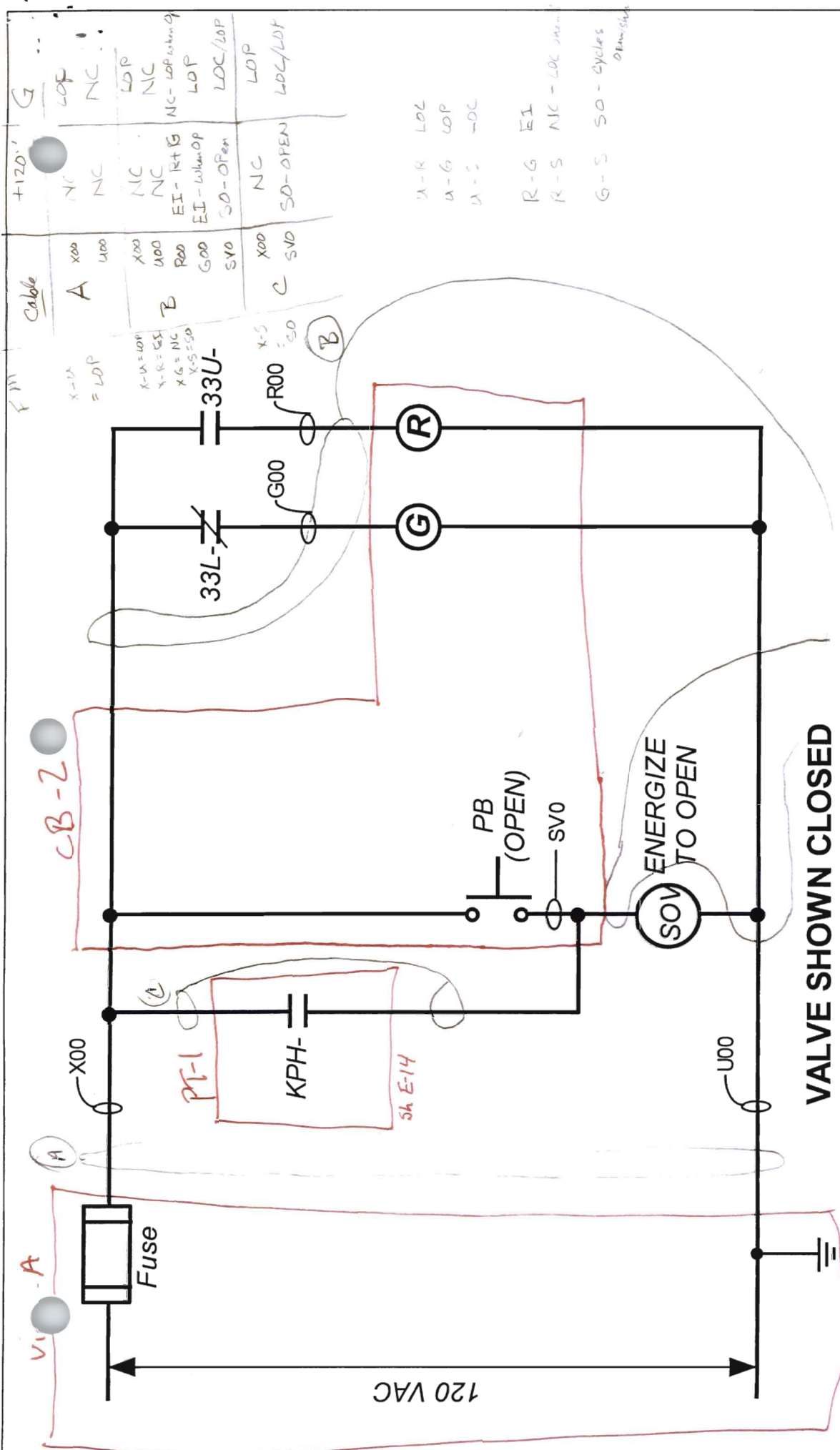
Comments:

$P_{(SO,B)} = 0.60 + 0.06 - (0.6 \times 0.06) = 0.62$

$P_{(SO,C)} = 0.57 \times 0.42 = 0.24$

$P_{(SO,C)} = 0.60 + 0.06 - (0.6 \times 0.06) = 0.62$

← Table 2 $P_{(SO,C)} = 0.67 \times 0.63 = 0.42$



SCHEME VA3

SNPP
 SCHEMATIC DIAGRAM -
 PRESSURE OPERATED
 RELIEF SOLENOID VALVE
 SOV-1

Drawing No.:	E-03
Date:	05/04/2007
Revision No.:	1

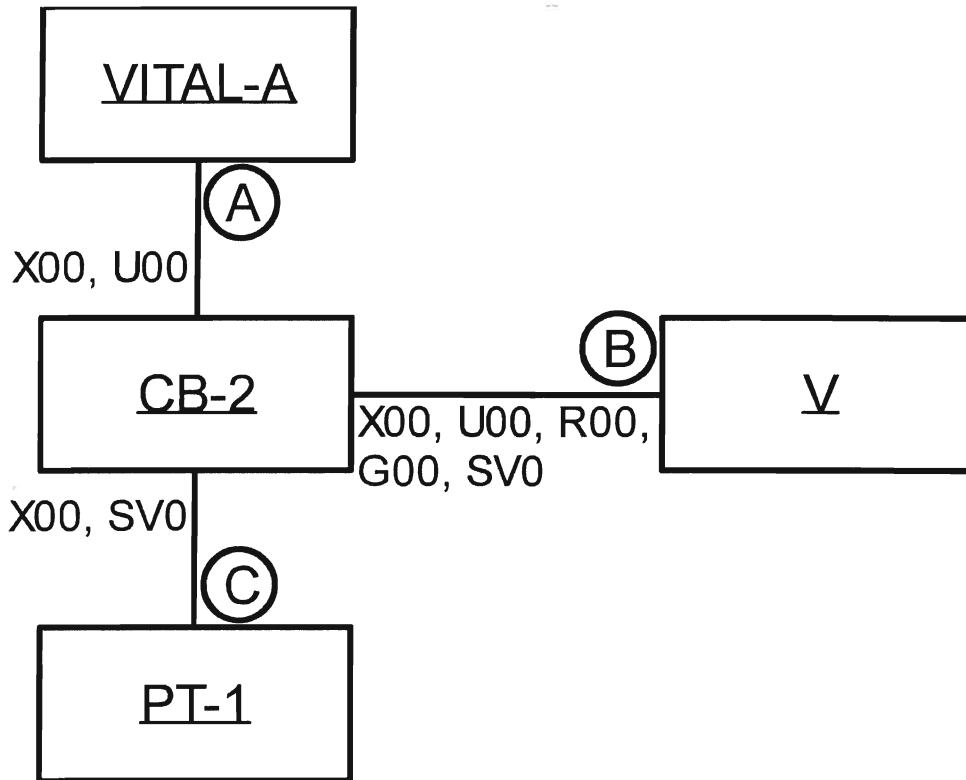
SNPP

TITLE:

AOV-1 BLOCK DIAGRAM

DATE:

4/27/07



SDV-1 SCHEME VA3

CIRCUIT ANALYSIS WORKSHEET

Example #2

Component ID: **AOV-3 (SOV-3)** Component Type: **AOV**

Component Description: **Charging Pump Injection Valve**

BE Code: **AOV-3_FTC (AOV-3 FAILS TO CLOSE)**

Required Position: **CLOSED**
Functional State

Normal Position: **OPEN**

Failed Electrical Position: **CLOSED**

Failed Air Position: **CLOSED**

High Consequence Component Yes No

Power Supplies: Panel B Breaker: 3

Breaker: _____

Cable Analysis:

Cable ID	Required?	Function	Fault Consequence	Comments
PB3A	N	Power	LOP	
PB3B	Y	Control	SD-Open	Energize SVO (ALSO, EI, LOP, LOC)
PB3C	N	Control	LOP	

Comments:

Table

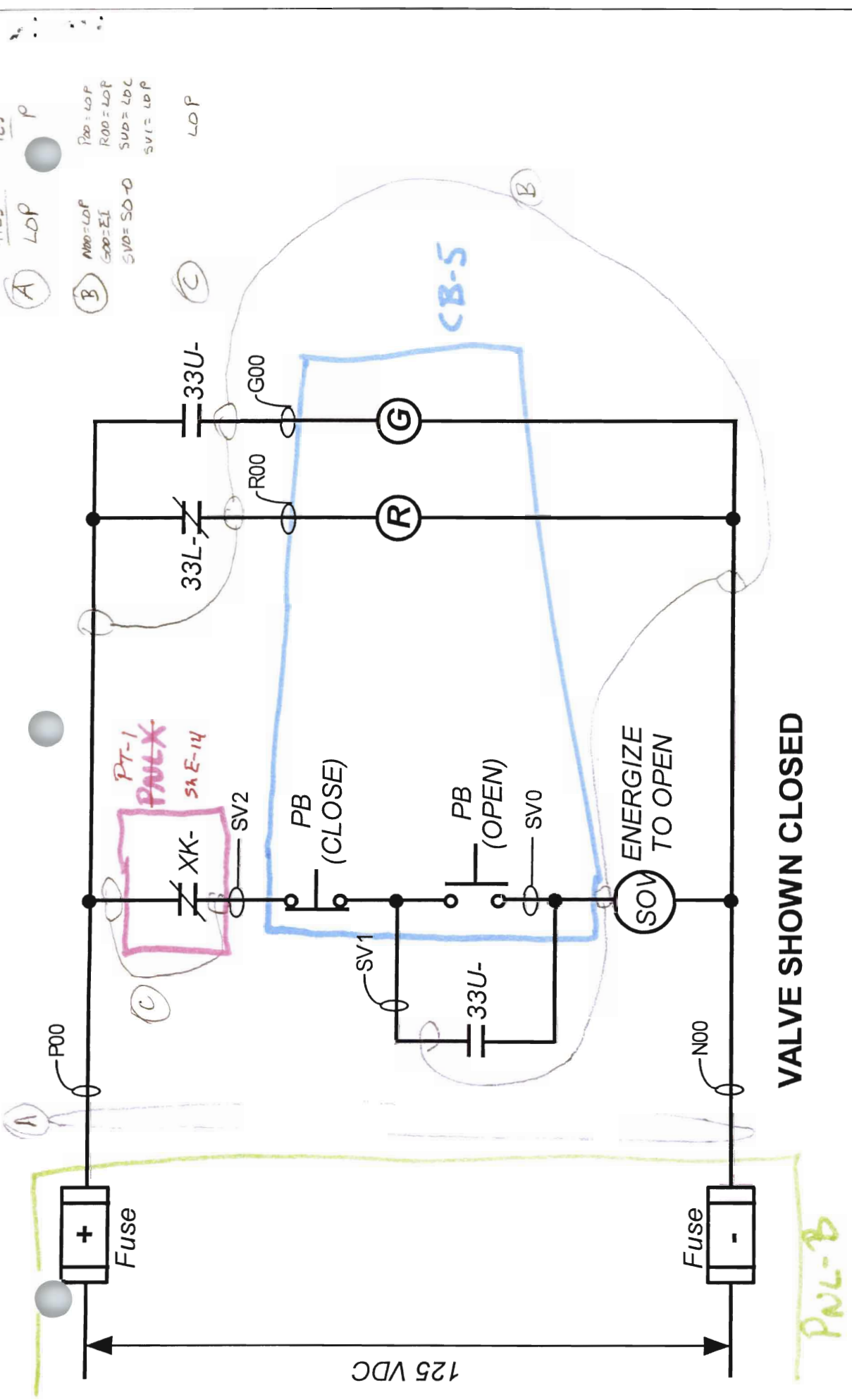
$$P_{(SO,1)} = 0.60 + 0.06 - (0.60 \times 0.06) = 0.62$$

Formula

$$P_{CL} = \frac{(7-1)}{(7-1) + (2 \times 1)} = \frac{6}{6+2} = \frac{6}{8} = 0.75$$

$$CF = \{1 [3 + \frac{0.5}{1}]\} / 7 = \frac{3.07}{7} = 0.44$$

$$P_{(SO,2)} = 0.75 \times 0.44 = 0.33$$

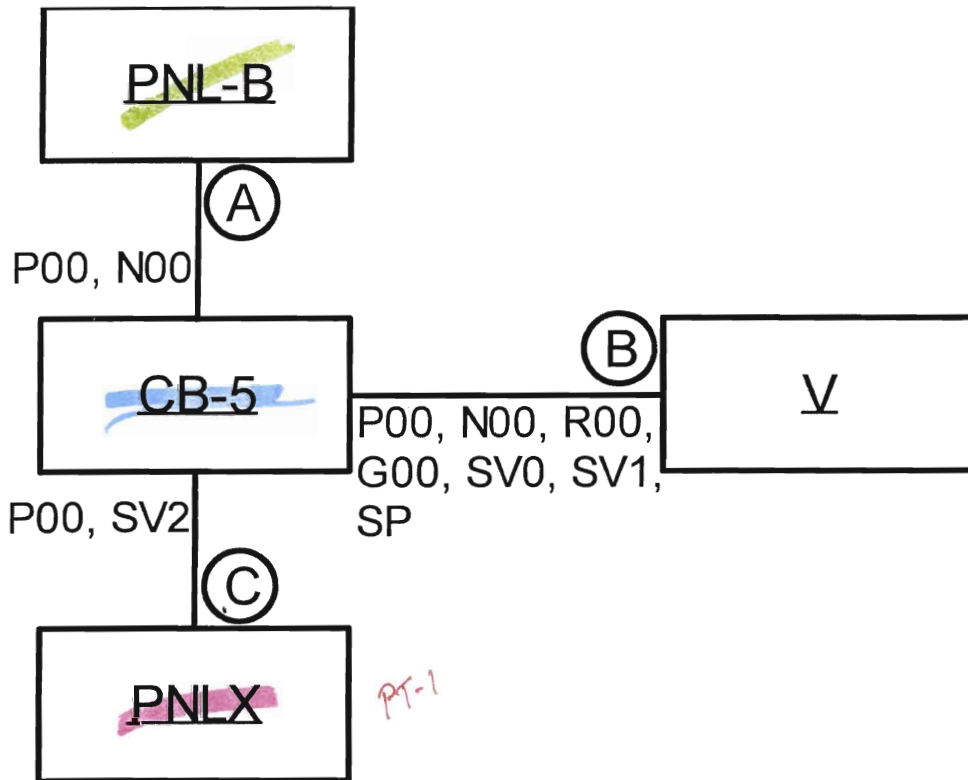


VALVE SHOWN CLOSED

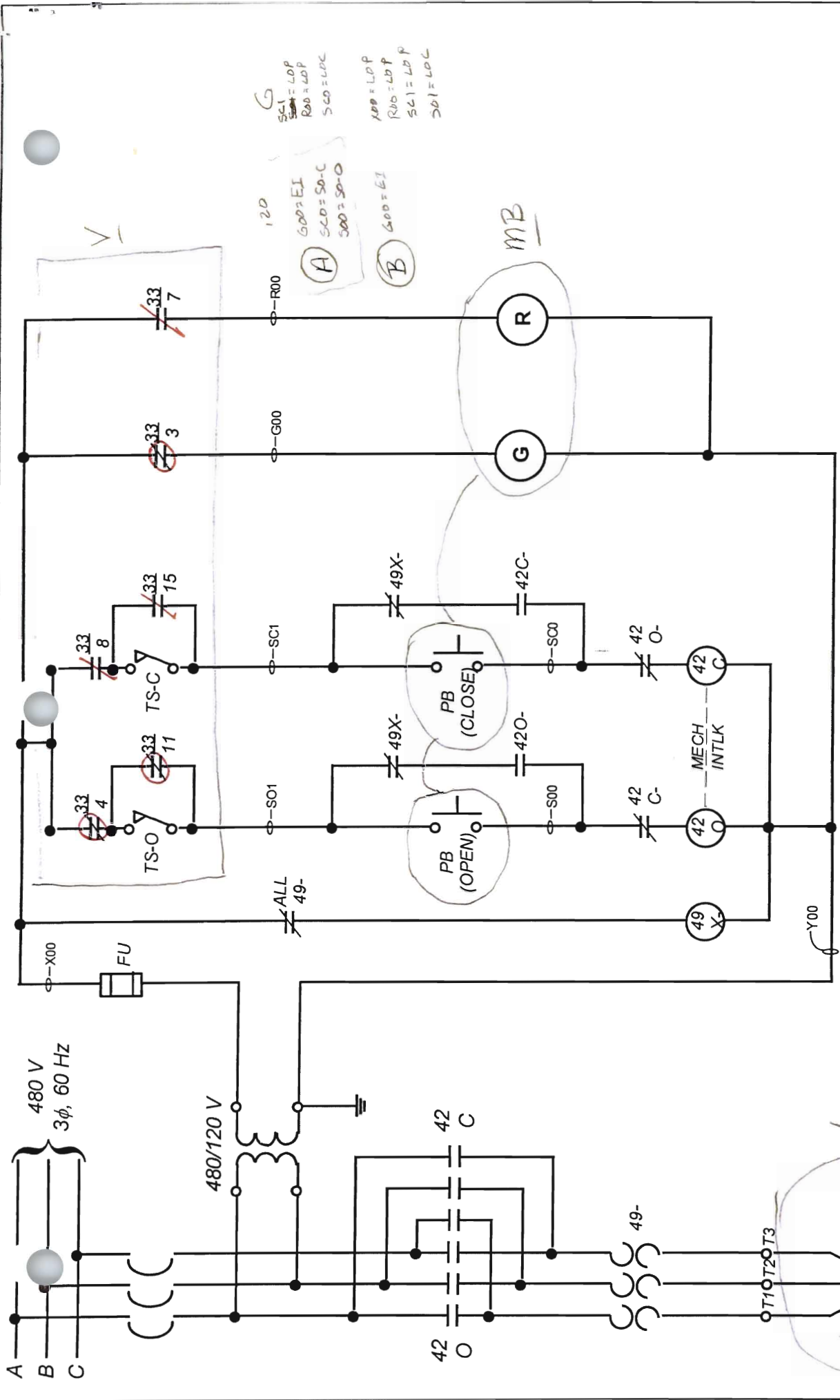
VALVE	DESCRIPTION	SCHEME	SWITCH ID
SOV-2	LETDOWN ISOLATION	PB2	AOV-2
SOV-3	CHARGING PUMP INJECTION	PB3	AOV-3

SNPP
 SCHEMATIC DIAGRAM --
 PRIMARY MAKEUP SYSTEM
 SOLENOID VALVES
 SOV-2 & SOV-3

Drawing No.: E-02
 Date: 5/4/07
 04/272007-
 Revision No.: 0



50V-3, SCHEME PB3



VALVE SHOWN IN CLOSED POSITION

SNPP

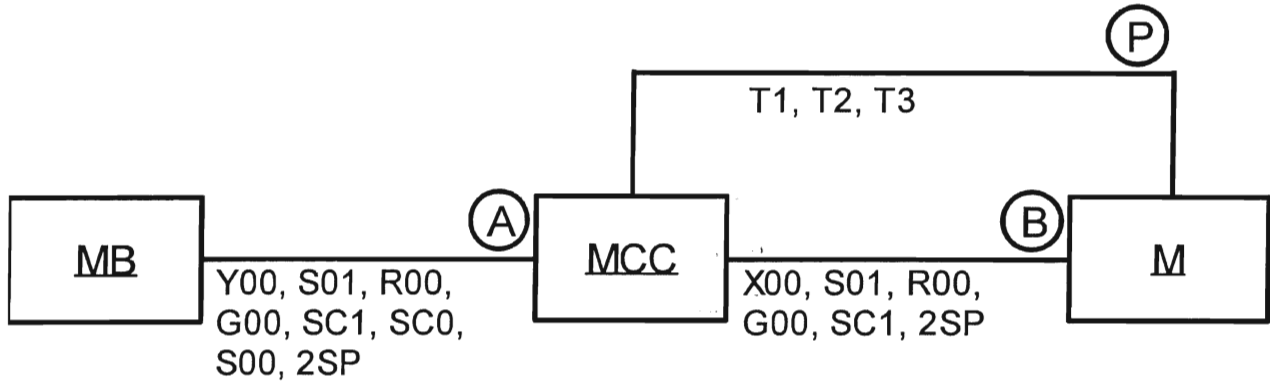
SCHEMATIC DIAGRAM – HIGH PRESSURE INJECTION MOTOR OPERATED VALVES MOV-1 & MOV-9

Drawing No.: E-04

Date: 05/01/2007

Revision No.: 0

VALVE	DESCRIPTION	SCHEME	SWITCH ID
MOV-1	HIGH PRESS INJECTION-A	MA12	MOV-1
MOV-9	HIGH PRESS INJECTION-B	MB15	MOV-9



<u>M</u>	<u>MCC</u>	<u>CUBICLE</u>	<u>MB</u>	<u>SCHEME</u>
MOV-1	MCC-A1	2	CB-5	MA12
MOV-3	MCC-A1	3	CB-5	MA13
MOV-4	MCC-B1	2	CB-5	MB12
MOV-5	MCC-A1	4	CB-5	MA14
MOV-6	MCC-B1	3	CB-5	MB13
MOV-7	MCC-A1	5	CB-5	MA15
MOV-9	MCC-B1	5	CB-5	MB15
MOV-16	MCC-A1	8	CB-3	MA18
MOV-17	MCC-B1	6	CB-3	MB16

CIRCUIT ANALYSIS WORKSHEET

Example #4

Component ID: **MOV-15** Component Type: **MOV**

Component Description: **AFW Steam Inlet Throttle Valve**

BE Code: **MOV-10_FTO (MOV-10 FAILS TO OPEN)**

Required Position: **THROTTLED**
Functional State

Normal Position: **CLOSED**

Failed Electrical Position: **AS-IS**

Failed Air Position: **N/A**

High Consequence Component Yes No

Power Supplies: DB DC Bus - B Breaker: 4

Breaker: _____

Cable Analysis:

Cable ID	Required?	Function	Fault Consequence	Comments
DB4A	Y	Control	LDP	SO possible only with
DB4B	Y	Control	LDP	dual hot shorts P01 - F03 (F02) AND N01 - F02 (F03)

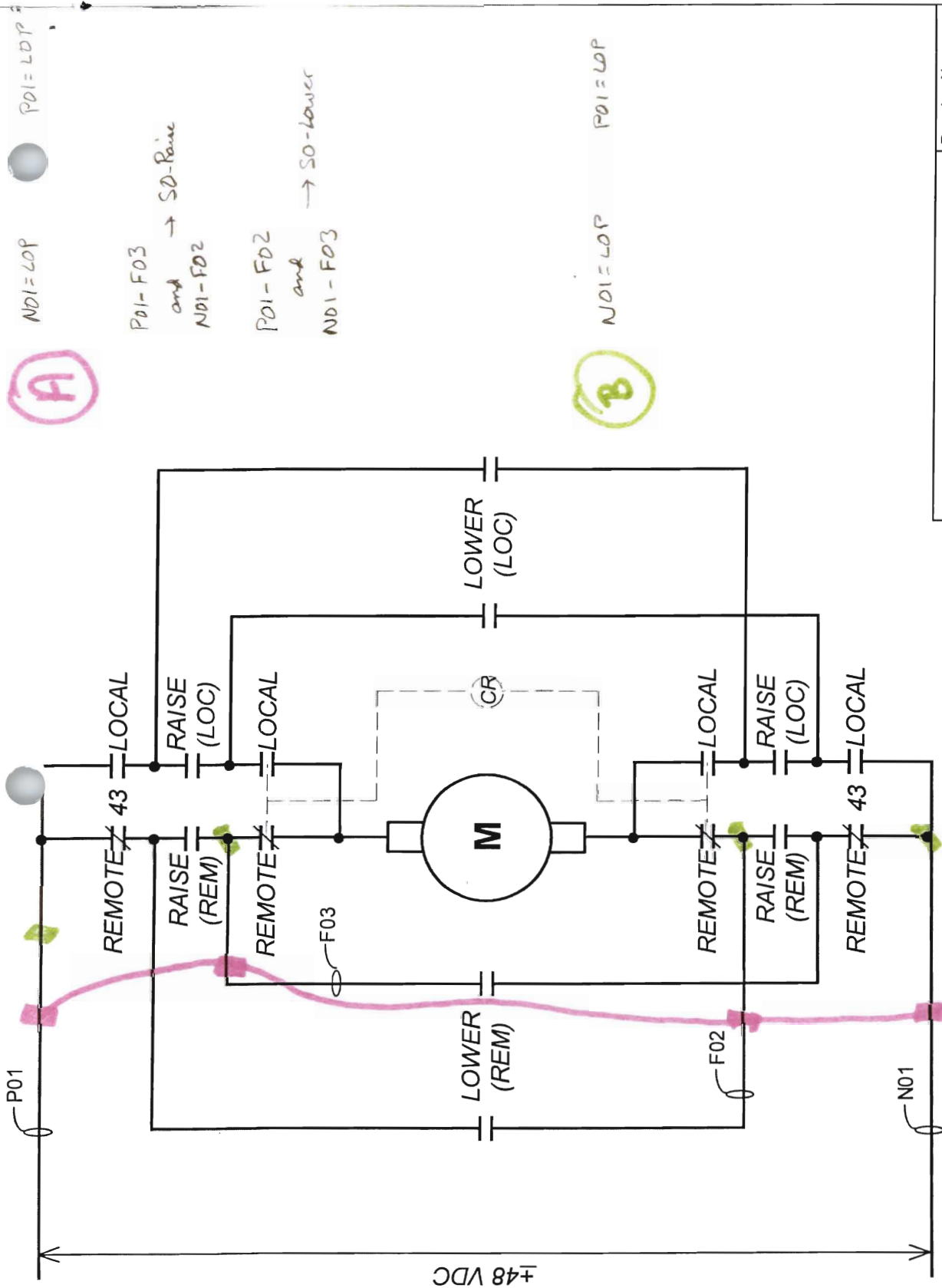
Comments:

Table

$$P_{(50)} = 0.60 + 0.00 - (0.60 \times 0.00) = 0.60 \quad P_{cc} = \frac{5-0}{(5-0)+0} = 1$$

$$CF_1 = (1 \times (1 + \frac{0.5}{5}))^{1/5} = .22 \quad CF_2 = (1 \times (1 + \frac{0.5}{3}))^{1/3} = 0.39$$

$$P_{LCO} = P_{cc} \times CF_1 \times CF_2 = 1 \times .22 \times .39 = 0.09$$



(A)

(B)

ND1 = LOP
P01 = LOP

P01 - F03
and
N01 - F02
→ SO-Raise

P01 - F02
and
N01 - F03
→ SO-Lower

ND1 = LOP
P01 = LOP

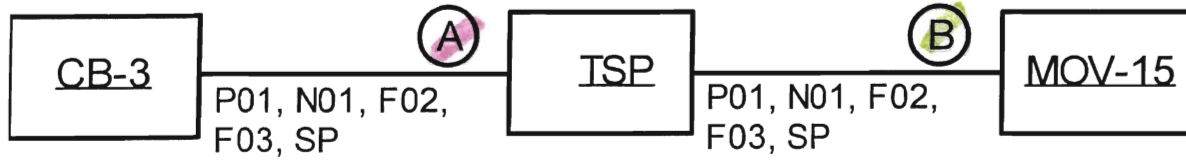
SNPP

**SCHEMATIC DIAGRAM –
AFW-B STEAM THROTTLE
MOTOR OPERATED VALVE
MOV-15**

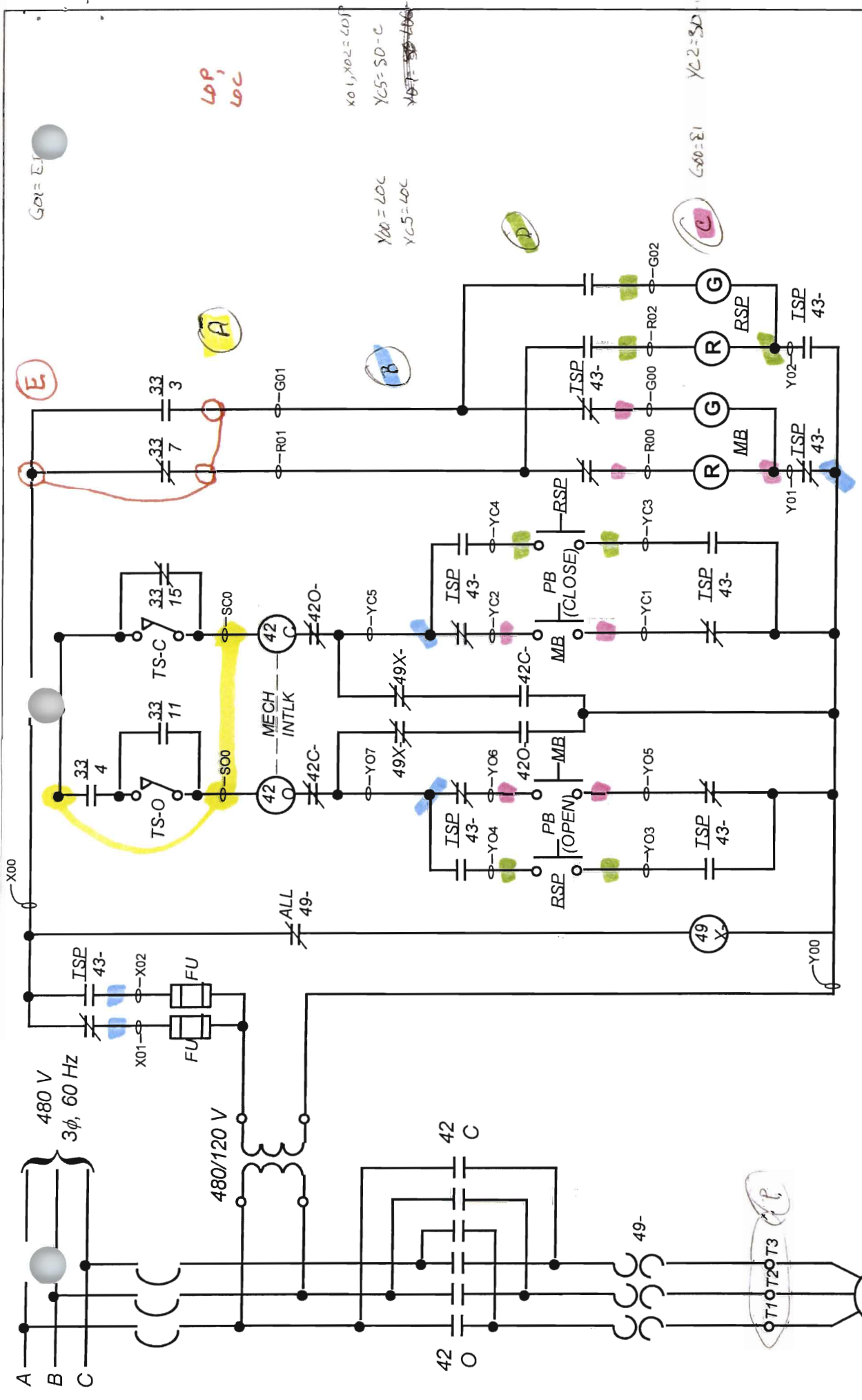
Drawing No.:	E-09
Date:	05/01/2007
Revision No.:	0

Motor Shown in Remote Operating Mode

MOV-15, SCHEME DB4



MOV-15, SCHEME DB4



Drawing No.:	E-10
Date:	05/01/2007
Revision No.:	0

SNPP
 SCHEMATIC DIAGRAM – PORV
 BLOCK MOTOR OPERATED
 VALVE
 MOV-13

VALVE SHOWN IN FULL OPEN POSITION
 MOV-13, SCHEME MA17

LDP,
 LOC

X01, X02 = LDP
 YC5 = SD-C
 YC7 = SD-C

Y00 = LOC
 YC5 = LOC

C600 = E1
 YC2 = SD-C

(E)

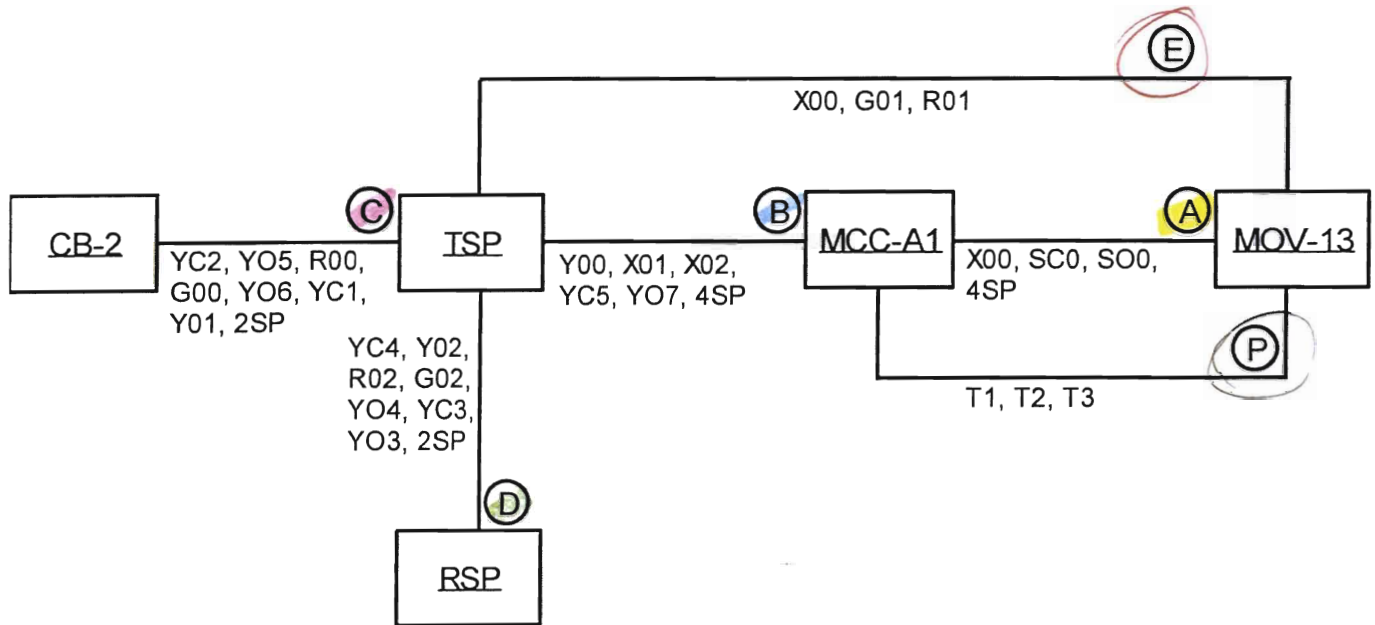
(A)

(B)

(D)

(C)

(P)



MOV-13, SCHEME MA17

CIRCUIT ANALYSIS WORKSHEET

Example #6

Component ID: **MOV-10** Component Type: **MOV**
 Component Description: **AFW Discharge Isolation Valve**

BE Code: **MOV-10_FTO (MOV-10 FAILS TO OPEN)**

Required Position: **OPEN**
 Functional State

Normal Position: **CLOSED**

Failed Electrical Position: **AS-IS**

Failed Air Position: **N/A**

High Consequence Component Yes No

Power Supplies: MCC-A1 Breaker: 6
 Breaker: _____

Cable Analysis:

Cable ID	Required?	Function	Fault Consequence	Comments
MA16A	Y	Control	SD-Close	
* MA16B	Y	Control	SD-Close	3-C, D and, 1 target, 1 source
MA16C	Y	Control	SD-Close	RSP
MA16D	Y	Control	SD-Close, LDC-OPEN	
MA16E	Y	Control	SD-Close, LDC-OPEN	
MA16P	Y	Power	LDP	

Comments: Note - MOV-10 is ungrounded control circuit

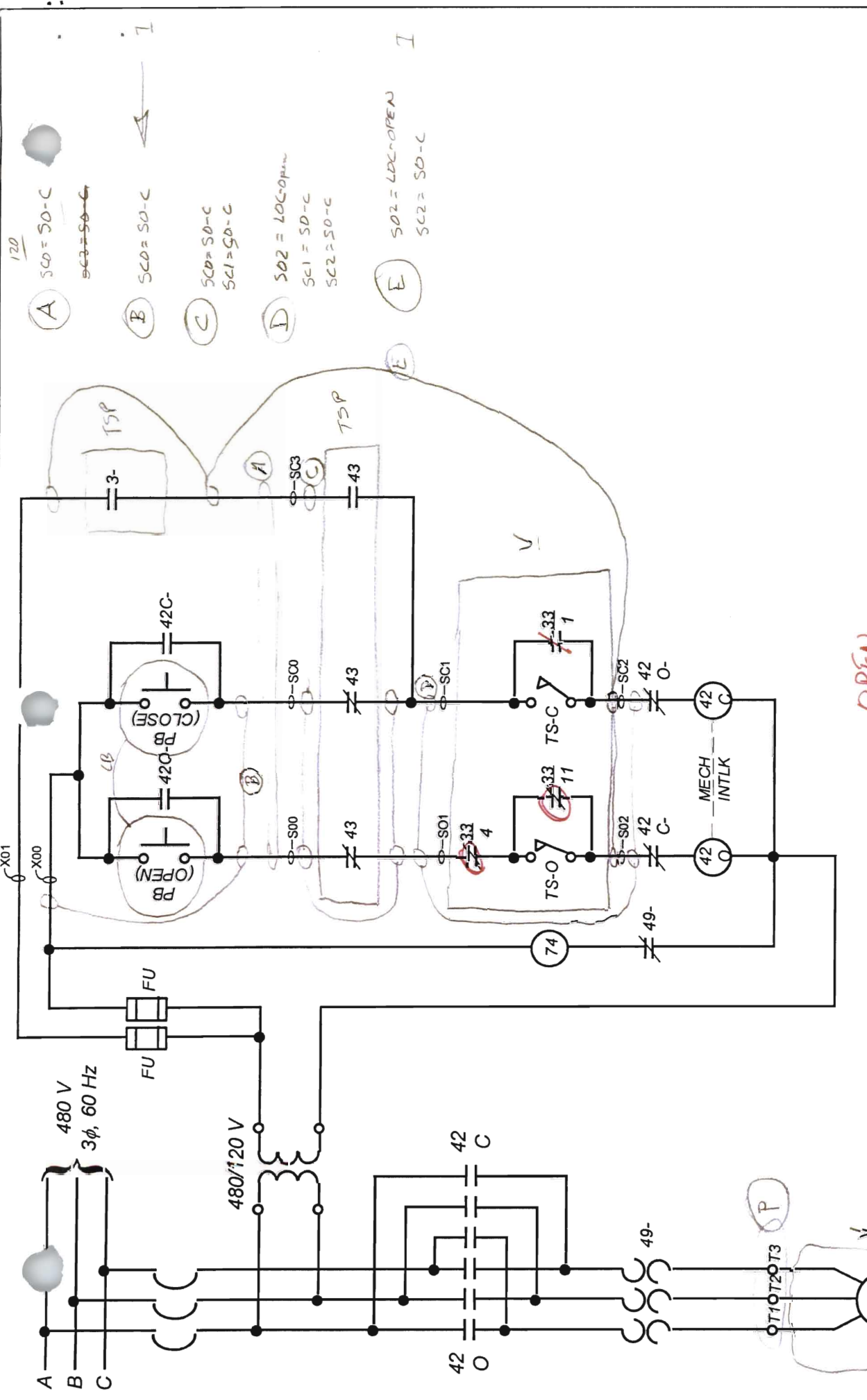
$$\#_{table} = 0.3 + 0.03 = 0.33$$

$$P_{ca} = \frac{(3-0)}{(3-0) + (2 \times 0)} = 1.0$$

$$\#_{calc} = 1.0 \times 0.33 = 0.33$$

$$CF = 1 \times [1 + \frac{5}{3}] / 3 = 0.39$$

Note: Only cables B and E have energized conductors



120

- A S00 = SO-C
S01 = SO-C
- B S02 = SO-C
- C S03 = SO-C
S04 = SO-C
- D S05 = LOC-OPEN
S06 = SO-C
S07 = SO-C
- E S08 = LOC-OPEN
S09 = SO-C

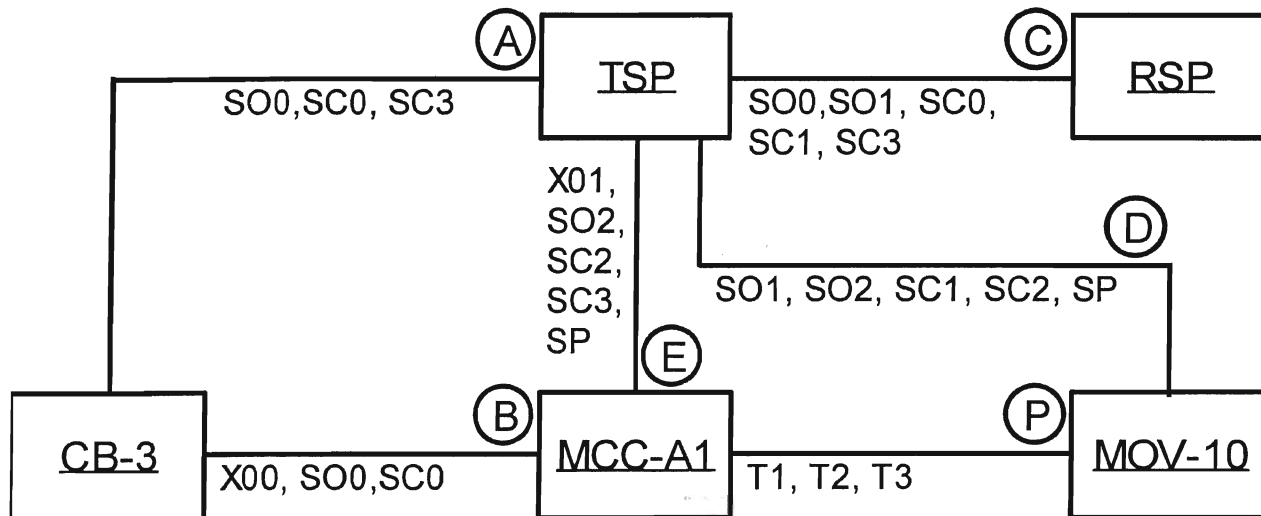
Drawing No.:	E-11
Date:	05/04/2007
Revision No.:	0

SNPP

SCHEMATIC DIAGRAM –
AFW-A DISCHARGE MOTOR
OPERATED VALVE
MOV-10

VALVE SHOWN IN FULL ~~CLOSED~~ **OPEN** POSITION

MOV-10, SCHEME MA16



MOV-10, SCHEME MA16

CIRCUIT ANALYSIS WORKSHEET

Example #7

Component ID: **MOV-8** Component Type: **MOV**

Component Description: **RHR Outboard Suction Valve**

BE Code: **MOV-8_TO (MOV-8 TRANSFERS OPEN)**

Required Position: **CLOSED**
Functional State

Normal Position: **CLOSED**

Failed Electrical Position: **AS-IS**

Failed Air Position: **N/A**

High Consequence Component Yes No

Power Supplies: MCC-B1 Breaker: 4
Breaker: _____

Cable Analysis:

Cable ID	Required?	Function	Fault Consequence	Comments
MB14A	Y	Control	SO-OPEN	Energize SOD (Also, EI, LDC, LOP)
MB14B	N	Control	EI, LXL, LOP	
MB14C	Y	Control	SO-42	Energize LOD (Also, EI, LDC)
MB14P	Y	Power	SO-OPEN	3Ø "SMART SHORT"

Comments:

$P_{(SO,A)} = 0.3 + 0.03 = 0.33$

$P_{cc} = \frac{(9-1)}{(9-1)+(2 \times 1)+1} = \frac{8}{11} = 0.73$ $CF = \{1 \times [1 + \frac{5}{9}]\} / 9 = 0.12$

$P_{(SO,A)} = 0.73 \times 0.12 = 0.09$

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~~X02 = LDC~~
~~X01 = LDC~~
~~X00 = LDC~~
 X02 = LDC
 X01 = LDC
 X00 = LDC

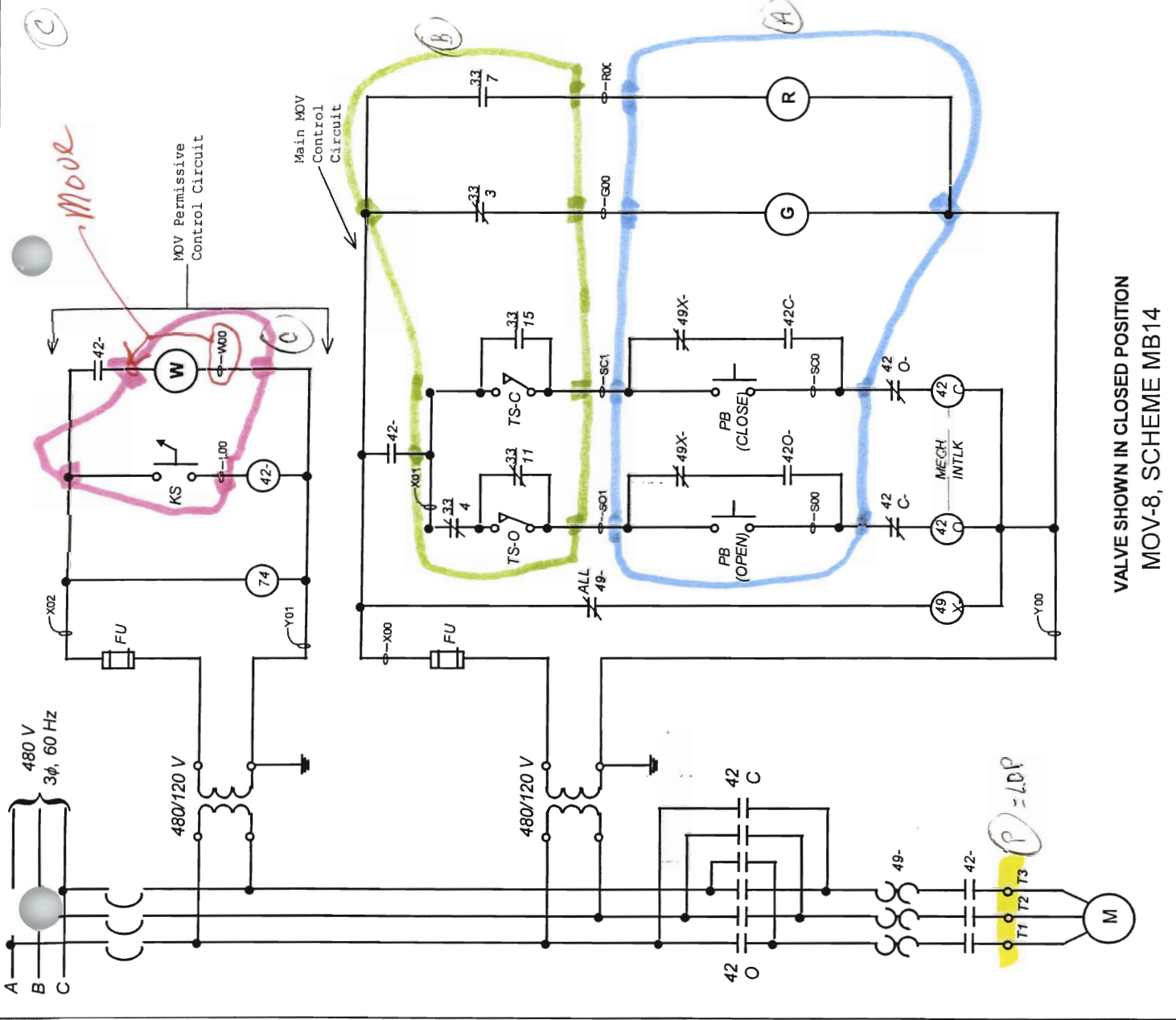
~~L00 = SD-42~~
~~L000 = EI~~
 L00 = SD-42
 L000 = EI

R00 = EI
 S00 = LDC
 S01 = LDC
 S02 = LDC
 S03 = LDC
 S04 = LDC
 S05 = LDC
 S06 = LDC
 S07 = LDC
 S08 = LDC
 S09 = LDC
 S10 = LDC
 S11 = LDC
 S12 = LDC
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 S89 = LDC
 S90 = LDC
 S91 = LDC
 S92 = LDC
 S93 = LDC
 S94 = LDC
 S95 = LDC
 S96 = LDC
 S97 = LDC
 S98 = LDC
 S99 = LDC
 S100 = LDC

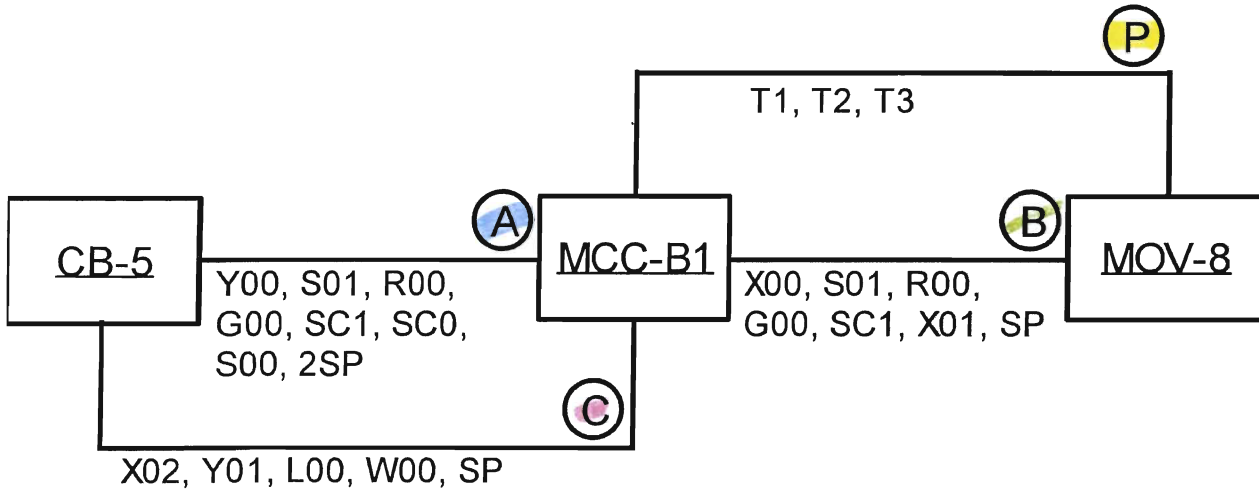
R00 = EI
 S00 = LDC
 S01 = LDC
 S02 = LDC
 S03 = LDC
 S04 = LDC
 S05 = LDC
 S06 = LDC
 S07 = LDC
 S08 = LDC
 S09 = LDC
 S10 = LDC
 S11 = LDC
 S12 = LDC
 S13 = LDC
 S14 = LDC
 S15 = LDC
 S16 = LDC
 S17 = LDC
 S18 = LDC
 S19 = LDC
 S20 = LDC
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 S24 = LDC
 S25 = LDC
 S26 = LDC
 S27 = LDC
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 S99 = LDC
 S100 = LDC

Drawing No.: E-12
 Date: 05/04/2007
 Revision No.: 0

SNPP
 SCHEMATIC DIAGRAM -
 RHR OUTBOARD SUCTION
 MOTOR OPERATED VALVE
 MOV-8



VALVE SHOWN IN CLOSED POSITION
 MOV-8, SCHEME MB14



MOV-8, SCHEME MB14

CIRCUIT ANALYSIS WORKSHEET

Example #8

Component ID: **MOV-11** Component Type: **MOV**

Component Description: **AFW Discharge Isolation Valve**

BE Code: **MOV-11_FTO (MOV-11 FAILS TO OPEN)**

Required Position: **OPEN**
Functional State

Normal Position: **CLOSED**

Failed Electrical Position: **AS-IS**

Failed Air Position: **N/A**

High Consequence Component Yes No

Power Supplies: DC Bus-B Breaker: 3
Breaker: _____

Cable Analysis:

Cable ID	Required?	Function	Fault Consequence	Comments
DB3A	Y	Control	SO-C, EI, LOC, LOP	YCI
DB3B	Y	Control	LOP	
DB3C	Y	Control	EI, LOP	
DB3P	Y	Power	LOC, LOP	

Comments:

Table

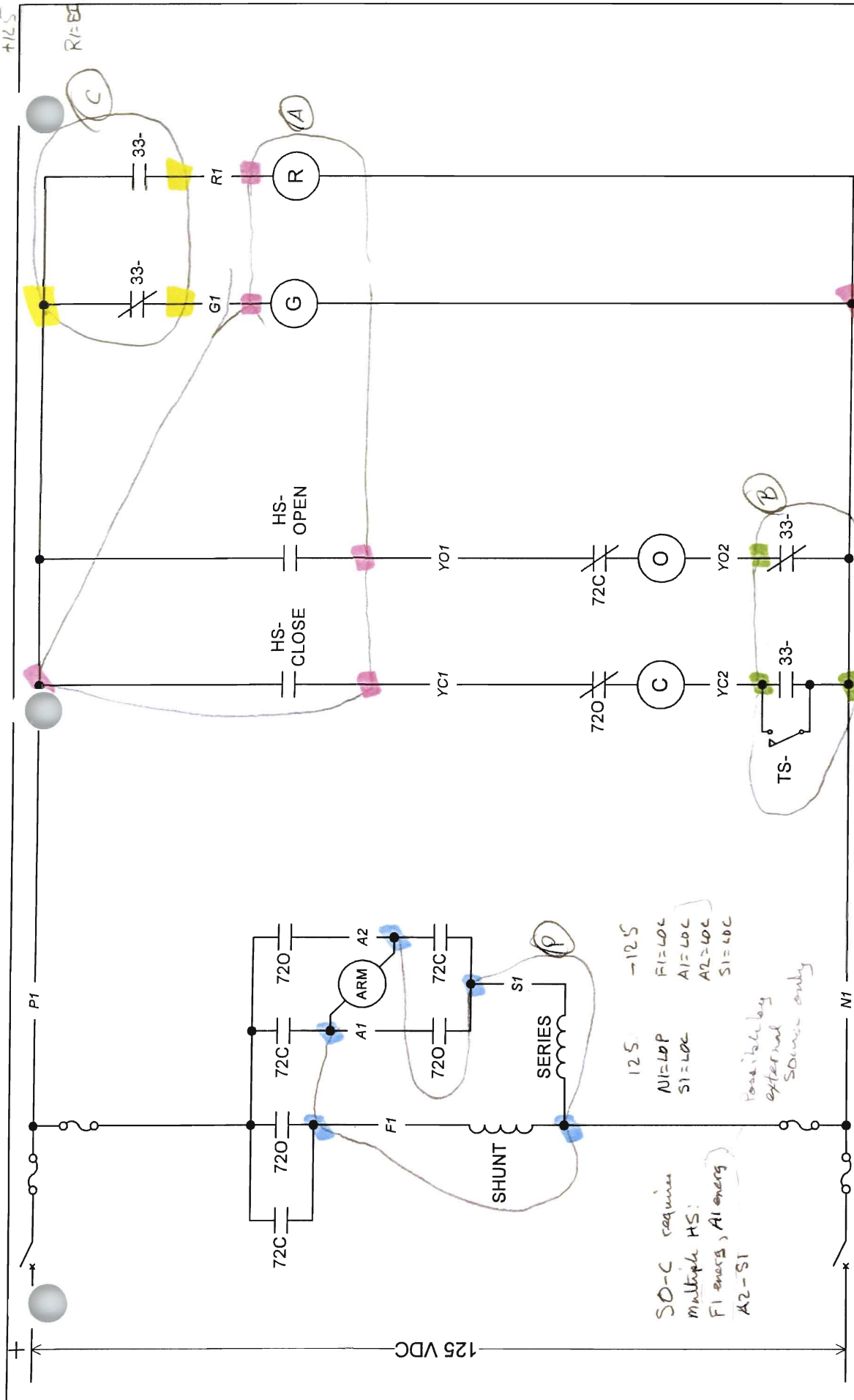
$$P_{(SO,A)} = 0.60 + 0.06 - (0.6 \times 0.06) = 0.62$$

$$P_{LL} = \frac{7-1}{(7-1) + (2 \times 1)} = \frac{6}{8} = 0.75 \quad CF = \{1 [2 + \frac{1}{2}]\} / 7 = 0.20$$

$$P_{(SO,A)} = 0.75 \times 0.30 = 0.23$$

+125 -12

P1=4
G1=4



125 -125
 NI=L0P
 S1=L0C
 F1=L0C
 A1=L0C
 A2=L0C
 S1=L0C

SD-C requires multiple HS:
 F1 energ, A1 energ
 A2-S1

Possibility external source only

VALVE SHOWN IN CLOSED POSITION

+125 -125
 Y01=SD-O
 Y01=L0P
 Y01=L0C
 R1=EI
 Y02=L0P
 N1=L0P

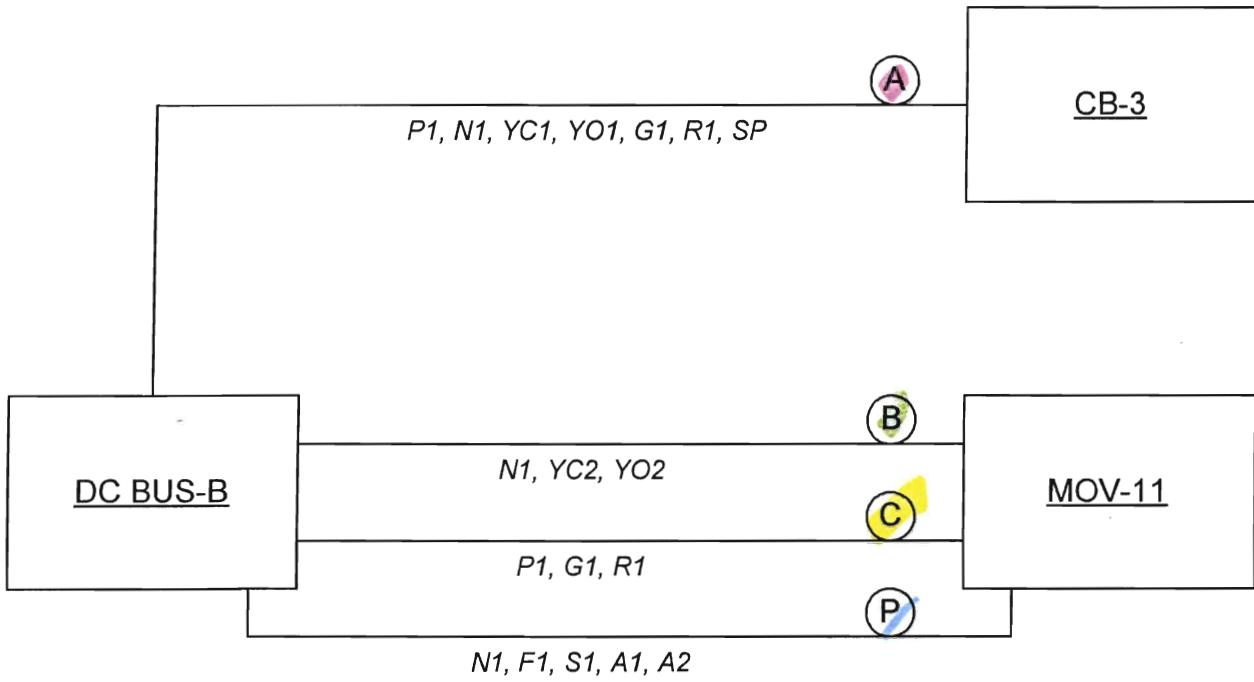
Drawing No.:	E-13
Date:	05/09/2007
Revision No.:	0

SNPP
 SCHEMATIC DIAGRAM -
 AFW-B DISCHARGED MOTOR
 OPERATED VALVE
 MOV-11

MOV-11, SCHEME DB3

(A)

(B)



MOV-11, SCHEME DB3

CIRCUIT ANALYSIS WORKSHEET

Example #9

Component ID: **MOV-16** Component Type: **MOV**

Component Description: **AFW Test Line Isolation Valve**

BE Code: **MOV-16_TO (MOV-16 TRANSFERS OPEN)**

Required Position: **CLOSED**
Functional State

Normal Position: **CLOSED**

Failed Electrical Position: **AS-IS**

Failed Air Position: **N/A**

High Consequence Component Yes No

Power Supplies: MCC-A1 Breaker: 8
Breaker: _____

Cable Analysis:

Cable ID	Required?	Function	Fault Consequence	Comments
MA18A	Y	Control	SO-Open	Energize SOO (Also EI, LOP, LOC)
MA18B	N	Control	EI, LOP	
MA18P	N	Power	LOP	

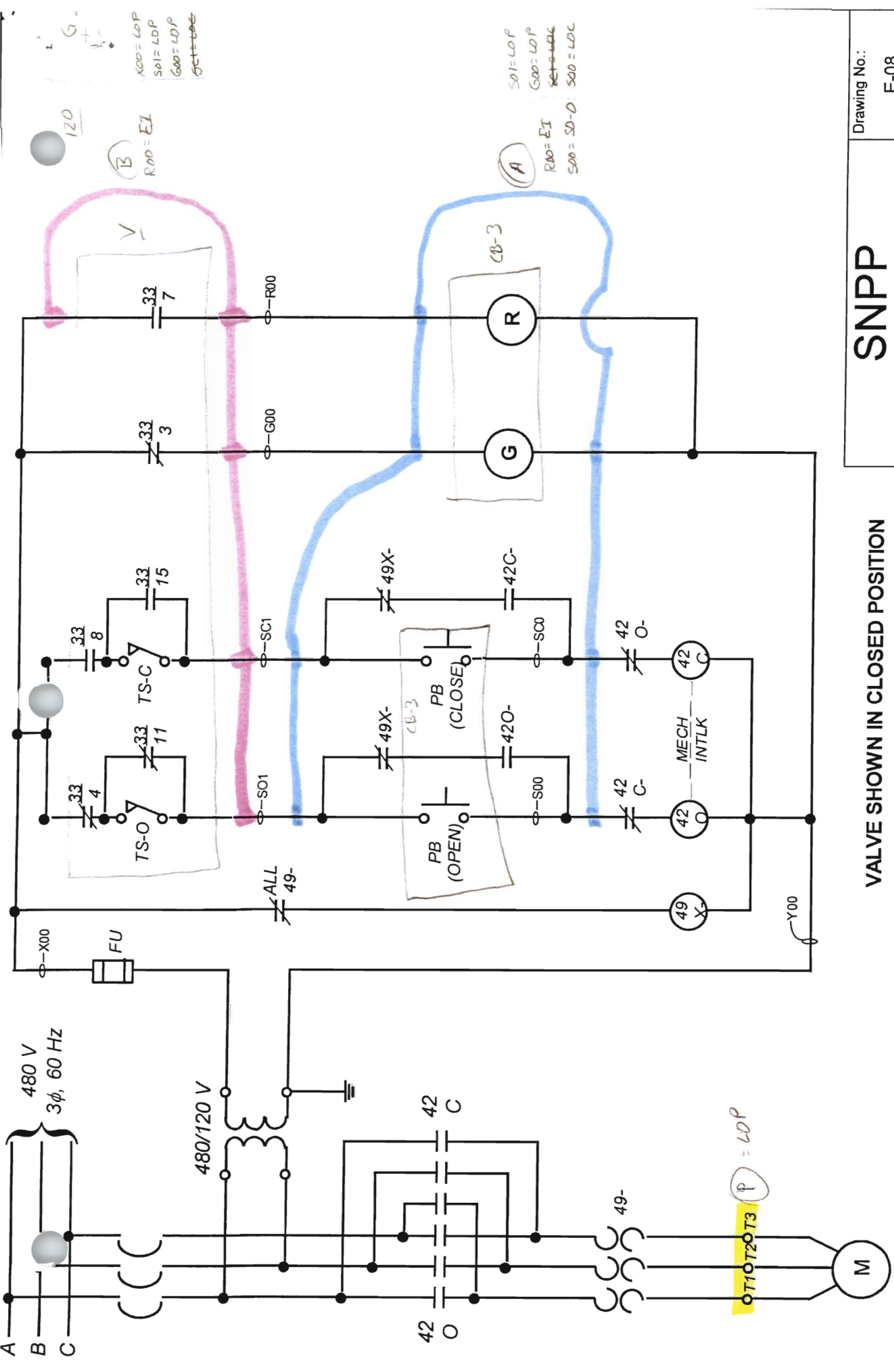
Comments:

$$P_{(SO,A)} = 0.30 + 0.03 = 0.33$$

$$P_{CC} = \frac{9-1}{(9-1)+(2 \times 1)+1} = \frac{8}{11} = 0.73$$

$$CF = \{1[2 + \frac{5}{4}]\} / 9 = 0.23$$

$$P_{(SO,A)} = 0.73 \times 0.23 = 0.17$$



120
 B
 R00 = EI
 X00 = LOP
 S01 = LDP
 G00 = LDP
 S00 = LDC

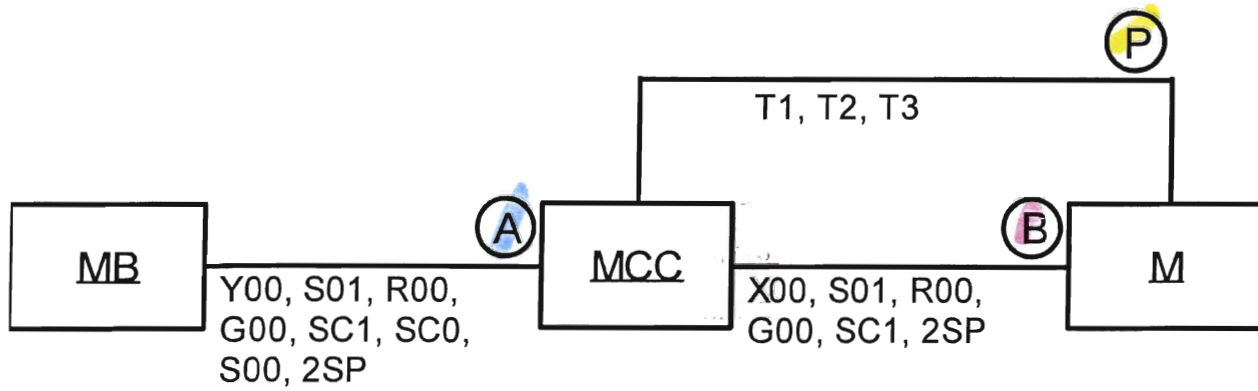
A
 S01 = LOP
 G00 = LOP
 R00 = EI
 S00 = SD-O
 S00 = LDC

Drawing No.: E-08
 Date: 05/01/2007
 Revision No.: 0

SNPP
 SCHEMATIC DIAGRAM - AFW
 TEST LINE ISOLATION MOTOR
 OPERATED VALVES
 MOV-16 & MOV-17

VALVE SHOWN IN CLOSED POSITION

VALVE	DESCRIPTION	SCHEME	SWITCH ID
MOV-16	AFW TEST LINE ISOLATION	MA18	MOV-16
MOV-17	AFW TEST LINE ISOLATION	MB16	MOV-17



<u>M</u>	<u>MCC</u>	<u>CUBICLE</u>	<u>MB</u>	<u>SCHEME</u>
MOV-1	MCC-A1	2	CB-5	MA12
MOV-3	MCC-A1	3	CB-5	MA13
MOV-4	MCC-B1	2	CB-5	MB12
MOV-5	MCC-A1	4	CB-5	MA14
MOV-6	MCC-B1	3	CB-5	MB13
MOV-7	MCC-A1	5	CB-5	MA15
MOV-9	MCC-B1	5	CB-5	MB15
MOV-16	MCC-A1	8	CB-3	MA18
MOV-17	MCC-B1	6	CB-3	MB16

Example 10

CIRCUIT ANALYSIS WORKSHEET

Component ID: **PI-1** Component Type: **Instrument**

Component Description: **RCS Pressure**

BE Code: **PI-1_FL (RCS Pressure Indication Fails High)**

Required Position: **AVAILABLE**
Functional State

Normal Position: **AVAILABLE**

Failed Electrical Position: ~~HIGH~~ **LOW**

Failed Air Position: **N/A**

High Consequence Component Yes No

Power Supplies: VITAL-B Breaker: 8

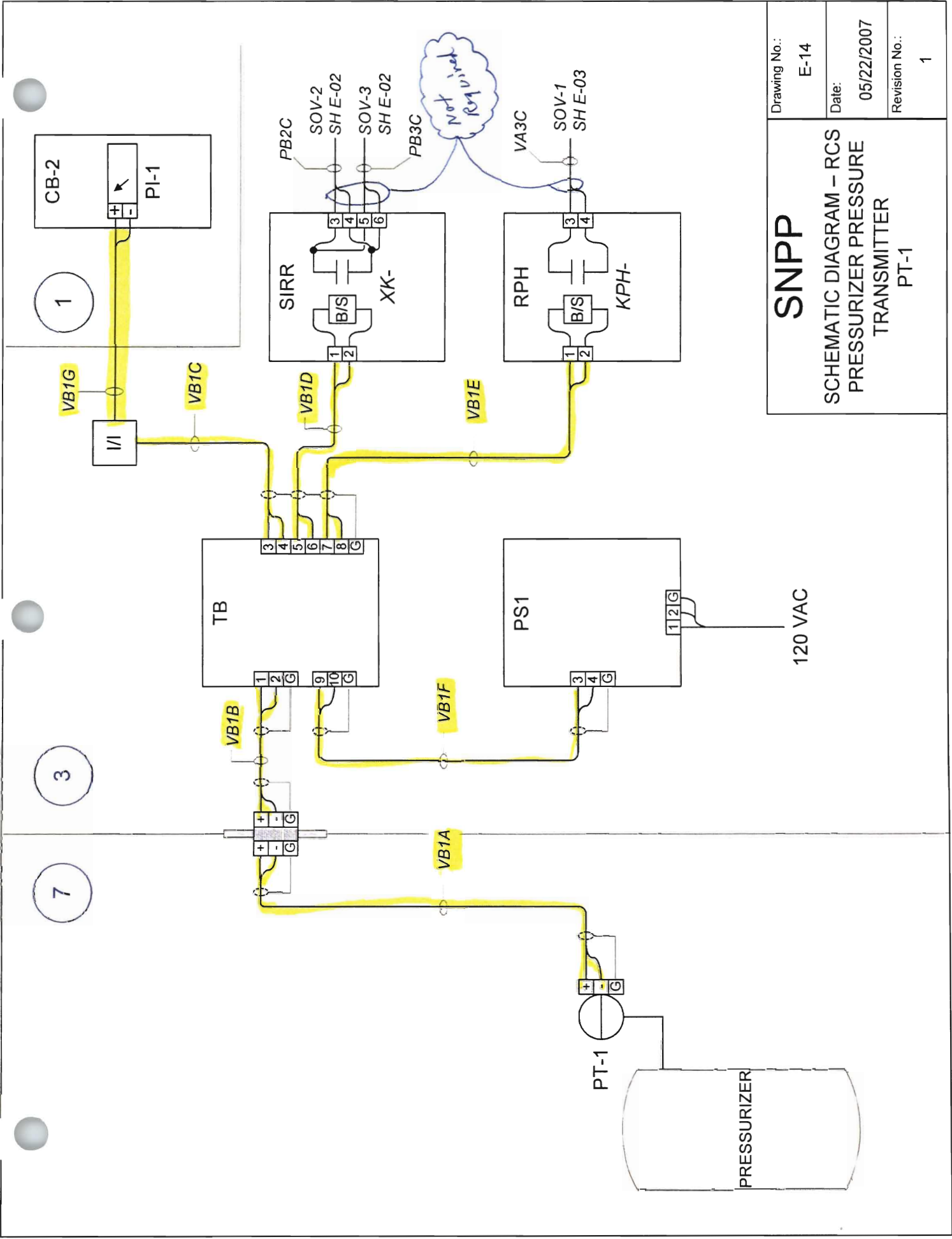
Breaker: _____

Cable Analysis:

Cable ID	Required?	Function	Fault Consequence	Comments
VB1A	Y	I	FH, ERROR-H	
VB1B	Y	I	FH, ERROR-H	
VB1C	Y	I	FL, ERROR-L	
VB1D	Y	I	FL, ERROR-L	
VB1E	Y	I	FL, ERROR-L	
VB1F	Y	I	FL, ERROR-L	
VB1G	Y	I	FL, ERROR-L	
VA3C	N	I	NONE	CANNOT AFFECT INDICATION

Comments:

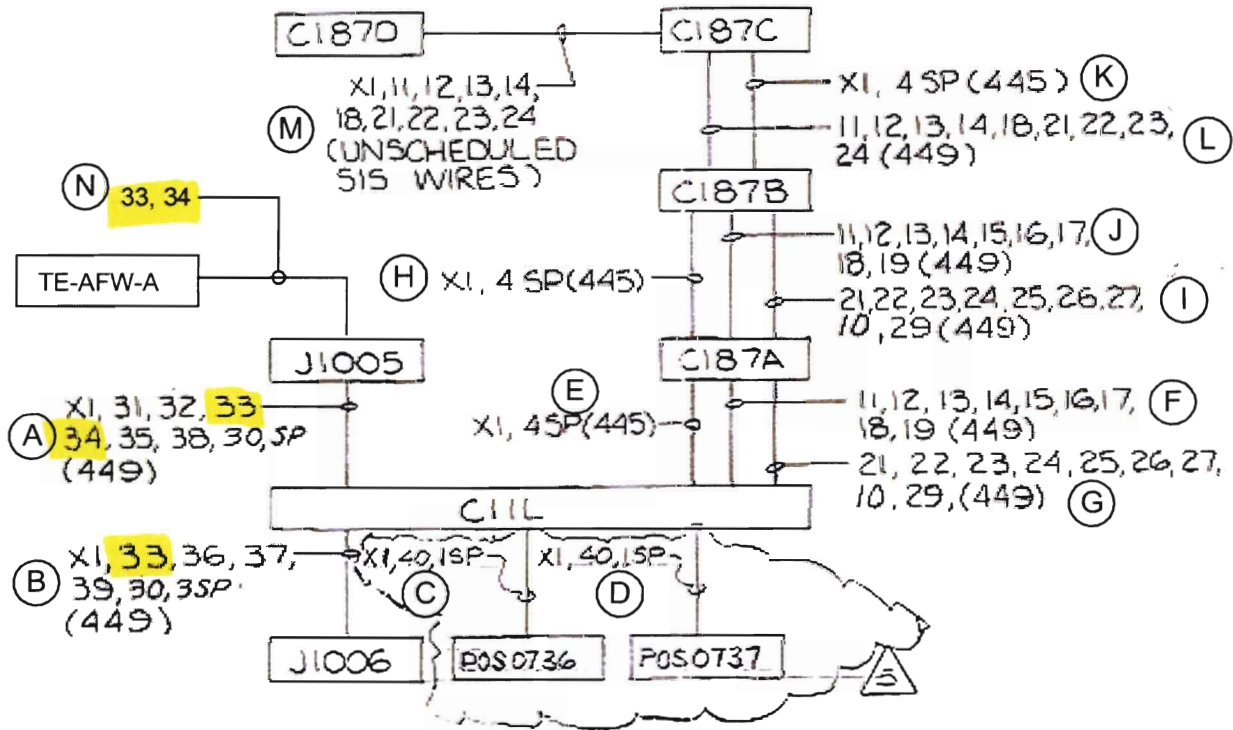
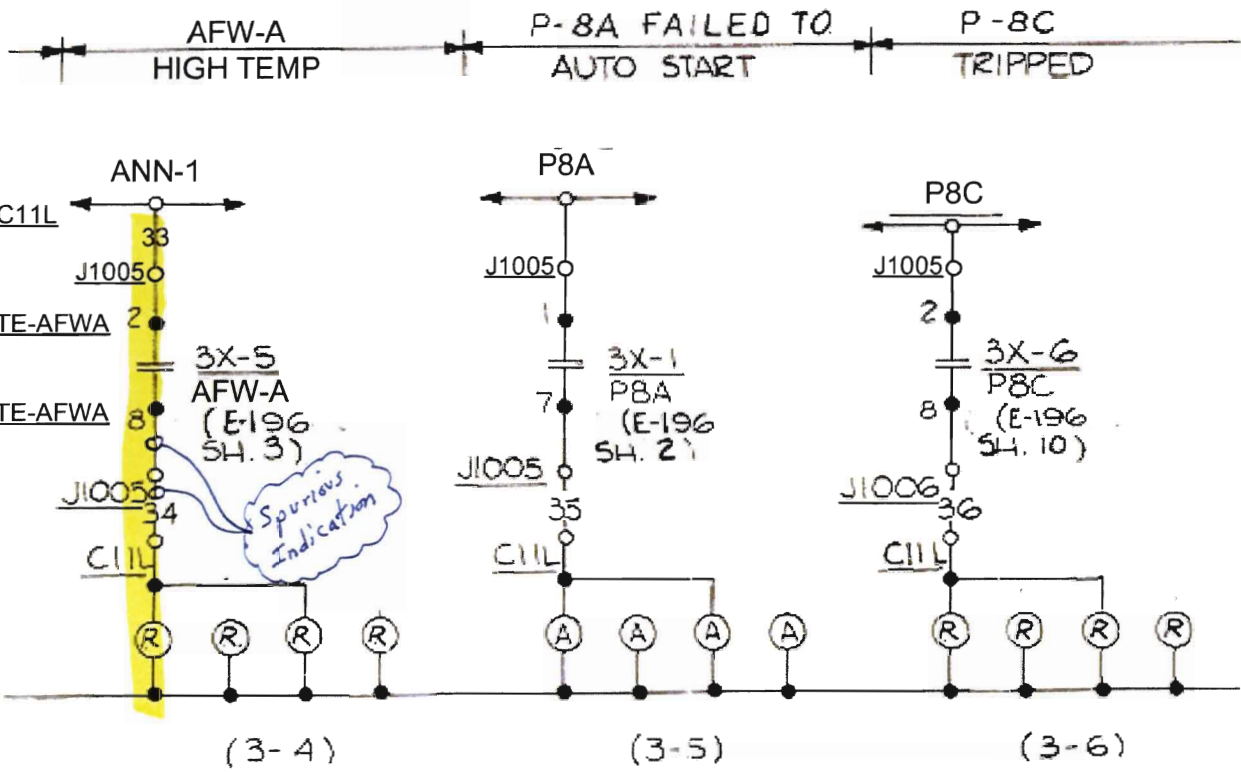
① SHIELDED INSTRUMENT CABLE - EXTERNAL HOT SHORTS NOT CONSIDERED CREDIBLE.



SNPP

SCHEMATIC DIAGRAM – RCS
PRESSURIZER PRESSURE
TRANSMITTER
PT-1

Drawing No.:	E-14
Date:	05/22/2007
Revision No.:	1



BLOCK DIAGRAM
SCHEME K16

<h1>SNPP</h1> <p>ANNUNCIATOR SCHEME K16</p>	Drawing No.:	ANN-1
	Date:	05/20/2007
	Revision No.:	#8

Example 12

CIRCUIT ANALYSIS WORKSHEET

Component ID: **HPI-B** Component Type: **Pump**

Component Description: **High Pressure Injection Pump B**

BE Code: **HPIA_FTS (HPI-A Fails to Start)**
HPIA_FTR (HPI-A Fails to Run)

Required Position: **ON**
Functional State

Normal Position: **STANDBY / ON**

Failed Electrical Position: **Off**

Failed Air Position: **N/A**

High Consequence Component Yes No

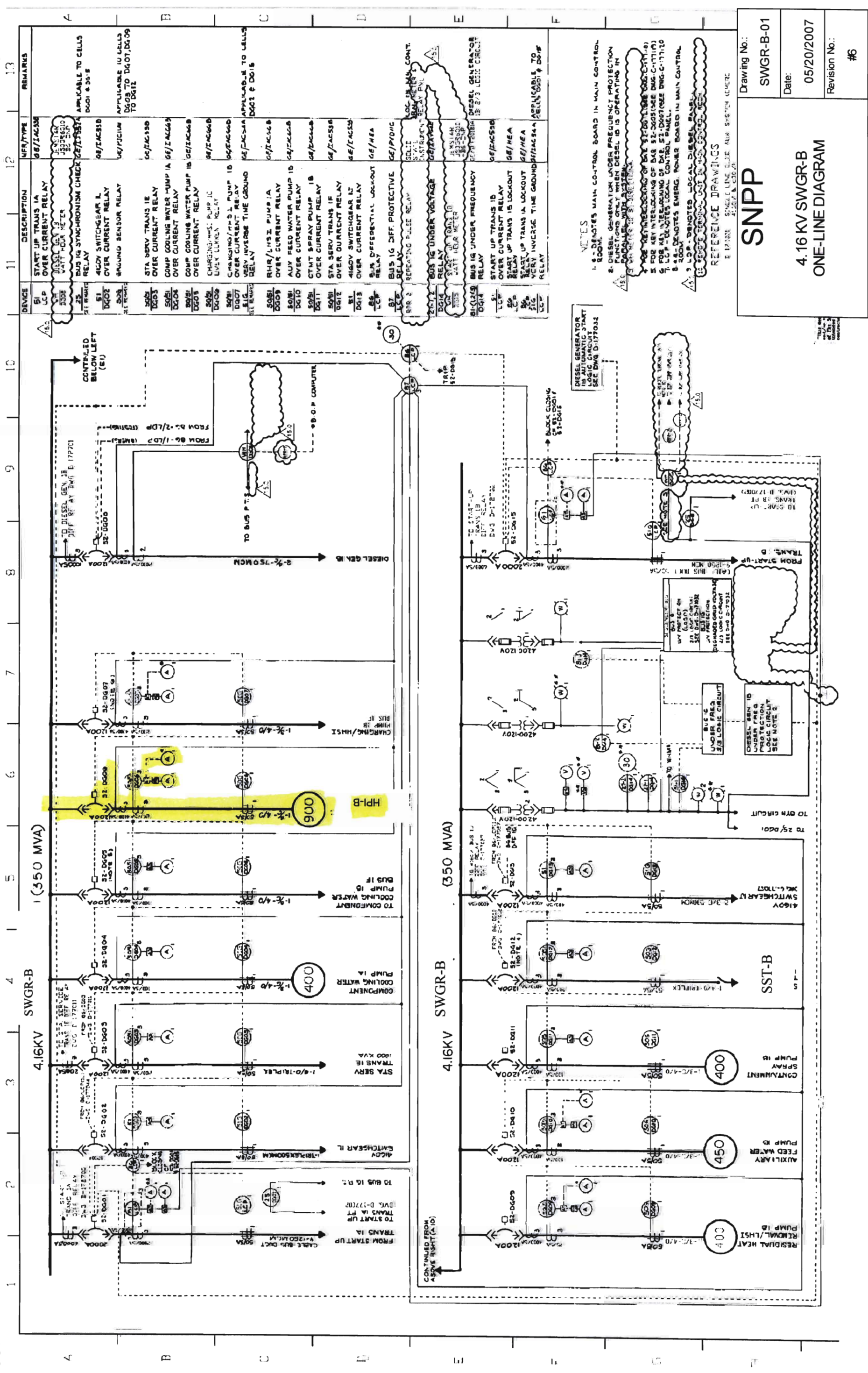
Power Supplies: _____ Breaker: _____

_____ Breaker: _____

Cable Analysis:

Cable ID	Required?	Function	Fault Consequence	Comments
BDG06-P	Y	P	LOP	
BDG06-N	Y	C		
BDG06-D	N	IND	NONE	ISOLATED BY I/I
BDG06-G	N	C	NONE	ISOLATED BY SCB/SS
BDG06-E	Y	C		
BDG06-Z	Y	C		
BDG06-L	Y			DC Control Power

Comments:



DEVICE	DESCRIPTION	MFR/TYPE	REMARKS
51	START UP TRANS IA OVER CURRENT RELAY	GE/IA330	
52	START UP TRANS IA OVER CURRENT RELAY	GE/IA330	
53	BUS 1G SYNCHRONISM CHECK RELAY	GE/IA330	APPLICABLE TO CELLS DG01 & DG02
54	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	APPLICABLE TO CELLS DG01 TO DG07, DG09 TO DG12
55	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
56	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
57	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
58	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
59	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
60	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
61	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
62	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
63	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
64	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
65	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
66	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
67	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
68	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
69	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
70	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
71	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
72	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
73	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
74	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
75	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
76	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
77	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
78	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
79	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
80	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
81	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
82	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
83	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
84	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
85	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
86	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
87	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
88	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
89	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
90	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
91	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
92	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
93	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
94	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
95	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
96	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
97	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
98	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
99	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	
100	400V SWITCHGEAR IA OVER CURRENT RELAY	GE/IA330	

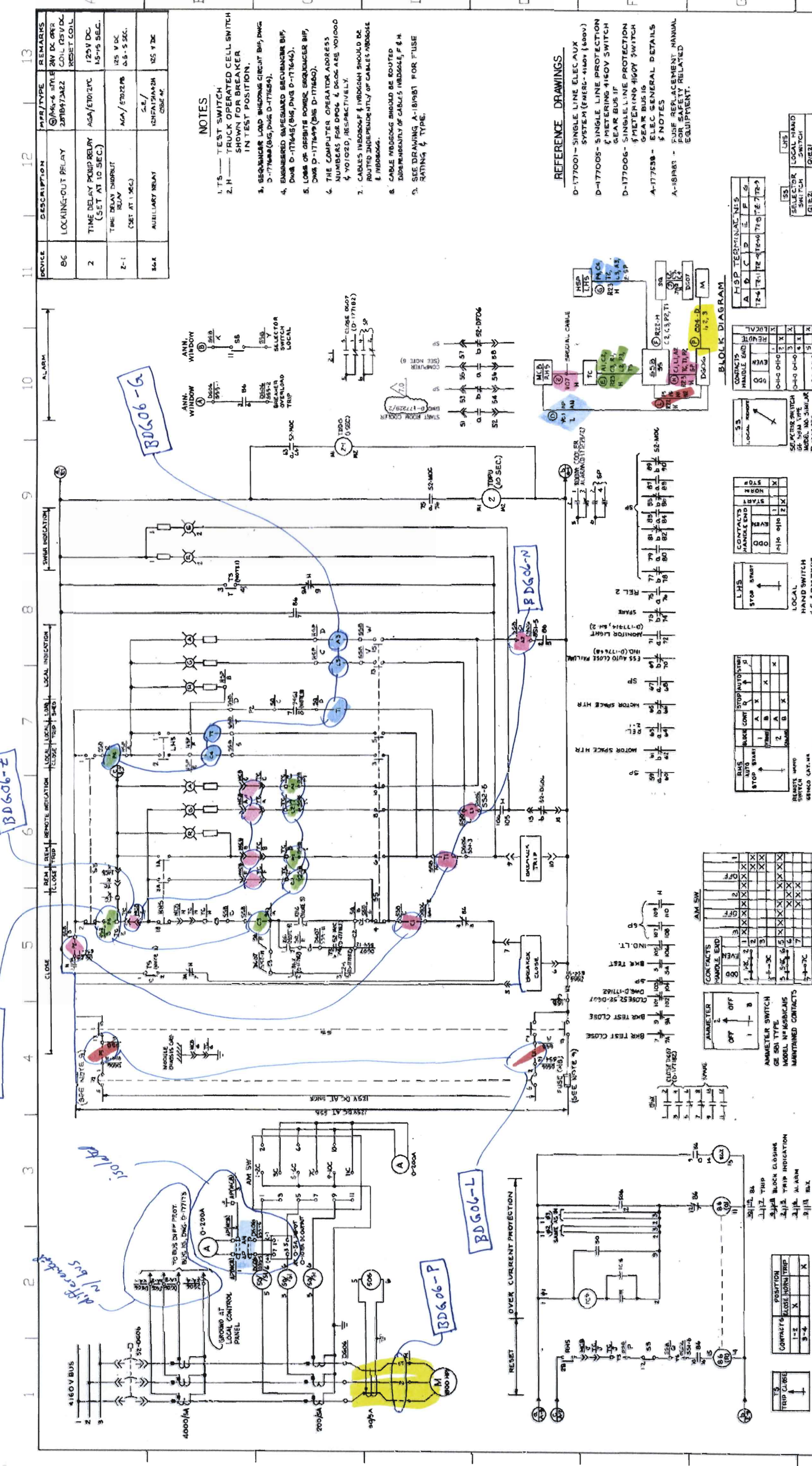
SNPP
 Drawing No.: SWGR-B-01
 Date: 05/20/2007
 Revision No.: #6
 4.16 KV SWGR-B ONE-LINE DIAGRAM

1. S - DENOTES MAIN CONTROL BOARD IN MAIN CONTROL ROOM.
 2. DIESEL GENERATOR UNDER FREQUENT PROTECTION FUNCTIONS ONLY WHEN DIESEL IS OPERATING IN STANDBY MODE.
 3. FOR KEY INTERLOCKING OF BUS 1G-2000 (SEE Dwg. C-17110) SEE KEY INTERLOCKING OF BUS 1G-2000 (SEE Dwg. C-17110)
 4. FOR KEY INTERLOCKING OF BUS 1G-2000 (SEE Dwg. C-17110) SEE KEY INTERLOCKING OF BUS 1G-2000 (SEE Dwg. C-17110)
 5. FOR KEY INTERLOCKING OF BUS 1G-2000 (SEE Dwg. C-17110) SEE KEY INTERLOCKING OF BUS 1G-2000 (SEE Dwg. C-17110)
 6. FOR KEY INTERLOCKING OF BUS 1G-2000 (SEE Dwg. C-17110) SEE KEY INTERLOCKING OF BUS 1G-2000 (SEE Dwg. C-17110)
 7. FOR KEY INTERLOCKING OF BUS 1G-2000 (SEE Dwg. C-17110) SEE KEY INTERLOCKING OF BUS 1G-2000 (SEE Dwg. C-17110)
 8. FOR KEY INTERLOCKING OF BUS 1G-2000 (SEE Dwg. C-17110) SEE KEY INTERLOCKING OF BUS 1G-2000 (SEE Dwg. C-17110)
 9. FOR KEY INTERLOCKING OF BUS 1G-2000 (SEE Dwg. C-17110) SEE KEY INTERLOCKING OF BUS 1G-2000 (SEE Dwg. C-17110)
 10. FOR KEY INTERLOCKING OF BUS 1G-2000 (SEE Dwg. C-17110) SEE KEY INTERLOCKING OF BUS 1G-2000 (SEE Dwg. C-17110)

SNPP

HPI-B SCHEMATIC DIAGRAM SHEET 1

TERMINAL	NO	TC	TERMINAL	NO	TC	TERMINAL	NO	TC	TERMINAL	NO	TC
1	1		1	1		1	1		1	1	
2	2		2	2		2	2		2	2	
3	3		3	3		3	3		3	3	
4	4		4	4		4	4		4	4	
5	5		5	5		5	5		5	5	
6	6		6	6		6	6		6	6	
7	7		7	7		7	7		7	7	
8	8		8	8		8	8		8	8	
9	9		9	9		9	9		9	9	
10	10		10	10		10	10		10	10	
11	11		11	11		11	11		11	11	
12	12		12	12		12	12		12	12	
13	13		13	13		13	13		13	13	



DEVICE	DESCRIPTION	PIR/TYPE	REMARKS
86	LOCKING-OUT RELAY	Q1A5-6 STYLE 2878472A22	24V DC OPER COIL (25V DC RESET COIL)
2	TIME DELAY PUMP RELAY (SET AT 10 SEC.)	AGA/57012PC	125V DC 15-15 SEC.
Z-1	TIME DELAY THROTTLE (SET AT 1 SEC.)	AGA/57012PB	125 V DC 4.5-5 SEC.
84K	AUXILIARY RELAY	S.E./ICNFA15A2M	125 V DC

NOTES

1. TEST SWITCH TRUCK OPERATED CELL SWITCH SHOWN FOR BREAKER IN TEST POSITION.
2. SEQUENCE LOAD SHEDDING CIRCUIT BIF, DWG D-177648 (BIS, DWG D-177649).
3. ENGINEER SAFEGUARD RECURRENCE BIF, DWG D-177648 (BIS, DWG D-177649).
4. LOW OR OFFBITS POWER SEQUENCE BIF, DWG D-177649 (BIS D-177650).
5. THE COMPUTER OPERATOR ADDRESS NUMBERS FOR DPOG & DDOG ARE VOICED & VOICED, RESPECTIVELY.
6. CABLES IN BOXES & IN BOXES SHOULD BE ROUTED INDEPENDENTLY OF CABLES IN BOXES & IN BOXES.
7. CABLE PROTECTORS SHOULD BE ROUTED INDEPENDENTLY OF CABLES IN BOXES & IN BOXES.
8. SEE DRAWING A-181981 FOR FUSE RATING & TYPE.

REFERENCE DRAWINGS

- D-177001 - SINGLE LINE ELECTRICAL SYSTEM (EMERG-410V @ 600V)
- D-177005 - SINGLE LINE PROTECTION & METERING 410V SWITCH GEAR BUS IF
- D-177006 - SINGLE LINE PROTECTION & METERING 410V SWITCH GEAR BUS IF
- A-177538 - ELEC GENERAL DETAILS & NOTES
- A-181981 - FUSE REPLACEMENT MANUAL FOR SAFETY RELATED EQUIPMENT.

BLOCK DIAGRAM

CONTACTS	HANDLE END	NO	NC	NO	NC	NO	NC	NO	NC
1	1								
2	2								
3	3								
4	4								
5	5								
6	6								
7	7								
8	8								
9	9								
10	10								
11	11								
12	12								
13	13								

TEST SWITCH AC TYPE 210 CAT. NO Z10-22-999 SPRING RETURN TO NORMAL

CIRCUIT ANALYSIS WORKSHEET

Example 13

Component ID: **COMP-1** Component Type: **Compressor**

Component Description: **Instrument Air Compressor**

BE Code: **COMP-1_FTR (COMP-1 Fails to Run)**

Required Position: **CYCLE**
Functional State

Normal Position: **CYCLE**

Failed Electrical Position: **Off**

Failed Air Position: **N/A**

High Consequence Component Yes No

Power Supplies: LC-1 Breaker: LCI-15

Breaker: _____

Cable Analysis:

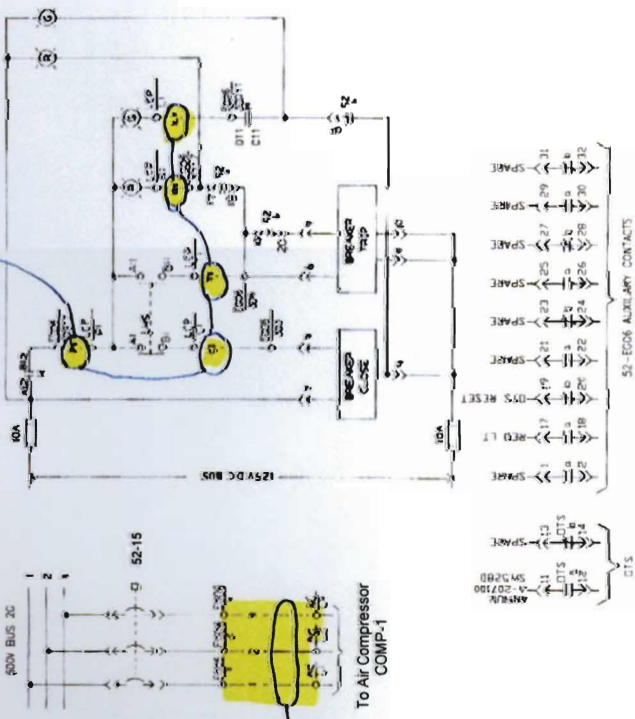
Cable ID	Required?	Function	Fault Consequence	Comments
YEG06-P	Y	P	LOP	
YEG06-A	Y	C	LOP	FAULTS COULD CAUSE LOP TO AIR COMPRESSOR SKID
YEQ17-A	Y	C	Los of Cooling H ₂ O, LOC	
YEQ17-B	Y	C	LOC	
YEQ17-E	Y	C	LOC	
YEQ17-I	Y	C	LOC	
YEQ17-H	Y	C	Fail off	
YEQ17-M	Y	C	LOC, fail off	

Comments:

- ① Air Compressor Sequence Control Mounted on COMP-1 SKID
- ② Motor winding heater not required

YEG06-A

480 V Load Center LC-1 Fender Blk LC1-15

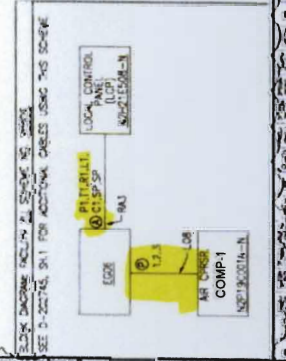


52-8206 AUXILIARY CONTACTS

A1	A12	A11	C1	C12	C11	A5	A6	A7	C5	C6	C7
SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE
52-8206 DELI SWITCH CONTACTS (H)											
A1	A12	A11	C1	C12	C11	D1	D12	D11	D5	D6	D7
SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE

LOCAL HANDLING CONTACTS (L.H.S.)

1	2	3	4	5	6	7	8	9	10	11	12
TRIP	CLOSE	AUT-TRIP	TRIP	TRIP	TRIP	TRIP	TRIP	TRIP	TRIP	TRIP	TRIP
52-8206 DELI SWITCH CONTACTS (H)											
A1	A12	A11	C1	C12	C11	D1	D12	D11	D5	D6	D7
SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE



SNPP

INSTRUMENT AIR COMPRESSOR COMP-1

Drawing No: COMP-1-02
 Date: 05/20/2007
 Revision No: #6

LEGEND

H - TRUCK OPERATED CELL SWITCH-BLOW WITH BREAKER IN TEST POSITION

OTS - OVERCURRENT TRIP SWITCH

REFERENCES:

0-207013 SH1 SINGLE LINE PROTECTION & METERING 600V LOAD CTR. 20

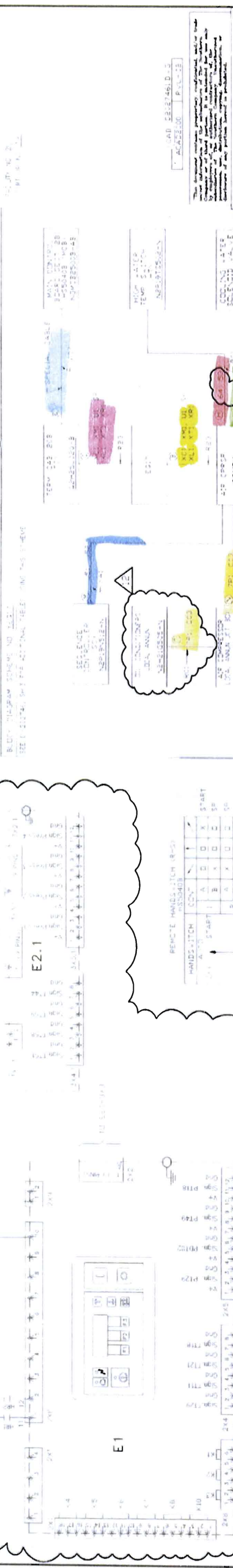
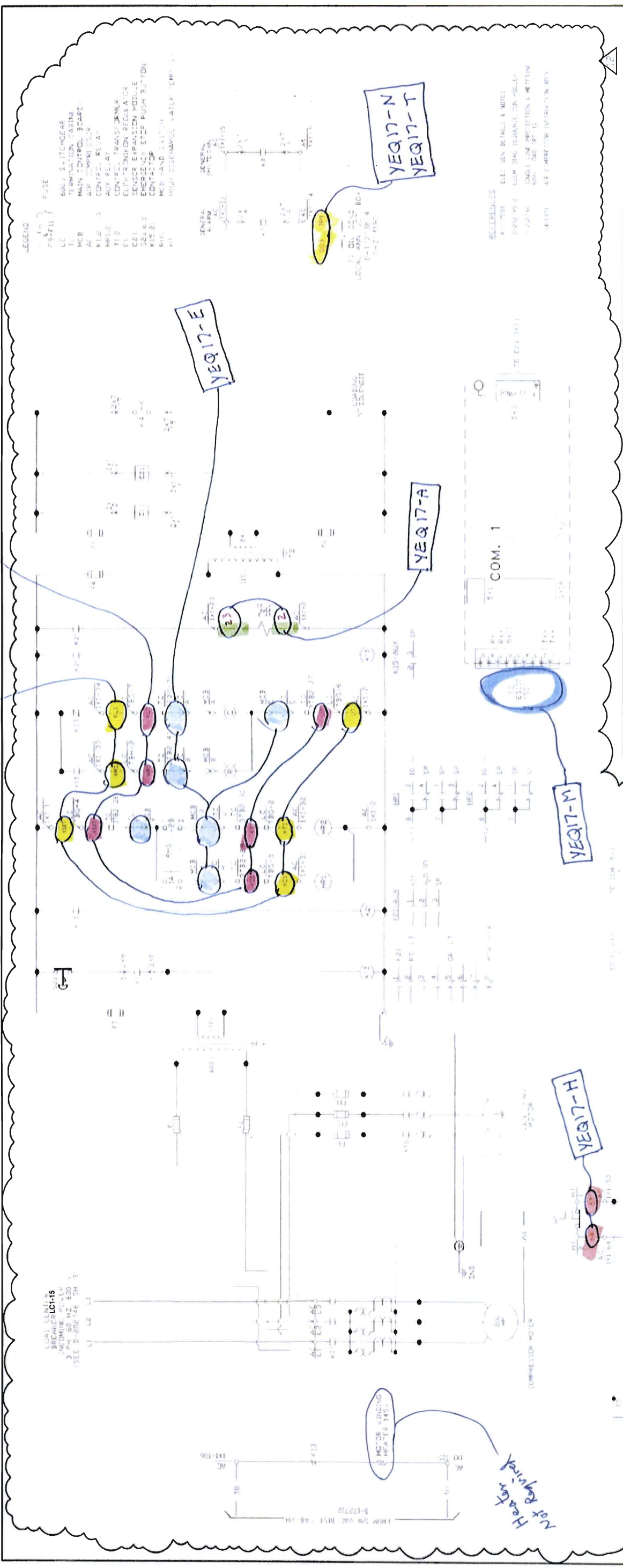
0-207876 SH1 SINGLE LINE PROTECTION & METERING 600V LOAD CTR. 20

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REV	NO	DATE	BY	CHKD	DESCRIPTION
1	1	05/20/07	JAMES E. CRANE		ISSUED FOR CONSTRUCTION
2	2	05/20/07	JAMES E. CRANE		REVISED PER FIELD CHANGES
3	3	05/20/07	JAMES E. CRANE		REVISED PER FIELD CHANGES
4	4	05/20/07	JAMES E. CRANE		REVISED PER FIELD CHANGES
5	5	05/20/07	JAMES E. CRANE		REVISED PER FIELD CHANGES
6	6	05/20/07	JAMES E. CRANE		REVISED PER FIELD CHANGES
7	7	05/20/07	JAMES E. CRANE		REVISED PER FIELD CHANGES
8	8	05/20/07	JAMES E. CRANE		REVISED PER FIELD CHANGES
9	9	05/20/07	JAMES E. CRANE		REVISED PER FIELD CHANGES
10	10	05/20/07	JAMES E. CRANE		REVISED PER FIELD CHANGES

SNPP

**INSTRUMENTAIR
 COMPRESSOR COMP-1**



REVISIONS

NO.	DATE	DESCRIPTION	BY	CHK
1	05/20/2007	ISSUED FOR CONSTRUCTION
2
3
4
5
6

APPROVED: [Signature]

DATE: 05/20/2007

BY: [Signature]

CHK: [Signature]

SCALE: 1:1

PROJECT: INSTRUMENTAIR COMPRESSOR COMP-1

DRAWING NO: COMP-1-02

REVISION NO: #6

Example 14

CIRCUIT ANALYSIS WORKSHEET

Component ID: **SWGR-B** Component Type: **Switchgear**

Component Description: **Train B 4160V Switchgear**

BE Code: **PNL-B EPS-4VBUSBF-2 (4KV BUS B FAULT)**

Required Position: **ENERGIZED FROM EDG-B**
Functional State

Normal Position: **ENERGIZED FROM SUT-1**

Failed Electrical Position: **Off**

Failed Air Position: **N/A**

High Consequence Component Yes No

Power Supplies: _____ Breaker: _____

_____ Breaker: _____

Cable Analysis:

Cable ID	Required?	Function	Fault Consequence	Comments

Comments:

CIRCUIT ANALYSIS WORKSHEET

Example 15

Component ID: **LC-B** Component Type: **Load Center**

Component Description: **Train B 480 V Load Center**

BE Code: **EPS-480VLCBF (480V LOAD CENTER B FAULT)**

Required Position: **ENERGIZED**
Functional State

Normal Position: **ENERGIZED**

Failed Electrical Position: **Off**

Failed Air Position: **N/A**

High Consequence Component Yes No

Power Supplies: SST-B Breaker: N/A
PNL-B Breaker: 11

Cable Analysis:

Cable ID	Required?	Function	Fault Consequence	Comments
AED02-A	Y	C	LOC, Loss-Protection	
AED02-B	Y	C	LOC, Loss-Protection	
AED02-Z	Y	C	LOC, Loss-Protection	
AED12-A	N	C	NONE	KIRK-KEY INTERLOCK
AED12-B	N	C	NONE	KIRK-KEY INTERLOCK
AED12-P	N	P	NONE	LOP FROM LC-1F
AED12-Q	N	P	NONE	LOP FROM LC-1F
AED12-R	N	P	NONE	LOP FROM LC-1F

Comments:

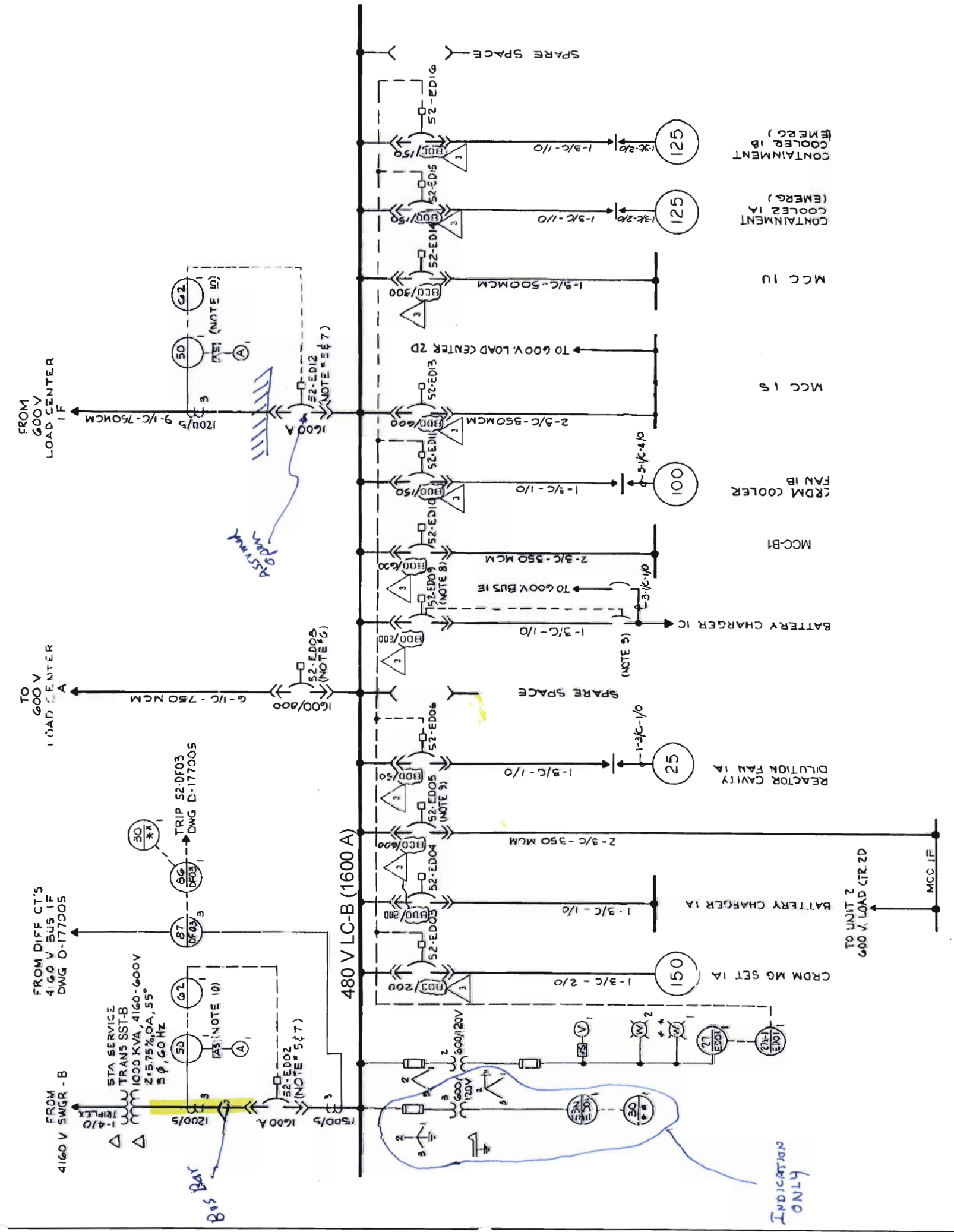
DEVICE	DESCRIPTION	MFR/TYPE	REMARKS
50 NOTE 10	STA SERVICE TRANSF. ID OVER CURRENT RELAY, 3Ø	GE/PJCS2G	
62 NOTE 10	TIME DELAY RELAY	AGASTAT/ ET012PA	
50 NOTE 10	OVER CURRENT RELAY, 3Ø, FOR INC. FDM FROM LOAD CTR. IF	GE/PJC-32G	
62 NOTE 10	TIME DELAY RELAY	AGASTAT/ ET012PA	
87 8703	STA SERVICE TRANSF. ID DIFFERENTIAL RELAY	GE/MDINDINA	
86 8603	STA SERVICE TRANSF. ID LOCKING OUT RELAY	G.E./HEA	
59N ED01	BUS ID OVER VOLTAGE RELAY (GROUND DETECTION)	WEST/CV-6	
27 ED01	BUS ID UNDER VOLTAGE RELAY	WEST/CV-2	
27X-1 ED01	AUXILIARY RELAY	WEST/M10-6	

NOTES

- * - DENOTES EMERG. POWER BOARD IN MAIN CONTROL ROOM.
- INTERRUPTING RATING OF ACB'S IS 22,000 AMPS RMS SYMMETRICAL (MIN)
- BUS SHORT CIRCUIT RATING 22,000 AMPS SYMMETRICAL.
- STATION SERVICE TRANSFORMER "ASKAREL" TYPE.
- BREAKERS 52-ED02 AND 52-ED12 ARE KEY INTERLOCKED SO THAT ONLY ONE CAN BE CLOSED AT ANY TIME (DWG. B-177125)
- BREAKERS 52-ED08 AND 52-EA09 (ON 600V. BUS 1A) ARE OPERATED BY A SINGLE CONTROL SWITCH IN THE MAIN CONTROL ROOM.
- ALL BKR'S EXCEPT 52-ED02 & 52-ED12 HAVE SOLID STATE TRIP UNITS WITH FOLLOWING DESIGNATIONS (BREAKER FRAME/SENSOR RATING-AMPERES)
8. BREAKERS 52-ED09, 52-ED06 AND MOLDED CASE BKRS TO BATTERY CHARGER IC ARE KEY INTERLOCKED SO THAT ONLY ONE BREAKER AND CORRESPONDING MOLDED CASE BKRS CAN BE CLOSED AT ANY TIME (DWG. C-171153).
- UNIT 1 BREAKER ED06 IS ELECTRICALLY INTERLOCKED WITH UNIT 2 BREAKER ED05 TO PREVENT SIMULTANEOUS CLOSING OF BOTH BREAKERS
- LOCATED IN TERMINAL BLOCK COMPARTMENT ABOVE ASSOCIATED BREAKER
- THIS DRAWING SUPERSEDES DRAWING C-177210, SPT. 1 OF 1. REV. 14, DATED 11-15-90, PER DEN. S. 93-1-6599, REV. 5

REFERENCE DRAWINGS

- A-177538 - ELECTRICAL GENERAL DETAILS & NOTES
- D-177001 - SINGLE LINE ELEC. AUX. SYSTEM (4160/600V)

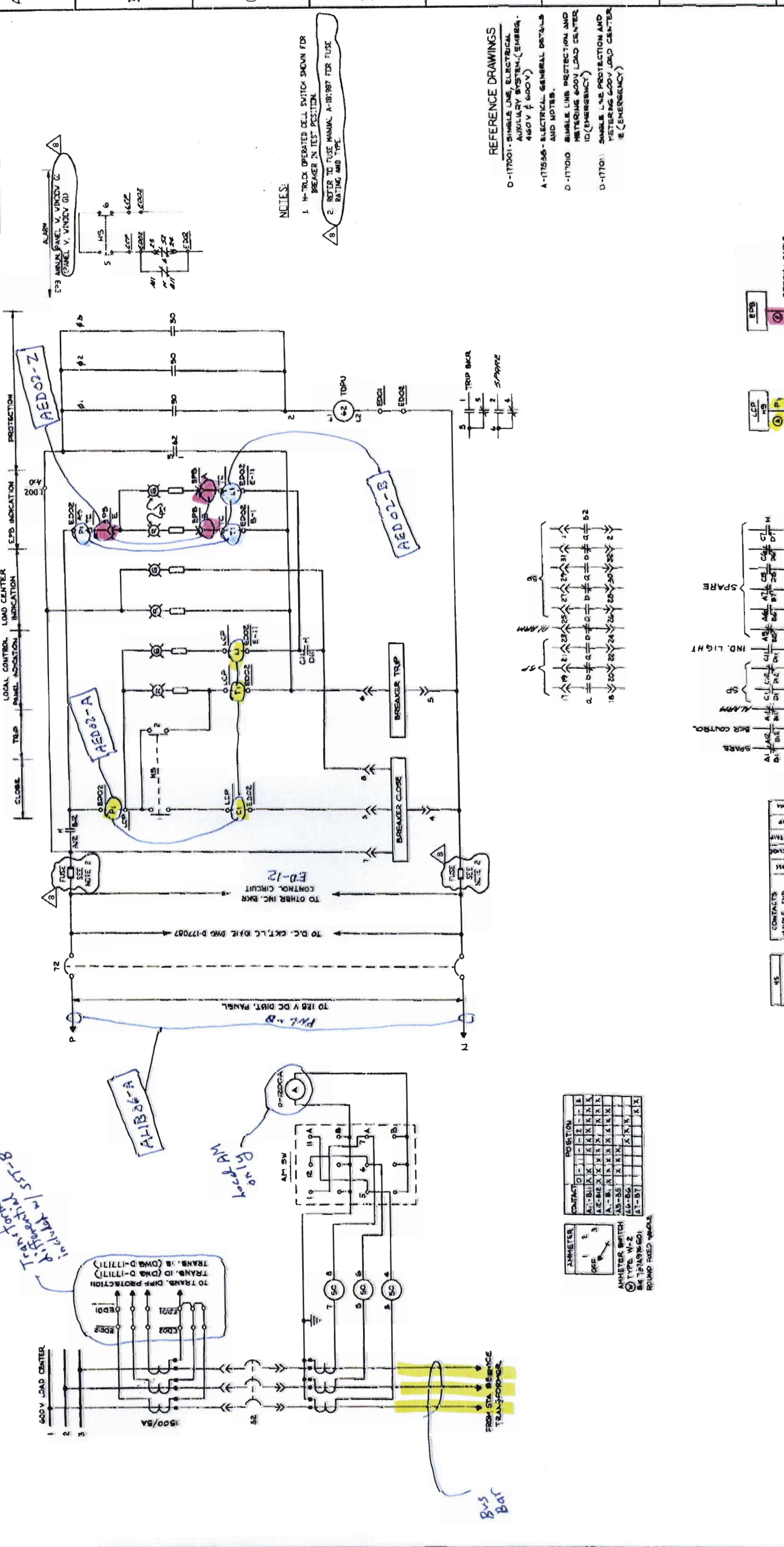


SNPP

LOAD CENTER B (LC-B)
ONE-LINE DIAGRAM

Drawing No.: LC-B-01
Date: 05/20/2007
Revision No.: #6

DEVICE	DESCRIPTION	REF./SPEC.	REMARKS
52	TIME DELAY PICK-UP RELAY	AGA-ETD2PA	250V DC OL TO LI SEC

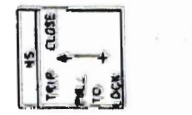


NOTES:
 1. HYDRO OPERATED CELL SWITCH SHOWN FOR BREAKER IN "TEST" POSITION.
 2. REFER TO FUSE MANUAL A-181987 FOR FUSE RATING AND TYPE.

- REFERENCE DRAWINGS
- D-1177001 - SINGLE LINE, ELECTRICAL AUXILIARY SYSTEM - (EMERGENCY - 480V \pm 600V)
 - A-117536 - ELECTRICAL GENERAL DETAILS AND NOTES.
 - D-1177010 - SINGLE LINE PROTECTION AND METERING 600V LOAD CENTER ID (EMERGENCY)
 - D-1177011 - SINGLE LINE PROTECTION AND METERING 600V LOAD CENTER (EMERGENCY)

TERMINAL	WIRE COLOR	WIRE SIZE	TERMINAL	WIRE COLOR	WIRE SIZE
1	BR	14	25	GR	14
2	OR	14	26	GR	14
3	GR	14	27	GR	14
4	GR	14	28	GR	14
5	GR	14	29	GR	14
6	GR	14	30	GR	14
7	GR	14	31	GR	14
8	GR	14	32	GR	14
9	GR	14	33	GR	14
10	GR	14	34	GR	14
11	GR	14	35	GR	14
12	GR	14	36	GR	14
13	GR	14	37	GR	14
14	GR	14	38	GR	14
15	GR	14	39	GR	14
16	GR	14	40	GR	14
17	GR	14	41	GR	14
18	GR	14	42	GR	14
19	GR	14	43	GR	14
20	GR	14	44	GR	14
21	GR	14	45	GR	14
22	GR	14	46	GR	14
23	GR	14	47	GR	14
24	GR	14	48	GR	14
25	GR	14	49	GR	14
26	GR	14	50	GR	14
27	GR	14	51	GR	14
28	GR	14	52	GR	14

CONTACTS	TRIP	IND LIGHT	ALARM	DRY CONTROL	SPARE
1-0-0-1-0	X				
0-1-0-0-1-0		X	X	X	X
0-1-0-0-1-0		X	X	X	X
0-1-0-0-1-0		X	X	X	X



EQUIPMENT	FAC	SCHEME	COMP.	LAD. SHEET	LOCAL CONTROL	EMERGENCY	TERMINATION	POSITION
INCOMING BREAKER TO 600V LOAD CENTER	P	N	AED02	Q1R21	3PDS05B-MS	3PDS05B-MS	3PDS05B-MS	2L30.8BA-A
				Q1R21	3PDS05B-MS	3PDS05B-MS	3PDS05B-MS	2L30.8BA-B

SNPP

52-ED-02
BREAKER SCHEMATIC

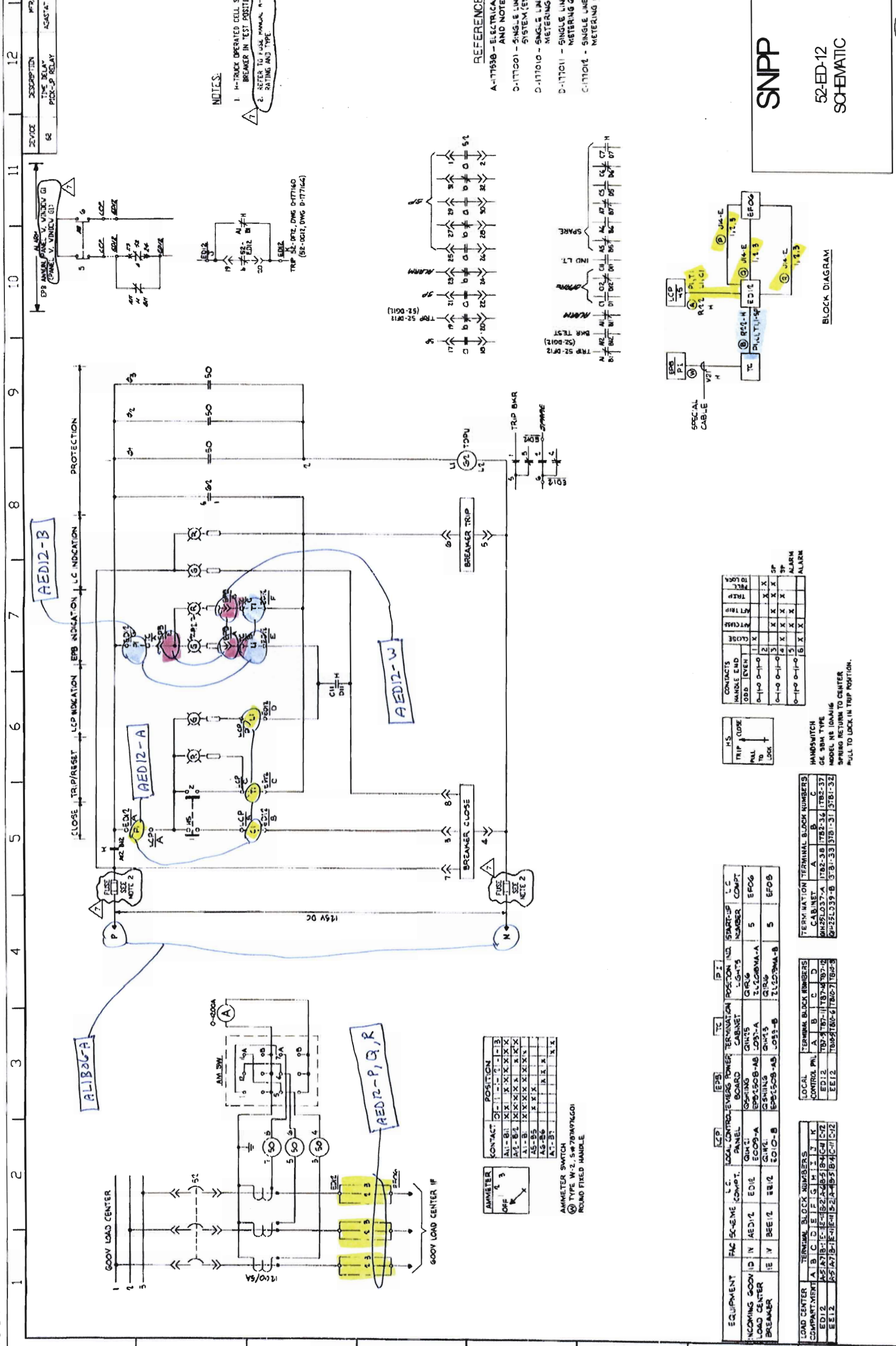
Drawing No: LC-B-02

Date: 05/20/2007

Revision No: #6

B BLOCK DIAGRAM

DESCRIPTION	DATE	BY	REVISION
TIME DELAY PICK-UP RELAY	ASAT 27 17284		
62			



AED12-B

AED12-A

AED12-W

ALIBAG-A

AED12-P, Q, R

NOTES:
 1. H-TRUCK OPERATED CELL SWITCH SHOWN FOR BREAKER IN TEST POSITION.
 2. REFER TO FUSE MANUAL, H-181987 FOR FUSE RATING AND TYPE.

CONTACT	POSITION
A1-B1	X
A2-B2	X
A3-B3	X
A4-B4	X
A5-B5	X
A6-B6	X
A7-B7	X

CONTACTS	MAINLINE END	TRIP	SPRING RETURN TO CENTER
0-10 0-10-0	X	X	X
0-10 0-10-0	X	X	X
0-10 0-10-0	X	X	X

EQUIPMENT	FAC	SCHEME	L.C. CONTROL-EMERG POWER BOARD	POSITION AND BOARD	START-UP NUMBER	L.C. COMP
INCOMING GOOV LOAD CENTER BREAKER	N	AED12	ED12	GOV-1-A	5	EFOG
	Y	EE12	EE12	GOV-2-B	5	EFOB

LOAD CENTER COMPARTMENT	TERMINAL BLOCK NUMBERS
AED12	1782-38 1782-31 1782-37
EE12	7805-7807 1787-11 1787-14 787-12

LOAD CENTER COMPARTMENT	TERMINAL BLOCK NUMBERS
AED12	1782-38 1782-31 1782-37
EE12	7805-7807 1787-11 1787-14 787-12

LOAD CENTER COMPARTMENT	TERMINAL BLOCK NUMBERS
AED12	1782-38 1782-31 1782-37
EE12	7805-7807 1787-11 1787-14 787-12

LOAD CENTER COMPARTMENT	TERMINAL BLOCK NUMBERS
AED12	1782-38 1782-31 1782-37
EE12	7805-7807 1787-11 1787-14 787-12

LOAD CENTER COMPARTMENT	TERMINAL BLOCK NUMBERS
AED12	1782-38 1782-31 1782-37
EE12	7805-7807 1787-11 1787-14 787-12

AMMETER SWITCH
 TYPE W-2, S#767976G01
 ROUND FIXED HANDLE

AMMETER
 OFF

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

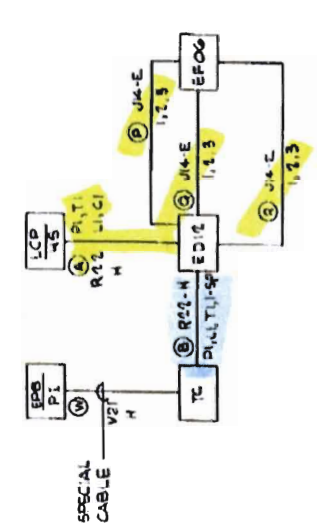
TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

REFERENCE DRAWINGS
 A-177538 - ELECTRICAL GENERAL DETAILS AND NOTES
 D-177001 - SINGLE LINE ELECTRICAL AUX SYSTEM (EMERG - GOOV & GOO)
 D-177010 - SINGLE LINE PROTECTION AND METERING GOOV L.C. (EMERG)
 D-177011 - SINGLE LINE PROTECTION AND METERING GOOV L.C. (EMERG)
 C-177014 - SINGLE LINE PROTECTION AND METERING GOOV LOAD CENTER IF



SNPP

52-ED-12
 SCHEMATIC

Drawing No.: LC-B-03
 Date: 05/20/2007
 Revision No.: #6

HANDSWITCH
 GE 88M TYPE
 MODEL NO 104416
 SPRING RETURN TO CENTER
 PULL TO LOCK IN TRIP POSITION.

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

TRIP BAR
 TRIP 52-012Z, DWG D-177160
 (52-0012, DWG D-177164)

STA SERV
TRANS SST-B

MECHANICAL
INTERLOCK

600V LOAD CTR IF

52-ED02

52-ED12

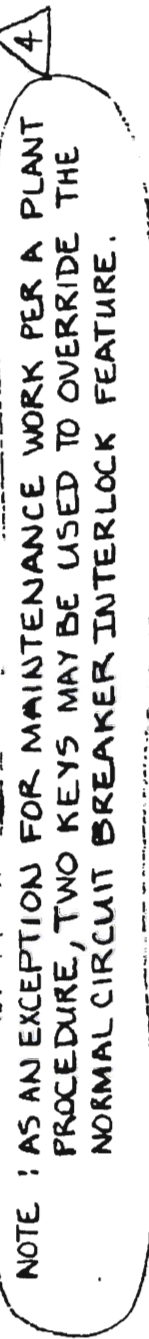
OPERATION SEQUENCE

KEY IS HELD IN CIRCUIT BREAKER 52-ED02 INTERLOCK.
TO ESTABLISH SERVICE THROUGH CIRCUIT BREAKER
52-ED12

1. TRIP CIRCUIT BREAKER 52-ED02
2. TURN KEY AI IN L-O INTERLOCK ON CIRCUIT BREAKER 52-ED02 TO LOCK OPEN. KEY AI IS NOW FREE.
3. INSERT KEY AI IN L-O INTERLOCK ON CIRCUIT BREAKER 52-ED12 AND TURN TO UNLOCK. KEY AI IS NOW HELD.
4. CLOSE CIRCUIT BREAKER 52-ED12.

REVERSE SEQUENCE TO RESTORE SERVICE THROUGH
CIRCUIT BREAKER 52-ED02.

NOTE: AS AN EXCEPTION FOR MAINTENANCE WORK PER A PLANT
PROCEDURE, TWO KEYS MAY BE USED TO OVERRIDE THE
NORMAL CIRCUIT BREAKER INTERLOCK FEATURE.



480 V Load Center LC-B

52-ED05

BATTERY CHARGER
IC

NOTES

1. ALL INTERLOCKS ARE KIRK TYPE
2. CIRCUIT BREAKERS 52-ED05, 52-ED09, 52-EE06 & MOLDED CASE BREAKERS TO BATTERY CHARGER IC ARE KEY INTERLOCKED SO THAT ONLY ONE BREAKER AND CORRESPONDING BATTERY CHARGER MOLDED CASE BREAKER CAN BE CLOSED AT ANY TIME (SEE DWG C-177133)

LEGEND

- L-O INTERLOCK WITH KEY HELD.
- L-O INTERLOCK WITH KEY REMOVED.
- L-O (LOCKED OPEN) INDICATES THAT THE KEY IS REMOVABLE WHEN THE CIRCUIT BREAKER IS LOCKED IN THE OPEN POSITION.
- E INDICATES KEY REMOVABLE ONLY WHEN BOLT EXTENDED.

INTERLOCK KEY TABLE

INTERLOCK	KEY NUMBER
AI	RE-14204

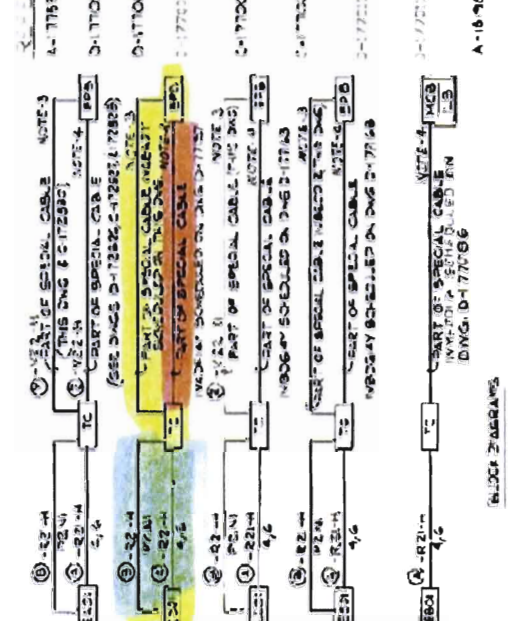
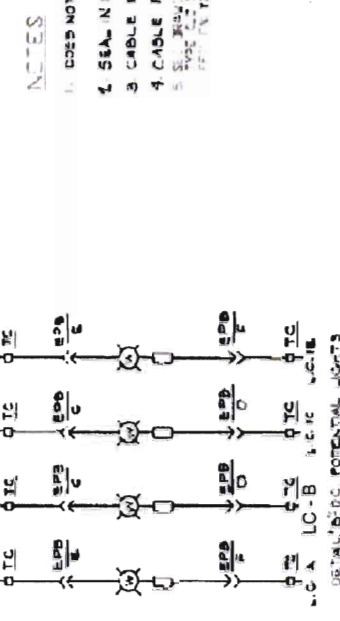
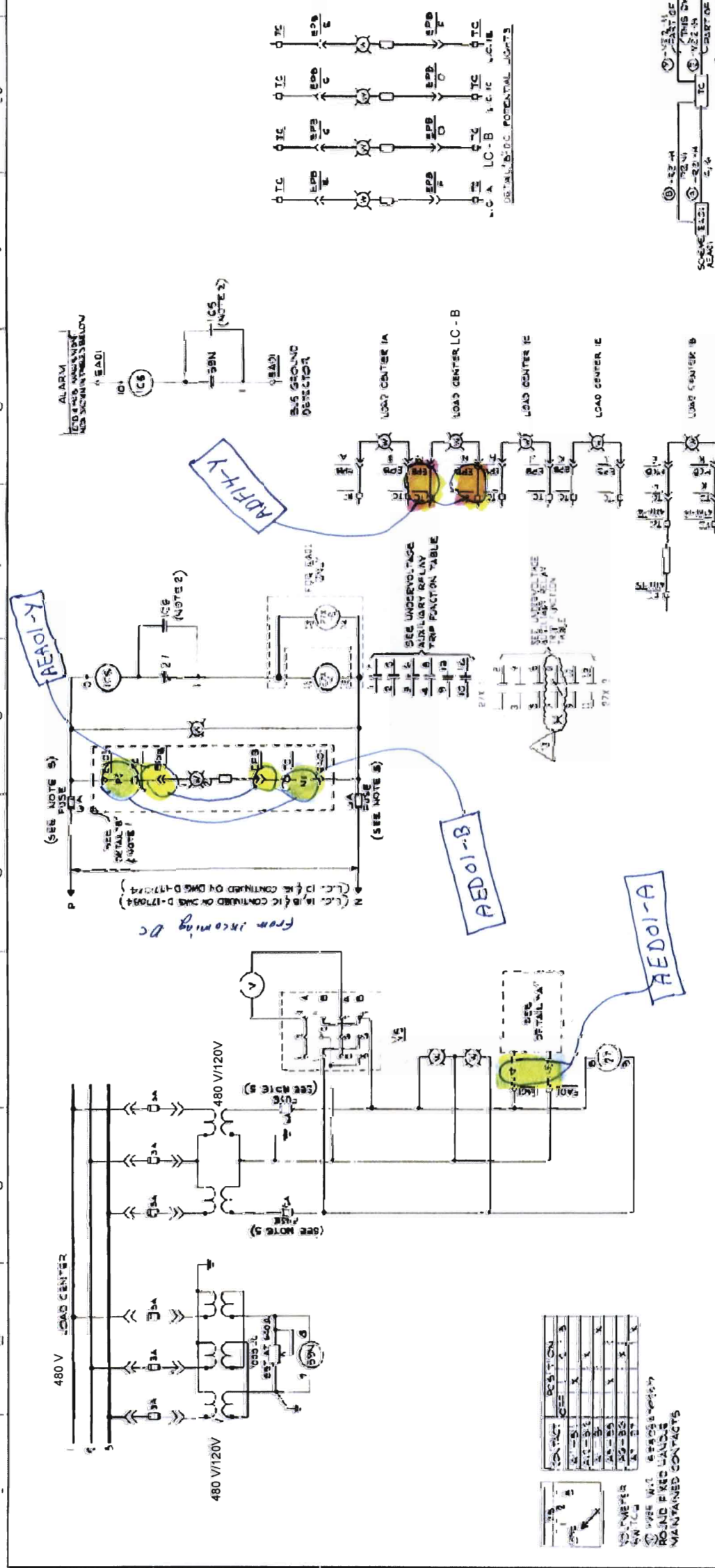
REFERENCE DWG.

- D-177001-SINGLE LINE ELEC AUX SYSTEM (4160V & 600V)
- C-177010 - SINGLE LINE PROTECTION & METERING 600V LOAD CENTER ID
- A-177538-ELEC GEN DETAILS & NOTES

<p>SNPP</p> <p>LC-B</p> <p>INCOMING BREAKER INTERLOCKS</p>	Drawing No.: LC-B-04
	Date: 05/20/2007
	Revision No.: #6

1 2 3 4 5 6 7 8 9 10 11 12 13

DEVICE	DESCRIPTION	MFR/TYPE	REMARKS
17X-1	AUXILIARY RELAY	17X-1	25 V DC
17X-2	AUXILIARY RELAY	17X-2	25 V DC



- NOTES
1. DOES NOT APPLY TO ESD.
 2. SEALED CONTACT TO BE DISCONNECTED.
 3. CABLE FOR D.C. POTENTIAL LIGHTS.
 4. CABLE FOR A.C. POTENTIAL LIGHTS.
 5. SEE DRAWING 17X-1, 17X-2, 17X-3, 17X-4, 17X-5, 17X-6, 17X-7, 17X-8, 17X-9, 17X-10, 17X-11, 17X-12, 17X-13, 17X-14, 17X-15, 17X-16, 17X-17, 17X-18, 17X-19, 17X-20, 17X-21, 17X-22, 17X-23, 17X-24, 17X-25, 17X-26, 17X-27, 17X-28, 17X-29, 17X-30, 17X-31, 17X-32, 17X-33, 17X-34, 17X-35, 17X-36, 17X-37, 17X-38, 17X-39, 17X-40, 17X-41, 17X-42, 17X-43, 17X-44, 17X-45, 17X-46, 17X-47, 17X-48, 17X-49, 17X-50, 17X-51, 17X-52, 17X-53, 17X-54, 17X-55, 17X-56, 17X-57, 17X-58, 17X-59, 17X-60, 17X-61, 17X-62, 17X-63, 17X-64, 17X-65, 17X-66, 17X-67, 17X-68, 17X-69, 17X-70, 17X-71, 17X-72, 17X-73, 17X-74, 17X-75, 17X-76, 17X-77, 17X-78, 17X-79, 17X-80, 17X-81, 17X-82, 17X-83, 17X-84, 17X-85, 17X-86, 17X-87, 17X-88, 17X-89, 17X-90, 17X-91, 17X-92, 17X-93, 17X-94, 17X-95, 17X-96, 17X-97, 17X-98, 17X-99, 17X-100.

UNDERVOLTAGE AUXILIARY RELAY TRIP FUNCTION TABLE

TRIP FUNCTION	TRIP FUNCTION	TRIP FUNCTION	TRIP FUNCTION	TRIP FUNCTION	TRIP FUNCTION	TRIP FUNCTION	TRIP FUNCTION	TRIP FUNCTION	TRIP FUNCTION
1. ESD	2. ESD	3. ESD	4. ESD	5. ESD	6. ESD	7. ESD	8. ESD	9. ESD	10. ESD
11. ESD	12. ESD	13. ESD	14. ESD	15. ESD	16. ESD	17. ESD	18. ESD	19. ESD	20. ESD
21. ESD	22. ESD	23. ESD	24. ESD	25. ESD	26. ESD	27. ESD	28. ESD	29. ESD	30. ESD
31. ESD	32. ESD	33. ESD	34. ESD	35. ESD	36. ESD	37. ESD	38. ESD	39. ESD	40. ESD
41. ESD	42. ESD	43. ESD	44. ESD	45. ESD	46. ESD	47. ESD	48. ESD	49. ESD	50. ESD
51. ESD	52. ESD	53. ESD	54. ESD	55. ESD	56. ESD	57. ESD	58. ESD	59. ESD	60. ESD
61. ESD	62. ESD	63. ESD	64. ESD	65. ESD	66. ESD	67. ESD	68. ESD	69. ESD	70. ESD
71. ESD	72. ESD	73. ESD	74. ESD	75. ESD	76. ESD	77. ESD	78. ESD	79. ESD	80. ESD
81. ESD	82. ESD	83. ESD	84. ESD	85. ESD	86. ESD	87. ESD	88. ESD	89. ESD	90. ESD
91. ESD	92. ESD	93. ESD	94. ESD	95. ESD	96. ESD	97. ESD	98. ESD	99. ESD	100. ESD

TRIP FUNCTION	TRIP FUNCTION	TRIP FUNCTION	TRIP FUNCTION	TRIP FUNCTION	TRIP FUNCTION	TRIP FUNCTION	TRIP FUNCTION	TRIP FUNCTION	TRIP FUNCTION
1. ESD	2. ESD	3. ESD	4. ESD	5. ESD	6. ESD	7. ESD	8. ESD	9. ESD	10. ESD
11. ESD	12. ESD	13. ESD	14. ESD	15. ESD	16. ESD	17. ESD	18. ESD	19. ESD	20. ESD
21. ESD	22. ESD	23. ESD	24. ESD	25. ESD	26. ESD	27. ESD	28. ESD	29. ESD	30. ESD
31. ESD	32. ESD	33. ESD	34. ESD	35. ESD	36. ESD	37. ESD	38. ESD	39. ESD	40. ESD
41. ESD	42. ESD	43. ESD	44. ESD	45. ESD	46. ESD	47. ESD	48. ESD	49. ESD	50. ESD
51. ESD	52. ESD	53. ESD	54. ESD	55. ESD	56. ESD	57. ESD	58. ESD	59. ESD	60. ESD
61. ESD	62. ESD	63. ESD	64. ESD	65. ESD	66. ESD	67. ESD	68. ESD	69. ESD	70. ESD
71. ESD	72. ESD	73. ESD	74. ESD	75. ESD	76. ESD	77. ESD	78. ESD	79. ESD	80. ESD
81. ESD	82. ESD	83. ESD	84. ESD	85. ESD	86. ESD	87. ESD	88. ESD	89. ESD	90. ESD
91. ESD	92. ESD	93. ESD	94. ESD	95. ESD	96. ESD	97. ESD	98. ESD	99. ESD	100. ESD

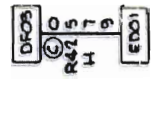
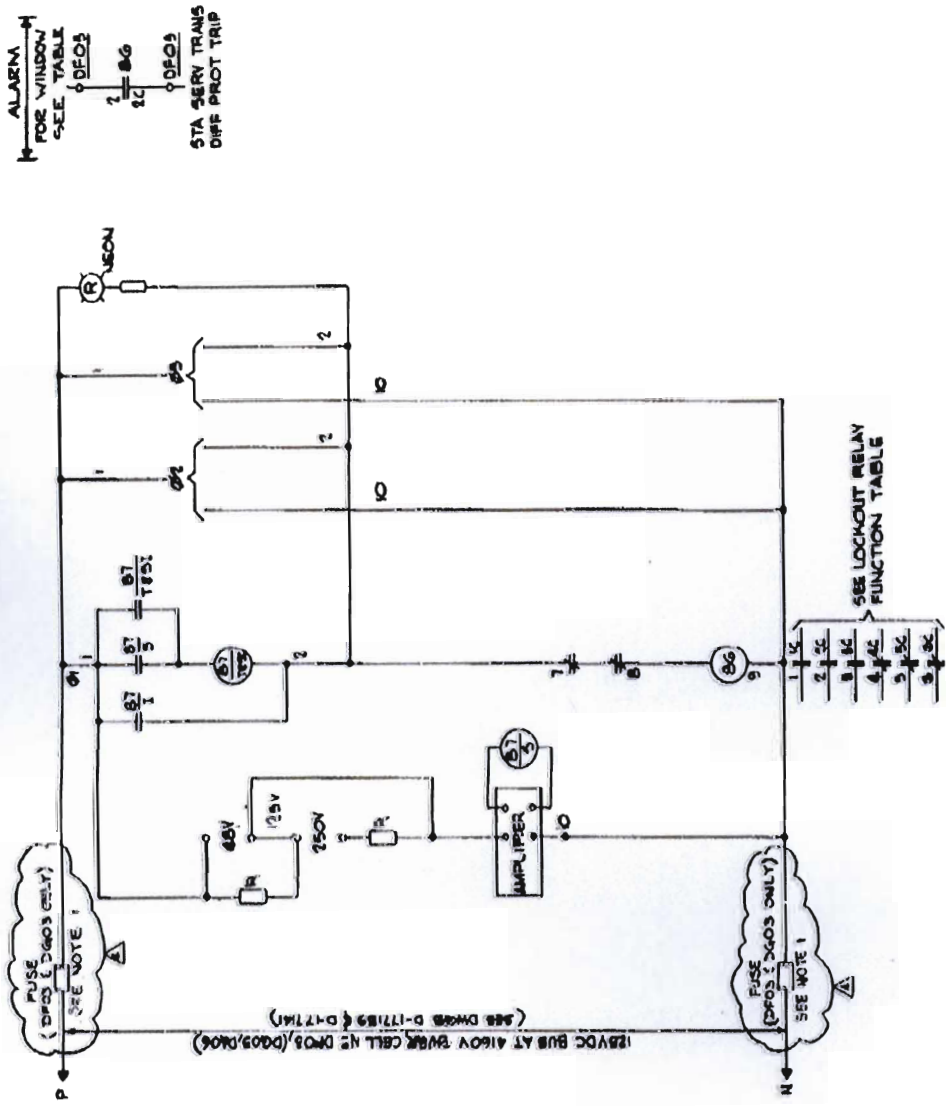
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LOAD CENTER
UNDERVOLTAGE SCHEME

Drawing No.: LC-B-05
Date: 05/20/2007
Revision No.: #6

11	12	13
DEVICE	DESCRIPTION	MR/TYPE
BG	LOCKOUT RELAY	SE/HENGLA123
REMARKS		125V DC

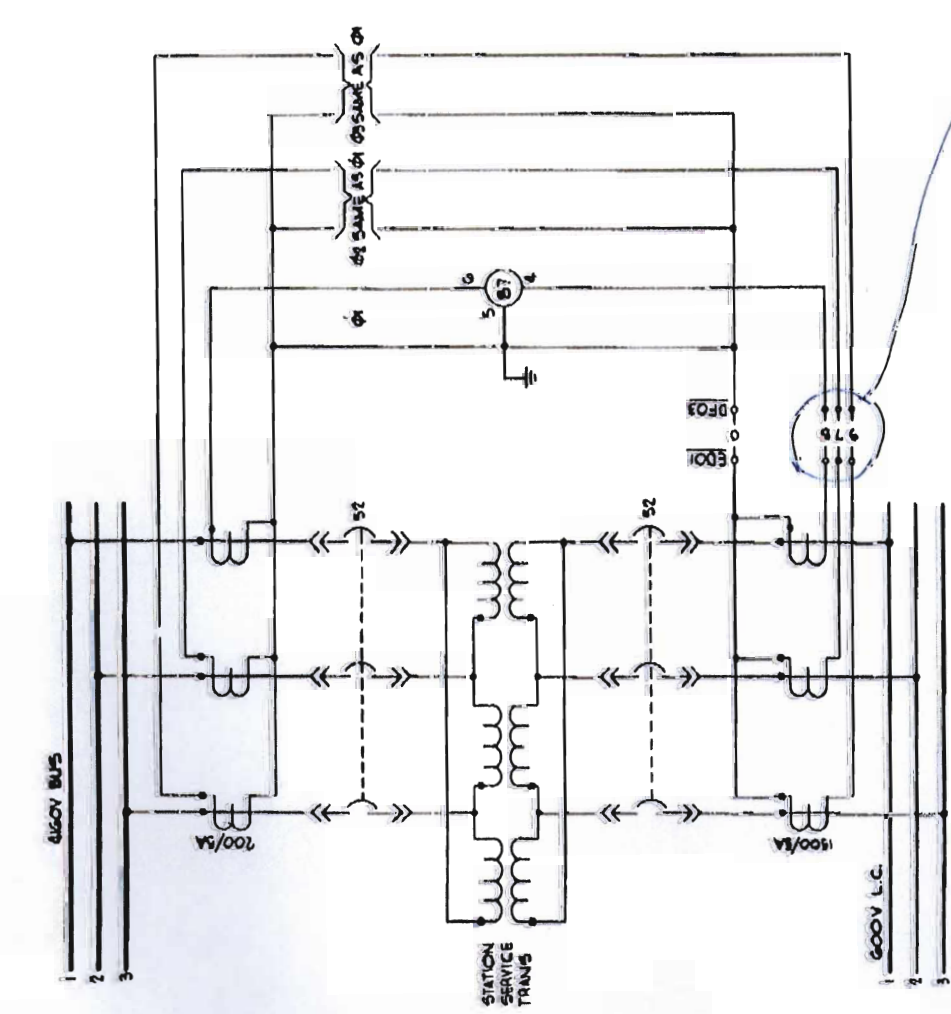
NOTES:
 1. SEE DRAWING A-101951 FOR FUSE RATING & TYPE.



BLOCK DIAGRAM

- REFERENCE DRAWINGS AND NOTES
- A-177535 — ELECTRICAL GENERAL DETAILS
 - D-177001 — SINGLE LINE ELECTRICAL AUX SYSTEM (EMERG - 480V & 600V)
 - D-177002 — SINGLE LINE PROTECTION AND METERING 480V SWITCHGEAR BUS 1A
 - D-177005 — SINGLE LINE PROTECTION AND METERING 600V SWITCHGEAR BUS 1F (EMERG)
 - D-177006 — SINGLE LINE PROTECTION AND METERING 600V SWITCHGEAR BUS 1G (EMERG)
 - C-177010 — SINGLE LINE PROTECTION AND METERING 600V LOAD CENTER 1D (EMERG)
 - C-177011 — SINGLE LINE PROTECTION AND METERING 600V LOAD CENTER 1E (EMERG)
 - C-177014 — SINGLE LINE PROTECTION AND METERING 600V LOAD CENTER 1I (EMERG)

1. FUSE REPLACEMENT MANUAL FOR SAFETY RELATED EQUIPMENT.



LOCKOUT RELAY FUNCTION TABLE

DWG NO	FUNCTION	RELAY	DWG NO	FUNCTION	DWG NO
1-12	TRIP BAR 51-DFO3	C-17759	1-12	TRIP BAR 51-DGO3	C-17759
2-12	ALARM	TRG-DWG	3-12	ALARM	TRG-DWG
3-12	SPARE		3-12	SPARE	
4-12	SPARE		4-12	BLOCK CLOSING BAR 52-DA06	D-177141
5-12	BLOCK CLOSING BAR 51-DFO3	C-17759	5-12	BLOCK CLOSING BAR 51-DGO3	C-17759
6-12	SPARE		6-12	SPARE	

EQUIPMENT	FAC	SCHEME	SUPPLY	LOAD CENTER	BUS	ASSOCIATED
DIFFERENTIAL RELAY FOR STATION SERV TRANSFORMER	IV	AFO3	DFO3	EDO1	5	EDO1 PANEL 1
	IV	BGO3	DGO3	EEO1	5	BUS PANEL 1
	IV	XDA06	DA06	E10N	5	BUS PANEL 1

SNPP

STATION SERVICE TRANSFORMER DIFFERENTIAL PROTECTION SCHEME

Drawing No.: LC-B-06
 Date: 05/20/2007
 Revision No.: #6

CIRCUIT ANALYSIS WORKSHEET

Example 16

Component ID: MCC-1B Component Type: MCC

Component Description: Train B 480 V Motor Control Center

BE Code: EPS-480MCCB1F (480V MCC B1 FAULT)

Required Position: ENERGIZED
Functional State

Normal Position: ENERGIZED

Failed Electrical Position: Off

Failed Air Position: N/A

High Consequence Component Yes [] No [x]

Power Supplies: LC-B Breaker: ED-10
Breaker:

Cable Analysis:

Table with 5 columns: Cable ID, Required?, Function, Fault Consequence, Comments. Rows include BEE10-P, BEE10-A, BEE10-B, BEE10-Z.

Comments:

- 1 Breaker control power included in analysis for LC-B.
2 MCC-1B has no main breaker. Power cables connected directly to bus.
3 Annunciation circuits not required for functionality.

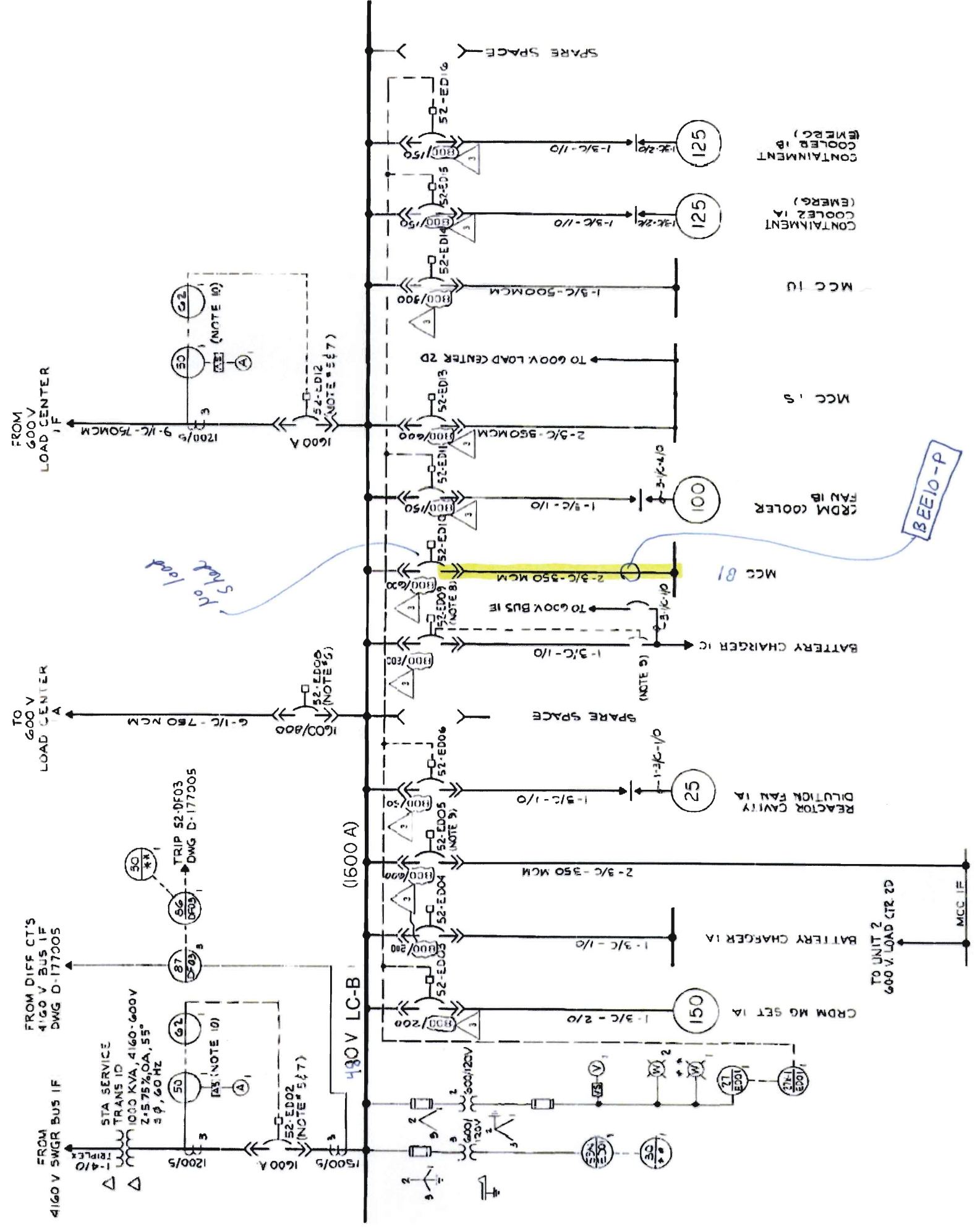
DEVICE	DESCRIPTION	MFR/TYPE	REMARKS
50	STA SERVICE TRANSF ID	GE/PJC320	
NOTE 10	OVER CURRENT RELAY, 3 ϕ		
62	TIME DELAY RELAY	AGASTAT/ET02RPA	
NOTE 10			
50	OVER CURRENT RELAY, 3 ϕ , FOR MFC FOR LOAD CTR 1 F	GE/PJC320	
NOTE 10			
62	TIME DELAY RELAY	AGASTAT/ET02RPA	
NOTE 10			
67	STA SERVICE TRANSF ID	GE/PJC320	
DF05	DIFFERENTIAL RELAY	GE/125D1DC3A	
66	STA SERVICE TRANSF ID	GE/PJC320	
DF05	LOCKING OUT RELAY	GE/125D1DC3A	
59N	BUS ID OVER VOLTAGE RELAY (GROUND DETECTION)	WEST/ICV-6	
ED01	BUS ID UNDER VOLTAGE RELAY	WEST/ICV-2	
27	BUS ID UNDER VOLTAGE RELAY	WEST/ICV-2	
ED01	AUXILIARY RELAY	WEST/MS-G	
27X-1			
ED01			

NOTES

1. ** DENOTES EMERG POWER BOARD IN MAIN CONTR. RM.
2. INTERRUPTING RATING OF ACB'S IS 22,000 AMPS RMS SYMMETRICAL (MIN)
3. BUS SHORT CIRCUIT RATING 22,000 AMPS SYMMETRICAL
4. STATION SERVICE TRANSFORMER "ASKAREL" TYPE.
5. BREAKERS 52-ED02 AND 52-ED12 ARE KEY INTERLOCKED SO THAT ONLY ONE CAN BE CLOSED AT ANY TIME (DWG. B-177125)
6. BREAKERS 52-ED08 AND 52-ED09 (ON 600V BUS 1A) ARE OPERATED BY A SINGLE CONTROL SWITCH IN THE MAIN CONTROL ROOM.
7. ALL BKR'S EXCEPT 52-ED02 & 52-ED12 HAVE SOLID STATE TRIP UNITS WITH FOLLOWING DESIGNATIONS (BREAKER FRAME/SENSOR RATING-AMPERES)
8. BREAKERS 52-ED01, 52-ED06 AND MOLDED CASE BARS TO BATTERY CHARGER IC ARE KEY INTERLOCKED SO THAT ONLY ONE BREAKER AND CORRESPONDING MOLDED CASE BARS CAN BE CLOSED AT ANY TIME (DWG-C-171153).
9. UNIT 1 BREAKER ED05 IS ELECTRICALLY INTERLOCKED WITH UNIT 2 BREAKER ED06 TO PREVENT SIMULTANEOUS CLOSING OF BOTH BREAKERS
10. LOCK IN TERMINAL BLOCK COMPARTMENT ABOVE ASSOCIATED BREAKER.
11. THIS DRAWING SUPERSEDES DRAWING C-177010, SHEET 1 OF 1, REV. 14, DATED 11-18-90, PER POK S 901-8592, REV. 5

REFERENCE DRAWINGS

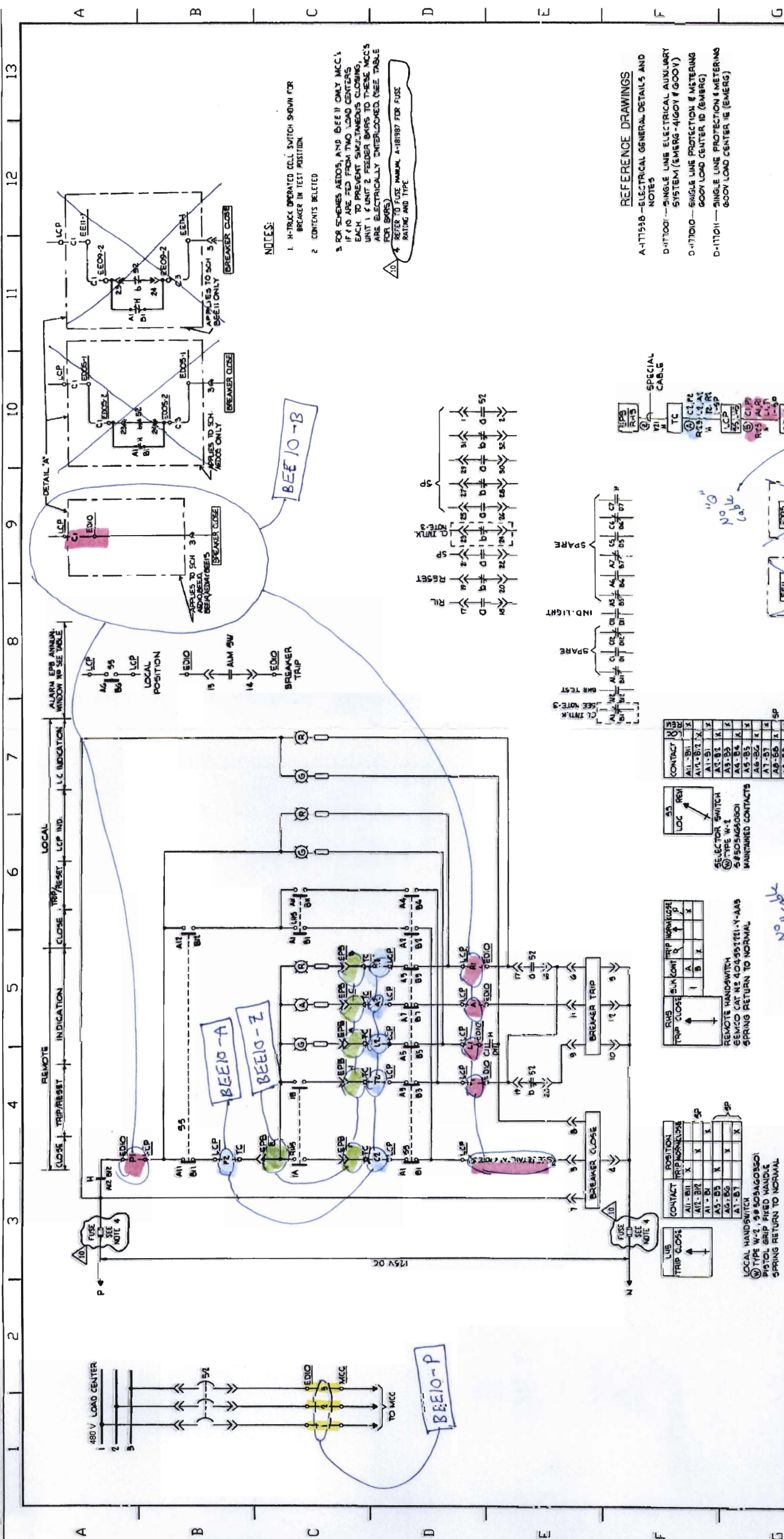
- A-177330 - ELECTRICAL GENERAL DETAILS & NOTES
- D-177001 - SINGLE LINE ELEC. AUX SYSTEM (4160/600V)



SNPP

LOAD CENTER B (LC-B)
ONE-LINE DIAGRAM

Drawing No.: LC-B-01
Date: 05/20/2007
Revision No.: #6



NOTES:

1. H-TRACK OPERATED CELL SWITCH SHOWN FOR BREAKER IN TEST POSITION
2. CONTENTS DELETED
3. FOR SCHEMES AEDOS, AND BEE11 ONLY MCC'S IF F10 ARE FED FROM TWO LOAD CENTERS EACH TO PREVENT SIMULTANEOUS CLOSING, UNIT 1 & UNIT 2 FEEDER BARS TO THESE MCC'S ARE ELECTRICALLY INTERLOCKED. (SEE TABLE FOR BARS)
4. REFER TO FUSE MANUAL A-181987 FOR FUSE RATING AND TYPE

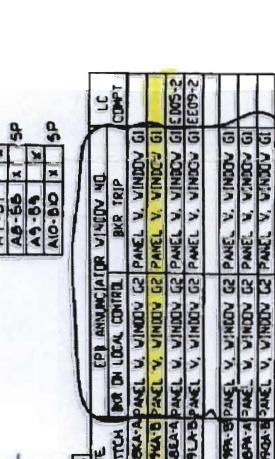
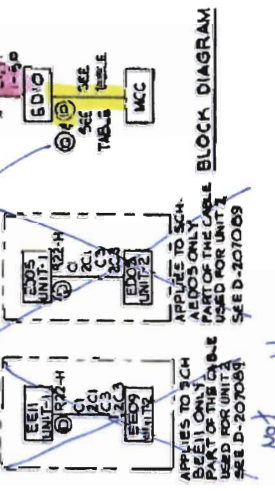
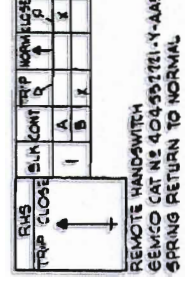
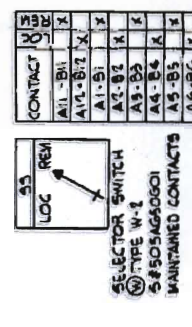
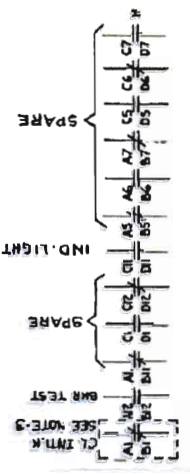
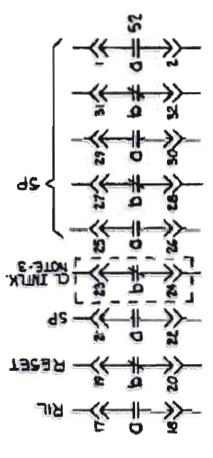
REFERENCE DRAWINGS

A-117538 - ELECTRICAL GENERAL DETAILS AND NOTES

D-117001 - SINGLE LINE ELECTRICAL AUXILIARY SYSTEM (EMERG - 4IGOV # GOOV)

D-117010 - SINGLE LINE PROTECTION & METERING GOOV LOAD CENTER 10 (EMERG)

D-117011 - SINGLE LINE PROTECTION & METERING GOOV LOAD CENTER 16 (EMERG)



EQUIPMENT	FAC	SCHEME	L.C. COMPT.	L.C.P. PANEL	EMERGENCY POWER BOARD	TERMINATION	START-UP	POWER CABLE	MOTOR COMT	CONSTRUCTION	REACTS	EPB	MINIATOR	WINDOW NO	L.C. UNIT
GOOV LOAD CENTER BAR & TO MOTOR CONTROL CENTER	IA	IV	AEDIO	EDIO	EMERGENCY	CHRS1037-A	6	LO9-F	FA-A2	1.1.3	1.1.3	EMERGENCY	EMERGENCY	PANEL V. WINDOW G1	EDIO
	IB	IV	BEE10	EDIO	EMERGENCY	CHRS1037-B	6	LO9-F	FB-A2	1.1.3	1.1.3	EMERGENCY	EMERGENCY	PANEL V. WINDOW G2	EDIO
	IC	IV	AEDOS	EDOS	EMERGENCY	CHRS1037-A	6	LO9-F	FA-A2	1.1.3	1.1.3	EMERGENCY	EMERGENCY	PANEL V. WINDOW G1	EDOS-2
	ID	IV	BEE11	EDIO	EMERGENCY	CHRS1037-B	6	LO9-F	FB-A2	1.1.3	1.1.3	EMERGENCY	EMERGENCY	PANEL V. WINDOW G2	EDOS-2
	IE	IV	BEE14	EDIO	EMERGENCY	CHRS1037-A	6	LO9-F	FA-A1	1.1.3	1.1.3	EMERGENCY	EMERGENCY	PANEL V. WINDOW G1	EDIO
	IF	IV	ABD4	EDIO	EMERGENCY	CHRS1037-A	6	LO9-F	FA-A1	1.1.3	1.1.3	EMERGENCY	EMERGENCY	PANEL V. WINDOW G1	EDIO
	IG	IV	BEE15	EDIO	EMERGENCY	CHRS1037-B	6	LO9-F	FB-A1	1.1.3	1.1.3	EMERGENCY	EMERGENCY	PANEL V. WINDOW G2	EDIO
	IH	IV	BEE15	EDIO	EMERGENCY	CHRS1037-B	6	LO9-F	FB-A1	1.1.3	1.1.3	EMERGENCY	EMERGENCY	PANEL V. WINDOW G2	EDIO
	II	IV	BEE15	EDIO	EMERGENCY	CHRS1037-B	6	LO9-F	FB-A1	1.1.3	1.1.3	EMERGENCY	EMERGENCY	PANEL V. WINDOW G2	EDIO
	II	IV	BEE15	EDIO	EMERGENCY	CHRS1037-B	6	LO9-F	FB-A1	1.1.3	1.1.3	EMERGENCY	EMERGENCY	PANEL V. WINDOW G2	EDIO

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MOTOR CONTROL CENTER
MCC-1B

Drawing No.: MCC-B1-01
Date: 05/20/2007
Revision No.: #6

Not applicable