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GEORGIA POWER

POWER GENERATION DEPARTMENT
VOGTLE ELECTRIC GENERATING PLANT

INSTRUCTIONAL MANUAL

TITLE:	RESPOND TO EMERGENCY DIESEL GENERATOR "MISCELLANEOUS" ALARMS	NUMBER:	NL-IU-11205-009-01-C
PROGRAM:	OUTSIDE AREA OPERATOR	REVISION:	1
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REFERENCES:

PROCEDURE 17035-1, ANNUNCIATOR RESPONSE PROCEDURES (REV 4)

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PERFORMANCE OBJECTIVE

Given a directive from the control room, respond to diesel generator miscellaneous alarms.

The alarm must be acknowledged and its validity determined. The condition causing the alarm must be investigated and, if possible, corrective actions taken. All communication and activities must be performed in accordance with current, approved procedures.

INFORMATION

The diesel generator miscellaneous alarms on the annunciator panel at the engine control panel also appear on the diesel generator annunciator panel in the control room. These alarms are:

1. DG1A TRIP HIGH TEMP ENGINE BRG
2. DG1A TRIP HI CRANKCASE PRESS
3. DG1A VIBRATION TRIP
4. DG1A TRIP OVERSPEED
5. DG1A LOW PRESS CONTROL AIR
6. DG1A HIGH PRESS STARTING AIR
7. DG1A FAILED TO START
8. DG1A SWITCH NOT IN AUTO
9. DG1A BARRING DEVICE ENGAGED
10. DG1A PANEL INTRUSION
11. DG1A HI TEMP PANEL
12. DG1A EMERGENCY START
13. DG1A ENGINE CNTL POWER A FAILURE
14. DG1A ENGINE CNTL POWER B FAILURE
15. DG1A LOCAL ANN PNL PWR FAILURE

Upon receipt of any one of these alarms, the control room operator will direct the CAO to perform local actions in accordance with Plant Vogtle ARP 17035-1 (17038-1 for DG1B).

When responding to any one of these alarms:

1. Acknowledge the alarm. This will include depressing the SILENCE push button to silence the alarm horn. Notice which annunciator window is flashing. For multiple alarms, it is a good operating practice to make a note all alarm windows that are flashing before pressing the ACKNOWLEDGE button on the engine control panel.
2. Investigate the alarm as directed by the control room operator. Check local indications that may help in determining the cause of the alarm.

3. Take corrective actions as directed by the control room operator to restore the diesel generator to normal operating conditions. The alarm must be reset after the condition causing the alarm has been corrected.
4. Log the activity.

A07 DG1A TRIP HIGH TEMP ENGINE BRG

This alarm occurs at 228° F. If the diesel generator has been started from a normal start, it will trip. This alarm could be caused by high temperature of the lubrication oil, loss of lube oil pressure, the failure of a main engine bearing, or an engine overload. This trip will not self-reset because the detectors have fusible rods which begin to melt at 228 degrees F and must than be replaced. The DG will still start in an emergency, however.

Acknowledge the alarm.
Acknowledge the alarm by depressing the ACKNOWLEDGE pushbutton on the the engine control panel. Silence the alarm horn by depressing the SILENCE pushbutton.

Investigate the alarm.
Check the lube oil out temperature by setting the thermocouple selector to LO-OUT and reading the Doric Trendicator. Monitor the annunciator panel for other alarms that may be illuminated, indicating the cause of this alarm. Listen for abnormal noises indicating a failure of a main engine bearing.

If the diesel generator is still running (i.e., had been emergency started), continually monitor the temperature and inform the control room operator of the temperature status. The control room operator may decide to shut down the diesel generator if it had been emergency started, dependent upon your investigation.

Take corrective action.
Check the oil level in the lube oil sump. If the level is low, notify the control room operator, who will direct Maintenance personnel to add oil. If the lube oil temperature is high, ensure proper operation of jacket water and NSCW to the jacket water heat exchanger. Check for proper operation of the Lube Oil System. If the Lube Oil System is not operating properly, check for other alarms, such as increasing temperatures, low oil level, or differential pressure across the lube oil strainers or filters. If this alarm comes in after other diesel generator lube oil alarms, correct the lube oil alarm first. If there is a malfunction in the Lube Oil System, the situation will clear when the Lube Oil System malfunction is corrected.

Stay clear of the sides of the engine, since a bearing, if hot enough, can cause ignition of oil vapors in the crankcase.

If the Lube Oil System is operating properly and no other alarms have activated, this alarm could be due to the failure of one of the engine main bearings. Notify the control room operator of equipment status. The condition causing the alarm will be corrected by Maintenance.

Log the activity.
Log the activity in the operator's log.

A08 DG1A TRIP HI CRANKCASE PRESS

This alarm occurs at 3 psi crankcase pressure and can be caused by extremely excessive wear of the piston and cylinder liners that allows combustible gases to pressurize the crankcase, the crankcase fans not operating, a crankcase explosion due to vapors ignited by a hot spot in the crankcase, or a plug in the crankcase vent line to the atmosphere.

Upon receipt of this alarm, the diesel generator will trip unless it has been emergency started, at which time it would annunciate the alarm.

Acknowledge the alarm.
This will include depressing the SILENCE pushbutton to silence the alarm horn. Note which annunciator window is flashing. Check for multiple alarms.

Investigate the alarm.
Verify the crankcase pressure from the crankcase pressure manometer (1-PI-19184) at the engine control panel. If an actual crankcase explosion occurred, the water may have been blown from the manometer. Check the crankcase fan breakers on 1NY1 to ensure that they are ON. Determine if the area appears smoky.

Take corrective action.
Notify the control room operator of the investigation. Reset the breakers for crankcase fans, if tripped. The control room operator will direct Maintenance personnel to investigate other causes of the trip. If the atmosphere in the diesel generator room appears very smoky, the control room operator will direct safety personnel to test the atmosphere because high crankcase pressure may cause explosive gases to accumulate in the diesel generator room. Once the condition causing the alarm has been corrected, reset the alarm.

Log the activity.
Log the activity in the operator's log.

A09 DG1A VIBRATION TRIP

This alarm will occur if excessive vibration is detected at the diesel engine or turbocharger and indicates potential mechanical problems with the moving parts of the diesel engine.

Upon receipt of this alarm, the diesel engine will automatically shut down when operating from a normal start. On an emergency start, the alarm will annunciate but the diesel will not trip.

Acknowledge the alarm.
This will include depressing the SILENCE push button to silence the alarm horn. Note which annunciator window is flashing.

Investigate the alarm.
If the diesel engine is still running, check the engine for unusual noises or vibrations. Unusual noises may be difficult to detect as some noises and vibrations are normal for an engine of this size.

Take corrective action.
Notify the control room operator of any unusual noises or vibrations. The control room operator will direct Maintenance personnel to investigate the alarm. Reset the alarm when the cause of the vibration has been corrected.

Log the activity.
Log the activity in the operator's log.

A10 DG1A TRIP OVERSPEED

This alarm occurs when the diesel engine speed reaches 517.5 rpm. This should never occur unless the governor malfunctions. This alarm will always result in a signal being generated to trip the diesel engine regardless of how it was started. If the diesel engine tripped at a speed beyond the design setpoint, the trip could cause internal damage to the diesel engine.

Acknowledge the alarm.
This will include depressing the SILENCE push button to silence the alarm horn. Note which annunciator window is flashing.

Investigate the alarm.
If present when an overspeed occurs and the approximate speed that was reached prior to the engine tripping is observed, inform the control room operator. Observe the governor for oil leaks, normal oil level, or any loose linkage to the fuel racks. Inform the control room operator of the governor's physical appearance.

Take corrective action.
The control room operator will direct Maintenance personnel to investigate the diesel engine overspeed. Upon direction from the control room operator and when the condition causing the alarm has been corrected, reset the overspeed trip device (located at the front of the diesel engine and to the right of the governor). Reset the device by depressing down on the two latches until they latch and hold. When the overspeed trip device is reset, press the emergency trip reset pushbutton on the engine control panel (when directed) then reset the alarm.

Log the activity.
Log the activity in the operator's log.

FO1 DG1A LOW PRESS CONTROL AIR

The control air portion of the diesel air system is tapped off of the starting air header on the diesel generator, after the strainers and before the solenoid air-operated start valve. The Starting Air System is regulated to maintain approximately 60 psig control air pressure. This alarm will appear if the control air pressure decreases to approximately 55 psig or less. The possible causes for this alarm include: the failure of the control air pressure regulator, a leak in the Control Air System, or the starting air being isolated from the diesel engine, low starting air pressure or failure of control air pressure switch 1-PSL-19174.

Acknowledge the alarm.
Depress the SILENCE push button to silence the alarm horn. Note which annunciator window is flashing.

Investigate the alarm.
Verify the low control air pressure at the engine control panel. Check for the low pressure starting air alarm. If this alarm has activated also, and is 55 psig or less, take corrective action to bring the starting air pressure back to normal. Check the Control Air System for leaks. A leak in the Control Air System should be easily detected audibly, if the diesel generator is shut down. Look in the back of the engine control panel and listen for any air leaks. Using a flashlight, observe the small air lines around the diesel engine to determine if any broken lines are causing a leak.

A shuttle valve allows control air to be provided by either receiver, unless the receivers are isolated.

If the starting air pressure is normal and there are no leaks, but the low pressure still remains, this indicates a malfunction of the control air pressure regulator located in the back of the engine control panel. Inform the control room operator of all findings.

Take corrective action.
Upon direction from the control room operator, perform actions to regain control air pressure. Either restore the starting air pressure to normal or Maintenance personnel may be required to repair any leaks or replace air pressure regulators. After repairs have been performed to restore the control air pressure, reset the alarm.

NOTE: Adequate control air pressure must be maintained for diesel generator trip capability.

Log the activity.
Log the activity in the operator's log.

FO3 DG1A HIGH PRESS STARTING AIR

This alarm occurs when the starting air pressure increases to 260 psig. The possible cause for this alarm is the failure of the air compressor pressure switches to shut off the air compressor. This alarm is common for both air compressors.

Acknowledge the alarm.
This will include depressing the SILENCE push button to silence the alarm horn. Note which annunciator window is flashing.

Investigate the alarm.
Check the starting air pressure gauge (1-PI-9052 and 9056) on the engine control panel and locally (1-PI-9060 and 9064) at the air receivers to determine which of the two starting air compressors caused the alarm. The receiver pressurized to 260 psig caused the alarm.

Take corrective action.
If the affected starting air compressor is still running and upon direction from the control room operator, stop the air compressor by placing its handswitch to the STOP position at MCC 1NB1. Depressurize the affected air start receiver until the alarm can be reset or until the air pressure is down to approximately 250 psig. This can be done by cracking open the receiver blowdown valve. Continuously monitor the starting air system that was shut down and notify the control room operator of system status. Restart the air compressor if the pressure decreases to approximately 225 psig and stop it when the air pressure is approximately 250 psig. The control room operator will direct Maintenance personnel to check and repair the starting air compressor pressure switch if necessary. When the repairs have been completed, place the air compressor control switch back in the AUTO position, ensure that the alarm clears, and reset the alarm.

Log the activity.
Log the activity in the operator's log.

F05 DG1A FAILURE TO START

This alarm will occur if the diesel engine fails to reach 200 rpm within five seconds after receiving a start signal. Possible causes for this alarm include a malfunction of the Fuel Oil System, the Starting Air System, or the Electro-Pneumatic Control System.

Acknowledge the alarm.
This will include depressing the SILENCE pushbutton to silence the alarm horn. Note which annunciator window is flashing.

Investigate the alarm.
Check for other associated alarms that may have caused this alarm. Ensure normal level in the fuel oil day tank. Using a flashlight, trace the alignment of the Starting Air System from the air receivers to the diesel engine and trace the Fuel Oil System from the day tank to the diesel engine checking for misaligned valves or leaks.

A common cause is misalignment of the valve from the day tank to the engine (1-2403-U4-031). Also, verify starting air pressure is normal and the receivers are not isolated.

Take corrective action.
Notify the control room operator of all findings. Correct any misalignments as directed. When the condition causing the alarm has been corrected, reset the alarm. The control room operator may attempt a restart after the cause has been corrected. A normal restart attempt is inhibited for about 90 seconds.

Log the activity.
Log the activity in the operator's log.

F06 DG1A SWITCH NOT IN AUTO

This alarm occurs when one of several diesel generator control switches is not in AUTO (or switched to OFF).

Acknowledge the alarm.
Acknowledge the alarm on the engine panel.

Investigate the alarm.
The alarm could have been caused by the mispositioning of any of the following handswitches:

a. Fuel oil transfer pump 001 or 002 (control room switches)

or at the diesel generator room:

a. Aftercooler 1 or 2
b. Air compressor 1 or 2
c. Lube oil keepwarm pump
d. Lube oil keepwarm heater
e. Jacket water keepwarm pump
f. Jacket water keepwarm heater
g. Generator space heater

Determine if any of the above switches are out of position and if tag-outs or maintenance is being done on the affected system. The loss of the lube oil keepwarm pump affects engine operability.

Take corrective actions.
Reset the affected handswitch after directed by the licensed operator.

Log the activity.
Log the activity in the operator's log.

F07 DG1A BARRING DEVICE ENGAGED

Acknowledge the alarm.
This will include depressing the SILENCE push button to silence the alarm horn. Note which annunciator window is flashing.

Investigate the alarm.
This alarm occurs when the barring device has been engaged to prevent operation of the diesel generator during maintenance. The alarm is expected when barring is in process.

Take corrective action.
Return the engine to OPERATIONAL and reset the alarm when barring is complete.

Log the activity.
Log the activity in the operator's log.

F08 DG1A PANEL INTRUSION

This alarm occurs when the engine control panel door is open.

Acknowledge the alarm.
This will include depressing the SILENCE push button to silence the alarm horn.

Investigate the alarm.
Determine why the engine control panel door is open.

Take corrective action.
Notify the control room operator of your findings. Close the panel door and reset the alarm.

Log the activity.
Log the activity in the operator's log.

F09 DG1A HI TEMP PANEL

This alarm occurs when the temperature inside the engine control panel reaches 130° F. The possible causes for this alarm include overheating of the control circuitry in the engine control panel or high temperature detected in the diesel generator room. Two additional sources of heat in the engine control panel are the interior light and the 250 watt strip heater.

Acknowledge the alarm.
This will include depressing the SILENCE push button to silence the alarm horn.

Investigate the alarm.
Check for high temperature in the diesel generator room by checking the HVAC controllers in the diesel generator room. Feel the engine control panel from the outside for excessive heat. Look for smoke around the engine control panel. Open the door to check for smoldering. If possible and can be done safely, place your hand a few inches from the strip heater to determine if excessive heat is radiating from it. The strip heater is normally energized below 100° F.

Take corrective action.
If the high temperature is in the diesel generator room, check the alignment and operation of the HVAC System. If smoke or fire occurs, notify the control room operator and stand by to assist the fire brigade.

Check for adequate ventilation of the engine control panel and DG room. The non-ESF fan should start above 85 degrees F. (with the engine not running).

Log the activity.
Log the activity in the operator's log.

F10 DG1A EMERGENCY START

This alarm is expected when the diesel generator has been started from a safety injection signal or from a manual emergency start. Only four

automatic trips will be enabled when the diesel is running under an emergency start. These trips are:

a. Low pressure lube oil trip
b. High jacket water temperature trip
c. Engine overspeed trip
d Generator differential trip

Acknowledge the alarm.
If this alarm occurs, the diesel generator has started. Acknowledge the alarm.

Investigate the alarm.
This alarm does not indicate a malfunction to be investigated, unless it started for no apparent reason.

If the emergency start occurred by itself, with no safety injection occurring, the start may have been due to a broken or loose breakglass. Personnel will be aware if the local emergency start was intentional.

Take corrective action.
The control room operator will direct the OAO to verify the blue "ready to load" light illuminates.

Refer to Procedure 13145-1, "Diesel Generator Operation Under LOCA Conditions," and monitor the listed parameters.

Log the activity.
Log the activity in the operator's log.

B08 DG1A ENGINE CNTL POWER A FAILURE

This alarm occurs on a loss of 125V DC supplied to the engine control panel (breaker 1-AD11-11 on panel 1-AD11 tripped), control power breakers CB 1-2 (gauged) on the front of the engine's control panel are tripped, or a loss of control air pressure.

NOTE: Control air pressure must be maintained for diesel generator trip capability.

Control power A is used for several engine starting functions, such as field flashing and opening two starting air admission valves. Its starting functions are redundant to the B power circuits. The A control power circuit also powers several generator-related (and other) alarm circuits.

Acknowledge the alarm.

This will include depressing the SILENCE push button to silence the alarm horn.

Investigate the alarm.
On the engine control panel, check the white light above the A power circuit breakers. The light is normally lit, and the circuit breaker is normally closed. If the light is not lit and CB 1-2 is still closed, the problems may be further upstream (electrically) with the trip of breaker 1-AD-11-11 at panel 1-AD-11. Also check for normal control air pressure (60 psig).

Take corrective action.
Reclose the breaker(s) or restore control air (as applicable).

Log the activity.
Log the activity in the operator's log.

809 DG1A ENGINE CNTL POWER B FAILURE

This alarm occurs on a loss of 125V DC supplied to the engine control panel (breaker 1-AD-12-11 on panel 1-AD-12 tripped), the control power breakers CB 3-4 on the left front of the engine control panel tripped, or a loss of control air pressure.

NOTE: Control air pressure must be maintained for diesel generator trip capability.

Control power B is used for several engine starting functions such as field flashing of the generator and opening two starting air admission valves. Its starting function is redundant to that of the A power 125V DC circuits, and the diesel generator STOP circuits. The electrical portions of the stopping circuits are from B power only. Do not confuse this with B or A trains. Each diesel generator has an A, B, and C 125V DC control power circuit.

With B circuit 125V DC not available, the diesel generator is still capable of being started (from the A circuit) but cannot be stopped using electric circuits (including protective generator trips and an emergency stop).

Acknowledge the alarm.
This will include depressing the SILENCE push button to silence the alarm horn.

Investigate the alarm.
When dispatched by the control room operator, check the breaker 1-AD-12-11 (on 1 AD-12). It is normally closed.

Check breakers CB 3-4 (gauged) on the engine control panel. They are normally closed and its white B power indicating light is lit. Also ensure control air system pressure is normal.

Take corrective action.
Reset the applicable tripped circuit breaker and notify the control room operator. If the breaker(s) will not stay reset and the control room operator directs, shut down the diesel generator by pushing in the push-to-stop/pull-to-run switch on the front of the engine skid after a normal start. It can still restart on a start signal. If the diesel generator had been started under an emergency start or it it is desirable to help prevent a restart, manually actuate the overspeed trip device.

Log the activity.
Log the activity in the operator's log.

E09 DG1A LOCAL ANN PNL PWR FAILURE

This alarm is on the control room annunciator light board, but involves responses from the CAO.

The diesel generator annunciator power supply is powered by 125V DC. The power supply, in turn, provides 24V DC for use by the annunciator systems.

DG1A annunciator power supply receives its 125V DC from panel 1-ND-31, breaker 07, through the C power supply breakers, CB 5 and 6 on the engine control panel, and through breakers CB 9 and 10 inside the engine control panel. With the local panel de-energized, all other diesel generator control room annunciators are inoperable.

Without this alarm to alert the control room operator, alarm conditions could exist without annunciating in the control room.

Acknowledge the alarm.
Acknowledge any directive from the control room.

Investigate the alarm.
The control room operator will dispatch you to check the breakers, reset them, and check that the annunciator power supply in the bottom of the panel is on.

Take corrective action.
Follow directives from the control room to correct any conditions causing the alarm.

Log the activity.
Log the activity in the operator's log.

PERFORMANCE GUIDE

Follow these steps to investigate miscellaneous diesel generator alarms.

1. Acknowledge the alarm.
2. Investigate the alarm.
3. Take corrective action.
4. Log the activity.

SELF-TEST

Before proceeding to the Task Practice, answer the following questions.

1. DG1A FAILURE TO START alarm occurs when _____.

2. There are four automatic trips that exist when the diesel engine is running under emergency start. What are they?
   a.
   b.
   c.
   d.

3. When DG1A TRIP OVERSPEED alarm occurs, it will result in a signal being generated to trip the diesel engine, regardless of how it was started.
   a. True
   b. False

ANSWERS

1. the diesel generator failed to start 5 seconds after receiving a start signal

2. a. low pressure lube oil
   b. high jacket water temperature
   c. engine overspeed
   d. generator differential

3. a. True

TASK PRACTICE

Before proceeding to the Performance Test, complete the following Task Practice exercise(s).

1. Review Procedures 17035-1 and 17038-1. Be sure that you understand all precautions, limitations, and steps associated with responding to DG miscellaneous alarms.

2. Take this instructional unit and Procedures 17035-1 and 17038-1 to the diesel generator building. Be sure that you can locate all local components and instrumentation associated with responding to DG miscellaneous alarms.

3. In the diesel generator building, walk through the task of responding to DG miscellaneous alarms. If possible, have a fellow trainee evaluate your performance using Procedures 17035-1 and 17038-1 and this instructional unit.

FEEDBACK ON TASK PRACTICE

1. If you have any questions about the precautions, limitations, or steps in Procedures 17035-1 and 17038-1, ask your instructor.

2. You should have been able to locate all local components and instrumentation associated with responding to DG miscellaneous alarms. If you had any difficulty, ask your instructor for help.

3. You should have walked through the steps necessary to respond to DG miscellaneous alarms. If you had any difficulty, re-read the pertinent sections of this instructional unit and the procedure. Resolve any questions with your instructor.