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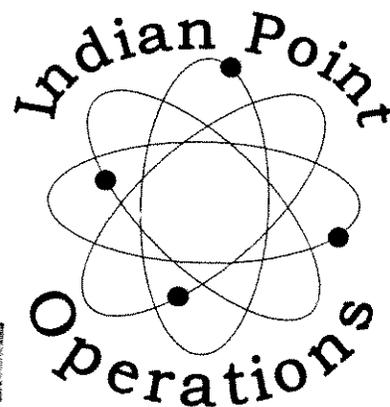
# UNIT 2 APPENDIX R DIESEL GENERATOR OPERATION

Approved By:

*E. Reimann* 6-13-08

Procedure Sponsor, DM/Designee

Date



Team 2A

Procedure Owner

**PARTIAL REVISION**

**REVISION SUMMARY**

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**1.0 REASONS FOR REVISION**

1.1 Editorial revision to correct sequence numbering of Attachment 4.

**2.0 SUMMARY OF CHANGES**

- 2.1 Added Steps 4.1.2.4, 4.3.3.4, 4.5.2.4, and 4.7.1.4 to ENSURE 3 damper set directly west of Appendix R DG are Open (Turbine Building West Wall, above MCC-10V) per EC 33794. (CR-IP2-2008-02938, CA2)
- 2.2 Changed NOTE prior to Step 4.3.30 to indicate Service Water Cooling must be initiated within 2 hours per EC 33794. (CR-IP2-2008-02938, CA2)
- 2.3 Changed Step 4.3.32 to require the Appendix R DG be transferred to Service Water Cooling within 2 hours per EC 33794. (CR-IP2-2008-02938, CA2)
- 2.4 Corrected typographical errors associated with sequence numbering throughout Attachment 4. (**Editorial, 4.6.13**)
- 2.5 Added location, 480 Volt Room, to Steps 1.2.3.4, 1.2.4.4, 1.3.3.4, and 1.3.4.4. (**Editorial 4.6.9**)

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## 1.0 PURPOSE

- 1.1 This procedure establishes requirements for operation of the Unit 2 Appendix R Diesel Generator.

## 2.0 PRECAUTIONS AND LIMITATIONS

- 2.1 IF this is an engine start supplying Unit 2 Appendix R Loads THEN GO TO Step 4.3, Engine Start Supplying Unit 2 Appendix R Loads. All applicable prerequisites are included in that section.
- 2.2 IF this is an engine start during a Loss of all AC Power THEN GOTO Step 4.5,

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Engine Start (Loss Of AC Power/ SBO). All applicable prerequisites are included in that section.

*2.3*

**IF this is an engine start supplying Unit 3 Appendix R Loads THEN GOTO Step, 1.1.**

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- 2.4 Engine Start (Supply Unit 3 SBO / ASS Loads. All applicable prerequisites are included in that section.
- 2.5 TRO 3.8.B applies in Modes 1, 2, 3 and 4.
- 2.6 The Appendix R Diesel Generator maximum continuous load is 2045 kW. During an emergency, maximum generator load is 2700 kW for 25 hours/yr.
- 2.7 Do NOT operate the engine less than 750 KW for long periods of time. Idling for a prolonged period of time (more than 30 minutes) can damage an engine or running with engine coolant temperature too low, below 140°F will dilute crank case oil with raw fuel.
- 2.8 Whenever the Appendix R Diesel Generator is running log readings SHALL be established. Log readings should be taken once an hour.
- 2.9 Crankcase oil level should only be checked at the lube oil reservoir gage glass when the engine is running. Removing the engine oil fill cap or dipstick can allow hot oil to splash out.
- 2.10 Pushing the Emergency Stop button OR placing the 0/Manual/Auto switch to the 0 position will cause an immediate engine shutdown (bypassing the cool-down at idle). This hot shutdown should be avoided, if possible, to prolong reliability of engine.
- 2.11 When a warning alarm comes in it can not be reset until the machine is shutdown. The only way to reset the alarm is to take the 0/Manual/Auto switch to the 0 position which would shutdown the engine without a cool-down.

**3.0 PREREQUISITES**

3.1

3.1 The Appendix R Diesel Generator (DG) is aligned per 2-COL-27.6, Unit 2 Appendix R Diesel Generator.

3.2

3.2 Lube Oil Supply Reservoir gauge glass level indicates between 8 gallons and 29 gallons.

3.3 The following Appendix R Diesel Generator Fuel Day Tank Indications are extinguished:

3.3.1

• Tank Rupture

3.3.2

• System Fail

3.3.3

• Critical High

3.3.4

• High Fuel

3.3.5

• Low Fuel

3.3.6

• Pump 2 Fail

3.3.7

• Pump 1 Fail

3.4

3.4 The Appendix R Diesel Generator Fuel Day Tank Level Gauge indicates between 7/8 and FULL.

**NOTE**

When the system heats up and the coolant expands, the surge tanks should indicate between 1/2 and 3/4 full. This reserves 1/4 to 1/2 of the tank volume to accommodate system surges.

3.5 The following coolant surge tank levels are within range:

3.5.1

• Jacket Water Surge Tank level between 1/4 and 1/2 full (cold level)

3.5.2

• After Cooler Surge Tank level between 1/4 and 1/2 full (cold level)

3.6 The Appendix R DG Auxiliary Transfer Switch is aligned to MCC 22 as follows:  
(Appendix R DG Auxiliaries MCC)

3.6.1

3.6.1 Source 1 Available (White Light Illuminated)

3.6.2

3.6.2 Source 1 Connected (Green Light Illuminated)

4.0 PROCEDURE

4.1 Normal Engine Start (Parallel Mode)

4.1.1 REQUEST the CCR to notify the SO that the Appendix R Diesel will be paralleled to 13W93.

**NOTE**

- Opening The Tool Room Roll up door may affect Centac operation. CCR permission is required prior to opening the Tool Room Roll-up door.
- The design maximum temperatures for the Unit 2 Appendix R DG are:
  - 104 °F for the electrical distribution equipment
  - 122 °F for the Diesel Generator air intake

4.1.2 PERFORM the following as necessary to prevent exceeding design maximum temperatures:

4.1.2.1 ENSURE the Delay Gate is Closed

4.1.2.2 IF the Tool Room Roll-up door will be opened, THEN REQUEST permission from the CCR to open the Tool Room Roll-up door.

4.1.2.3 ENSURE one of the following is Open:

- The Maintenance Loading Bay overhead door (15' Elevation)
- Tool Room Roll-up door (15' Elevation)

4.1.2.4 ENSURE 3 damper set directly west of Appendix R DG is Open (Turbine Building West Wall, above MCC-10V)

4.1.3 ENSURE the following Appendix R Diesel Generator Fuel Oil Day Tank Indications are Illuminated:

- System Ready                      Yellow LED flashing
- Power Available                      Green LED illuminated

- ~~4.1.4~~ **PERFORM** the following at the Appendix R DG Day Tank Control Panel:
  - ~~4.1.4.1~~ **PRESS** the System Test switch
    - ~~a)~~ **CHECK** all LEDs on the control panel are illuminated
    - ~~b)~~ **RELEASE** the System Test switch
  - ~~4.1.4.2~~ **PRESS** the Alarm Test switch to test the alarm level and pump fail functions.
    - ~~a)~~ **RELEASE** the Alarm Test switch
  - ~~4.1.4.3~~ **CHECK NO** abnormal condition exists as indicated by a LED in a flashing ON state and horn sounding.
    - ~~a)~~ **IF** at any time an abnormal condition is sensed:
      - ~~1)~~ **PRESS** the Alarm Silence button to silence the alarm horn.
      - ~~2)~~ **WHEN** the abnormal condition is corrected, **THEN** the alarming LED is turned OFF automatically.
- ~~4.1.5~~ **ENSURE** that breaker SBOH (SBO/APP. R Switchgear 13.8KV Bus) is OPEN. (SBO/APP. R Switchgear 13.8KV Bus)
- ~~4.1.6~~ **ENSURE** that breaker SBO/ASS is OPEN. (SBO/APP R Diesel Generator Switchgear)
- ~~4.1.7~~ **PLACE** the UNIT-PARALLEL switch in PARALLEL. (SBO/ APP R Switchgear 13.8 KV Bus)
- ~~4.1.8~~ **CLOSE** Breaker ASS. (SBO/APP. R Switchgear 13.8KV Bus)
- ~~4.1.9~~ **ENSURE** the following at the Appendix R DG Switch Panel (Control Panel):
  - ~~4.1.9.1~~ Shutdown Status indicator – Extinguished
  - ~~4.1.9.2~~ Warning Status indicator – Extinguished
- ~~4.1.10~~ **At the Appendix R DG Switch Panel (Control Panel) PRESS and HOLD** the Panel Lamp/Lamp Test button for at least 3 Seconds
  - ~~4.1.10.1~~ **CHECK** all control panel LEDs illuminate
  - ~~4.1.10.2~~ **RELEASE** Panel Lamp/Lamp Test button

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**CAUTION**

When Service Water is aligned to supply cooling to the Appendix R DG Heat Exchangers, placing Service Water in service slowly ensures flow will NOT adversely affect the operation of the conventional Service Water header.

~~4.1.11 IF Service Water will be the cooling source, THEN ALIGN Service Water to The Appendix R DG as follows:~~

~~4.1.11.1 OPEN SWT-837~~

NA

~~4.1.11.2 ADJUST Cooling Water flow as follows:~~

~~a) THROTTLE UW-840 to achieve approximately 140 gpm as indicated by FI-7980, Aftercooler Water Flow.~~

~~b) THROTTLE UW-836 to achieve approximately 160 gpm as indicated by FI-7979, Jacket Water Flow.~~

~~4.1.12 IF City Water will be the cooling source, THEN ALIGN City Water to The Appendix R DG as follows:~~

~~4.1.12.1 OPEN the following:~~

~~a) UW-854~~

~~b) UW-855~~

~~4.1.12.2 ADJUST Cooling Water flow as follows:~~

~~a) THROTTLE UW-840 to achieve approximately 90 gpm as indicated by FI-7980, Aftercooler Water Flow.~~

~~b) THROTTLE UW-836 to achieve approximately 120 gpm as indicated by FI-7979, Jacket Water Flow.~~

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### NOTE

- There is no time delay when starting the engine in manual mode. ✓
- The default starting sequence is 3 start cycles, comprised of 10 seconds of cranking and 10 seconds of rest.
- When the coolant reaches operating temperature OR the warm-up at idle time is completed, the generator will ramp up to rated speed and voltage.

~~4.1.13~~ TURN the 0/MANUAL/AUTO switch to the MANUAL position.

~~4.1.14~~ PRESS AND HOLD the Manual Run/Stop button for a minimum of 3 seconds *1220*

~~4.1.14.1~~ RELEASE the Manual Run/Stop button.

### NOTE

- The \_ \ momentary pushbutton on Menu A of the Operator Panel is used to close and open breaker SBO/ASS.
- \_ \ indicates breaker SBO/ASS is open, PUSH to close
- \_ - indicates breaker SBO/ASS is closed, PUSH to open
- When using the \_ \ momentary pushbutton, breaker SBO/ASS will close only when set-up conditions allow (i.e. dead bus OR generator synchronized with bus).

~~4.1.15~~ CLOSE breaker SBO/ASS as follows:

~~4.1.15.1~~ PRESS AND HOLD the \_ \ momentary pushbutton until the symbol indicates - - (breaker SBO/ASS closed).

~~4.1.15.2~~ RELEASE the momentary pushbutton.

*1221*

NOTE

- A fault that could result in engine damage, causes an immediate engine shutdown.
- All other faults allow the engine to run during the cool-down sequence before engine shutdown.
- Warning alarms will not cause a shutdown but may indicate abnormal operation.

- NA 4.1.16 IF a Warning Condition occurs (Warning Status Indicator illuminates yellow), THEN PERFORM the following:
- NA 4.1.16.1 IF the Alarm Module warning horn annunciated, THEN momentarily PUSH the PUSH TO SILENCE HORN button.
  - NA 4.1.16.2 REFER to the following for assistance in correcting the condition:
    - NA • ATTACHMENT 2, WARNING AND SHUTDOWN FAULT CODES
    - NA • ATTACHMENT 3, APPENDIX R DG TROUBLESHOOTING PROCEDURES

NOTE

A warning condition can not be reset until the engine is shutdown.

- NA 4.1.16.3 WHEN the condition is corrected, THEN the Warning Status Indicator may be reset as follows:
- NA a) PRESS the front panel FAULT ACKNOWLEDGE button

NOTE

If a shutdown condition occurs the Shutdown Status Indicator will illuminate red and the engine will shutdown immediately or on a cool-down timer at any time an abnormal condition is sensed:

NA

4.1.17 IF a shutdown condition occurs (Shutdown Status Indicator illuminates red), THEN PERFORM the following:

NA

4.1.17.1 IF the Alarm Module warning horn annunciated, THEN momentarily PUSH the PUSH TO SILENCE HORN button.

NA

4.1.17.2 REFER to the following for assistance in correcting the condition:

NA

- ATTACHMENT 2, WARNING AND SHUTDOWN FAULT CODES

NA

- ATTACHMENT 3, APPENDIX R DG TROUBLESHOOTING PROCEDURES

NA

4.1.17.3 PERFORM the following to reset the shutdown condition:

NA

a) IF the EMERGENCY STOP button was pressed, THEN PULL the EMERGENCY STOP button out

NA

b) PLACE the 0/MANUAL/AUTO switch in 0

NA

c) PRESS the front panel FAULT ACKNOWLEDGE button

NA

d) PLACE the 0/MANUAL/AUTO switch in AUTO

NA

4.1.18 IF desired to ALIGN the Appendix R DG Auxiliaries MCC to the Appendix R DG THEN PERFORM the following:

NA

4.1.18.1 CHECK the Appendix R DG Auxiliary Transfer Switch is aligned as follows:

NA

a) Source 2 Available (Yellow Light illuminated)

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*ND* 4.1.18.2

ROTATE and HOLD the Appendix R DG Auxiliaries Normal/Standby Switch in the NORMAL position (Aligned to the Appendix R DG Output) (Appendix R DG Auxiliaries MCC)

*Did not work!*

*SEE DRN-08-02521*

a) WHEN the CHECK Source 2 Connected (Red Light) illuminates, THEN RELEASE the switch

*STUDY*

*ND* 4.1.19 CHECK that the DG Area Fan is running

*Told to go on*

*ND* 4.1.20 ADJUST cooling water throttle valves to maintain normal cooling temperatures.

*NA* • UW-836

*NA* • UW-840

**NOTE**

One set of data should be taken, even if engine is operated for less than an hour.

*NA*

4.1.21 RECORD Appendix R DG parameters once per hour using ATTACHMENT 1, APPENDIX R DG DATA SHEETS.

**NOTE**

When the Appendix R DG Day Tank is operating in AUTO, the The Appendix R DG Day Tank Level should be maintained between 7/8 and Full.

*ND* 4.1.22 MONITOR Appendix R DG Day Tank Level.

*ND* 4.1.23 MONITOR Lube Oil Supply Reservoir gauge glass level.

*NA* 4.1.23.1 WHEN gauge glass level indicates less than 8 gallons, THEN REFILL Lube Oil Supply Reservoir with proper grade of oil. (SAE 15W – 40 Class A)

*ND* 4.1.24 CHECK the engine systems for leakage

*ND* 4.1.24.1 IF leakage is observed, THEN INITIATE a WRT as necessary:

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①

4.1.18.2 ROTATE and HOLD the Appendix R DG Auxiliaries Normal/Standby Switch in the **NORMAL STANDBY** position (Aligned to the Appendix R DG Output) (Appendix R DG Auxiliaries MCC)

②

a) WHEN the CHECK Source 2 Connected (Red Light) illuminates, THEN RELEASE the switch

- 4.1.19 CHECK that the DG Area Fan is running
- 4.1.20 ADJUST cooling water throttle valves to maintain normal cooling temperatures.
  - UW-836
  - UW-840

**NOTE**

One set of data should be taken, even if engine is operated for less than an hour.

— 4.1.21 RECORD Appendix R DG parameters once per hour using ATTACHMENT 1, APPENDIX R DG DATA SHEETS.

**NOTE**

When the Appendix R DG Day Tank is operating in AUTO, the The Appendix R DG Day Tank Level should be maintained between 7/8 and Full.

- 4.1.22 MONITOR Appendix R DG Day Tank Level.
- 4.1.23 MONITOR Lube Oil Supply Reservoir gauge glass level.
  - 4.1.23.1 WHEN gauge glass level indicates less than 8 gallons, THEN REFILL Lube Oil Supply Reservoir with proper grade of oil. (SAE 15W – 40 Class A)
- 4.1.24 CHECK the engine systems for leakage
  - 4.1.24.1 IF leakage is observed, THEN INITIATE a WRT as necessary:

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4.1.25 IF it is desired to adjust diesel generator load,  
THEN PERFORM the following:

4.1.25.1 SELECT Base Load using the arrow key from the UTILITY  
Menu.

4.1.25.2 ADJUST load as desired using the "+" or "-" keys.

4.1.26 IF it is desired to adjust diesel generator VARs,  
THEN PERFORM the following:

4.1.26.1 SELECT PF LEVEL using the arrow key from the UTILITY  
Menu.

4.1.26.2 ADJUST VARs as desired using the "+" or "-" keys.

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## 4.2 Normal Engine Shutdown (Parallel Mode)

4.2.1 REQUEST the CCR to notify the SO that the Appendix R DG will be unloaded.

4.2.2 IF Appendix R DG Auxiliaries are aligned to the DG, THEN ALIGN the Appendix R DG Auxiliaries MCC to MCC 22 as follows:

4.2.2.1 CHECK the Appendix R DG Auxiliary Transfer Switch is aligned as follows:

a) Source 1 Available (White Light illuminated)

4.2.2.2 ROTATE and HOLD the Appendix R DG Auxiliaries Normal/Standby Switch in the **STANDBY NORMAL** position (Aligned to MCC 22) (Appendix R DG Auxiliaries MCC).

a) WHEN the CHECK Source 1 Connected (Green Light) illuminates, THEN RELEASE the switch

### NOTE

- The preset cool-down time (at rated speed) will vary dependent on the kW output.
- The generator will stop after the cool-down at idle time is expended.

4.2.3 PRESS AND RELEASE the Manual Run/Stop button.

4.2.3.1 VERIFY engine rotation has stopped.

4.2.3.2 ENSURE breaker SBO/ASS is Open and verify it's closing springs are charged. (SBO/APP R Diesel Generator Switchgear)

4.2.3.3 OPEN breaker ASS and verify the closing springs are charged. (SBO/APP. R Switchgear 13.8KV Bus)

4.2.3.4 PLACE the UNIT/PARALLEL switch in UNIT. (SBO/APP R Switchgear 13.8KV Bus)

DRN 08-02521

*NA*

4.2.3.5

IF the Appendix R DG Heat Exchangers are aligned to Service Water, THEN ALIGN the Appendix R DG Heat Exchangers to City Water as follows:

a) CLOSE SWT-837 to secure Service Water flow.

b) OPEN the following:

1) UW-854

2) UW-855

c) ADJUST Cooling Water flow as follows:

1) THROTTLE UW-840 to achieve approximately 100 gpm as indicated by FI-7980, Aftercooler Water Flow.

2) THROTTLE UW-836 to achieve approximately 100 gpm as indicated by FI-7979, Jacket Water Flow.

d) WAIT a minimum of 5 minutes for City Water to flush residual service water from the Appendix R DG Heat Exchangers and piping.

4.2.3.6

ENSURE the following are Closed to secure City Water to the APPENDIX R DG Heat Exchangers:

a) UW-854

b) UW-855

4.2.3.7

ENSURE the door opened in Step 4.1.2.3 is CLOSED.

4.2.4

ENSURE the Lube Oil Supply Reservoir is refilled with the proper grade of oil. (SAE 15W - 40 Class A) *greater than 8 gallons*

4.2.5

TURN the 0/MANUAL/AUTO switch to the AUTO position.