

PALO VERDE NUCLEAR GENERATING STATION

HVAC

Classroom Lesson



HVAC Training	Date: 01/13/2005
LP Number: NMH10X000202	Rev Author: Paula Stapleton
Title: Generrex AC Unit	Technical Review:
Duration : 1 Hour	
	Teaching Approval:

INITIATING DOCUMENTS:

15DP-OTR69 Training and Qualification Administration

HVAC Technician Training Requirements

Training Program Description for HVAC Maintenance

REQUIRED TOPICS

NONE

CONTENT REFERENCES

CRDR 116668 (U-3) The Exciter cubicle HVAC compressor overheated and stopped working. HVAC installed temporary cooling

Maintenance Standard and Expectations handbook

WO# 00685073 install A/C unit on the Generrex excitation cubicle.

Maintenance Prevent Events Strategy

Palo Verde Safety Manual

System Training Manual Volume 23A Main Generation System (MA)

System Training Manual Volume 24 Main Generator Excitation And Regulation System (MB)

OE5860 - Near Miss - Operator received electrical shock

Lesson Plan Revision Data

Mar 08, 2004 Paula Stapleton

Developed LP for CBT

TCSAI# 2686952 Revision includes more P.E., Standards & Expectations, OE 5860, CRDR 116668.

Title: Generrex AC Unit

Lesson Plan #: NMH10X000202

Tasks and Topics Covered

The following tasks are covered in Generrex AC Unit:

Task or Topic Number*	Task Statement
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Lesson: Generrex AC Unit

ACU32	Check the operation of the Generrex A/C unit
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Total tasks or topics: 1

TERMINAL OBJECTIVE:

- 1.1 Given a CBT presentation, describe the purpose, operation and good maintenance practices of the Generrex AC Mastery will be demonstrated by successfully completing the questions at the end of the CBT presentation with a score of 80% or greater.
 - 1.1.1 Describe the purpose of the Generrex Excitation Cubical A/C Unit
 - 1.1.2 Describe the operation of the Generrex Excitation Cubical A/C Unit
 - 1.1.3 Identify good Maintenance practices when working on the Generrex Excitation Cubical A/C Unit

Lesson Introduction: Generrex AC Unit

The following items are things to consider in your Lesson Introduction. They are not mandatory. You should develop your own introduction and place that material in the Program Hierarchy in the Lesson Introduction Tab or appropriate Training Unit.

CLASSROOM GUIDELINES

- If applicable, remind students of class guidelines as posted in the classroom.
- Pass the attendance sheet around and have it signed in Dark ink.
- Ensure that student materials needed for the class are available for each student.
- Emphasize student participation and remind them of your philosophy on asking and answering questions, if applicable.

ATTENTION STEP

- Give a brief statement or story to get student concentration focused on the lesson subject matter.

LESSON INTRODUCTION

- Give a brief statement that introduces the specific lesson topic. Should be limited to a single statement.

MOTIVATION

- Focus student's attention on the benefits they derive from the training. At Instructor's discretion. The need for motivation in each succeeding lesson must be analyzed by the Instructor and presented as necessary.
- Instructor should include how the STAR process can be used to improve or enhance Operator Performance, if applicable.
- Read and discuss lesson terminal objective and review lesson enabling objectives, if desired.
- If applicable, briefly preview the lesson topic outline and introduce the major points to be covered. The objective review may have been sufficient.
- REINFORCE the following PVNGS management expectations as opportunities become available
 - Nuclear Safety
 - Industrial Safety Practices
 - STAR and Self-Checking
 - Procedure Compliance
 - Communication Standards
 - ALARA
 - Prevent Events

T.Obj 1.1	Given a CBT presentation, describe the purpose, operation and good maintenance practices of the Generrex AC Mastery will be demonstrated by successfully completing the questions at the end of the CBT presentation with a score of 80% or greater.
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1.1.1 Introduction

This lesson material covers the Generrex Excitation Cubicle and describes how its system operates.

1.1.2 Main Idea

Prevent Events & STAR
Achieving Breakthrough Performance

Let’s begin with a **Pre-Job Brief**. The minimum Pre-Job Briefing will consist of the five prevent events questions....

What is the task I am going to perform?

TERMINAL OBJECTIVE:

Given a CBT presentation, describe the purpose, operation and good maintenance practices of the Generrex AC and discuss good maintenance practices when working on Generrex Excitation Cubical A/C Unit.

Do you understand it?

- The enabling objective that are going to help you understand the terminal objectives are;
- Describe the purpose of the Generrex Excitation Cubical A/C Unit
- Describe the operation of the Generrex Excitation Cubical A/C Unit
- Identify good Maintenance practices when working on the Generrex Excitation Cubical A/C Unit

What is the worst thing that could happen and how can I prevent it?

OE5860 –Documents a near miss when an operator received an electrical shock

On March 11, 1993 at Nine Mile Point Unit 2 a licensed operator entered the main generator exciter cubicle to replace an oil drip absorbent pad located on the floor beneath the exciter inboard bearing. The pad was in place to collect minor oil drips from the bearing. When the operator reached to remove the pad, his shoulder contacted the end plate of the brush rigging. This end plate is energized with 200-250 VDC.

The operator was knocked back against the door of the exciter cubicle. Although shaken, the operator was released and returned to the site after receiving a medical evaluation.

Although you are not going to be entering the exciter cubicle when working on the exciter cubicle A/C unit, you may be opening the door if temporary cooling is required. This OE is a good example of an activity that can be perform many times without incident and something as simple a change in body position result in an event.

A preliminary review of this event revealed that this operator and many others were not aware of all of the energized portions of the exciter assembly.

Are you aware of all the energized portions of the exciter cubicle appropriate to this work activity?

This is a good time to look at the hazards associated with working in the turbine building and on the Generrex Excitation Cubical A/C Unit. This A/C Unit is mounted on the Turbine excitation cubical which is part of the Main Generator.

What else could go wrong?

Title: Generrex AC Unit

Lesson Plan #: NMH10X000202

CRDR# 116668 Documents a situation when the compressor for the Exciter cubicle cooling unit overheated and stopped operating. The temp in the cubicle reached 120 degrees which caused the Area Operator to take the alarm response actions. The Cubicle doors were opened and the area was caution flagged off and a RFI exclusion area was established. To prevent this from happening in the future a temporary cooling unit is used when the cooling unit is out of service for extended periods of time.

What safety and/or radiation protection equipment is needed?

There are no radiological concerns. If you have questions contact the appropriate Unit Radiation Protection desk. Required PPE; Hard hats, safety glasses with side shields, hearing protection, and a pair of work gloves.

Is my training and are my qualifications up-to-date?

Prerequisites to this CBT course are:

NMH05, Chiller Control Panel Troubleshooting

HVAC-0001-00 EPA Certification,

Always check your qualifications for a task prior to performing work. If you do not know how to check, or you are in doubt, ask your Leader

EO 1.1.1	Describe the purpose of the Generrex Excitation Cubical A/C Unit
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1.1.1.1 Main Idea

The exciter cubicle is mounted on the side of the generator on the generator framework. It is divided into three sections (control, breaker and rectifier). The exciter cubicle contains the DC regulator, the field flashing circuit, the de-excitation breaker (field shorting switch), various alarms and relays and the power rectifiers.

An air conditioning unit is mounted on the side of the exciter cubicle to maintain internal temperature below 122°F. The original design of the excitation cubical was to provide natural cooling of the internal components through the vents on the front and side panels.

However, during the summer months the turbine deck temperatures can exceed 118 F.

The internal cabinet temperatures can reach up to 135 F.

The internal components of the excitation cubicle are rated at 122 F.

A modification was generated to install an air conditioning unit on the excitation cubical due to numerous alarms and failures associated with the main generator excitation system caused by heat and age related stresses on the electronic equipment.

The ACU maintains the cabinet temperature within a normal operating range to extend the life of the components.

An enclosed bus connects from the AC bushings in the excitation dome to the top of the exciter cubicle.

An enclosed DC bus connects from one end of the exciter cubicle to the collector housing. Water piping for the rectifiers and all electrical connections to the exciter cubicle are brought out through conduit in the foundation.

EO 1.1.2	Describe the operation of the Generrex Excitation Cubical A/C Unit
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1.1.2.1 Main Idea

The McLean Midwest direct expansion air condition is a high ambient temperature unit designed to maintain the exciter cabinet internal temperature at or below 90 F.

A 5" diameter gauge is located on top of the Generrex Excitation Cubicle. The maximum allowable temperature is 100 F.

The temperature controller dial is set to open at 75 F.

The differential setting should be set at 15 F, which will start the unit at 90 F.

The 90 F on/75 F off setting minimizes short cycling of the A/C compressor.

This ACU will be operating in Mode 1 after the Generrex field is flashed.

This ACU receives its power from the 480 VAC field flashing transformer.

EO 1.1.3	Identify good Maintenance practices when working on the Generrex Excitation Cubical A/C Unit
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1.1.3.1 Main Idea

The environment that the Generrex ACU and the HVAC Technician is exposed to can be any or all of the following:

- a. high ambient temperatures
- b. high noise
- c. plant trip hazard

The Generrex ACU is not required to support the generator operability. However, without the cooling the cabinet temperature may increase to 120F, which will cause an alarm response action from Operations.

If the ACU is not operating properly or needs to be removed from service, notify the Control Room.

Temporary cooling may need to be installed depending on ambient temperature and the Unit Mode of operation.

The door to the excitation cabinet may be opened and a supply duct directed into the cabinet. To do this first open and secure the door. Cover the exposed electrical connections using blanket roll and clips.

Extreme care must be taken when installing the temporary cooling. Be sure not touch any of the components inside the cabinet. This is a potential trip hazard.

Maintain FME, check the ducting prior to use to prevent dirt and debris from being blown into the excitation cabinet. Always notify the control room prior to beginning work on the Generrex unit.

SUMMARY OF MAIN PRINCIPLES

The following items are things to consider in your lesson summary. They are not mandatory. You should develop your own summary.,

Objectives Review

Review the Lesson Objectives

Topic Review

Restate the main principles or ideas covered in the lesson. Relate key points to the objectives. Use a question and answer session with the objectives.

Questions and Answers

Oral questioning

Ask questions that implement the objectives. Discuss students answers as needed to ensure the objectives are being met.

Problem Areas

Review any problem areas discovered during the oral questioning, quiz, or previous tests, if applicable. Use this opportunity to solicit final questions from the students (last chance).

Concluding Statement

If not done in the previous step, review the motivational points that apply this lesson to students needs. If applicable, end with a statement leading to the next lesson.

You may also use this opportunity to address an impending exam or practical exercise.

Should be used as a transitional function to tie the relationship of this lesson to the next lesson. Should provide a note of finality.