

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8310240150 DOC. DATE: 83/10/14 NOTARIZED: NO DOCKET #
 FACIL: 50-397 WPPSS Nuclear Project, Unit 2, Washington Public Power 05000397
 AUTH. NAME: SORENSEN, G.C. AUTHOR AFFILIATION: Washington Public Power Supply System
 RECIP. NAME: SCHWENCER, A. RECIPIENT AFFILIATION: Licensing Branch 2

SUBJECT: Provides status info on Branch Technical Position PSB-1 commitments per S Rhaw 830905 request. GE field dispositions re final Div 3 second level undervoltage protection design & two oversize drawings encl. Aperture cards available in PDR.

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NRR LB2 LA	1 0	AULUCK, R. 01	1 1
INTERNAL: ELD/HDS2	1 0	IE FILE	1 1
IE/DEPER/EPB 36	3 3	IE/DEPER/IRB 35	1 1
IE/DEQA/QAB 21	1 1	NRR/DE/AEAB	1 0
NRR/DE/CEB 11	1 1	NRR/DE/EHEB	1 1
NRR/DE/eqB 13	2 2	NRR/DE/GB 28	2 2
NRR/DE/MEB 18	1 1	NRR/DE/MTEB 17	1 1
NRR/DE/SAB 24	1 1	NRR/DE/SGEB 25	1 1
NRR/DHFS/HFEB40	1 1	NRR/DHFS/LQB 32	1 1
NRR/DHFS/PSRB	1 1	NRR/DL/SSPB	1 0
NRR/DSI/AEB 26	1 1	NRR/DSI/ASB	1 1
NRR/DSI/CPB 10	1 1	NRR/DSI/CSB 09	1 1
NRR/DSI/ICSB 16	1 1	NRR/DSI/METB 12	1 1
NRR/DSI/PSB 19	1 1	NRR/DSI/RAB 22	1 1
NRR/DSI/RSB 23	1 1	REG FILE 04	1 1
RGNS	3 3	RM/DDAMI/MIB	1 0
EXTERNAL: ACRS 41	6 6	BNL (AMDTS ONLY)	1 1
DMB/DSS (AMDTS)	1 1	FEMA-REP DIV 39	1 1
LPDR 03	1 1	NRC PDR 02	1 1
NSIC 05	1 1	NTIS	1 1

Extras To R. AULUCK

Washington Public Power Supply System

P.O. Box 968 3000 George Washington Way Richland, Washington 99352 (509) 372-5000

October 14, 1983
G02-83-928

Docket No. 50-397

Director of Nuclear Reactor Regulation
Attention: Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: NUCLEAR PROJECT NO. 2
BRANCH TECHNICAL POSITION PSB-1
COMMITMENT IMPLEMENTATION STATUS

Dear Mr. Schwencer:

This letter provides status information on the WNP-2 commitments pertaining to Branch Technical Position PSB-1. This information was requested by Mr. Sang Rhaw of the Power System Branch in a telephone conversation September 5, 1983 with Messrs. P. L. Powell and T. L. Meade of the Supply System.

Section B.4 of PSB-1 requires a test to be performed on the plant electrical distribution system to measure bus voltages in both static and dynamic conditions to verify optimum intervening transformer tap settings. The procedure for this test has been written and approved via the Test Working Group Committee, and is expected to be performed during the week of October 17-21, 1983.

Section B.1 of PSB-1 requires the installation of a second level undervoltage scheme to detect a degraded voltage condition on the 1E busses. Division 1, 2, and 3 second level undervoltage protection has been installed and tested. It is now operational. The final Division 3 second level undervoltage protection design has been received on-site in the form of an expedited disposition from General Electric. The initial design did not meet the coincident logic requirement delineated in PSB-1 and required modification. This resulted in the field dispositions referred to above. These field dispositions are attached for Mr. Sang Rhaw's review. Design drawings for the Division 1 and 2 have also been attached.

The following is a description of the Division 3 primary and second undervoltage scheme:

(Refer to FDDR No. KKI-1214, Rev. 1, Sheet 4)

8310240150 831014
PDR ADDCK 05000397
A. PDR

Boo1
1/60

Mr. A. Schwencer, Chief
Page Two

On a loss of voltage to SM-4 relays 27S-1(2), dropout at 72% of nominal bus voltage and close their associated contacts shown on Sheet 4 as 3-7. Closure of these contacts energize relays 62S-3(4). These relays time out after two seconds and close their associated contacts shown on Sheet 4 as T1-M1. Closure of these contacts energize relays 27NX(Y) and 62S-1(2). When energized, relays 27NX(Y) will trip the supply breaker to SM-4, breaker 4-2. Relays 62S-3(4) time out after two seconds and energize relays 27SX(Y) and 27SX1(Y1). Relays 27SX(Y) start the HPCS diesel generator and annunciate the undervoltage condition. Relays 27SX1(Y1) disable the HPCS pump breaker closure until power is restored to the bus SM-4. (Note that this disable signal from relays 27SX1(Y1) is bypassed if a LOCA signal is received.) Testing at WNP-2 has demonstrated the ability of the HPCS diesel generator to start and accelerate with the HPCS pump on the bus.

To review the primary undervoltage scheme two seconds after a loss of power to SM-4, the supply breaker will be tripped. Four seconds after a loss of power to SM-4, the HPCS diesel generator will start.

In a degraded grid voltage scenario, the bus voltage drops below 87% for longer than eight seconds. At this time, relays 27/62-1(2) time out and drop out. Contacts 11-12 and 14-15 then close to energize relays 62S-1(2) and 27NX(Y). Contacts off 27NX(Y) trip the supply breaker to SM-4, breaker 4-2. Contacts off 62S-1(2), after a two second time delay, close to energize relays 27SX(Y) and 27SX1(Y1) to start the HPCS diesel generator. Contacts 2-3 off relays 62S-1(2) allow closure of the supply breaker, 4-2, onto a dead bus.

Attached is a marked up copy of FSAR Section 8.3.1.2.4.3.2, "Secondary Undervoltage Sensing".

Please contact us if you have any questions.

Very truly yours,

Alan Hosenbr

G. C. Sorensen, Acting Manager
Nuclear Safety and Regulatory Programs

Attachments:

- (1) FDDR No. KKI-1214, Rev. 1
- (2) FDDR No. KKI-1214, Rev. 0
- (3) FSAR Excerpt, Page 8.3-52a
- (4) E517, Sheet 3
- (5) E517, Sheet 18

cc: R Auluck - NRC
WS Chin - BPA
AD Toth - NRC Site

WNP-2

AMENDMENT NO. 7
November 1979

Page 1 of 2

Q. 040.36
(RSP)

In addition to the undervoltage scheme currently provided to detect a loss of offsite power at the safety busses, we require the WNP-2 facility to have a second level of voltage protection, including a time delay, to protect the onsite power system from any adverse effects that could result from a sustained degraded voltage condition in the offsite power system. The design criteria for this second level of voltage protection are:

- a. The selection of the voltage and time set points shall be determined by an analysis of the voltage requirements of the safety-related loads at all onsite system distribution levels..
- b. The voltage protection shall incorporate coincidence logic to preclude spurious trips of the offsite power source.
- c. The time delay which is selected shall be based on the following considerations: (1) the allowable time delay, including a conservative margin, shall not exceed the maximum time delay that is assumed in the appropriate accident analyses in Section 15 of the FSAR; (2) the time delay shall minimize the effect of short duration disturbances which might reduce the availability of the offsite power source(s); and (3) the allowable time duration of a degraded voltage condition at all distribution system levels shall not result in failure of safety-related systems or components.
- d. The voltage sensors shall automatically initiate the disconnection of offsite power sources whenever the voltage set point and time delay limits have been exceeded.
- e. The voltage sensors shall be designed to satisfy the following requirements: (1) the equipment will be Class IE and will be physically located at, and electrically connected to, the emergency switchgear; (2) independent undervoltage protection will be provided for each division of emergency power; (3) the equipment will have the capability to be tested and calibrated during power operation; and (4) annunciation must be provided in the control room for any bypasses incorporated into the design.

WNP-2

AMENDMENT NO. 25
June 1982

- f. The Technical Specifications for the WNP-2 facility will include: (1) the limiting conditions for operation; (2) the surveillance requirements; (3) the trip setpoints, including their minimum and maximum limits; and (4) the allowable values of voltage and time relay for second level voltage protection sensors and its associated time delay devices (i.e., the delayed trip).

Response:

The FSAR has been revised as shown below to incorporate the second level of under voltage protection for critical buses 7 (DG-1), 8 (DG-2) and 4 (DG-3).

- a. See text of 8.3.1.2.4.3.2, page 8.3-52a, which has been revised to incorporate the response to this item.
- b. See text of 8.3.1.1.1, page 8.3-4, which has been revised to incorporate the response to this item.
- c. See text of 8.3.1.1.8.1.7, pages 8.3-13 and 13a, 8.3.1.2.4.3.1, page 8.3-52a, and Table 6.3-1, which has been revised to incorporate the response to this item.
- d. See text of 8.3.1.1.1, page 8.3-4, which has been revised to incorporate the response to this item.
- e. See text of 8.3.1.1.1, pages 8.3-4 and 8.3-4a, and 8.3.1.2.4.3.2, page 8.3-52a, which have been revised to incorporate parts 1, 2, and 3 of this item. There are no bypasses of the protective action for this system.
- f. Section 3/4.8, Electrical Power Systems, of the Technical Specifications will include, (1) the limiting conditions for operation; (2) the surveillance requirements; (3) the trip set points, including their maximum and minimum limits; and (4) the allowable values of voltage and time delay for second level voltage protection sensors and its associated time delay devices.

WNP-2

AMENDMENT NO. 37
August 1986

8.3.1.2.4.3.2 Secondary Undervoltage Sensing

Static Class 1E undervoltage relays with definite time delay located in each of the redundant Division 1 and Division 2 4.16 kV Class 1E switchgear units are utilized for detection of sustained degraded voltage in the offsite power system. This protection scheme is designed to compliment the primary undervoltage scheme described above.

The trip setpoint of each relay is 3,631 volts, corresponding to 87.3 percent of nominal bus voltage and 90.8 percent of nominal motor voltage. Trip setpoint selection is based upon insuring 90 percent of motor nominal voltage at the motor terminals, including allowance for feeder voltage drop. The relay automatically resets when the bus voltage exceeds 89.9% of nominal rating.

The eight seconds time delay will override the voltage dips associated with motor starting loads under normal operating practice and under normal source voltage.

The relays operate to isolate the degraded source and initiate the sequence of events to select the next available source. Circuit design precludes spurious voltage loss signal and allows for testing of the individual relay, one at a time, without disrupting the protective function.

During loss-of-coolant accident, diesel generator power is available to the Division 1 and Division 2 emergency loads 13 seconds after the sustained degraded grid voltage condition is sensed at the emergency bus. This time delay is derived from the 8-second delay prior to the offsite breaker trip plus a .5-second delay prior to the diesel generator breaker closure. The above time delay is acceptable since during a concurrent loss-of-coolant accident, the emergency core cooling system (ECCS) coolant injection time requirements as specified in Table 6.3-1 are met.

See Figures 8.3-16c and 8.3-17c for the logic diagrams of Divisions 1 and 2 secondary undervoltage protection.

The same voltage trip and time delay setpoints are used for the Division 3 secondary undervoltage relays. For Division 3, however, the diesel generator power is available at the bus 11 seconds after a coincident occurrence of a loss-of-coolant accident and a degraded grid condition. This time delay is equal to the 8-second delay prior to the offsite breaker trip plus a 3-second delay prior to the diesel generator breaker closure.

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AMENDMENT NO. 36
December 1985

See Figure 8.3-18c for the Division 3 secondary undervoltage protection logic diagram. The HPCS injection time requirement of Table 6.3-1 is also met.

Assume that during an accident when the emergency motor loads are running a subsequent degradation of offsite grid voltage occurs assuming further that the degraded voltage is anywhere between 69% and 87.3% of the bus nominal voltage; the following analysis shows that the motor loads remain adequately protected and ready for a restart as soon as the power supply has been restored to normal. Under the above condition the emergency motors would be exposed to terminal voltage between 72% and 90% (approximately) of nameplate value. For terminal voltages between 80% (or 75% for the HPCS pump motor) and 90%, the motor will continue to run overloaded up to 125% (133% for the HPCS pump motor) of full load current. The motors can safely carry this overload for 8 seconds. For voltages less than 80% (75% for the HPCS pump motor), the motor torque could be less than the load torque, thus resulting in deceleration and eventual stalling.

The motors are protected against locked rotor conditions by a relay which trips and locks out in 10 seconds. Since the secondary undervoltage relaying is set to trip the offsite source breaker 8 seconds after the undervoltage condition develops, the locked rotor protective relay will not trip. Load shedding after the 8th second trips the motor without locking them out. A subsequent motor restart when power supply is restored will expose the motor to locked rotor currents for another 5 seconds as a maximum. (Based on maximum motor starting time of 5 seconds.) The total stall time is therefore equal to 13 seconds. This is less than the designed motor safe stall time of 14 seconds at rated terminal voltage or greater than 17 seconds at voltages less than 90% of rated. Since the voltage at the motor is assumed to be less than 90% of nameplate value, it follows that there is sufficient margin between the motor stall time under the above worst case conditions, and the designed motor safe stall time.

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June 1983

Table 8.3-19 indicates the voltage values expected at the various levels of the Class 1E portions of the auxiliary AC distribution system under a degraded (69% of nominal, based upon 4.16 kV voltage sensors) value of input voltage (2870 V).

It should be noted that critical (Class 1E) plant controls and vital instrumentation are supplied by redundant (Division 1 and 2) divisions of the 120/240 VAC Class 1E uninterruptible power supply system. This system supplies loads via inverters, with static transfer to an alternate AC supply in case of circuit faults or loss of inverter voltage. The alternate supply line voltage is regulated within $\pm 10\%$ of normal in accordance with the NSSS vendor's requirements. A manual bypass switch is provided for maintenance of the inverter or static switch.

Table 8.3-17 indicates the various monitors and alarms (annunciators/computer) provided to monitor system voltages.

8.3.1.3 Physical Identification of Safety-Related (Class 1E) Equipment

Each safety-related electrical component or cable is tagged with an identification number. In addition, a color-coded separation marker is provided along with the identification number which indicates the assignment to one of seven divisions (Divisions 1, 2, 3, 4, 5, 6, and 7). This division marker is inscribed with color-coded characters on a color-coded background as shown in Tables III and V of the document entitled "WNP-2 Electrical Separation Practices" submitted to the NRC under separate cover letter. Assignment of equipment to the seven divisions is given in Table II of the same document.

Cable routing information is provided in Tables VIII, X, XI, XII, XV, and XVI of the document entitled "WNP-2 Electrical Separation Practices". This illustrates the computer program used for identification and routing of cables in trays... Routing information for cables in conduits is provided in raceway layout drawings. Table IX of the same document indicates sample cable routing schedules. Actual cable tray drawings for the reactor, control, and radwaste buildings are shown in Figures 8.3-9 through 8.3-14, inclusive.

A list of Class 1E components and equipment is provided to facilitate identification of safety-related components and their circuits.

ATTACHMENT 8

RELATED ELECTRICAL DESIGN DRAWINGS

Attached are the following drawings:

<u>Drawing No.</u>	<u>Revision No.</u>	<u>Drawing No.</u>	<u>Revision No.</u>
E502-1	26	EWD-39E-028	4
E502-2	36	EWD-46E-078	7
E502-3	16	EWD-46E-080	7
E502-4	4	EWD-46E-089	5
E521-9	17	EWD-46E-092	8
EWD-7E-001	11	EWD-46E-106	9
EWD-7E-004	5	EWD-46E-106A	2
EWD-7E-022	8	EWD-46E-130	7
EWD-7E-031	4	EWD-46E-132	6
EWD-8E-001	8	EWD-46E-327	1
EWD-9E-001	8	EWD-47E-003	10
EWD-13E-001	7	EWD-58E-001	11
EWD-39E-011	8	EWD-80E-001	9
		EWD-80E-005	8

HANFORD 2

No. KK1-124, Rev. 2

VPF # 3390-23-2 Sh Rev 1

FIELD DEVIATION
DISPOSITION REPORT

Sheet 2 of 12
Date 9-21-83
XPL E22-5004

TITLE METAL CLAD SWITCHGEAR
UNIT-102
Zone B-E, 1-5

27N2 AD

10	02
30	04
50	06
70	08

27N1 AE

10	02
30	04
50	06
70	08

27S2 AF

10	02	3-A12
30	04	3-BRT1
50	06	5-AG6
70	08	5-AP2C
		6-A3
		7-ARB1

27S1 AG

10	02	3-A9
30	04	3-BRT1
50	06	5-A1
70	08	6-A2, AF5
		7-AQB1

27SX AH

03	06
10	05
20	06
04	00

1-B9
2-B10
3-A15, AL3
4-A16, AL4
5-B1
6-B2
7-C9, AL7
8-C10, ALB
9-B13, AL9
10-B14, AL10
11-B3
12-B4
13-AK10
14-AK6, AQB4

62S2 AJ

9	9	3	3	1
0	0	0	0	0
10	8	6	4	2

2-AJ5, AM14
3-C7
5-AJ2, ARM1
6-A14, AL14
8-ARB1
10-CB, AL13

62S1 AK

9	9	3	3	1
0	0	0	0	0
10	8	6	4	2

2-AK5, AN14
3-C5
5-AK2, ARM1
6-A11, AH14
8-AQT1
10-C6, AH13

27SY AL

SAME AS
27SX

1-AH1, B11
2-AH2, B12
3-AH3
4-AH4
5-B5
6-B6
7-AH7
8-AH8
9-AH9
10-AH10
11-B7
12-B8
13-AJ10
14-AJ6, ARB4

27/62-1 AM

8	7	6	5	4	3	2	1
0	0	0	0	0	0	0	0
16	15	14	13	12	11	10	9
0	0	0	0	0	0	0	0

0 GND.

3-A4
4-A5, AN3
7-AM12
8-C4
11-C11
12-A9, AM7
14-AJ2
15-C12

27/62-2 AN

0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
SAME AS
AM

3-AM4
4-A6
7-AN12
8-C3
11-C12
12-A12, AN7
14-AK2
15-C11

62S3 AQ

M1	R1	R3	M3
81	T1	T3	83
B2	T2	T4	B4
M2	R2	R4	M4

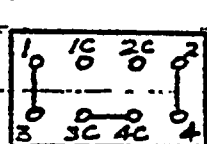
B1-A67
B4-AH14
T1-A63, AK8
M1-AK5

62S4 AR

SAME AS
62S3

B1-AF7
B4-AL14
T1-AF3, AJ8
M1-AJ5

NOTE: RELAYS 62S3 & 62S4
ARE LOCATED ON LEFT PANEL
IN UNIT 102. THIS DRAWING
WAS REDRAWN FOR CLARITY
TO SHOW REVISED CONFIGURATION.

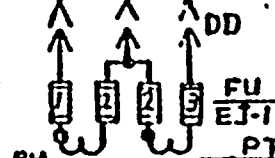
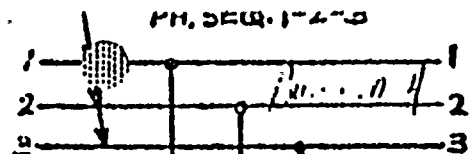


AP
1C-A7
2C-AF5
3C-AB
1-AC1
2-AC2

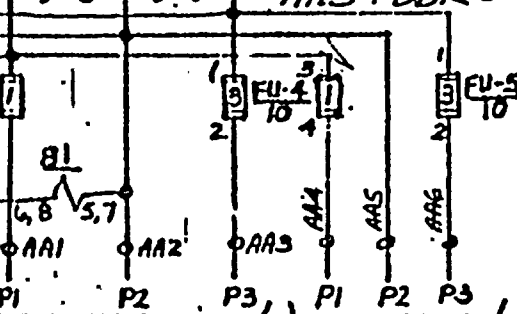
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VPF # 3390-23-2

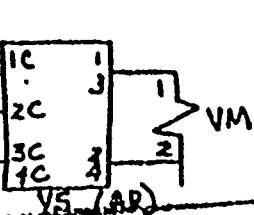
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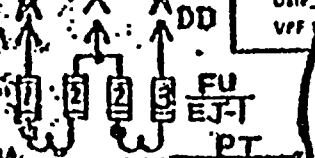
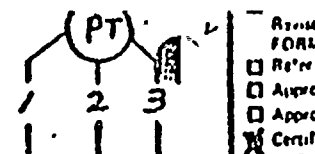
TO "DG" PANEL METERS AND RELAYS
TO CONT ROOM METERS AND RELAYS



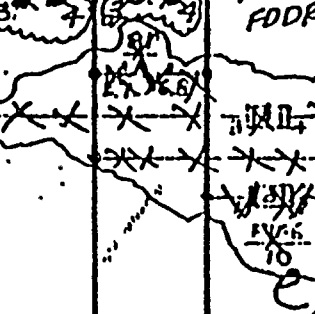
HANFORD 2

HANFORD 2
FIELD DEVIATION
DISPOSITION REPORT

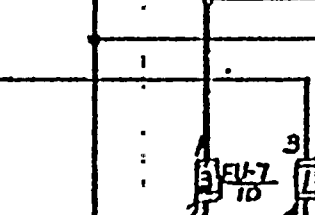
NO. KK1-1214, REV. 2
Sheet 3 of 12
Date 9-21-83
NPL E22-S004



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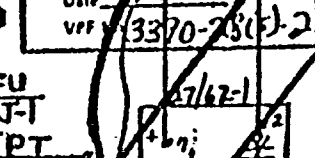
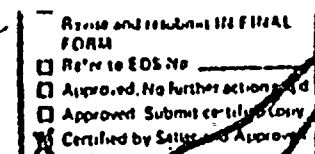


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TO CONT ROOM METERS AND RELAYS

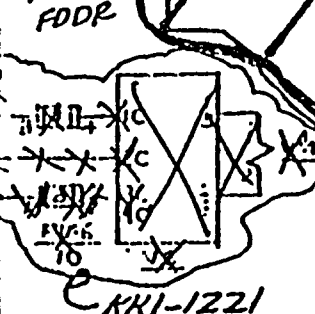


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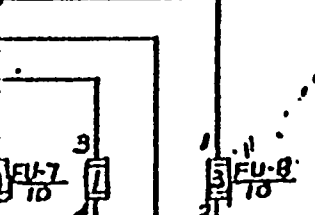
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FIELD DEVIATION
DISPOSITION REPORT



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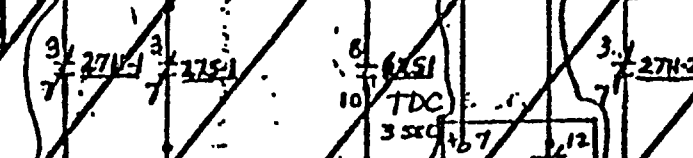
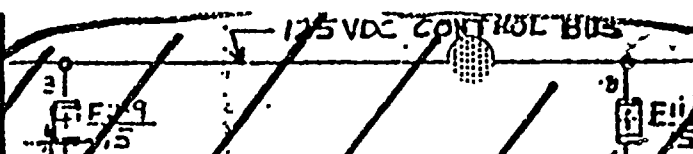


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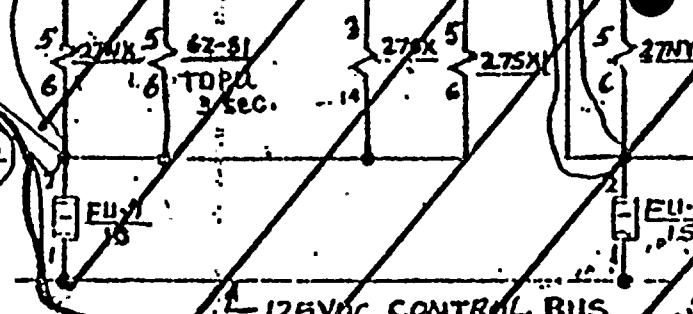


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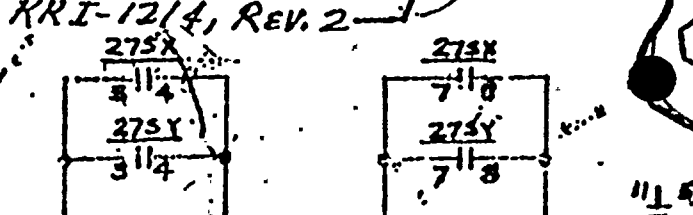
HANFORD 2
FIELD DEVIATION
DISPOSITION REPORT



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TO "DG" PANEL METERS AND RELAYS
TO CONT ROOM METERS AND RELAYS



HANFORD 2

HANFORD 2
FIELD DEVIATION
DISPOSITION REPORT

Review and submit to official form
Revised to EDS No
Approved. No further action required
Approved. Submit certificate to Buyer
Certified by Seller and Approved by Buyer
Reviewed
Date
VPF # 3390-28(5)-2

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125 VDC CONTROL BUS

125 VDC CONTROL BUS

125 VDC CONTROL BUS

125 VDC CONTROL BUS

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125 VDC CONTROL BUS

125 VDC CONTROL BUS

125 VDC CONTROL BUS

125 VDC CONTROL BUS

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VPF # 3390-28(5)-2

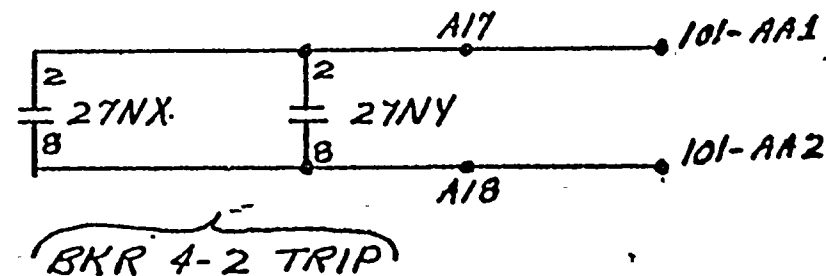
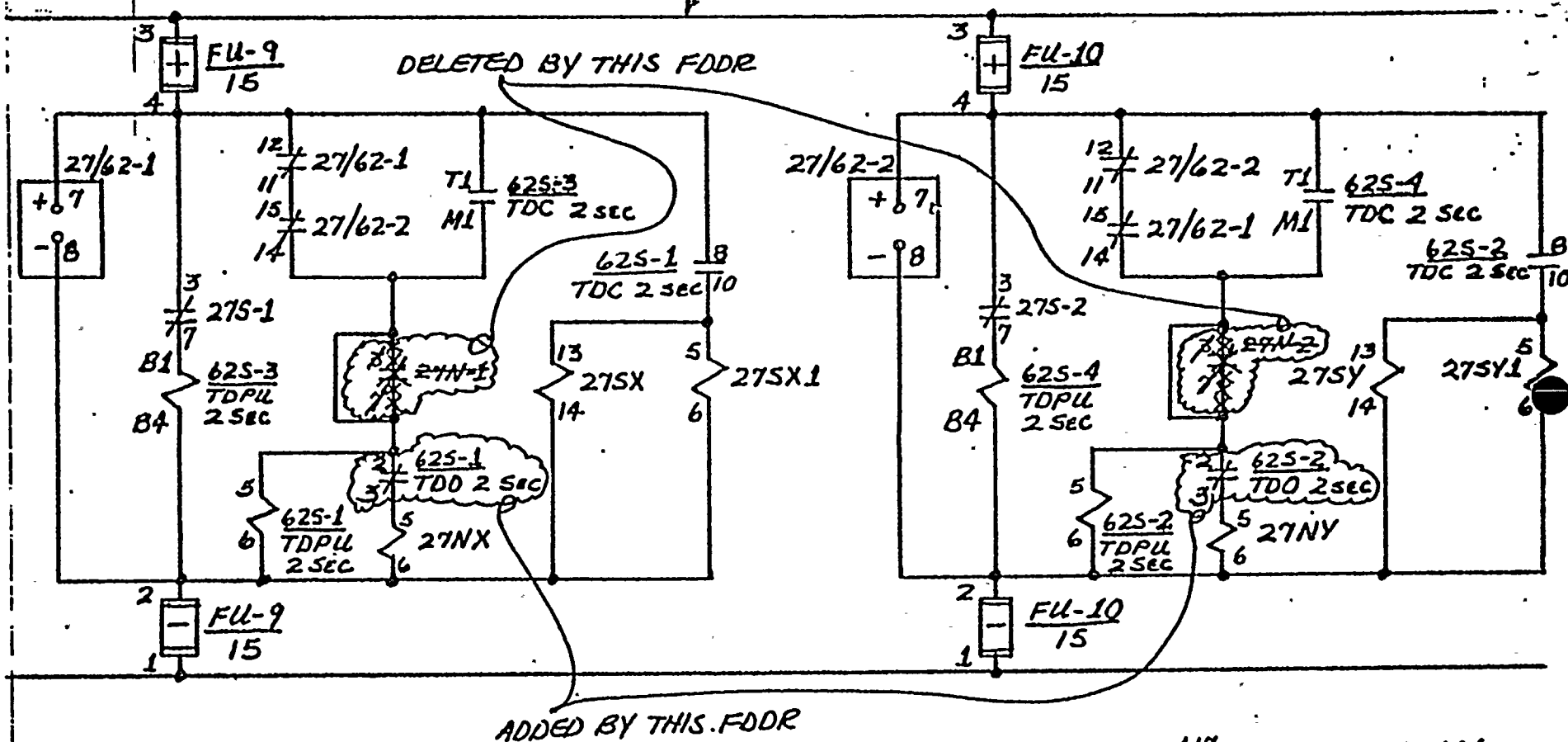
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VPF # 3390-28(5)-2

VPF # 3390-28(5)-2

VPF # 3390-28(5)-2

125 Vdc CONTROL BUS



MANFORD 2

FIELD DEVIATION DISPOSITION REPORT

NO. KK1-1214, REV. 2'

Sheet 4 of 12

Date 9-21-83

NPL E22-5004

DOCUMENT NO. VPF#3390-28(5)-2 SH 5 REV 1

TITLE POTENTIAL AND UNDERVOLTAGE CIRCUIT

Zone

FIELD DEVIATION

DISPOSITION REPORT

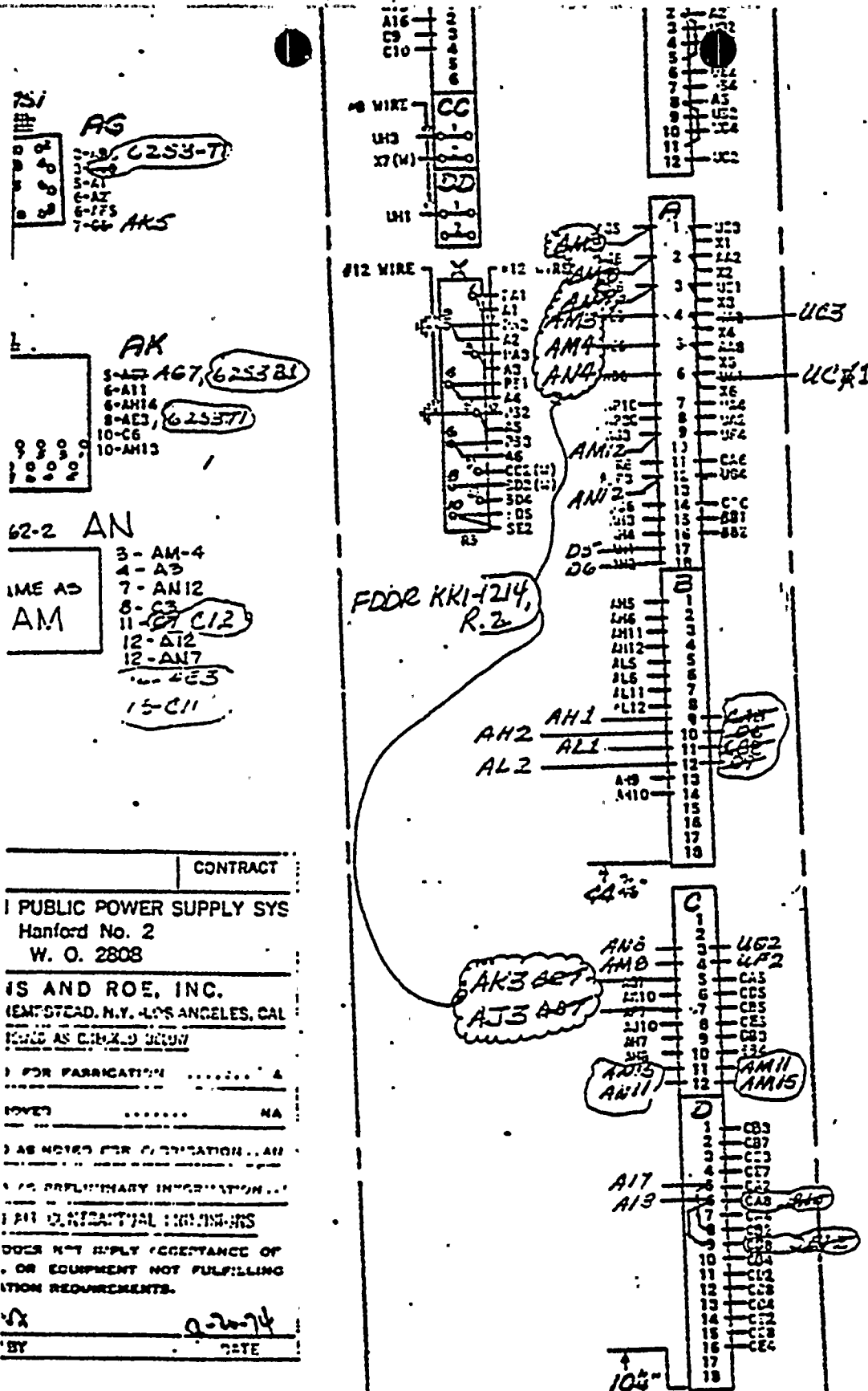
Sheet 5 of 12
Date 9-21-83
HWPL E22-S004

11 TITLE METALCLAD SWITCHGEAR CONNECTION

DIAGRAM UNIT 102

Zone A-H, 6-7

CONTRACT
 PUBLIC POWER SUPPLY SYS
 Hanford No. 2
 W. O. 2808
 IS AND ROE, INC.
 WESTSTEAD, N.Y. LOS ANGELES, CAL
 KILLED AS CANCELED ORDER
 FOR FABRICATION
 DYES NA
 AS NOTED FOR CANCELLATION...
 PRELIMINARY INFORMATION...
 FOR CONTRACTUAL PURPOSES
 DOES NOT IMPLY ACCEPTANCE OF
 OR EQUIPMENT NOT FULFILLING
 ION REQUIREMENTS.
 2-2-74
 BY DATE



LEFT SIDE SHEET FRONT VIEW

3390-23-2

TERMINATION INSTRUCTIONS

TOTAL NO. INTERCONNECTS THIS SHEET: 17

NO.	COND. SIZE	NOMENCLATURE	FROM		TO		TERMINATED BY	DATE	CRIMP TOOL #	COMMENT
			BLOCK	POINT	BLOCK	POINT				
1		REMOVE	AD	3	AR	M1				
2		REMOVE	AD	3	AM	14				
3		REMOVE	AD	5	AE	6				
4		REMOVE	AD	6	A	6				
5		REMOVE	AD	7	C	7				
6		REMOVE	AD	7	AJ	5				
7		REMOVE	AE	3	AQ	M1				
8		REMOVE	AE	3	AN	14				
9		REMOVE	AE	5	A	4				
10		REMOVE	AE	6	A	5				
11		REMOVE	AE	7	C	5				
12		REMOVE	AE	7	AK	5				
13		ADD	AJ	5	AJ	2				
14		ADD	AJ	5	AR	M1				
15		ADD	AM	14	AJ	2				
16		ADD	AJ	3	C	7				
17		ADD	AK	5	AK	2				

SPECIAL INSTRUCTIONS:

INSPECTED BY:

FOREMAN

TS16

TERMINATION INSTRUCTIONS

TOTAL NO. INTERCONNECTS THIS SHEET: 9

[illegible]

SPECIAL INSTRUCTIONS:

INSPECTED BY:

FOREMAN:

TSI

HANFORD 2

No. KKI-1214, Rev. 1

Document No.

Sh

Rev

FIELD DEVIATION
DISPOSITION REPORT

Sheet 8 of 12

TITLE

Date 9-15-83

XPL E22-5004

Zone

THIS SHEET REVISES SHEET 5 OF KKI-1214, REV. 0

3

3.1.5 Adjust and verify relays 62S-1 and 62S-2
time delay pickup at ~~four (4)~~ ^{two (2)} seconds.

3.1.6 Adjust and verify relays 62S-3 and 62S-4
time delay pickup at two (2) seconds.

4.0 REFERENCE DOCUMENTS

4.1 731E302AD

4.2 VPF # 3390-28(5)-3, Schematic Drawing

4.3 VPF # 3390-23-3, SWGR Wiring Diagram

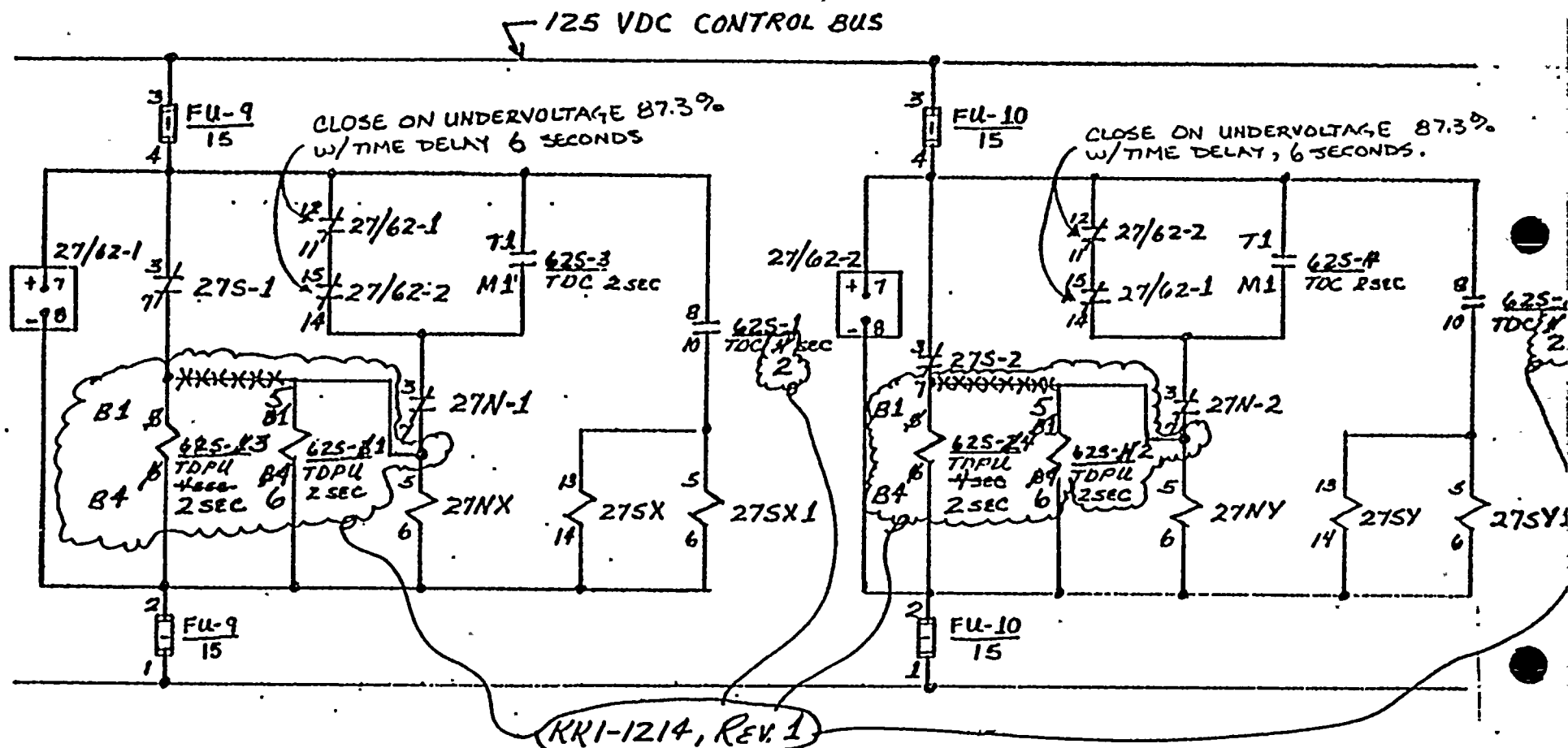
4.4 VPF # 3390-14-7, SWGR Layout



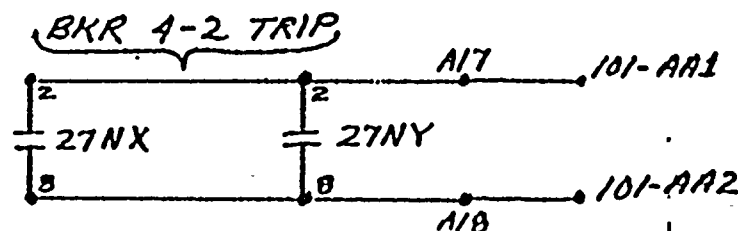
MANFORD 2

FIELD DEVIATION
DISPOSITION REPORTNO. KKI-1214, Rev. 1Sheet 9 of 12Date 9-15-83NPL E22-5004

Zone

INSTRUMENT NO. 0184B1719SH 5 REV 1TITLE Electrical Diagram Unit-102 Potential and
Undervoltage CircuitTHIS SHEET REVISES SHEET 6 OF KKI-1214, REV. 0
5

1. 27/62-1/2 RELAY COILS, ARE
SHOWN AS THE SAME IN BOTH
CIRCUITS



REVISION TO DWG. 0184B1719, Sh. 5

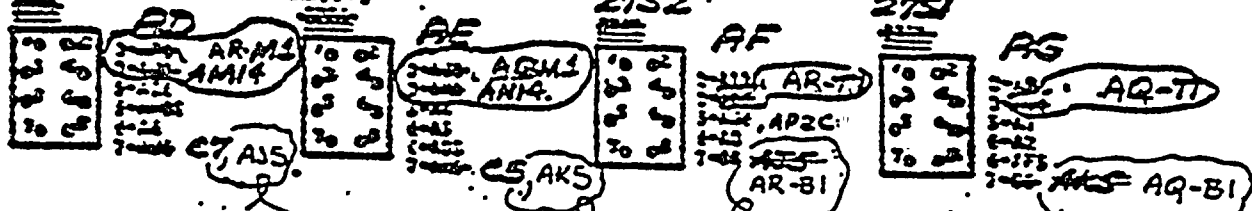
FIELD DEVIATION
DISPOSITION REPORT

27N2

27N1

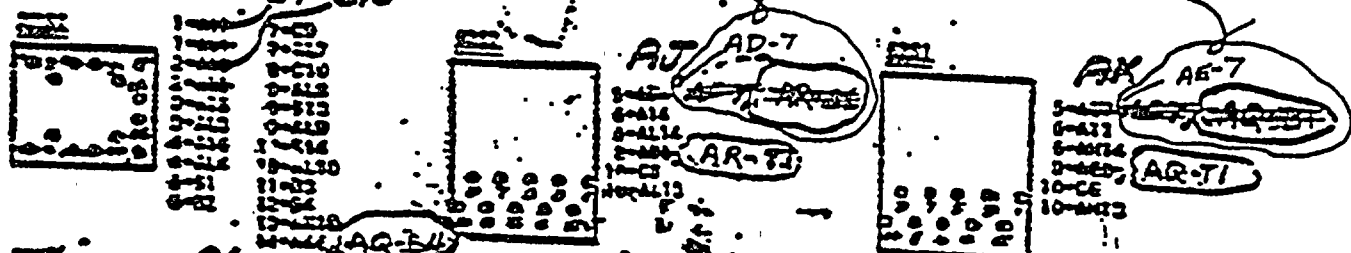
27S2

27S1



PH 310

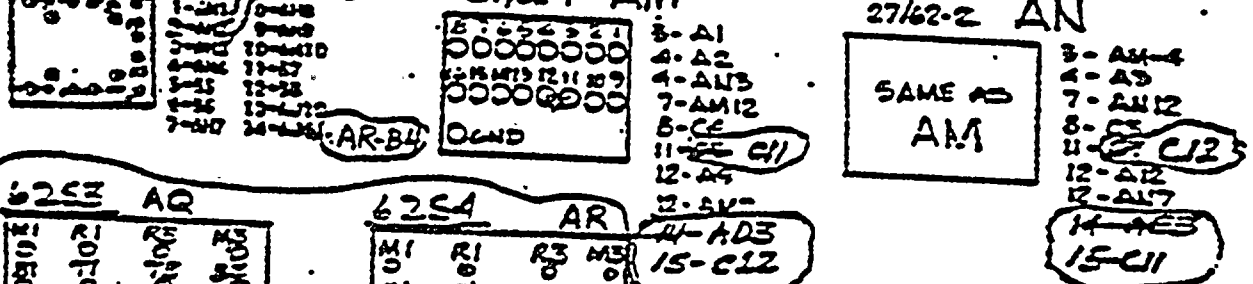
THIS FDDR



PH 312

27/62-1 AM

27/62-2 AN



6253 AQ

0501	0502	0503	0504
0505	0506	0507	0508
0509	0510	0511	0512
0513	0514	0515	0516

6254 AR

M1	R1	R2	M2
S1	T1	T2	E1
E2	T3	T4	R3
M3	R4	R5	M4

P1-AR5 AG-7
E4-AM14
T1-AG3, AK5
M5-AE3

P1-AR5 AF-7
E4-AM14
T1-AF3, AJ3
M5-AE3

THIS FDDR

THIS SHEET REVISES
SH. 7 OF KK1-1214 R.O

CONTRACT	
WASHINGTON PUBLIC POWER SUPPLY SYS	
Hartford No. 2	
W. O. 2808	
BURNS AND ROE, INC.	
GRADEN, N.J. - NEW YORK, N.Y. - LOS ANGELES, CAL.	
REVISION AS ORDERED	
<input type="checkbox"/>	APPROVED FOR FABRICATION
<input type="checkbox"/>	NOT LISTED
<input type="checkbox"/>	APPROVED AS WORK FOR FABRICATION
<input type="checkbox"/>	APPROVED FOR PRELIMINARY INSPECTION
THIS REVIEW DOES NOT IMPLY ACCEPTANCE OF ANY MATERIAL OR EQUIPMENT NOT FULFILLING ALL SPECIFICATION REQUIREMENTS.	
D. J. Cantelero	
PROCESSED BY	

ANFORD

No. K4-1214 R.ODOCUMENT NO. 0123D3801-SIU-102REV 1FIELD DEVIATION
POSITION REPORTSHEET 11 OF 12DATE 8-30-83MPL E22-S004TITLE METAL CLAD SWITCHGEAR OPT
CONNECTION DIAGRAM (VPE # 9590-23-2)UNIT 102

TERMINATION INSTRUCTIONS

THIS SHEET REUSES
SH 17 OF K4-1214 R.OTOTAL NO. INTERCONNECTS THIS SHEET: 17
USE #14 AWG WIRE.

O.	COND. SIZE	NOMENCLATURE	FROM		TO		TERMINATED BY	DATE	CRIMP TOOL #	COMMENT
			BLOCK	POINT	BLOCK	POINT				
1		REMOVE	C	5	AM	11				
2		REMOVE	C	7	AN	11				
3		REMOVE	AE	3	AG	3				
4		REMOVE	AD	3	AF	3				
5		REMOVE	B	9	CA	8				
6		REMOVE	D	6	B	10				
7		REMOVE	B	11	CB	8				
8		REMOVE	D	9	B	12				
9		ADD	AM	11	C	11				
10		ADD	AM	14	AD	3				
11		ADD	AM	15	C	12				
12		ADD	AN	11	C	12				
13		ADD	AN	14	AE	3				
14		ADD	AN	15	C	11				
15		ADD	AG	3	AQ	T1				
16		ADD	AF	3	AR	T1				
17		ADD	AQ	B1	AK AG	579	THIS FDR			

SPECIAL INSTRUCTIONS:

HANFORD
FIELD DEVIATION
DISPOSITION REPORT

No. KK1-1214 R.O.
SHEET 12 OF 12
DATE 8-30-83
MPI E22-5007

DOCUMENT NO. 012303801 SH 11-102 REV 1
TITLE METALCLAD SWITCHGEAR CONNECTION
DIAGRAM (VPE # 3390-23-2)

TERMINATION INSTRUCTIONS

THIS SHEET REVISES SH 16
OF KK1-1214 R.O.

35 REMOVE AJ 8 AD 3
36 REMOVE AK 8 AE 3
TOTAL NO. INTERCONNECTS THIS SHEET: 19

NO.	COND. SIZE	NOMENCLATURE	FROM		TO		TERMINATED BY	DATE	CRIMP TOOL #	COMMENTS
			BLOCK	POINT	BLOCK	POINT				
18		ADD	GAQ	B4	AH	14				
19		ADD	AQ	T1	AG	3				
20		ADD	AQ	T1	AK	8				
21		ADD	AQ	M1	AE	3				
22		ADD	AR	B1	AF	14				
23		ADD	AR	B4	AL	14				
24		ADD	AK	T1	AF	3				
25		ADD	AK	T1	AJ	8				
26		ADD	AR	M1	AD	3				
27		ADD	AK	5	AE	7				
28		ADD	AK	8	AQ	T1				
29		ADD	AJ	5	AR	7				
30		ADD	AJ	8	AK	T1				
31		ADD	AH	14	AQ	B4				
32		ADD	CA	8	D	6				
33		ADD	CB	8	D	9				
34		ADD	AL	14	AR	B4				

SPECIAL INSTRUCTIONS:

FIELD DEVIATION
DISPOSITION REPORT

Sheet 2 of 17

TITLE _____

Date 8-31-83

MPL E22-5004

Zone _____

DESCRIPTION OF TASK

1.0 PURPOSE OF CHANGE

- 1.1 Modify the existing primary UV protection circuit to provide a 2 sec. time delay following primary UV protection trips before tripping the normal supply breaker.
- 1.2 Modify the second level of UV protection to provide 2 out of 2 coincident trip logic.
- 1.3 Modify the primary and secondary level UV trip logic to permit closure of the normal supply breaker to a deenergized SM-4 bus.

2.0 MATERIAL REQUIRED

- 2.1 Two Agastat ETR14D3AC2004002 relays, Class 1-E, 125 Vdc TDPUL 2 sec. or equivalent.
- 2.2 Wire No. 14 AWG per 175A7293 P006.

3.0 PROCEDURE3.1 WORK SEQUENCE

- 3.1.1 Mount two relays in Switchgear Cub 102 as shown on sheets 13-17.
- 3.1.2 Perform wiring changes per sheets 11 and 12.
- 3.1.3 Adjust and verify deenergizing voltage of relays 27N-1 and 27N-2 at 90 % of nominal bus SM-4 voltage.
- 3.1.4 Verify pickup voltage of relays 27N-1 and 27N-2 at less than or equal to 100 % of nominal bus SM-4 voltage.

HANFORD 2

No. KK1-12/4

Document No. Sh Rev

Sheet 3 of 17

TITLE

FIELD DEVIATION
DISPOSITION REPORT

Date 8-31-83

MPL E22-S004

Zone

3.1.5 Adjust and verify relays 62S-1 and 62S-2
time delay pickup at four (4) seconds.

3.1.6 Adjust and verify relays 62S-3 and 62S-4
time delay pickup at two (2) seconds.

4.0 REFERENCE DOCUMENTS

4.1 731E302AD

4.2 VPF # 3390-28(5)-3, Schematic Drawing

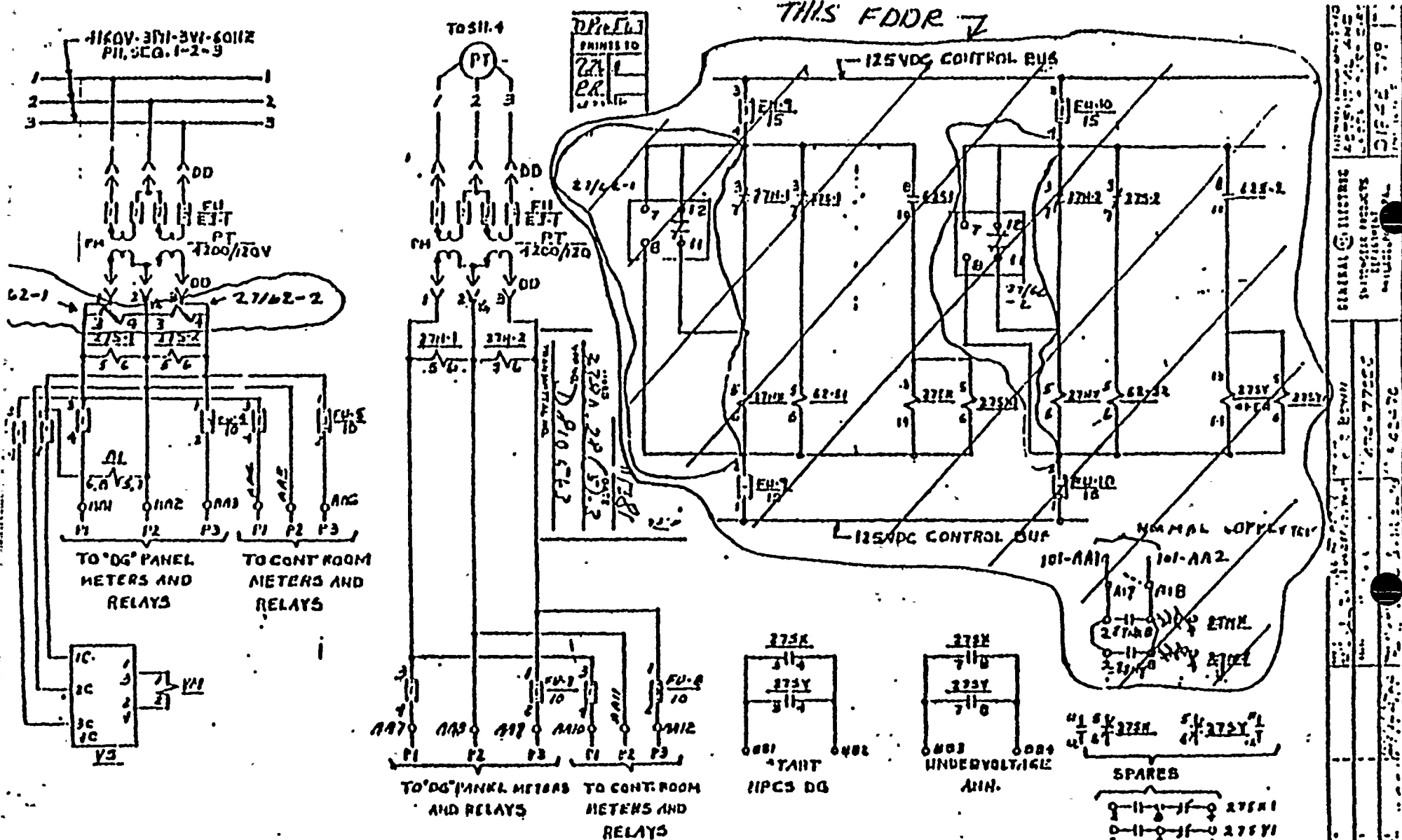
4.3 VPF # 3390-23-3, SWGR Wiring Diagram

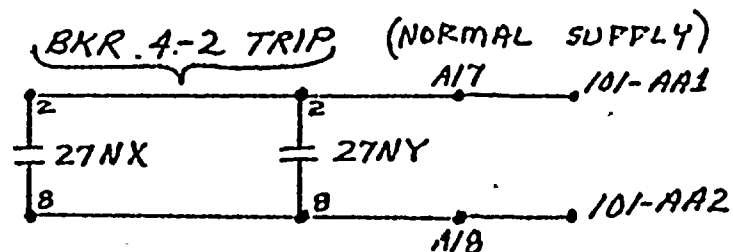
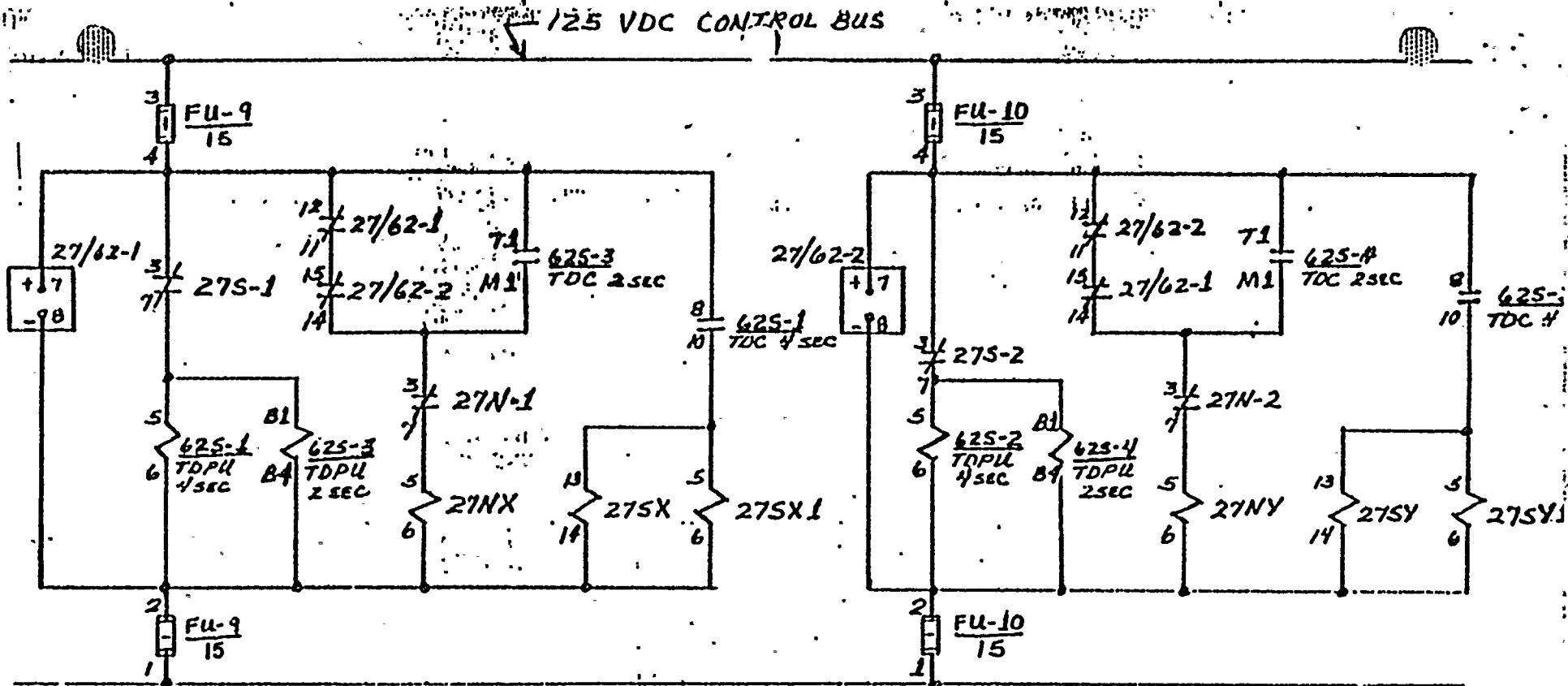
4.4 VPF # 3390-14-7; SWGR Layout

HAINFORD 2

 NO. KKI-1214
 Sheet 4 of 17
 Date 8-31-83
 MPL E22-S004

 DOCUMENT NO. 018481719
 TITLE Electrical Diagram Unit-102 Potential and
 Undervoltage Circuit
 Zone

 FIELD DEVIATION
 DISPOSITION REPORT




REVISION TO DWG. 0184B1719, Sh. 5

NO. KK1-1214
 Sheet 5 of 17
 Date 8-31-83
 NPL E22-S004
 FIELD DEVIATION
 DISPOSITION REPORT

DOCUMENT NO. 0184B1719
 SII 5 REV 1
 TITLE Electrical Diagram Unit-102 Potential and Under-voltage Circuit
 Zone

NO. KK1-1214
Sheet 6 of 17
Date 8-31-83
EMPL E22-S004

WATFORD 2

FIELD DEVIATION

DISPOSITION REPORT

CONTRACT
WASHINGTON PUBLIC POWER SUPPLY SYS
Hanford No. 2
W. O. 2808

BURNS AND ROE, INC.
TRADELL, N.J. • HENSTAD, N.Y. • LOS ANGELES, CAL.
REVISED AS CURRENT DATA

☐ APPROVED FOR FABRICATION

U/NOT APPROVED NA

10. החלטות .

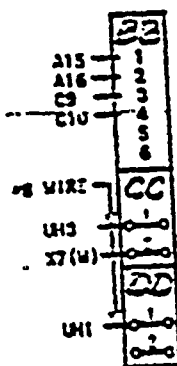
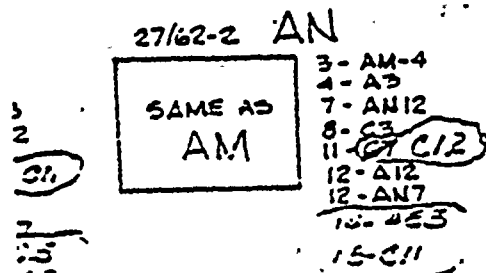
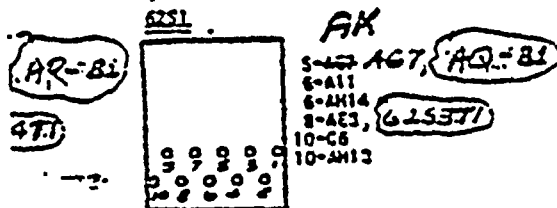
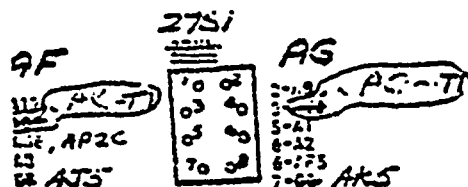
U.S. AIR FORCE - MILITARY INFORMATION

33-0. All INFORMATION CONTAINED HEREIN IS UNCLASSIFIED

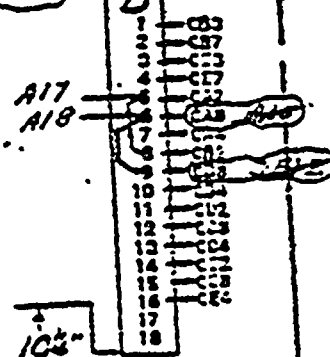
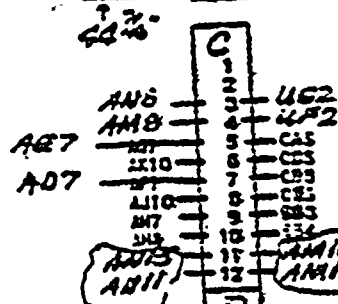
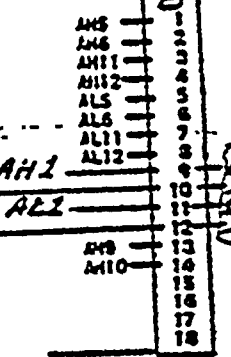
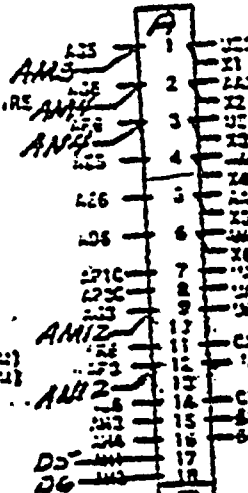
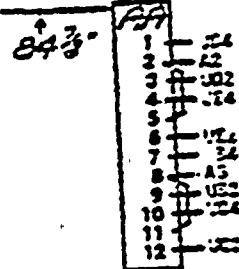
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ANY MATERIAL OR EQUIPMENT NOT FULFILLING
ALL SPECIFICATION REQUIREMENTS.

D. L. 41-2
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#12 WIRE



VIES

VPF# 3390-23-2

LEFT SIDE JACKET FRONT VIEW

901 METAL CLAD SWGR CONN. DIAG.

Document No. 57-3
TITLE METAL CLIP SWITCHGEAR

UNIT-102

Zone B-E, 1-5

27#2

2741

2752

275

三

BD
AR-M1
AM14
C7

7-10-68
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3-44	9-513
3-44	9-418
4-44	1-414
4-44	10-410
4-44	11-23
4-44	12-64
4-44	12-410

[illegible]

AK
5-~~AG~~ AG7, AQ=BI
5-A11
5-A118
3-AG, AQ=TI
10-CE
10-A113



PL BU 812

1-207	3-210
2-207	5-210
3-207	10-210
4-214	11-27
5-25	12-28
6-26	13-212
7-207	14-214

AR-E

27/62-1

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4-A2
4-AN3
7-AM12
8-CA
11-~~EE~~ C11
12-A4
12-AN7
14-AD3
15-C12

R
MS

27/62-2 AN
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3-AM-4
4-A3
7-AM12
8-C3
11-C12
12-A12
12-AM7
14-AE3
15-C11

6253	AQ	
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0000	00	M4
0000	00	00

P1- AK5
 E4- AH4
 T1- AG3, AKB
 M1- AES

6254		AR	
M1	R1	R3	M3
81	T1	T3	E3
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E2	T2	T4	E4
0	0	0	0
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24-AL14
T1-AFE, AJS
M1-AJS

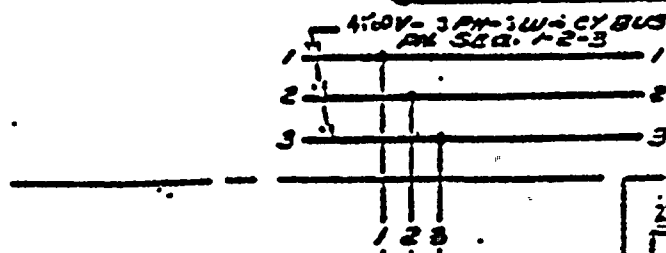
AP
12-45
25-40
30-43
1-45
2-45

CONTRACT	
WASHINGTON PUBLIC POWER SUPPLY SYS Hanford No. 2 W. O. 2808	
BURNS AND ROE, INC. ORADELL, N.J. • HENRIKSTAD, N.Y. • LOS ANGELES, CAL.	
REVIEW AS CHECKED BY	
<input type="checkbox"/>	APPROVED FOR FABRICATION
<input type="checkbox"/>	NOT APPROVED
<input checked="" type="checkbox"/>	APPROVED AS NOTED FOR FABRICATION
<input type="checkbox"/>	DEFERRED FOR PRELIMINARY INFORMATION
SPEC. OF CONFIDENTIALITY	
THIS REVIEW DOES NOT IMPLY ACCEPTANCE OF ANY MATERIAL OR EQUIPMENT NOT FULFILLING ALL SPECIFICATION REQUIREMENTS.	
D. J. Smith PROCESSED BY	

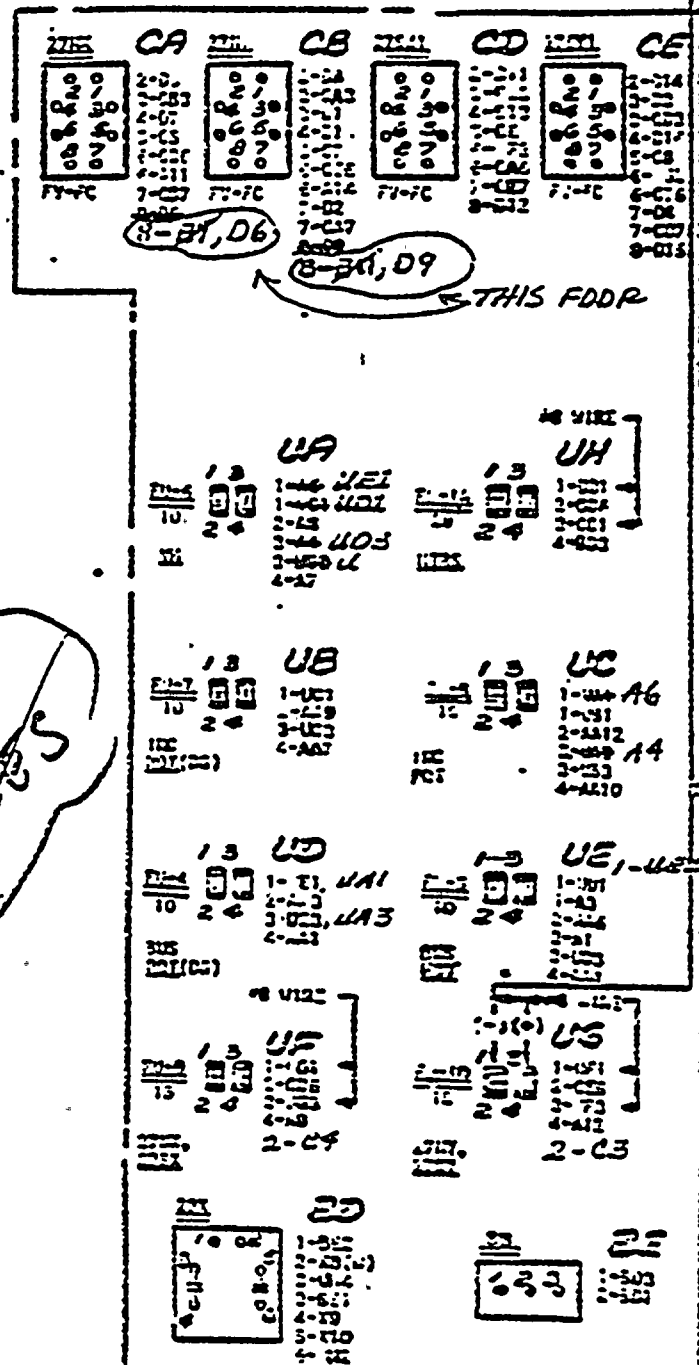
300R BACK VIEW

12303801 METALCLAD SWGR CONN. DIAG., VPF # 3390-23-2

UNIT 2
METAL CLAD SWITCHGEAR - UNIT 2
Zone B 10

[illegible][illegible]

012303801		METAL CLAD SWITCHGEAR	
		SECTION DIAGRAM	
	0121.75	FRONT VIEW	75-77
	0121.75	75-77	205-ACT
	0121.75	75-77	205-ACT



VPF# 3390-23-2

FIELD DEVIATION DISPOSITION REPORT

No. KK1- 1214
 Sheet 9 of 17
 Date 8-31-83
 NPL E22-5004

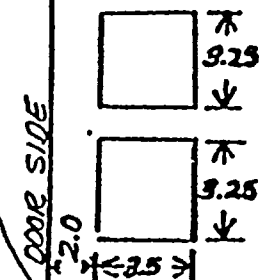
FILE METAL CLAD SWITCHGEAR

VPF # 3390-14-7

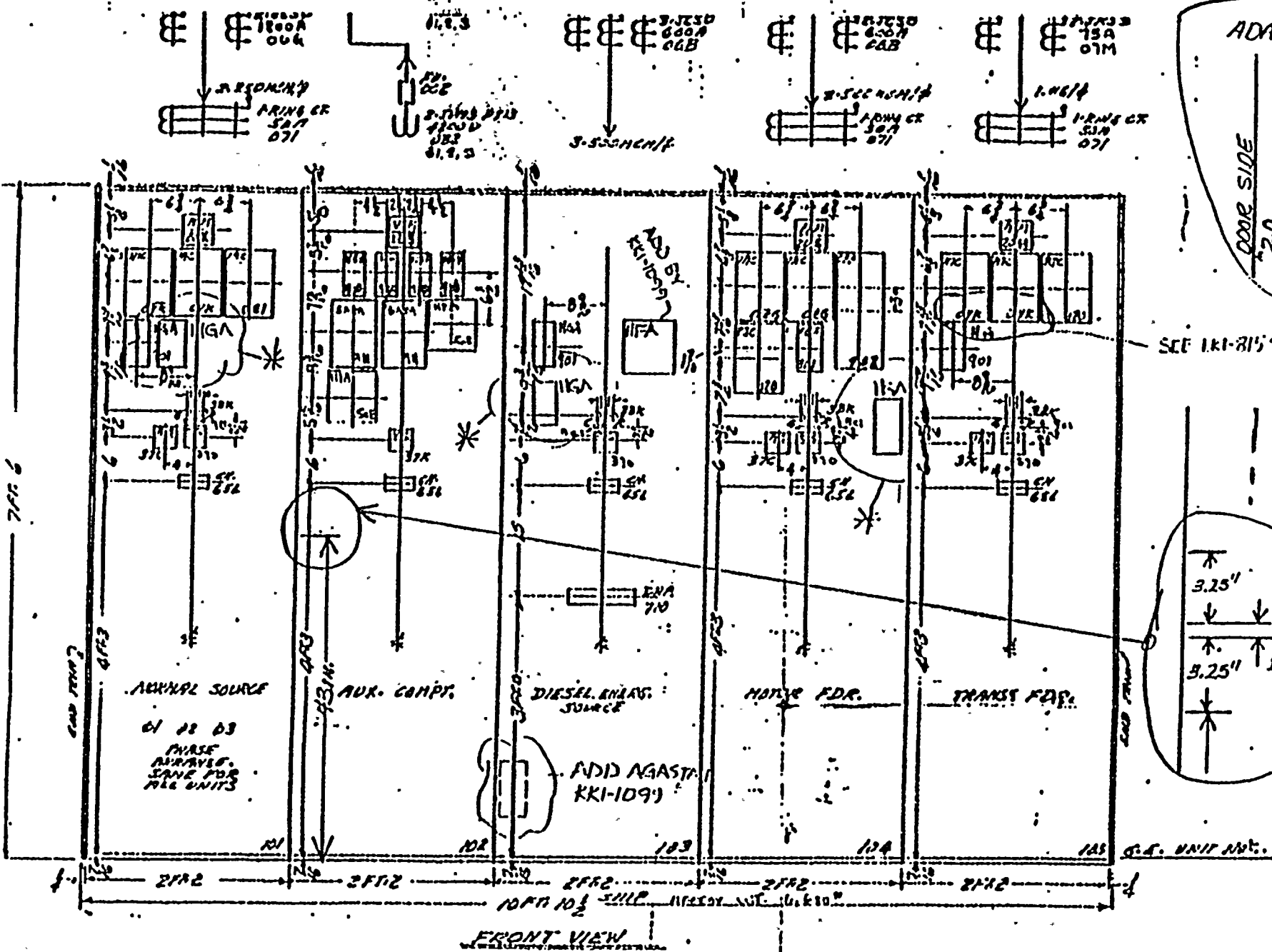
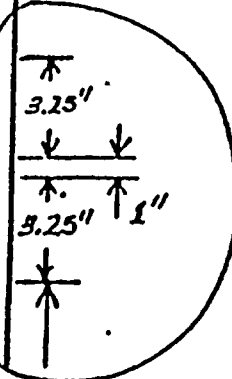
Zone D4

THIS FDDR 7

ADAPTED PLATE



SECRET

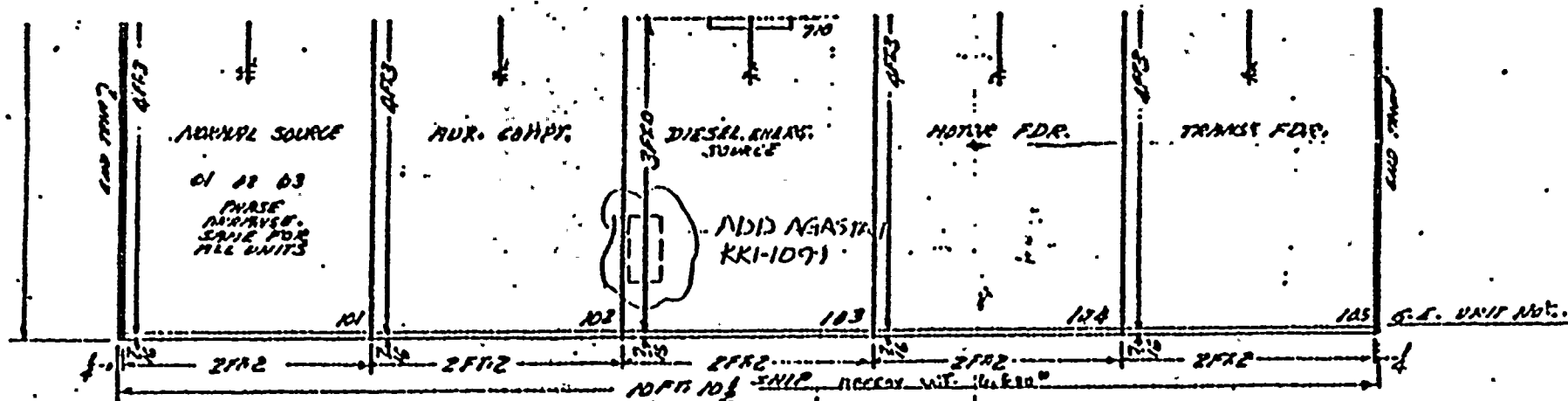


HAIFORD 2

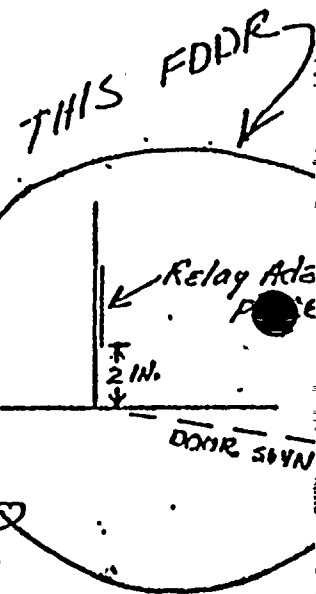
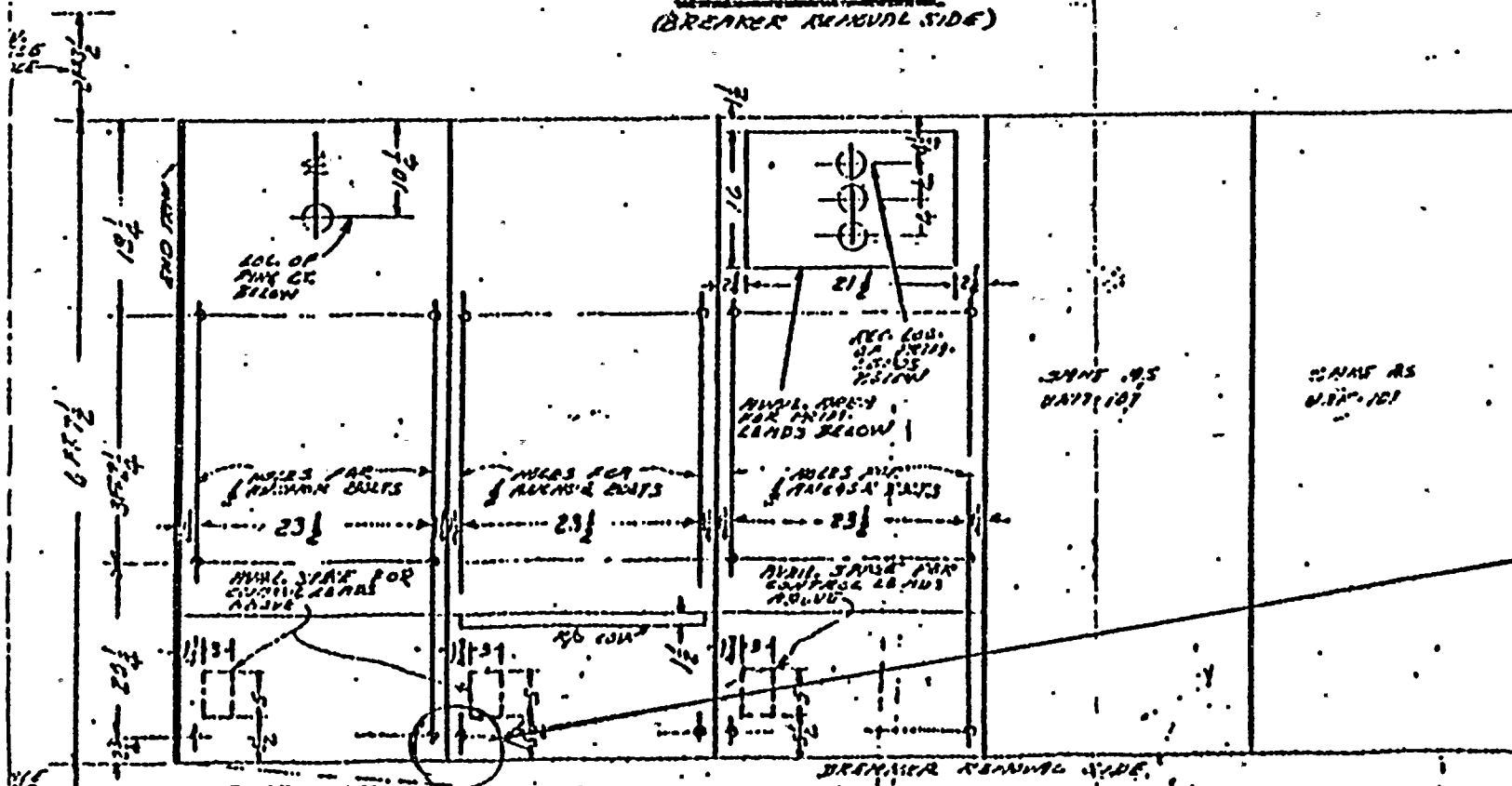
FIELD DEVIATION
DISPOSITION REPORT

NO. KKI- 1217
Street 10 of 17
Date 8-31-83
HPL E22-S004

DOCUMENT NO. 012101000
RE METALCLAD SWITCHGEAR
VPF# 3390-14-7
Zone H4



FRONT VIEW
(BREAKER REMOVAL SIDE)



HANFORD 2
FIELD DEVIATION
DISPOSITION REPORT

No. KKI-1214
Sheet 11 of 17
Date 8-31-83
MPL E22-5004

Document No. 169C918 Sh 3 Rev 5
TITLE Purchase Part. Drawing
Zone A-C, 1-3

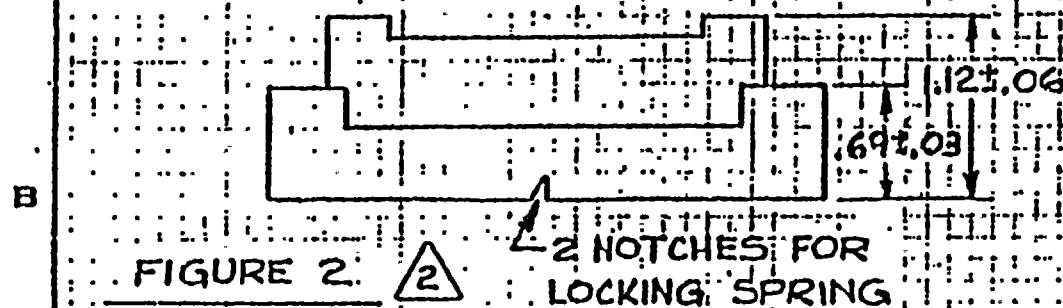
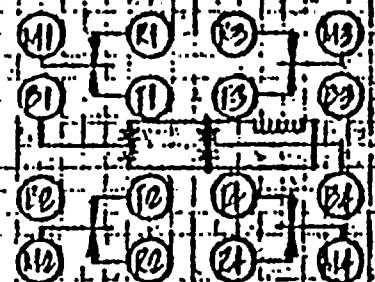
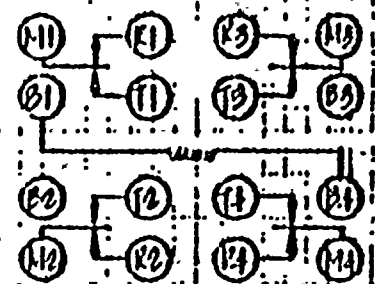
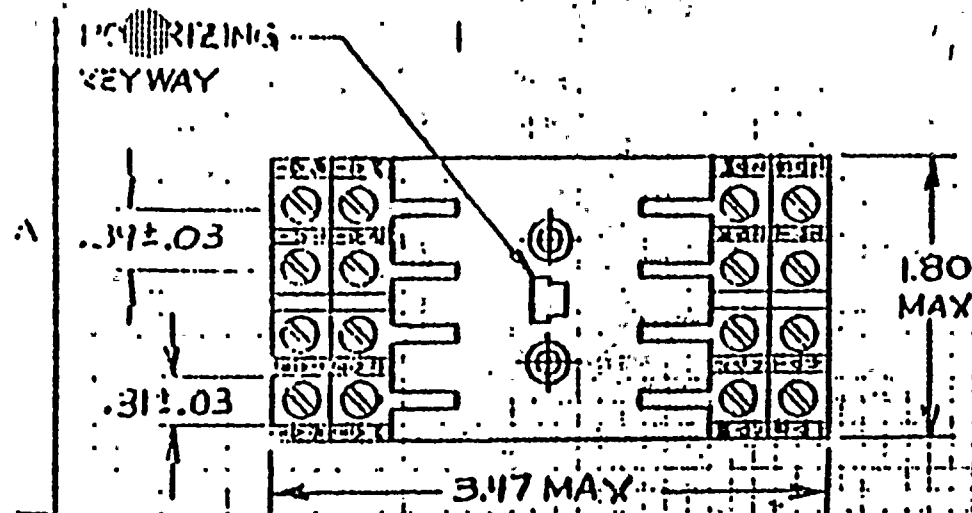


FIGURE 2
SOCKET
ECR0002001

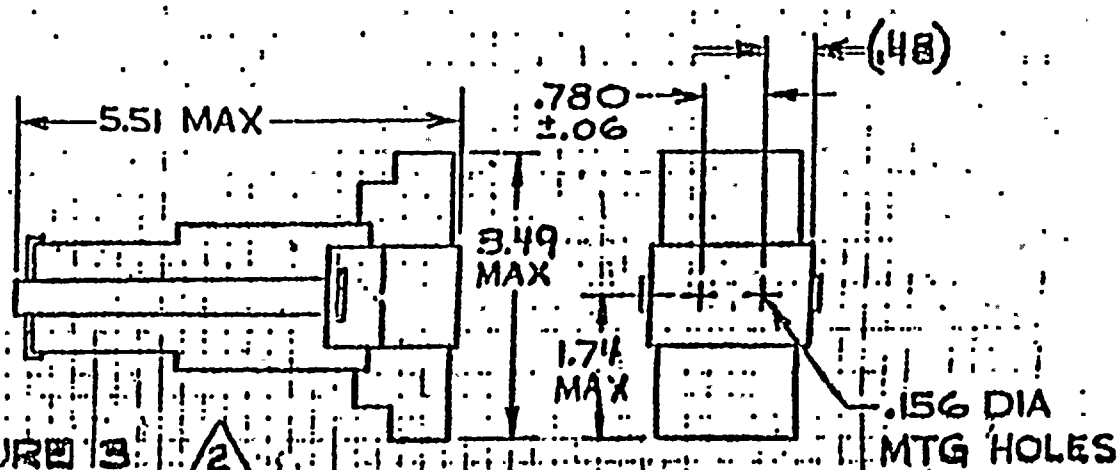
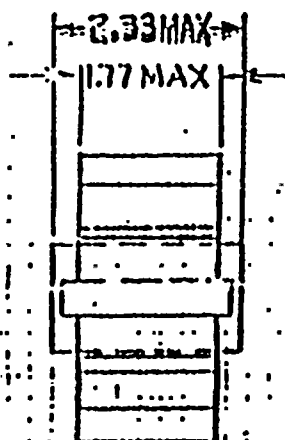


FIGURE 3

RELAY WITH ECR0002001 SOCKET (WITH SCREW TERMINALS)

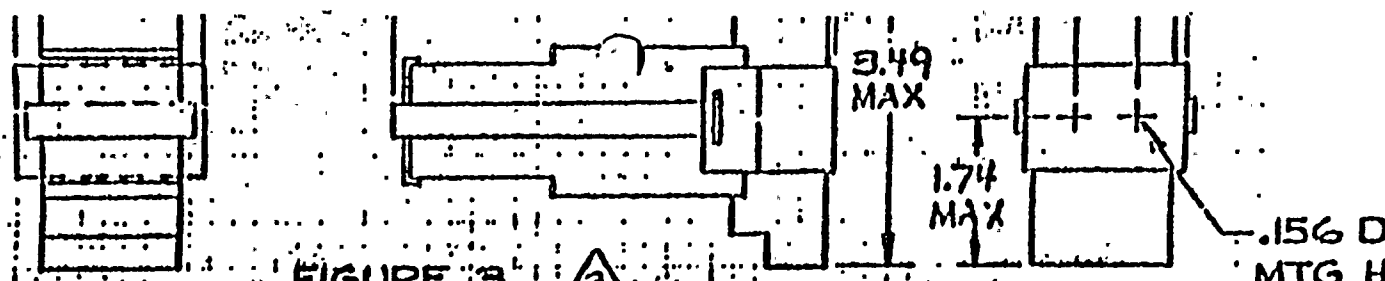


FIGURE 3 2

RELAY WITH ECR0002001 SOCKET (WITH SCREW TERMINALS)
AND ECR033001 LOCKING STRAP

5

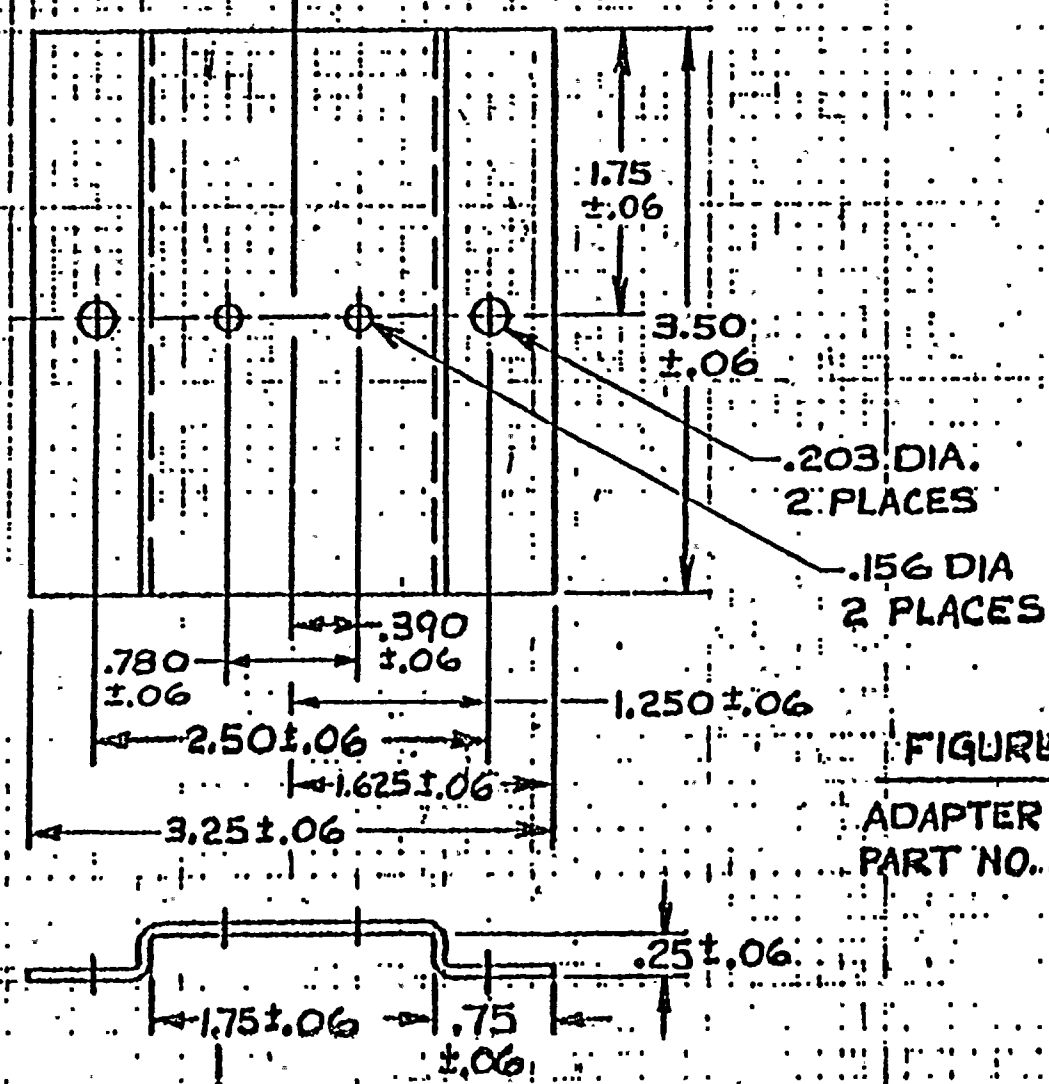


FIGURE 4 2

ADAPTER PLATE
PART NO. 34176-01

C
D
E

HANFORD 2

No. KI-12

Document No. 169C9488 Sh 3 Rev 5

FIELD DEVIATION
DISPOSITION REPORT

Sheet 13 of 17
Date 8-31-83
MPL E22-5004

Zone G-H, 1-3

169C9488
REV NC
1-27-84

(SOCKET) ECR002001	
(STRAP) ECR0133001	
(ADAPTER) 3417601	

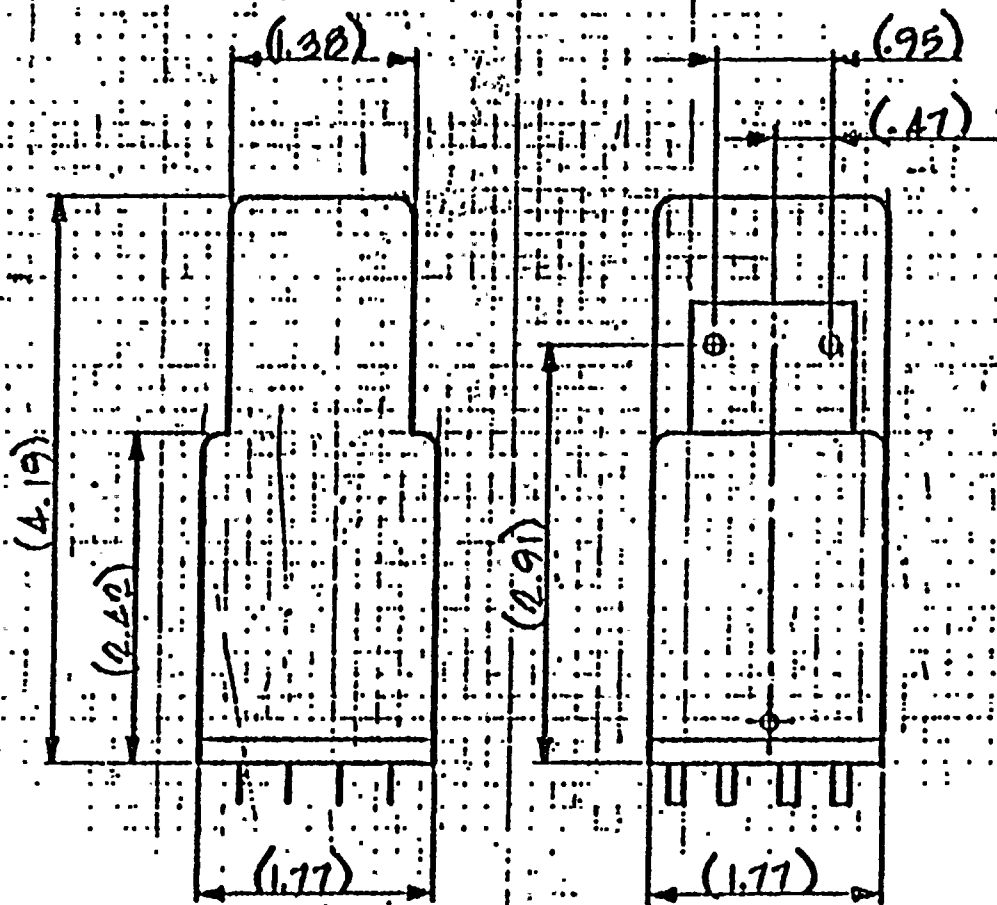


FIGURE 1
RELAY

REVISIONS		PRINTS TO	
5	NJ35679	1	AML-1663 4-29-81
		2	NJ 23264
		3	NJ26826
		4	NJ29559

HANFORD 2

NO. KKI-1214

DOCUMENT NO. 731E302ADN 1 REV

Sheet 14 of 17

TITLE HPCS Power Supply

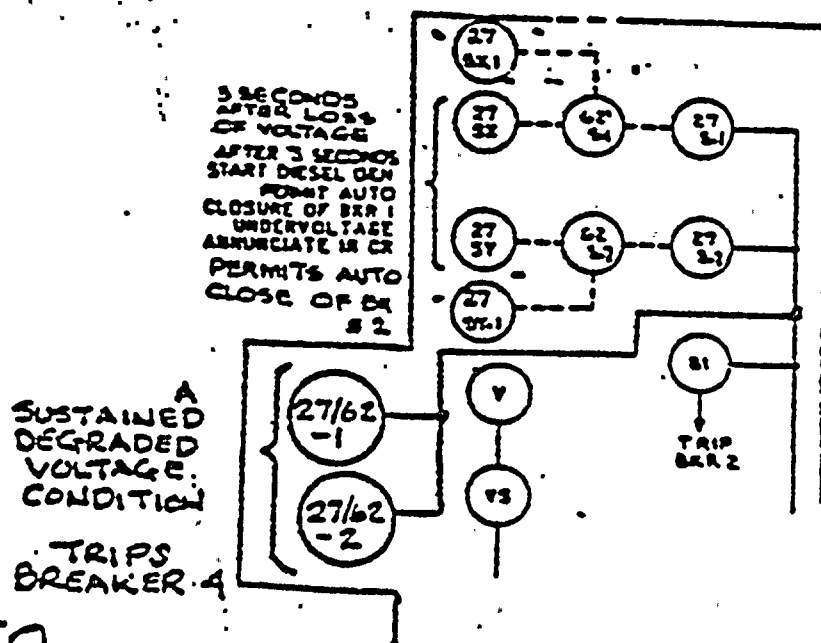
FIELD DEVIATION
DISPOSITION REPORT

Date 8-31-83

MPL E22-S004

Zone D-6

731E302 AD HPCS POWER SUPPLY ONE LINE DIAGRAM

SH.1 (ZONE D-6), CHANGE AS SHOWN;
FROMTO

SEE SHEET 15

THIS FDDR

HANFORD 2

No. KK1-1214

Document No. T31E302AD Sh | Rev 1

FIELD DEVIATION
DISPOSITION REPORT

Sheet 15 of 17

TITLE APCS PWR SUPPLY

Date E-31-83

MPL E22-5004

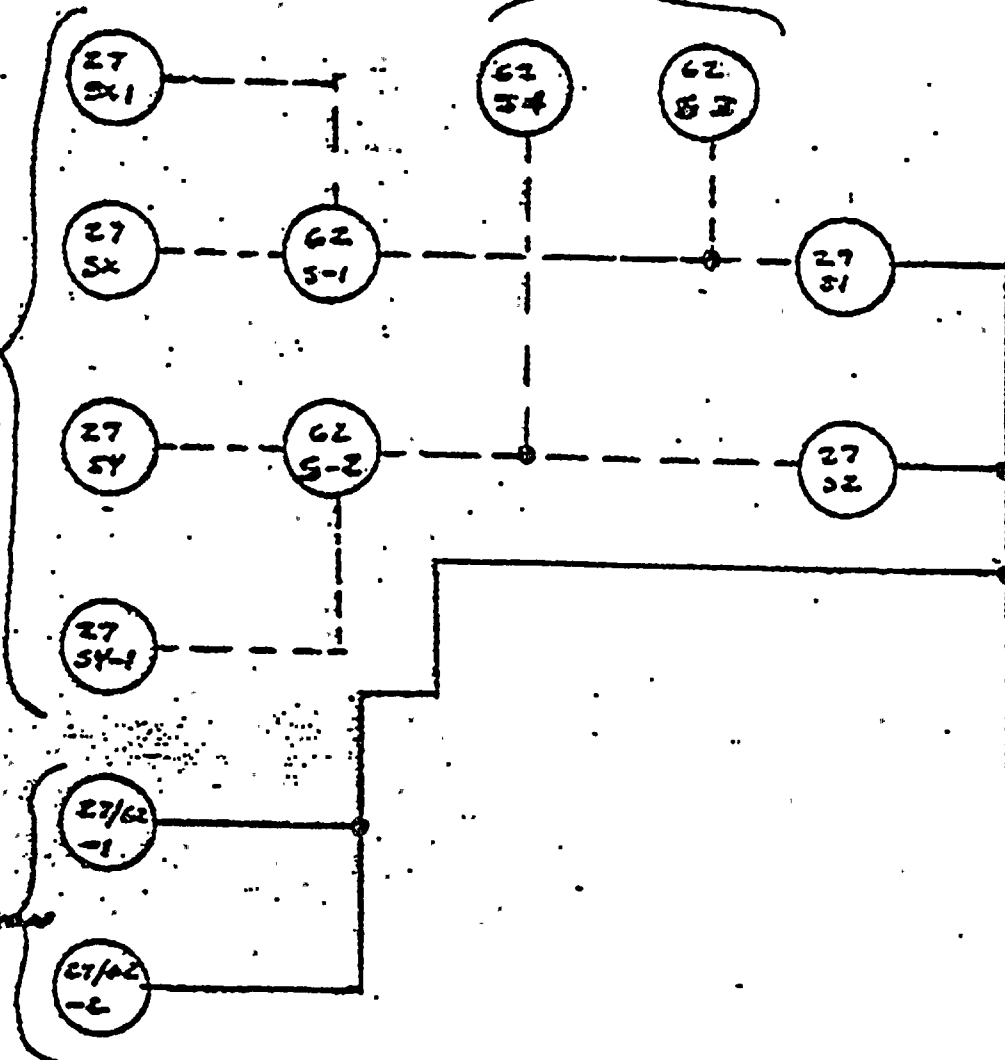
Zone D-6

TO

2 SECONDS AFTER
LOSS OF VOLTAGE
TRIP BREAKER 4

4 SECONDS
AFTER LOSS
OF VOLTAGE
START D/G
PERMIT AUTO
CLOSURE OF BRK 1
UNDER-
VOLTAGE
ARMOR, 10 CL.
PERMIT AUTO
CLOSURE OF
BRK 2

A
SUSTAINED
DEGRADED
VOLTAGE CONDITION
TRIPS
BREAKER 4



HANFORD
FIELD DEVIATION
DISPOSITION REPORT

No. VKI-1214
SHEET 16 OF 17
DATE 8-30-83
MPL E22-S007

Document NO. 712303801 SH 11-102-REV 1
TITLE METALCLAD SWITCHGEAR CONNECTION
DIAGRAM (VPF # 3390-23-2)

TERMINATION INSTRUCTIONS

35	REMOVE	AJ	8	AD	3
36	REMOVE	AK	8	AE	3
TOTAL NO. INTERCONNECTS THIS SHEET:		19			

NO.	COND. SIZE	NOMENCLATURE	FROM		TO		TERMINATED BY	DATE	CRIMP TOOL #	COMMENTS
			BLOCK	POINT	BLOCK	POINT				
18		ADD	GAQ	B4	AH	14				
19		ADD	AQ	T1	AG	3				
20		ADD	AQ	T1	AK	8				
21		ADD	AQ	M1	AE	3				
22		ADD	AR	B1	AJ	5				
23		ADD	AR	B4	AL	14				
24		ADD	AR	T1	AF	3				
25		ADD	AR	T1	AJ	8				
26		ADD	AR	M1	AD	3				
27		ADD	AK	5	AQ	B1				
28		ADD	AK	8	AQ	T1				
29		ADD	AJ	5	AR	B1				
30		ADD	AJ	8	AR	T1				
31		ADD	AH	14	AQ	B4				
32		ADD	CA	8	D	6				
33		ADD	CB	8	D	9				
34		ADD	AL	14	AR	B4				

SPECIAL INSTRUCTIONS:

INSPECTED BY:

FOREMAN:

TSID

CONT. TEST OK: YES...

WATFORD 2
FIELD DEVIATION
DISPOSITION REPORT

NO. WV-214
SHEET 17 OF 17
DATE 8-30-83
MPL E22-S004

DOCUMENT NO. 0123D3801-SH4-102-REV 1
TITLE META-CLAD SWITCHGEAR - 2 WPT
CONNECTION DIAGRAM (VPE # 9390-23-2)

UNIT 102

TERMINATION INSTRUCTIONS

TOTAL NO. INTERCONNECTS THIS SHEET: 17

USE #14 AWG WIRE

NO.	COND. SIZE	NOMENCLATURE	FROM		TO		TERMINATED BY	DATE	CRIMP TOOL #	COMMENTS
			BLOCK	POINT	BLOCK	POINT				
1		REMOVE	C	5	AM	11				
2		REMOVE	C	7	AN	11				
3		REMOVE	AE	3	AG	3				
4		REMOVE	AD	3	AF	3				
5		REMOVE	B	9	CA	8				
6		REMOVE	D	6	B	10				
7		REMOVE	B	11	CB	8				
8		REMOVE	D	9	B	12				
9		ADD	AM	11	C	11				
10		ADD	AM	14	AD	3				
11		ADD	AM	15	C	12				
		ADD	AN	11	C	12				
		ADD	AN	14	AE	3				
14		ADD	AN	15	C	11				
15		ADD	AG	3	AQ	T1				
16		ADD	AF	3	AR	T1				
17		ADD	AQ	B1	AK	5				

SPECIAL INSTRUCTIONS:

INSPECTED BY:

FOREMAN:

8.3.1.2.4.3.2 Secondary Undervoltage Sensing

Static Class 1E undervoltage relays with definite time delay located in each of the redundant Division 1 and Division 2 4.16 kV Class 1E switchgear units are utilized for detection of sustained degraded voltage in the offsite power system. This protection scheme is designed to compliment the primary undervoltage scheme described above.

The trip setpoint of each relay is 3631 volts, corresponding to 87.3 percent of nominal bus voltage and 90.8 percent of nominal motor voltage. Trip setpoint selection is based upon insuring 90 percent of motor nominal voltage at the motor terminals, including allowance for feeder voltage drop. The relay automatically resets when the bus voltage exceeds 89.9% of nominal rating.

Eight seconds of time delay is provided to permit override of motor starting dip. The duration of motor starting voltage dip is very short lived - in the order of 2 to 5 seconds. The second level of undervoltage relays will not, therefore, initiate actions for this condition.

The relays operate to isolate the degraded source and initiate the sequence of events to select the next available source. Circuit design precludes spurious voltage loss signal and allows for testing of the individual relay, one at a time, without disrupting the protective function.

During loss-of-coolant accident, diesel generator power is available to the emergency loads 13 seconds after the sustained degraded grid voltage condition is sensed at the emergency bus. This time delay is derived from the 8-second delay prior to the offsite breaker trip plus a 5-second delay prior to the diesel generator breaker closure. The above time delay is acceptable since during a concurrent loss-of-coolant accident, the emergency core cooling system (ECCS) coolant injection time requirements as specified in Table 6.3-1 are met.

See Figures 8.3-16c and 8.3-17c for the logic diagrams of Divisions 1 and 2 secondary undervoltage protection.

The same voltage trip and time delay setpoints are used for the Division 3 secondary undervoltage relays. For Division 3, however, the diesel generator power is available at the bus *12* seconds after a coincident occurrence of a loss-of-coolant accident and a degraded grid condition. This time delay is equal to the 8-second delay prior to the offsite breaker trip plus *4* 5-second delay prior to the diesel generator breaker closure.