

GENERAL ELECTRIC

REVISION STATUS SHEET

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CONT ON SHEET 2 SH NO. 1

NUCLEAR ENERGY DIVISION

DOCUMENT TITLE ELECTRICAL PROTECTION ASSEMBLY

SPECIFICATION  DRAWING  OTHER

TYPE INSTALLATION SPECIFICATION

FMF REACTOR PROTECTION SYSTEM

MPL No. PRODUCT SUMMARY, SECTION 5

LEGEND OR DESCRIPTION OF GROUPS

**RECEIVED**  
**MAY - 4 1981**  
**DESIGN  
ENGINEERING**

REVISIONS

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ONLY**

**APPROVAL**  
CHR. \_\_\_\_\_ DATE \_\_\_\_\_  
APPR. \_\_\_\_\_ DATE \_\_\_\_\_  
ie No. APED-C71-028-NI

**DOCUMENT REVIEW:**  
IOWA ELECTRIC LIGHT & POWER  
DESIGN ENGINEERING DEPARTMENT  
1.  WORK MAY PROCEED.

3.  REVISE AND RESUBMIT.  
WORK MAY NOT PROCEED.

2.  REVISE AND RESUBMIT.  
WORK MAY PROCEED SUBJECT  
TO INCORPORATION OF  
CHANGES INDICATED.

4.  REVIEW NOT REQUIRED.  
WORK MAY PROCEED.

**IMPORTANT:** PERMISSION TO PROCEED DOES NOT CONSTITUTE  
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BY THE SUPPLIER AND DOES NOT RELIEVE SUPPLIER FROM FULL  
COMPLIANCE WITH CONTRACTUAL OBLIGATIONS.

ENGR. P. Shah GRP. LDR. C. Dejan for C. Tucciaro

QA Ed K. Peter 6/3/81 LICENSING NA

SUPERVISING ENG. Ed for PD Ward INITIAL DATE 5/26/81

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PRINTS TO

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## 1. SCOPE

1.1 This document provides engineering requirements for the installation of Electrical Protection Assemblies (EPA) used to protect components of the Reactor Protection System (RPS).

## 2. APPLICABLE DOCUMENTS

2.1 The following documents form a part of this specification to the extent specified herein.

### 2.2 General Electric Company Documents

- |   |              |
|---|--------------|
| a. Electrical Protection Assembly<br>(Design Specification)             | 22A5941      |
| b. Reactor Protection System<br>MG Set Control (Elementary<br>Drawing)  | 913E940      |
| c. Electrical Protection Assembly<br>(Operation and Maintenance Manual) | VPF 383083-1 |

### 2.3 Codes and Standards

- a. Institute of Electrical and Electronic Engineers (IEEE)
- (1) Standard Criteria for Independence of Class 1E Equipment and Circuits  
IEEE 384 (1977)
  - (2) Criteria for Protection Systems for Nuclear Power Generating Stations  
IEEE 279 (1971)
- b. Regulatory Guide (USNRC)
- (1) 1.75, Physical Independence of Electrical Systems

## 3. DESCRIPTION

3.1 The Electrical Protection Assembly (EPA) is described in design specification 22A5941. EPAs are required to protect Reactor Protection System (RPS) components from the effects of overvoltage, undervoltage, and underfrequency.

3.2 Two units are installed in series in the load side, in each of the power supply lines, from each of the two RPS motor-generator sets and from the alternative power source

3.3 The EPAs are designed and qualified to IEEE Class 1E requirements (IEEE 279).

#### 4. REQUIREMENTS

4.1 Exact location of the EPA installation may be selected by the Installer; however, the following requirements must be met.

- |   |  |
|---|--|
| a. Enclosure mounting:                            | Vertical   |
| b. Temperature range:                             | 40° to 122°F   |
| c. Relative Humidity Range:                       | 10 to 95%  |
| d. Radiation exposure:<br>(total integrated dose) | Group 1 $2.0 \times 10^4$ rad<br>Group 2 $2.0 \times 10^5$ rad |
| e. Seismic Excitation Requirements                |  |
| (1) Operating Base Earthquake                     | 5.0 g  |
| (2) Safe Shutdown Earthquake                      | 7.0 g  |
| (3) Frequency                                     | 1 to 33 Hz   |

4.2 The following distances between EPA components are mandatory (Figure 1):

- |   |        |
|---|--------|
| a. Minimum vertical separation  | 3 feet |
| b. Minimum horizontal separation<br>between any two EPAs in series<br>with any other series of two EPAs | 3 feet |

4.3 Input and output power and instrumentation cables shall be routed independently and in separate conduit or cable trays to meet the divisional requirements of IEEE 384, and Regulatory Guide 1.75.

4.4 Prior to installation, the EPA units for MG set A must be functionally tested and calibrated for 120 Vac, 60 Hz, 1Ø operation. Refer to Reference 2.2.a.

4.5 The EPAs shall be installed while the reactor is in a shutdown mode, per Paragraphs 4.1, 4.2, and 4.3 and connected as shown in the drawing listed in Paragraph 2.2.b.

\* As stated in NEDO-24317 dated January 1981,  
EPA's are qualified per IEEE 344-1975 and  
IEEE 323-1974.

4.6 With MG set A and Reactor Protection System energized, the following voltage and frequency measurements must be made at RPS components listed:

- a. Voltage and frequency at MG set A
- b. Voltage at two RPS (A) sensor relay coils
- c. Voltage at two Scram (A) relay coils
- d. Voltage at two Scram (A) contactor coils
- e. Voltage at two relay or contactor coils in other systems sourced by RPS MG set (bus) A power.

Voltage output of the MG set must be adjusted until voltage measured at locations indicated in items b through e is  $115 \pm 2$  Vac.

4.7 The trip settings of the two EPAs used with MG set A (per O&M manual listed in Paragraph 2.2.c) must be adjusted for + 10%  $\begin{matrix} + 0\% \\ - 2.5\% \end{matrix}$  overvoltage, - 10%  $\begin{matrix} + 2.5\% \\ - 0\% \end{matrix}$  undervoltage, and - 5%  $\begin{matrix} + 2.0\% \\ - 0\% \end{matrix}$  underfrequency.

4.8 The factory set time delay for the MG set A EPAs must be verified to be  $100 \begin{matrix} +40 \\ -0 \end{matrix}$  milliseconds (factory setting).

4.9 The Installer shall ensure that the trip settings between the non-Class 1E protective circuit on the respective (bus A&B) MG sets and the Class 1E EPAs are consistent.

4.10 Paragraphs 4.5 through 4.9 must be repeated for MG set B and associated EPA trip units and RPS components.

4.11 Either A or B RPS circuit must be transferred to the alternate power source and the voltages and frequency measured and recorded at the locations listed in Paragraph 4.6.

4.12 Trip settings of the alternate power EPAs must be adjusted for + 10%  $\begin{matrix} + 0\% \\ - 2.5\% \end{matrix}$  overvoltage, - 10%  $\begin{matrix} + 2.5\% \\ - 0\% \end{matrix}$  undervoltage, and - 5%  $\begin{matrix} + 2.5\% \\ - 0\% \end{matrix}$  underfrequency.

4.13 The RPS A&B and alternate power EPA units are now ready for operation.

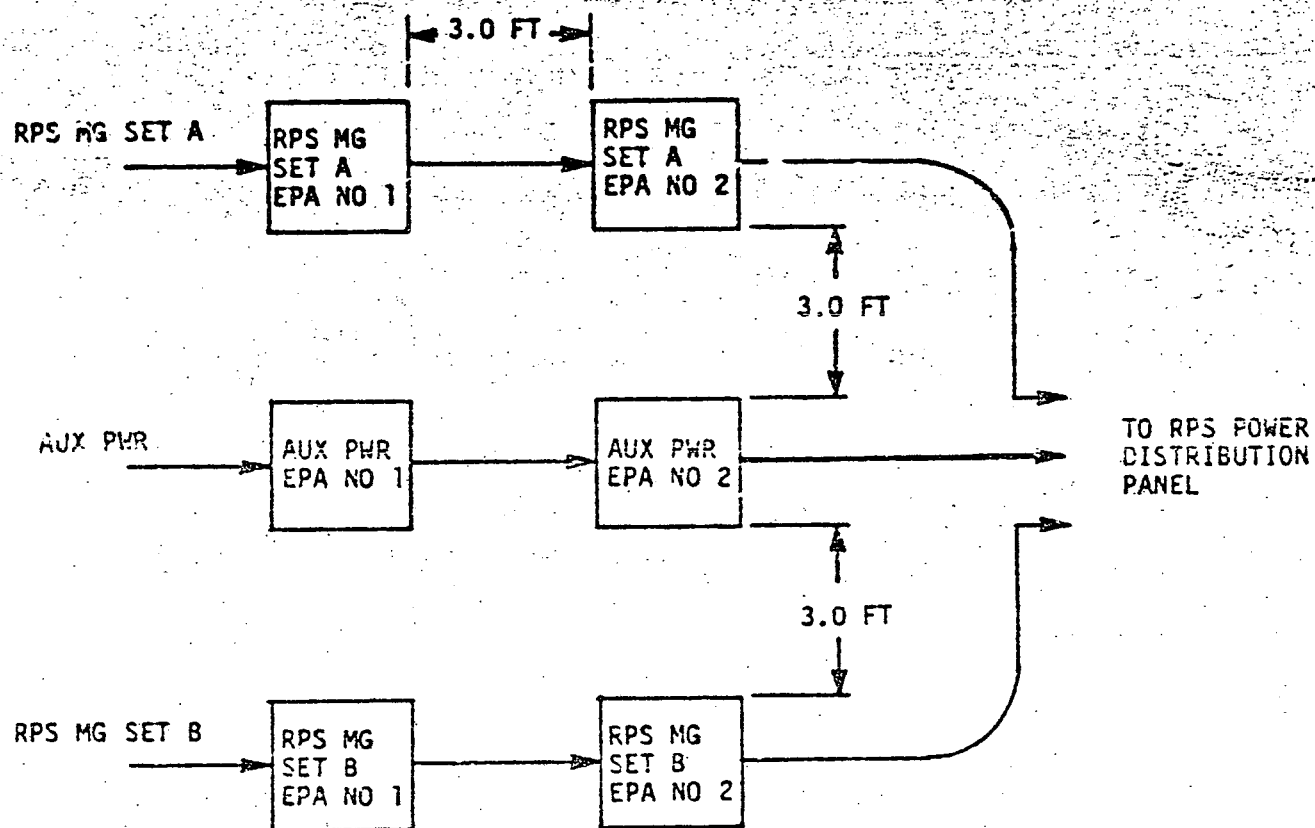


FIGURE 1. SEPARATION OF EPA COMPONENTS