GPU Nuclear
100 Interpace Parkway
Parsippany, New Jersey 07054
201 263-6500
TELEX 136-482
Writer's Direct Dial Number:

April 29, 1982

Mr. Dennis M. Crutchfield, Chief
Operating Reactor Branch #5
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Crutchfield:

Subject: Oyster Creek Nuclear Generating Station
Docket No. 50-219
Reactor Protection System Power Supply

References: 1. Letter D. M. Crutchfield to I. R. Finfrock, August 3, 1981
2. Letter P. B. Fiedler to D. M. Crutchfield, March 24, 1982

Pursuant to your letter of August 3, 1981, please find enclosed General Electric (G.E.) document NEDO-24317, G.E. drawing 913E911 Rev. 0 and Jersey Central Power & Light Co. drawing BR 3013 Rev. 18. In accordance with G.E.'s recommendation a 100 millisecond time delay shall be provided as part of the protective circuit modification. A review of the Reactor Protection System (RPS) components indicates that they will not be adversly affected during the duration of the delay. The time delay will serve to minimize the number of challenges to the RPS as a result of abnormal conditions on the RPS power distribution bus.

If additional information is required, please contact Mr. J. Knubel at (201) 299-2264.

Very truly yours,

P. B. Fiedler
Vice President
Director-Oyster Creek

A001
1/1
Aperture Dist.
Send Drwgs to:
BC

lr

NEDO-24317
81NED301
CLASS I
JANUARY 1981

REACTOR PROTECTION SYSTEM PROTECTIVE CIRCUIT UPGRADE DESCRIPTION

R. S. De VREUGD

GENERAL ELECTRIC

NEDO-24317
81NED301
Class I
January 1981

REACTOR PROTECTION SYSTEM PROTECTIVE CIRCUIT UPGRADE DESCRIPTION

R. S. DeVreugd

Approved: R. D. Brandon, Manager
Nuclear Services Engineering
Nuclear Fuel and Services
Engineering Department

Approved: R. L. Gridley, Manager
Fuel and Services Licensing
Safety and Licensing
Operation

NUCLEAR POWER SYSTEMS DIVISION • GENERAL ELECTRIC COMPANY
SAN JOSE, CALIFORNIA 95125

GENERAL ELECTRIC

IMPORTANT NOTICE REGARDING CONTENTS OF THIS REPORT

Please Read Carefully

The only undertakings of General Electric Company respecting information in this document are contained in the contract between the plant owner provided with this document and General Electric Company, and nothing contained in this document shall be construed as changing the contract. The use of this information by anyone other than the plant owner, or for any purpose other than that for which it was intended, is not authorized; and with respect to any unauthorized use, General Electric Company makes no representation or warranty, and assumes no liability as to the completeness, accuracy or usefulness of the information contained in this document.

CONTENTS

ILLUSTRATIONS

1. INTRODUCTION

This report describes the Electrical Protection Assembly (EPA) for plants with Reactor Protection System (RPS) Motor Generator (MG) sets.

The EPA provides redundant protection to the RPS and other essential circuits against overvoltage, undervoltage, and underfrequency. The EPA consists of trip components which disconnect circuitry from input power whenever voltage or frequency exceeds their normal tolerances. The unit is Class 1E qualified to IEEE standards.

2. HISTORY

Prior to the issuance of the Edwin I. Hatch Unit 2 operating license, the Nuclear Regulatory Commission (NRC) identified a concern regarding the RPS instrument MG set. It was noted that the existing RPS MG protective circuitry was not Class 1E. This fact lead to the conclusion that the system output voltage of 120 volts alternating current (Vac) could be varied sufficiently by a seismic event to cause a failure of the RPS.

Normally, the MG set's output voltage is maintained virtually constant by means of a voltage regulator (see Figure 2-1). Additionally, overvoltage and undervoltage protective devices isolate the MG's output from the RPS if the voltage exceeds ±10% of 120 Vac. Isolation also occurs if output voltage frequency drops by more than 5%.

The NRC's concern was that the overvoltage, undervoltage, and underfrequency devices were not seismically qualified and could become inoperable, along with the voltage regulator, as a result of a seismic event. The RPS could then receive an out-of-limits voltage supply and thereby sustain damage to the RPS which could prevent a required reactor scram.

The RPS instrument MG set concern applies to all plants where the RPS employs a relay system as opposed to the solid state RPS. The single exception to this rule is the Limerick plant which derives its RPS supply voltage from inverters. The design modification is generic for all affected plants, thus simplifying the review process and facilitating the procurement of the additional equipment.

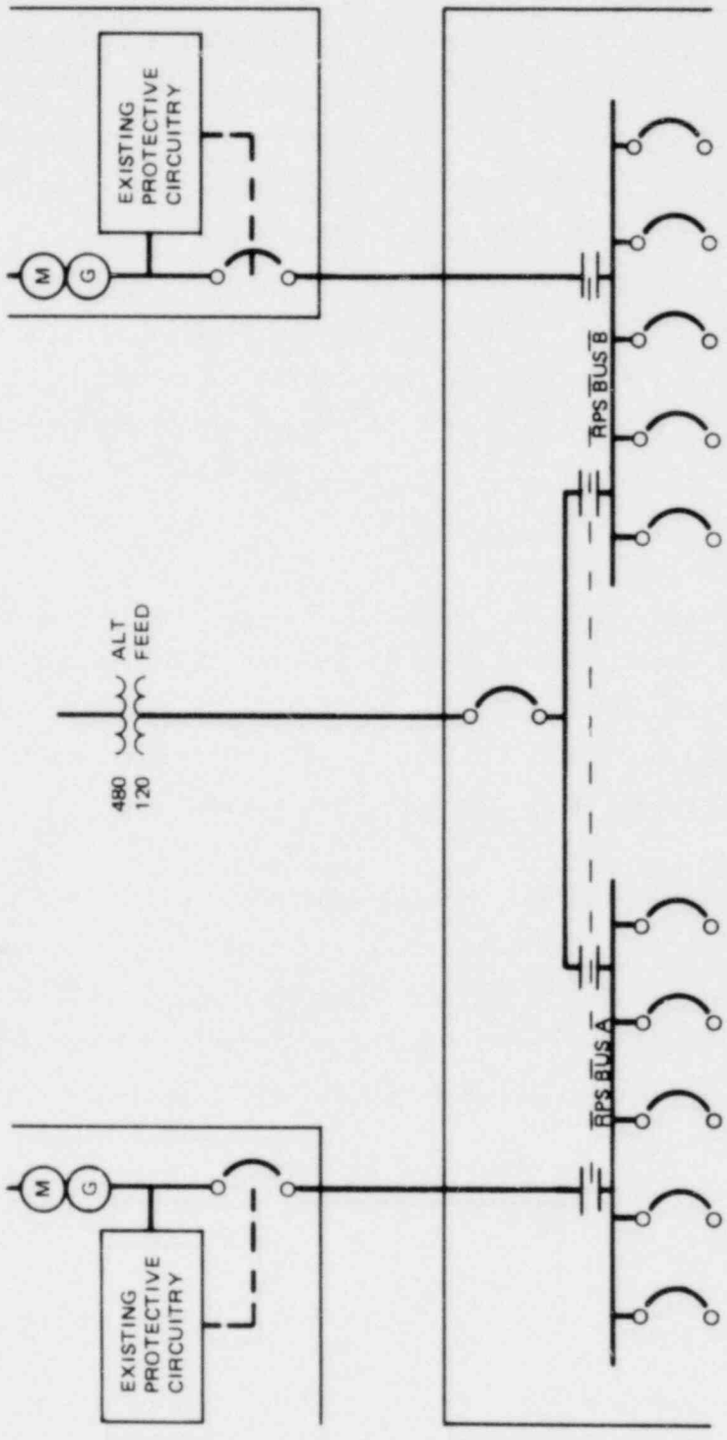

Figure 2-1. Existing RPS Protective Circuitry

3. HARDWARE QUALIFICATIONS

Seismically qualified protective circuits for undervoltage, overvoltage, and underfrequency are packaged in an enclosure designed to be wall mounted. Two of these assemblies will be connected in series, between the power source and the RPS. The enclosures will be mounted separately from the MG sets, and separate from each other. The circuits and enclosures are designed and manufactured to General Electric Company specifications.

The enclosures will be located in an area where the ambient temperature will be 40°F to 122°F. The circuits within the enclosures are qualified to operate up to 137°F at 95% relative humidity. The assemblies are seismically qualified per IEEE-344, 1975, to the Safe Shutdown Earthquake (SSE) and Operating Base Earthquake (OBE). The units are environmentally qualified to the requirements of IEEE-323, 1974.

Enclosure dimensions are 20 inches by 16 inches by 8 inches.

4. SYSTEM DESCRIPTION AND APPLICATION

The block diagram shown in Figure 4-1 functionally depicts the addition of the new assemblies to the RPS power supplies. Two assemblies will be connected in series to each RPS's power source, including auxiliary power. The protective circuit trip setpoints are plus and minus 10 percent of nominal alternating current (ac) voltage and minus 5 percent of nominal frequency.

At installation, voltage measurements will be taken to determine ac line losses between the motor generator set, protective circuits, and downstream components. The motor generator voltage regulators and the protective circuit trip points will be adjusted to voltage levels that reflect optimal operating conditions for the Reactor Protection System and associated system components.

Protecting the EPA from tripping due to low frequency, overvoltage or undervoltage transients is accomplished by three independent time delays. These variable time delays (from 0.1 to 3.0 seconds) prevent the EPA from immediately tripping with the occurrence of a transient. Thus, if the transient dissipates prior to tripping the EPA, the EPA remains untripped.

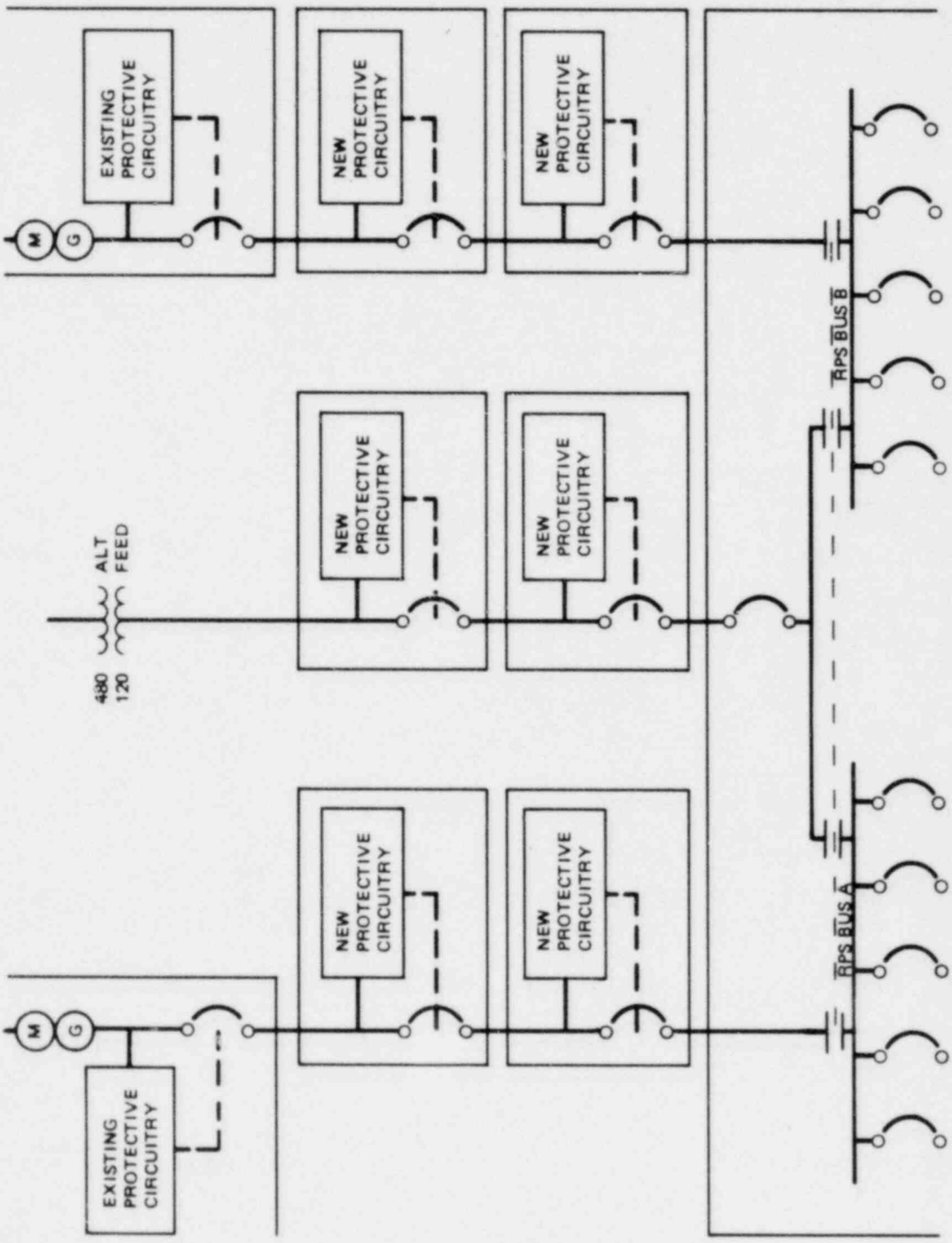

Figure 4-1. New RPS Protective Circuitry

5. SPECIFICATIONS

5.1 FRONT PANEL CONTROL/INDICATORS (see Figure 5-1)

5.1.1 Indicators (Test Maintenance)

a. Overvoltage

b. Undervoltage

c. Underfrequency

d. Power IN

e. Power OUT

5.1.2 Indicators (Operation)

a. Power IN

b. Power OUT

5.1.3 Controls

a. Main circuit breaker ON/OFF

b. Lockswitch for test maintenance use.

5.2 ELECTRICAL REQUIREMENTS

Nominal Voltage Range: 120 Vac (±2%)
Current Requirements:
Startup Current: 280 mA for one second
Running Current: 250 mA
Single Phase: Two Wire (plus ground)

Frequency: 50 hertz (Hz)/60 Hz

Time Delay: Continuously Adjustable 0.1 to 3.0 seconds

Circuit Breaker Max Load: 175 amperes ac

5.3 OPERATING REQUIREMENTS

Temperature: 40°F to 137°F

Humidity: Up to 95% Relative

Radiation: $2x10^4$ RAD, Silcon Total Integrated Dose (TID) Group I

$2x10^5$ RAD, Silcon Total Integrated Dose (TID) Group II

Altitude: 0 - 10,000 feet above sea level.

5.4 MECHANICAL

Weight: 60 pounds

Height: 20 inches

Depth: 8 inches

Width: 16 inches

A hasp and staple are provided for padlocking the EPA enclosure. External feet are furnished for mounting.

5.5 CABLES

Cable and conduit access openings to be provided by the user at time of installation.

5.6 SEISMIC QUALIFICATION

a. Operating base earthquake (OBE) 5.0 gravity (G)

b. Safe sl. tdown earthquake (SSE) 7.0 G

c. Frequency Spectrum 1 to 33 Hz

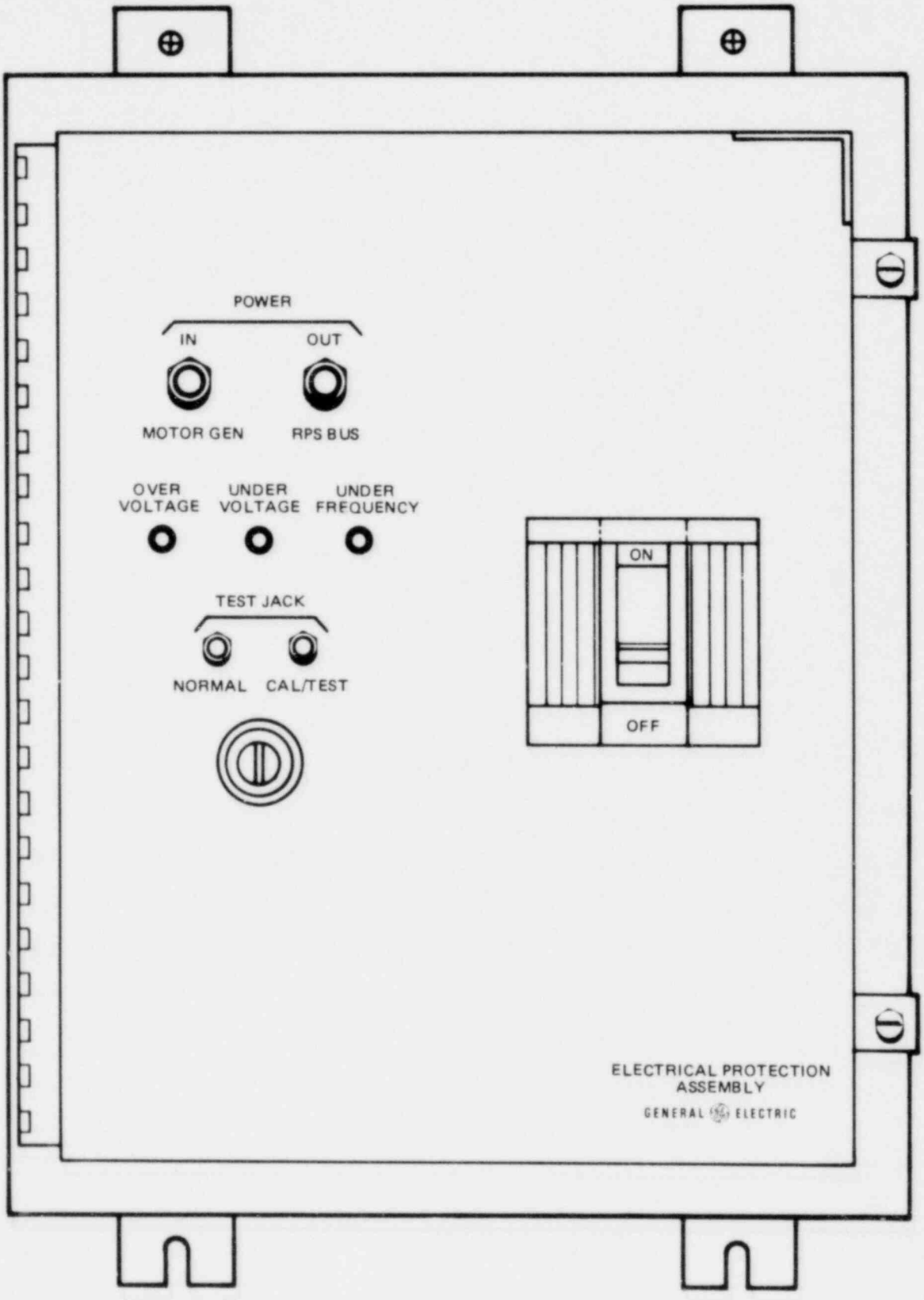

Figure 5-1. Front Panel Control/Indicators

6. REFERENCES

General Electric Company Instruction Manual for the Electrical Protection Assembly, Vendor Print File (VPF) 3830-83-6, December 1980.

DISTRIBUTION

Name	M/C
R. S. De Vreugd (2)	781
K. R. Miller (1)	275
R. A Siemer (1)	740
C. L. Tully (44)	277
L. M. Zull (1)	682
NEBG Library (5)	328
VNC Library (2)	V01

NUCLEAR ENERGY DIVISIONS • GENERAL ELECTRIC COMPANY
SAN JOSE, CALIFORNIA 95125

GENERAL ELECTRIC

TECHNICAL INFORMATION EXCHANGE

TITLE PAGE

AUTHOR	SUBJECT	TIE NUMBER
R. S. DeVreugd	Nuclear Science and Technology	81 NED 301
		DATE: January 1981
TITLE: Reactor Protection System Protective Circuit Upgrade Description		GE CLASS: I
		GOVERNMENT CLASS:
REPRODUCIBLE COPY FILED AT TECHNICAL SUPPORT SERVICES, R&UO, SAN JOSE, CALIFORNIA 95125 (Mail Code 211)		NUMBER OF PAGES: 15

SUMMARY

A description of the Electrical Protection Assembly for plants with Reactor Protection System motor generator sets is presented.

By cutting out this rectangle and folding in half, the above information can be fitted into a standard card file.

DOCUMENT NUMBER NEDO-24317

INFORMATION PREPARED FOR Nuclear Power Systems Division

SECTION Nuclear Safety and Licensing Operation

BUILDING AND ROOM NUMBER K-2121 MAIL CODE 682

GENERAL ELECTRIC