482 FORT CALHOUN STATION
FORM

FC-1115A 34
R3

SURVEILLANCE TEST COVERSHEET

Surveillance Test Number: OP-ST-DG-0002		Work Order Package No: 00171193 01
Title: DIESEL GENERATOR 2 CHECK		
Due Date: 7/21/2004	Drop Date: 7/28/2004	Frequency: M01
EEQ: N	Scaffold: N	Trending: Y
Special Conditions:		
1. Reason for Test (if other than scheduled): **ATTACHMENT 5**		
2. Postponement explanation (if required):		

Expected Completion:	Supervisor or System Engineer:	Date:

3. Test results acceptable?	[X] Yes	[ ] No	
Tech Specs satisfied?(Not required for acceptable test)	[ ] Yes	[ ] No	
Supervisor or System Engineer:	Time: 1245	Date: 7-21-04	
Additional Code analysis required within 72 hours?	[ ] Yes	[ ] No	[X] N/A
	STA Initials:	Date: 7/21/04	
Responsible System Engineer: RONNING, RICHARD R			

4. ST Coordinator initial test review	Initials: RM	Date: 7-22-04
WO required? WR 73316	[X] Yes	[ ] No
Frequency increased?	[ ] Yes	[X] No
CR required? CR200402518	[X] Yes	[ ] No
Retest required?	[ ] Yes	[X] No
System Engineer test review: Y	Initials: RRR	Date: 7-27-04
IST Coordinator test review: N	Initials:	Date:
ST Coordinator final test closeout review:	Initials: RM	Date:: 7-27-04

Fort Calhoun Station
Unit No. 1

OP-ST-DG-0002

SURVEILLANCE TEST

Title: DIESEL GENERATOR 2 CHECK

FC-68 Number: EC 29169

Reason for Change: Add steps to ensure that the voltage regulator is run down. Clarify minimum voltage and frequency for the Full Speed Start. Add voltage and frequency acceptance criteria.

Requestor: Richard Ronning

Preparer: Daniel A Hochstein

DIESEL GENERATOR 2 CHECK

SAFETY RELATED

1. PURPOSE

To satisfy in part the requirements of Technical Specification 3.1, Table 3-2, Items 11 and 12, 3.7(1)a and 3.7(1)f, for monthly testing of Diesel Generator 2 (DG-2) Auto-Start initiating circuitry and Fuel Oil Transfer Pumps.

2. REFERENCES/COMMITMENT DOCUMENTS

2.1 Technical Specifications:

- 2.7: Electrical Systems
- 3.1, Table 3-2, Items 11 and 12: Minimum Frequency for Checks, Calibrations *and Testing of Engineered Safety Features Instrumentation and Controls*
- 3.7: Emergency Power System Periodic Tests

2.2 USAR:

- 7.3.2.1, Auto-Start of Diesel Generators
- 8.3, Station Distribution
- 8.4, Diesel Generators

2.3 10CFR50:

- Appendix A, Criterion 17: Electrical Power Systems
- Appendix A, Criterion 18: Inspection and Testing of Electrical Power Systems

2.4 Ongoing Commitments:

- AR 09196, NRC-88-0318
- AR 07759, LIC-87-0864
- AR 16852, LIC-95-0175

2.5 Commitments (other than Ongoing):

- AR 06751, LIC-88-0261
- AR 09150, PED-SYE-92-0567
- AR 11562, LIC-91-0058
- AR 11735, Memo FC-0876-91
- AR 11845, Memo RTC-91-0042
- AR 12033, PED-SYE-92-0001

2.6 SO-G-23, Surveillance Test Program

2.7 EAR 91-010, Diesel Generator Speed and Voltage

3. DEFINITIONS

None

4. EQUIPMENT LIST

4.1 TEST EQUIPMENT REQUIRED/USED:

NOTE: During the course of this procedure, some portable or temporary test equipment may be used to prove operability of a plant component. All such equipment must be entered into the appropriate I&C Instrument Log. The Stopwatches are only required for performance of Attachments 1A, 1B, 4A, and 4B. Otherwise N/A this step.

EQUIPMENT	OPPD NO./ CALIBRATION DUE DATE	INITIALS/DATE
Stopwatch	/	N/A /
Stopwatch	/	N/A /

5. PRECAUTIONS AND LIMITATIONS

5.1 All anomalies and deficiencies shall be reported immediately to the immediate Supervisor, Shift Manager, and noted on the Comment Sheet. An immediate check shall be made to verify Limiting Conditions for Operation, per Technical Specifications have not been exceeded.

5.2 A Work Request shall be initiated to correct any reported deficiency and the number shall be referenced on the Comment Sheet.

5.3 If any valve or its control system has been replaced, repaired or undergone maintenance that could affect its performance, then prior to returning the valve to service, it shall be tested to demonstrate performance parameters are within acceptable limits.

5.4 Deviations between previous and new values shall be identified, and verification that the new values represent acceptable valve operation shall be made within 96 hours after the valve is returned to service.

5.5 Valve stroke times shall be determined by timing the interval between actuation of the control switch and the end of valve motion as observed by full open/closed remote indicating lights.

5.6 If any valve fails to exhibit the required change in valve stem or disc position or exceeds its limiting value of full stroke time, the valve shall be immediately declared inoperable.

5.7 The Diesel Generator continuous load rating is dependent on the ambient air temperature (see Figure 1).

5.8 During testing, the generator load shall be greater than the continuous load rating while not exceeding the 2000 hr rating. For higher engine intake ambient temperatures (greater than 97°F), the continuous load rating is reduced to minimize engine wear.

5.9 Ensure Diesel Breaker 1AD2 protection is not overridden during Surveillance Test for protection of the generator.

5.10 Ensure Diesel Breaker 1AD2 mode switch is in OFF-AUTO during Surveillance Test to prevent breaker auto closure.

5.11 Ensure Diesel Generator Test Switch 43/D2 is in the TEST position whenever the diesel is started by an emergency start test signal for protection of the diesel.

5.12 Before attempting to shut down DG-2, ensure that all start signals have been cleared.

5.13 If the Turbo Oil Circulating Pump fails to run after the diesel Generator is shutdown following a loaded run, restart the Diesel Generator and run it at idle speed. Notify the System Engineer.

5.14 Ensure governor motor is run back to the idle limit switch after the engine is shut down. Operation of the Diesel Generator in any condition other than an idle speed start requires declaring the diesel inoperable. This occurs because any speed other than idle could cause misoperation of the load shed circuitry and the subsequent inability of the Diesel Generator to accelerate safeguards loads.

5.15 Lube oil should always be visible in the bottom sightglass.

5.16 Lube oil should only be visible in the upper sightglass when the engine is running.

5.16.1 If lube oil is visible in the upper sightglass when the engine is in Standby, perform a roll through inspection.

5.16.2 Do not start the engine until the problem is identified and resolved.

5.17 Minimize operation of the Diesel Generator at no load. No load or light load (below 20% of rating) operation may allow oil accumulation in the exhaust system and air box, creating a fire hazard. Turbocharger gear train wear is also greatly accelerated. Should extended no load operations be required, the following guidelines should be observed.

5.17.1 If more than four (4) hours of light load operation occurs, then operate the engine at greater than or equal to 40% load for greater than or equal to 30 minutes in order to clean out any oil accumulations in the air box/exhaust manifold.

5.17.2 If more than eight (8) hours of no load operation occurs at idle speed, then operate the engine as in Step 5.17.1 .

5.18 Mechanical agitation (tapping), multiple stroking of valves, pre-test stroking of valves or any action taken to produce satisfactory test results due to SOV failure/sticking is prohibited. Any SOV failure/sticking shall result in the valve and its associated process valve, if applicable, being immediately declared inoperable, even if subsequent stroking produces acceptable SOV performance.

5.19 The following may alarm during this Surveillance Test:

- **DIESEL AUTO STANDBY** (AI-30B-D2, A37, A-5)
- **DIESEL AUTO START DEMAND** (AI-30B-D2, A37, A-4)
- **DIESEL ROOM CONTROL** (AI-30B-D2, A37, A-3)
- **DIESEL TROUBLE** (AI-30B-D2, A37, A-2)
- **DIESEL TRIPPED** (AI-30B-D2, A37, B-3)
- **DIESEL OFF-AUTO** (AI-30B-D2, A37, B-2)
- **DIESEL OR BKR TESTING** (AI-30B-D2, A37, B-1)
- **LOCAL ALARM ACTIVATED** (AI-30B-D2, A37, C-4)
- **BREAKER AUTO STANDBY** (AI-30B-D2, A37, D-5)
- **BKR OFF-AUTO** (AI-30B-D2, A37, D-2)
- **BKR PROTECTION OFF-AUTO** (AI-30B-D2, A37, E-3)
- **PANEL TROUBLE** (AI-30B-D2, A37, E-2)
- **KEY REMOVED** (AI-30B-D2, A37, E-1)
- **START AIR PRESS LOW** (DG2, D2L, B-4)
- **SWITCH NOT IN AUTO** (DG2, D2L, B-6)
- **1AD2 TESTING INTERLOCK** (CB-20, A18, A-4)

5.20 Due to high velocity air flow near the generator and radiator, maintain positive control over any hand held or loose objects to avoid accidental ingestion of objects into the generator blower, inlet air filters or the radiator fan.

5.21 Use caution while the Diesel Engine is running due to hot piping, hot surfaces and rotating equipment.

6. PREREQUISITES — INITIALS/DATE

6.1 Procedure Revision Number

Revision No. 41 — KB / 7-21-04

6.2 No other test is in progress which could potentially affect this test, or, if this test were performed, could have an effect on that test. — KB / 7-21-04

6.3 Calibration of test equipment has been verified. — KB / 7-21-04

6.4 A prejob briefing has been conducted prior to the start of this test. — KB / 7-21-04

6.5 The listed "Lead Person (people)" are qualified to a minimum of Electricians category E16C and available for the performance of this test. (Print Names)

Dave Kovar

DK / 7-21-04
EM

NOTE: The most recently completed checklist with deviations maintained on file may be used for alignment verification.

6.6 Diesel Generator No. 2 (DG-2) aligned per applicable portion(s) of OI-DG-2. — KB / 7-21-04

6.7 Diesel Generator No. 1 and all required associated engineered safeguards equipment are operable. — KB / 7-21-04

6.8 Bus 1A4 is energized from off-site power source, either 161 KV or 345 KV. — KB / 7-21-04

6.9 ERF Computer is in operation per OI-ERFCS-1, Emergency Response Facilities Computer System normal operation. — KB / 7-21-04

6.10 System Engineering has been notified and is available for performance of Attachment 8.

WB / 7-21-04
SE

6.11 Chemistry has been notified and is available for the quarterly performance of CH-SMP-MI-0016, Emergency Diesel Generator Engine Jacket Water System Sampling. N/A if sampling will not be performed this run.

OB / 7/21/04
Chemistry

NOTE: If bus voltage is greater than 4300 volts, placing the DG on the bus may increase bus voltage high enough to cause the DG Voltage Regulator control to reach maximum voltage.

6.12 IF 4160 volt Bus 1A4 voltage is greater than 4300 volts per ERF Computer Point Y3287B, THEN DO NOT PROCEED WITH THIS PROCEDURE. Contact System Engineering for further directions. Record voltage from ERF Computer Point.

Y3287B 4216 volts

TG / 7-21-04

6.13 Shift Manager authorizes performance of this test:

Shift Manager ______________ Date/Time 7/21/04 / 0816

7. PROCEDURE

NOTE: Steps 7.1 can be performed at anytime and repeated as necessary.

7.1 IF this Surveillance Test is turned over, a prejob briefing must be conducted prior to the continuation of this test.

N/A

NOTE: Step 7.2 need not be completed prior to performance of subsequent steps.

7.2 Perform Attachment 8 locally at DG-2.

WB / 7-21-04
SE

7.3 Test Diesel Generator DG-2 per the surveillance schedule or as specified in the post maintenance testing. (Initial and date appropriate attachment):

ATTACHMENTS	PAGE	
1A - Channel "A" Test (Full Speed)	9	/
1B - Channel "B" Test (Full Speed)	24	/
2 - Normal Start (Local)	39	/
3 - Emergency Start (AI-30B)	51	/
4A - Channel "A" Test (Idle Speed)	63	/
4B - Channel "B" Test (Idle Speed)	77	/
5 - Emergency Start (Local)	91	/ 7-21-04
6 - Normal Start (AI-30B)	103	/
7 - Reset and Shutdown of DG-2 After Test Failure	115	/
8 - DG-2 Performance Monitoring Record	118	MB 7-21-04

7.4 All independent verifications have been completed. / 7-21-04

Completed by ______ Date/Time 7-21-04 / 1130

8. RESTORATION

8.1 Shift Manager has been notified this test has been completed.

Shift Manager ______ Date/Time 7/21/04 / 1150

9. ACCEPTANCE CRITERIA

9.1 All systems/components actuated and performed as required within the appropriate attachment.

9.2 During performance of Attachment 1A or 1B, the diesel starts and accelerates to rated generator frequency AND voltage (Ready to Load) in less than or equal to ten seconds.

9.3 The diesel carries greater than its continuous load rating per Figure 1 for at least one (1) hour.

9.4 Fuel Oil Transfer Pump s operated per the attachment performed.

9.5 During performance of Attachments 1A, 1B, 4A and 4B, YCV-871F was fully stroked within the maximum stroke times indicated on the performed attachments.

10. TEST RECORD

10.1 Sections 1 through 11, the attachment selected in Section 7, Attachment 7 (if performed), and Attachment 8.

11. REVIEW

11.1 Test data shall be evaluated by the STA and reviewed by the Shift Manager for acceptability within 24 hours of the completion of this test.

Evaluated by ______________ Date/Time 7/21/04 / 1230
STA

Reviewed by ______________ Date/Time 7-21-04 / 1245
Shift Manager

11.2 The System Engineer is responsible for reviewing the test data, trending on appropriate attachments, and identified deficiencies noted within the test. This test has been reviewed and found acceptable or deficiencies and actions taken have been noted on the Comment Sheet.

System Engineer ______________ Date/Time 7-22-04 / 1403

Attachment 5 - Emergency Start (Local)

PROCEDURE	(√)	INITIALS
1. Log entry into T.S. 2.7(2)j LCO for inoperability of DG-2.		KA
NOTE: If DG-2 has been run in the last 24 hours Step 2 may be N/A'd.		
2. **(LOCAL)** Perform the engine barring procedure and check for any leakage from the cylinder test valves. Barring over may be performed either with the hand jack or the electric driven attachment.		
2.1 Close SA-163 Diesel Generator DG-2 Secondary Starting Air Stop Valve.		
2.2 Open SA-166 Diesel Generator DG-2 Secondary Starting Air Bleed-OFF Valve.		
2.3 Close SA-164 Diesel Generator DG-2 Primary Starting Air Stop Valve.		
2.4 Open SA-165 Diesel Generator DG-2 Primary Starting Air Bleed-OFF Valve.		
2.5 Verify **START AIR PRESS LOW** (DG2, D2L, B-4) is in alarm.		
2.6 Open all 20 cylinder test valves.		MM
2.7 Using engine turning device, rotate engine at least one complete revolution. When complete, remove engine turning device.		MM
2.8 **IF** indication of fluid leakage from a cylinder test valve is found, **THEN** contact the System Engineer for evaluation.		MM
2.9 Close all 20 cylinder test valves.		MM Ind Verif

Attachment 5 - Emergency Start (Local)

PROCEDURE (continued) (√) INITIALS

2.10 Close SA-166 Diesel Generator DG-2 Secondary Starting Air Bleed-OFF Valve.

DRM
Ind Verif

2.11 Open SA-163 Diesel Generator DG-2 Secondary Starting Air Stop Valve.

DRM
Ind Verif

2.12 Close SA-165 Diesel Generator DG-2 Primary Starting Air Bleed-OFF Valve.

DRM
Ind Verif

2.13 Open SA-164 Diesel Generator DG-2 Primary Starting Air Stop Valve.

DRM
Ind Verif

NOTE: Starting air pressure is between 200 - 240 psi.

2.14 Verify **START AIR PRESS LOW** (~~DG2,~~ D2L, B-4) is clear.

3. If Step 2 is N/A'd record the date and time the diesel was last run.

Date/Time N/A

N/A

4. Open Dampers YCV-871A, B, C, D and F by placing Diesel Generator D-2 Inlet/Exhaust Dampers YCV-871A/B/C/D/F Switch in the OPEN position AND Observe proper light indication.

5. Close Damper YCV-871A, B, C, D and F by placing Control Switch YCV-871A/B/C/D/F in the AUTO position and observe for proper light indication.

Attachment 5 - Emergency Start (Local)

PROCEDURE (continued) (√) INITIALS

6. **(LOCAL)** Verify Air Start Motor System SM/SS Switch is in the No. 1 position (DG-2 Engine Control Panel).

7. **(LOCAL)** Place Fuel Oil Transfer Pump Hand/Off/Auto Switches in the OFF position.

   - 43/FT1 ✓
   - 43/FT2 ✓

8. **(LOCAL)** Verify **SWITCH NOT IN AUTO** (DG2, D2L, B-6) is in alarm.

9. **(LOCAL)** Verify Engine Control 143/SS Switch is in the EMERG position.

10. **(LOCAL)** Notify the Control Room that local switch alignment is complete.

11. Verify **DIESEL AUTO STANDBY** (AI-30B-D2, A37, A-5) light is on.

12. Place Breaker Protection Mode Selector Switch 43-3/1AD2 (AI-30B) in the OFF position.

13. Verify **BKR PROTECTION OFF-AUTO** (AI-30B-D2, A37, E-3) is in alarm.

14. Place Breaker 1AD2 Mode Selector Switch 43-1/1AD2 (AI-30B) in the OFF AUTO position.

15. Verify **BREAKER AUTO STANDBY** (AI-30B-D2, A37, D-5) light is off.

16. Verify **BKR OFF-AUTO** (AI-30B-D2, A37, D-2) is in alarm.

17. **(LOCAL)** PLACE Diesel Generator Test Switch 43/D2 in TEST.

18. **(LOCAL)** Notify the Control Room that local switch alignment is complete.

19. Contact System Engineering and the equipment operator at DG-2 to verify that they are ready to collect data and that DG-2 is ready to begin testing.

20. **(LOCAL)** Start DG-2 by pushing Emergency Engine Start Pushbutton (DG-2 Engine Control Panel) to begin engine warm-up.

Attachment 5 - Emergency Start (Local)

PROCEDURE (continued) (√) INITIALS

21. Verify the Engine Start light is on (AI-30B).

22. **(LOCAL)** Verify that Jacket Water Outlet Temperature is greater than 120°F.

NOTE: Slower Diesel Governor control is achieved by performing the next step.

23. Depress the Diesel Normal Start Pushbutton (AI-30B).

24. Raise DG-2 speed to 900 RPM by taking Diesel Generator D2 Governor CS-65/D2 to the RAISE position.

25. Verify the Ready To Load light is on (AI-30B).

26. Place 43/1AD2, 1A24/1A44 Interlock Bypass Switch, in BYPASS position. (1A4-1)

27. Verify **1AD2 TESTING INTERLOCK** (CB-20, A18, A-4) is in alarm.

28. Turn D2/BUS 1A4 Sync Switch to the ON position for Breaker 1AD2.

NOTE: The ERF Computer may also be used to monitor voltages while matching DG-2 and Bus 1A4 voltages.

29. Adjust Diesel Generator D2 Voltage Regulator CS-90/D2 (CB-20) to match DG-2 and Bus 1A4 voltages.

NOTE: Recommended synchroscope speed is less than 1 revolution per 10 seconds.

30. Adjust Diesel Generator D2 Governor CS-65/D2 (CB-20) until the synchroscope is rotating **SLOWLY** in the **FAST** direction.

31. **WHEN** the synchroscope is **BETWEEN** 11 and 12 o'clock, **THEN** close Breaker 1AD2 (CB-20).

Attachment 5 - Emergency Start (Local)

PROCEDURE (continued) (√) INITIALS

NOTE: Current shall normally be limited to 400 amps maximum at 2500 KW.

NOTE: Diesel Generator manual loading and unloading rates should be maintained at less than 500 KW per minute.

NOTE: Maintain power factor from .8 to 1 per TDB-III.26 when the Diesel is loaded.

CAUTION

Under no conditions exceed 450 amps.

CAUTION

Periodically monitor ERF Computer Point Y3287B while diesel is loaded. If Bus voltage is greater than 4375 volts, notify System Engineering immediately.

32. Adjust Diesel Generator D2 Governor CS-65/D2 (CB-20) to load DG-2 to at least the continuous load rating per Figure 1 and the Technical Data Book, Figure TDB-III.26. TG

33. Turn D2/BUS 1A4 Sync Switch to the OFF position for Breaker 1AD2. TG

34. Record the time continuous load rating load was achieved.

    Time Applied 0910 TG

NOTE: Steps 35 through 40 may be performed out of sequence during diesel load run.

NOTE: If arcing is unusually intense, DG-2 shall be shut down and the commutators/slip rings cleaned.

35. **(LOCAL)** Inspect through generator viewing window for arcing of brushes. DK. EM

Attachment 5 - Emergency Start (Local)

PROCEDURE (continued) (√) INITIALS

NOTE: **Should it be determined that the field flash circuitry is continually energized, the Diesel Generator may have problems which would prevent the field flash circuitry from performing its function on the next diesel run. The Diesel Generator should be shut down and a thorough examination of the field flash circuitry be performed. Proceed as directed by the Shift Manager to exit procedure.**

36. **(LOCAL)** ***Inspect field flash circuitry by performing the following:***

36.1 Verify that Control Relay 2CR in Panel AI-133B is not energized. DK. EM

36.2 Verify that Field Flash Current Limiting Resistors (13R, 14R, 15R, and 16R) in Panel AI-133B are not damaged due to overheating. Contact System Engineer if damage is suspected. DK. EM

NOTE: The following step may be N/A'd at the discretion of the Shift Manager.

37. **(LOCAL)** Record the engine lube oil level.

Level 2" BELOW FULL (between low and full marks acceptable) MM

38. **(LOCAL)** During DG-2 testing, observe for any sign of abnormal or improper operation, overheating, or alarms and record discrepancies on the Comment Sheet.

39. **(LOCAL)** Check fuel oil, jacket water, lube oil, and air start systems for leaks.

40. **(LOCAL)** Record the governor oil level:

Level 7/16 (within the sight glass is acceptable)

41. Maintain at least the continuous rated load on DG-2 for a minimum of one (1) hour. **[AR 07759]**

Attachment 5 - Emergency Start (Local)

PROCEDURE (continued) | (√) | INITIALS

NOTE: Refer to TDB-III.26 for proper KVAR loading while unloading the diesel.

NOTE: Diesel Generator manual loading and unloading rates should be maintained at less than 500 KW per minute.

CAUTION

The governor controls are very sensitive and load reductions at a very rapid rate will occur unless care is taken in controlling the governor. A very rapid rate of reduction could result in operation of the reverse power relay and generator damage. **[AR 09196]**

42. Adjust Diesel Generator D2 Governor CS-65/D2 (CB-20) to slowly reduce DG-2 load to 300 KW AND record the time load reduction began. **[AR 09196]**

Load Reduction Start Time 10:13

43. Open Breaker 1AD2 (CB-20).

NOTE: Steps 44 and 45 may be performed concurrently.

CAUTION

A speed of 900 RPM shall be maintained on DG-2. Damage to the static exciter may result at lower engine RPM.

44. Maintain 900 RPM for five (5) minutes, but in no case longer than ten (10) minutes.

45. Record the D-2 PD reading on the FC-89, Generation Totals Form.

46. Shut down DG-2 by depressing AND holding **BOTH** Diesel Stop pushbuttons (A1-30B) for at least ten 10 seconds.

47. Station an Operator at DG-2 to locally observe rundown of the governor. **[AR 16852]**

NOTE: Steps 48 and 49 must be performed concurrently. **[AR 16852]**

48. Place AND hold Diesel Generator D2 Governor CS-65/D2 (CB-20) in the LOWER position until amber light is on. **[AR 16852]**

Attachment 5 - Emergency Start (Local)

PROCEDURE (continued) (√) INITIALS

NOTE: Full rundown of the governor consists of approximately 8 to 9 revolutions of the Speed Setting knob in the counterclockwise direction. **[AR 16852]**

49. **(LOCAL)** Observe rundown of the Diesel Generator Governor. **[AR 16852]**

50. Place 43/1AD2, 1A24/1A44 Interlock Bypass Switch, in NORMAL position. (1A4-1)

51. Verify **1AD2 TESTING INTERLOCK** (CB-20, A18, A-4) is clear.

52. Generate a "DG2" GTR report that bounds the start and stop times.

53. Place Breaker 1AD2 Mode Selector Switch 43-1/1AD2 in the EMERGENCY STANDBY position.

54. Verify **BREAKER AUTO STANDBY** (AI-30B-D2, A37, D-5) light is on.

55. Verify **BKR OFF-AUTO** (AI-30B-D2, A37, D-2) is clear.

56. Place Breaker Protection Mode Selector Switch 43-3/1AD2 in the EMERGENCY STANDBY position.

57. Verify **BKR PROTECTION OFF-AUTO** (AI-30B-D2, A37, E-3) is clear.

58. Complete Form FC-1046, Diesel Generator Demand Record.

NOTE: The engine fuel rack lever should be fully in, when the diesel is shutdown.

59. **(LOCAL)** Exercise the engine fuel rack by performing the following steps:

    59.1 Pull the engine fuel rack lever fully out (no fuel position) and verify the pointer on the governor LOAD LIMIT dial rotates to approximately "1".

Attachment 5 - Emergency Start (Local)

PROCEDURE (continued) (√) INITIALS

59.2 Return the engine fuel rack lever to its full fuel position and verify the pointer on the governor LOAD LIMIT dial rotates to *approximately* "10".

Ind Verif

NOTE: The following steps shall only be completed after DG-2 has been unloaded and stopped.

60. **(LOCAL)** PLACE Diesel Generator Test Switch 43/D2 in AUTO.

61. **(LOCAL)** *Visually verify that field flash relays,* GFB *and* 2CR, *have both* deenergized and returned to their proper position. DK. EM

62. **(LOCAL)** Verify Day Tank FO-2-2 level is below 150 gallons.

NOTE: Steps 63 through 79 may be N/A'd if OP-ST-FO-3002 is to be performed.

63. **(LOCAL)** Place the following instruments in service by opening their *isolation valves:*

- PI-2124 FO-203 ✓
- PI-2125 FO-204 ✓
- PI-2128 FO-207 ✓
- PI-2129 FO-208 ✓
- PI-2132 FO-215 ✓

64. **(LOCAL)** Place the following valves in the required position to place FI-2122 in service:

- FO-222 Open ✓
- FO-225 Closed ✓

65. **(LOCAL)** Depress the totalizer RESET button on FI-2122 and verify the gallons display reads zero.

66. **(LOCAL)** Place Fuel Oil Transfer Pump No. 1 43/FT1 Switch in the HAND position to start Pump FO-4A-2.

Attachment 5 - Emergency Start (Local)

PROCEDURE (continued) (√) INITIALS

67. **(LOCAL)** WHEN Pump FO-4A-2 has run for approximately two (2) minutes, THEN record the following data:

Data	Instrument	Reading	Initials
Pump FO-4A-2 suction pressure	PI-2124	13 "Hg Vac (≈ 15)	
Pump FO-4A-2 discharge pressure	PI-2128	16 psig (≈ 15)	
DG-2 Fuel Transfer Header pressure	PI-2132	6.5 psig (≈ 7)	
Discharge flow rate	FI-2122	15 gpm (≈ 15)	
Displayed volume	FI-2122	39.6 gal	[illegible]

68. **(LOCAL)** Place Fuel Oil Transfer Pump No. 1 43/FT1 Switch in the OFF position. [illegible]

69. **(LOCAL)** Place Fuel Oil Transfer Pump No. 2 43/FT2 Switch in the HAND position to start Pump FO-4B-2. [illegible]

Attachment 5 - Emergency Start (Local)

PROCEDURE (continued) (√) INITIALS

70. **(LOCAL)** WHEN Pump FO-4B-2 has run for approximately two (2) minutes, THEN record the following data:

Data	Instrument	Reading		Initials
Pump FO-4B-2 suction pressure	PI-2125	17.5 "Hg Vac (≈ 15)		
Pump FO-4B-2 discharge pressure	PI-2129	16 psig (≈ 15)		
DG-2 Fuel Transfer Header pressure	PI-2132	7 psig (≈ 7)		
Discharge flow rate	FI-2122	14 gpm (≈ 15)		
Displayed volume	FI-2122	79.8 gal		JLR

71. **(LOCAL)** Place Fuel Oil Transfer Pump No. 2 43/FT2 Switch in the OFF position. JLR

72. **(LOCAL)** Place Fuel Oil Transfer Pump No. 1 43/FT1 Switch in the HAND position to start Pump FO-4A-2. JLR

73. **(LOCAL)** WHEN Pump FO-4A-2 is automatically shut OFF by Day Tank Level Switch LC-3419B control, THEN record the total displayed volume:

FI-2122 244.86 gal JLR

74. **(LOCAL)** Depress the totalizer RESET button on FI-2122 and verify the gallons display reads zero. JLR

75. **(LOCAL)** Close the following instrument isolation valves:

- PI-2124 FO-203 ✓
- PI-2125 FO-204 ✓
- PI-2128 FO-207 ✓
- PI-2129 FO-208 ✓
- PI-2132 FO-215 ✓ JLR

Attachment 5 - Emergency Start (Local)

PROCEDURE (continued) (√) INITIALS

76. **(LOCAL)** Place the following valves in the Required position to remove FE/FI-2122 from service:

- FO-222 Closed ✓
- FO-225 Open ✓

Ind Verif

77. **(LOCAL)** Ensure Fuel Oil Transfer Pump Selector 43/FPC Switch is in the No. 1 position.

78. **(LOCAL)** Place Fuel Oil Transfer Pump Hand/Off/Auto Switches in the AUTO position.

- 43/FT1 ✓
- 43/FT2 ✓

79. **(LOCAL)** Verify **SWITCH NOT IN AUTO** ~~(DG2, D2L, B-6) is clear.~~

NOTE: *Lube oil shall be sampled for indication of fuel oil dilution by checking the flash point, which should be a minimum of 420°F. This sample may be taken at a later time at the discretion of the Shift Manager.*

80. **(LOCAL)** Take an engine lube oil sample. MM

81. Return Diesel Generator Test Switch 43/D2 key to Control Room.

NOTE: Do not complete Step 82 until OP-ST-FO-3002 is completed, if it is being performed.

82. Exit T.S. 2.7(2)j LCO for DG-2.

83. Complete the Diesel Outage Log for DG-2.

84. Attach a copy of "DG2" GTR printout to this test procedure.

Completed by ____________ Date/Time 7-21-04 / 1118

Attachment 8 - DG-2 Performance Monitoring Record

PROCEDURE	(√)	INITIALS
NOTE: The System Engineer shall determine the data collection frequencies to be used along with the need for monitoring additional process parameters on a test-by-test basis. Steps may be N/A'd at the discretion of the System Engineer.		
1. Prior to starting Diesel Generator 2 (DG-2), record the beginning hour meter reading. Beginning Hour meter 894.0		MB
NOTE: Steps 2 through 7 may be performed at any time in any order, but must be performed prior to completion of this test.		
2. Record DG-2 start time. • Start Time 0848 • Time to 100 rpm 1s (Local Tach or in Control Room) • Time to 500 rpm 3s (Local Tach or in Control Room)	✓ ✓ ✓	MB
3. Record the time (Loading Initiated) load was initially applied to DG-2. 894.0 before start Loading Initiated 0905		MB
4. Record the time (Unloading Initiated) load was initially removed from DG-2. Unloading Initiated 1013		MB
5. Record DG-2 Shutdown Time. Shutdown Time 1031		MB
6. After shutdown of DG-2, record the ending hour meter reading. Ending Hour meter 895.5		MB
7. Record calculated fuel consumption. —		MB

Attachment 8 - DG-2 Performance Monitoring Record

Item No	Parameter	Units	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
1	Generator Blower Intake Temp *	°F																		
2	Generator Blower Outtake Temp	°F																		
3	Engine Air Intake Temp Filter #1	°F																		
4	Engine Air Intake Temp Filter #2	°F																		
5	Engine Air Intake Temp Filter #3	°F																		
6	Engine Air Intake Temp Filter #4	°F																		
7	Engine Air Intake Temp Filter #5	°F																		
8	Engine Air Intake Temp Filter #6	°F																		
9	Engine Air Intake Temp Filter #7	°F																		
10	Engine Air Intake Temp Filter #8	°F																		
11	Engine Air Intake Temp Filter #9	°F																		
12	Radiator Air Intake Temp NORTH	°F																		
13	Radiator Air Intake Temp SOUTH	°F																		
14	Radiator Air Inlet Temp (LOCAL)	°F			90															
15	Radiator Air Outlet Temp (LOCAL)	°F			125															
16	Room Ambient Air Temp NORTH	°F																		
17	Room Ambient Air Temp SOUTH	°F																		
18	Outside Air Temp Weather Tower	°F																		
19	Engine Tach Panel AI-133B	RPM			810															

Attachment 8 - DG-2 Performance Monitoring Record

Item No	Parameter	Units	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
20	Generator Current Panel AI-133B	Amps			380															
21	Generator Field Voltage AI-133B	Volts		85	~~490~~ 113.7	21-04														
22	Generator Field Amps AI-133B	Amps			65															
23	Exciter Cabinet AI-133B Air Temperature	°F			82															
24	Generator Load Indicator (Local)	0-10			7.8															
25	Jacket Water Inlet Temp (Engine Panel)	°F			170															
26	Jacket Water Outlet Temp (Engine Panel)	°F			175															
27	JW to L.O. Cooler Temp (LOCAL)	°F			162															
28	JW from Radiator Temp (LOCAL)	°F			152															
29	Jacket Water Pump Disch Press (Local)	psig			59															
30	Fuel Oil Pressure No. 1 (Engine Panel	psig			64															
31	Fuel Oil Pressure No.2 (Engine Panel)	psig			44-82 60															
32	Lube Oil Pump Disch Pressure (Eng. Pnl)	psig			80															

Attachment 8 - DG-2 Performance Monitoring Record

Item No	Parameter	Units	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
33	Lube Oil Cooler Outlet Temp (Local)	°F			186															
34	Lube Oil Cooler Inlet Temp (Local)	°F			206															
35	Turbo Lube Oil Pressure (Local)	psig			80															
36	Fuel Oil Day Tank Level (Local)	gal			245 @ 919															
37	Primary Air Regulator Press (Starting Air Regulator Pressure to be 180 ± 10 psig)	psig			182															
38	Secondary Air Regulator Press (Starting Air Regulator Pressure to be 180 ± 10 psig)	psig			182															
39	#1 Cylinder Exhaust Gas Temp (Eng Panel)	°F			975															
40	#2 Cylinder Exhaust Gas Temp (Eng Panel)	°F			-															
41	#3 Cylinder Exhaust Gas Temp (Eng Panel)	°F			1080															
42	#4 Cylinder Exhaust Gas Temp (Eng Panel)	°F			1060															
43	#5 Cylinder Exhaust Gas Temp (Eng Panel)	°F			1025															

Attachment 8 - DG-2 Performance Monitoring Record

Item No	Parameter	Units	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
44	#6 Cylinder Exhaust Gas Temp (Eng Panel)	°F			1060															
45	#7 Cylinder Exhaust Gas Temp (Eng Panel)	°F			1065															
46	#8 Cylinder Exhaust Gas Temp (Eng Panel)	°F			1060															
47	#9 Cylinder Exhaust Gas Temp (Eng Panel)	°F			990															
48	#10 Cylinder Exhaust Gas Temp (Eng Panel)	°F			985															
49	#11 Cylinder Exhaust Gas Temp (Eng Panel)	°F			950															
50	#12 Cylinder Exhaust Gas Temp (Eng Panel)	°F			1020															
51	#13 Cylinder Exhaust Gas Temp (Eng Panel)	°F			1080															
52	#14 Cylinder Exhaust Gas Temp (Eng Panel)	°F			1060															
53	#15 Cylinder Exhaust Gas Temp (Eng Panel)	°F			1040															

Attachment 8 - DG-2 Performance Monitoring Record

Item No	Parameter	Units	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
54	#16 Cylinder Exhaust Gas Temp (Eng Panel)	°F			1060															
55	#17 Cylinder Exhaust Gas Temp (Eng Panel)	°F			1040															
56	#18 Cylinder Exhaust Gas Temp (Eng Panel)	°F			1005															
57	#19 Cylinder Exhaust Gas Temp (Eng Panel)	°F			990															
58	#20 Cylinder Exhaust Gas Temp (Eng Panel)	°F			995															
59	*Exhaust Gas Average Temp #21* (Eng Panel)	°F			960															
60	Turbo Exhaust Gas Temp #22 (Eng Panel)	°F			715															
61	Turbo Exhaust Stack Pressure (Eng. Panl)	"H_2O			2.1															
62	Air Inlet Temp Right Aftercooler (LOCAL)	°F			305															
63	Air Outlet Temp Right Aftercooler (LOCAL)	°F			295															

Attachment 8 - DG-2 Performance Monitoring Record

Item No	Parameter	Units	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
64	Air Inlet Temp Left Aftercooler (LOCAL)	°F			285															
65	Air Outlet Temp Left Aftercooler (LOCAL)	°F			223															
66																				
67																				
68																				
69																				
70																				
71																				
72																				
73																				
74																				

Completed by [illegible] Date/Time 7-21-04 1118
System Engineer

Figure 1

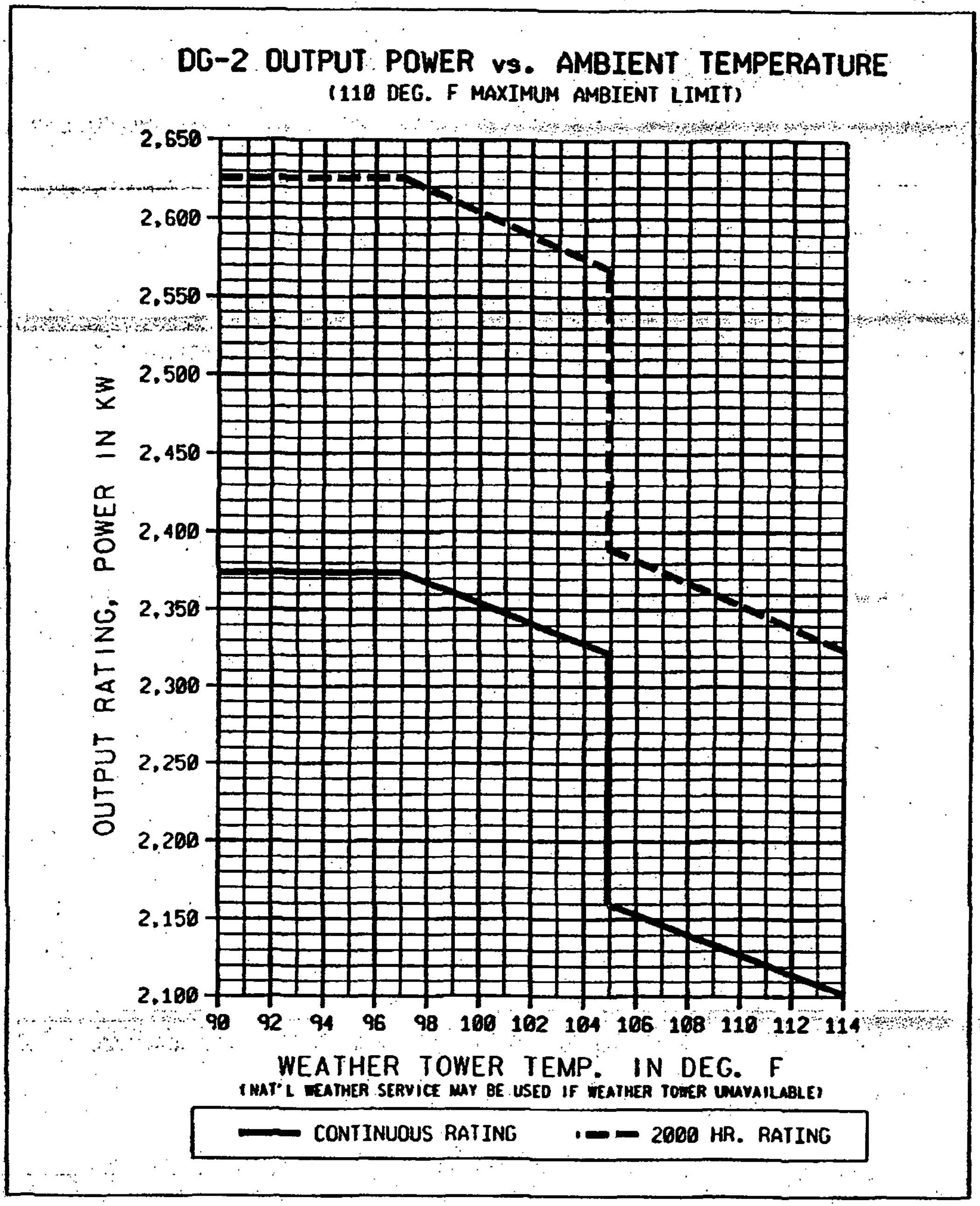
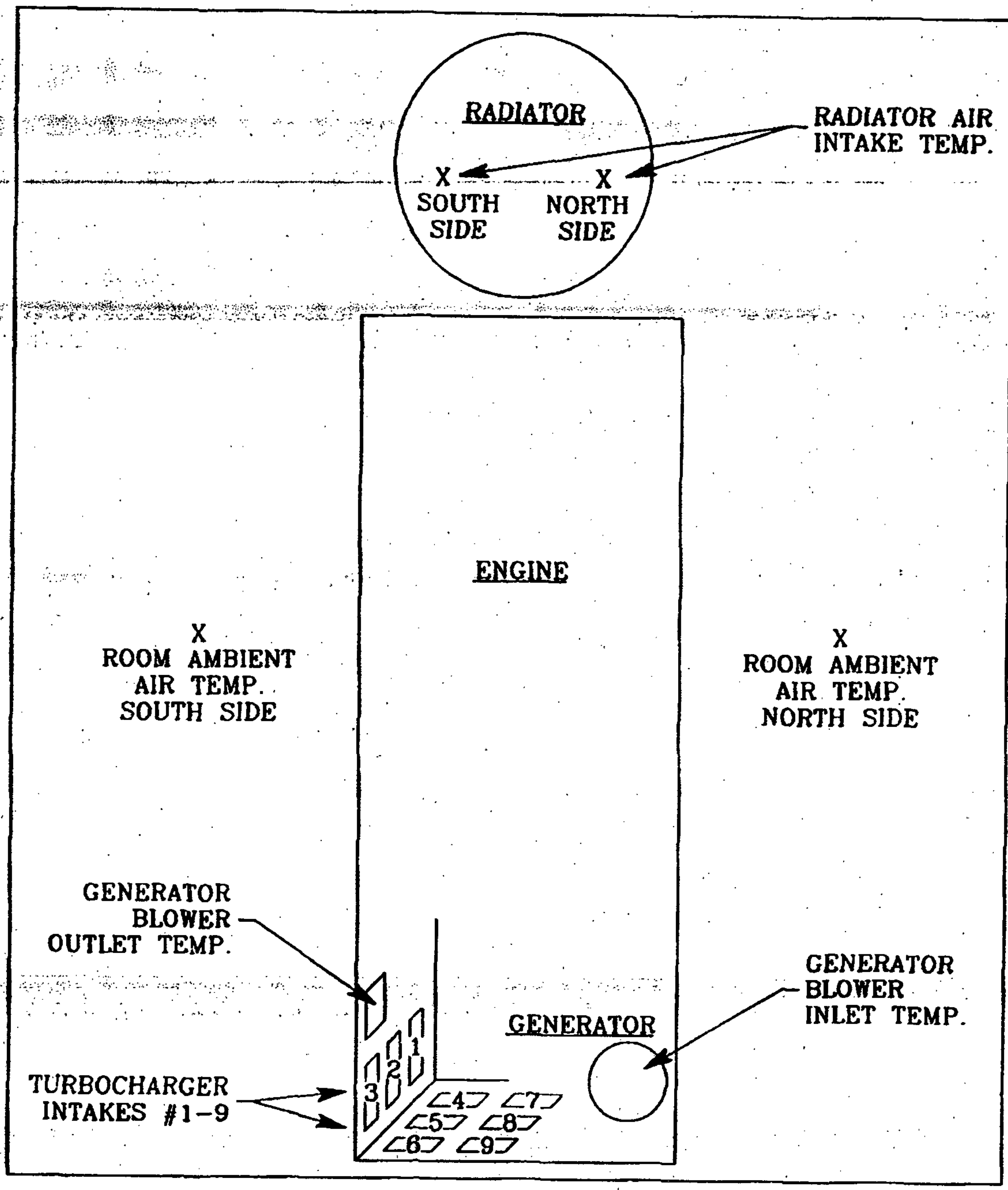

DG-2 OUTPUT POWER vs. AMBIENT TEMPERATURE
(110 DEG. F MAXIMUM AMBIENT LIMIT)
OUTPUT RATING, POWER IN KW
2,650
2,600
2,550
2,500
2,450
2,400
2,350
2,300
2,250
2,200
2,150
2,100
90 92 94 96 98 100 102 104 106 108 110 112 114
WEATHER TOWER TEMP. IN DEG. F
(NAT'L WEATHER SERVICE MAY BE USED IF WEATHER TOWER UNAVAILABLE)
CONTINUOUS RATING
2000 HR. RATING

Figure 2 - Location Layout for Handheld Temperature Device



Comment Sheet

① STEP 45 COULD NOT BE COMPLETED. D-2PD DID NOT INDICATE A READING. CR# 200402518. WR# 73316. 7-21-04

7.21.04

REPORT: ** DG2 ** was requested on **21-JUL-04 11:32:09.3**

DATE/TIME	*Y3256* *KVARS*	*Y3258* *VOLTS*	*Y3260* *AMPS*	*Y3262* *FREQ*	*Y3277* * KW *	** T1 ** **10 Meter	** T2 ** AMBIENT**
21-JUL-04 09:08:00.0	32.813	4236.914	254.062	59.987	1801.406	78.980	78.782
21-JUL-04 09:09:00.0	351.094	4245.117	326.719	59.981	2310.000	78.944	78.746
21-JUL-04 09:10:00.0	587.344	4253.320	370.547	59.975	2598.750	78.926	78.746
21-JUL-04 09:11:00.0	577.500	4253.320	361.875	59.981	2556.094	78.980	78.782
21-JUL-04 09:12:00.0	528.281	4249.219	360.703	59.981	2546.250	78.926	78.746
21-JUL-04 09:13:00.0	1004.062	4265.625	379.453	59.981	2611.875	78.890	78.710
21-JUL-04 09:14:00.0	945.000	4261.523	365.391	59.981	2516.719	78.872	78.710
21-JUL-04 09:15:00.0	971.250	4257.422	364.687	59.987	2506.875	78.962	78.782
21-JUL-04 09:16:00.0	938.437	4257.422	363.516	59.987	2510.156	78.980	78.782
21-JUL-04 09:17:00.0	1056.563	4261.523	368.906	59.994	2503.594	78.980	78.800
21-JUL-04 09:18:00.0	1194.375	4265.625	376.172	59.994	2490.469	79.106	78.890
21-JUL-04 09:19:00.0	1237.031	4265.625	380.625	59.987	2483.906	79.088	78.872
21-JUL-04 09:20:00.0	1191.094	4261.523	377.578	59.987	2506.875	79.142	78.944
21-JUL-04 09:21:00.0	1109.063	4261.523	374.062	59.981	2533.125	79.250	79.016
21-JUL-04 09:22:00.0	1063.125	4257.422	372.656	59.975	2533.125	79.268	78.998
21-JUL-04 09:23:00.0	1020.469	4257.422	371.016	59.975	2542.969	79.322	79.070
21-JUL-04 09:24:00.0	984.375	4257.422	369.609	59.969	2546.250	79.286	79.070
21-JUL-04 09:25:00.0	1092.656	4261.523	373.828	59.975	2539.688	79.304	79.052
21-JUL-04 09:26:00.0	1191.094	4265.625	381.328	59.969	2546.250	79.322	79.088
21-JUL-04 09:27:00.0	1158.281	4265.625	378.984	59.981	2542.969	79.358	79.142
21-JUL-04 09:28:00.0	1069.688	4261.523	374.531	59.981	2546.250	79.394	79.160
21-JUL-04 09:29:00.0	1050.000	4261.523	371.953	59.994	2536.406	79.430	79.214
21-JUL-04 09:30:00.0	971.250	4257.422	368.906	59.987	2539.688	79.502	79.322
21-JUL-04 09:31:00.0	1004.062	4257.422	372.422	59.975	2549.531	79.538	79.340
21-JUL-04 09:32:00.0	1017.187	4257.422	373.594	59.962	2556.094	79.610	79.430
21-JUL-04 09:33:00.0	1158.281	4261.523	382.031	59.962	2569.219	79.610	79.430
21-JUL-04 09:34:00.0	1230.469	4265.625	384.141	59.969	2552.813	79.574	79.412
21-JUL-04 09:35:00.0	1187.813	4265.625	380.625	59.981	2539.688	79.574	79.412
21-JUL-04 09:36:00.0	1115.625	4261.523	376.875	59.987	2536.406	79.628	79.394
21-JUL-04 09:37:00.0	1089.375	4261.523	376.875	59.987	2549.531	79.646	79.430
21-JUL-04 09:38:00.0	1030.313	4257.422	373.125	59.994	2539.688	79.754	79.538
21-JUL-04 09:39:00.0	984.375	4257.422	370.781	59.987	2539.688	79.772	79.574
21-JUL-04 09:40:00.0	994.219	4257.422	371.953	59.987	2542.969	79.880	79.646
21-JUL-04 09:41:00.0	1089.375	4261.523	377.109	59.981	2542.969	79.916	79.682
21-JUL-04 09:42:00.0	1200.938	4265.625	382.734	59.981	2539.688	79.844	79.628
21-JUL-04 09:43:00.0	1217.344	4261.523	383.203	59.981	2539.688	79.862	79.628
21-JUL-04 09:44:00.0	1135.313	4261.523	379.453	59.975	2539.688	79.880	79.628
21-JUL-04 09:45:00.0	1082.813	4261.523	378.750	59.969	2552.813	79.916	79.718
21-JUL-04 09:46:00.0	1063.125	4257.422	378.516	59.969	2556.094	79.952	79.754
21-JUL-04 09:47:00.0	1010.625	4257.422	375.937	59.969	2549.531	80.042	79.808
21-JUL-04 09:48:00.0	1027.031	4257.422	376.641	59.975	2549.531	80.042	79.808
21-JUL-04 09:49:00.0	1023.750	4253.320	377.578	59.969	2562.656	80.006	79.826
21-JUL-04 09:50:00.0	1112.344	4257.422	380.156	59.975	2542.969	80.006	79.808
21-JUL-04 09:51:00.0	1227.188	4261.523	386.953	59.975	2546.250	80.096	79.844
21-JUL-04 09:52:00.0	1246.875	4261.523	387.891	59.975	2549.531	80.096	79.862
21-JUL-04 09:53:00.0	1200.938	4257.422	385.781	59.975	2546.250	80.186	80.006
21-JUL-04 09:54:00.0	1105.781	4257.422	380.625	59.969	2549.531	80.222	80.024
21-JUL-04 09:55:00.0	1063.125	4257.422	379.922	59.969	2556.094	80.240	80.042
21-JUL-04 09:56:00.0	1023.750	4257.422	376.406	59.975	2549.531	80.222	80.060
21-JUL-04 09:57:00.0	987.656	4257.422	373.125	59.994	2533.125	80.330	80.150
21-JUL-04 09:58:00.0	984.375	4257.422	371.719	59.994	2526.563	80.348	80.132
21-JUL-04 09:59:00.0	948.281	4253.320	368.906	60.006	2510.156	80.384	80.186
21-JUL-04 10:00:00.0	1030.313	4257.422	373.828	60.006	2526.563	80.420	80.222
21-JUL-04 10:01:00.0	1155.000	4261.523	379.687	60.006	2529.844	80.456	80.258
21-JUL-04 10:02:00.0	1151.719	4261.523	378.984	60.012	2526.563	80.510	80.294
21-JUL-04 10:03:00.0	1112.344	4261.523	375.703	60.019	2513.438	80.618	80.402
21-JUL-04 10:04:00.0	1076.250	4257.422	374.297	60.012	2513.438	80.744	80.510
21-JUL-04 10:05:00.0	1017.187	4257.422	373.125	60.006	2526.563	80.870	80.654

21-JUL-04	10:06:00.0	1000.781	4257.422	373.125	60.006	2529.844	80.924	80.708
21-JUL-04	10:07:00.0	984.375	4257.422	373.125	60.000	2536.406	80.924	80.744
21-JUL-04	10:08:00.0	967.969	4253.320	371.719	59.994	2526.563	80.996	80.798
21-JUL-04	10:09:00.0	967.969	4253.320	372.187	60.000	2529.844	81.176	80.960
21-JUL-04	10:10:00.0	945.000	4257.422	372.422	59.987	2539.688	81.482	81.302
21-JUL-04	10:11:00.0	928.594	4257.422	372.422	59.987	2539.688	81.752	81.572
21-JUL-04	10:12:00.0	981.094	4257.422	374.062	59.987	2536.406	81.986	81.842
21-JUL-04	10:13:00.0	1105.781	4257.422	379.219	59.987	2529.844	82.256	82.130
21-JUL-04	10:14:00.0	1102.500	4257.422	322.734	60.006	2063.906	82.418	82.292
21-JUL-04	10:15:00.0	938.437	4249.219	256.406	59.994	1584.844	82.598	82.454
21-JUL-04	10:16:00.0	495.469	4241.016	142.266	59.994	889.219	82.652	82.526
21-JUL-04	10:17:00.0	423.281	4241.016	135.000	59.981	862.969	82.742	82.634
21-JUL-04	10:18:00.0	275.625	4232.813	78.750	59.981	495.469	82.778	82.706
21-JUL-04	10:19:00.0	6.562	4232.813	1.289	58.781	6.562	83.012	82.904
21-JUL-04	10:20:00.0	0.000	2186.133	0.176	58.775	0.000	83.282	83.120
21-JUL-04	10:21:00.0	0.000	2157.422	0.176	58.769	0.000	83.336	83.228
21-JUL-04	10:22:00.0	0.000	2169.727	0.176	59.950	0.000	83.552	83.426

REPORT: ** DG2 ** was requested on **21-JUL-04 11:32:09.3**

DATE/TIME	*Y3256* *KVARS*	*Y3258* *VOLTS*	*Y3260* *AMPS*	*Y3262* *FREQ*	*Y3277* * KW *	** T1 ** **10 Meter	** T2 ** AMBIENT**
21-JUL-04 09:08:00.0	32.813	4236.914	254.062	59.987	1801.406	78.980	78.782
21-JUL-04 09:09:00.0	351.094	4245.117	326.719	59.981	2310.000	78.944	78.746
21-JUL-04 09:10:00.0	587.344	4253.320	370.547	59.975	2598.750	78.926	78.746
21-JUL-04 09:11:00.0	577.500	4253.320	361.875	59.981	2556.094	78.980	78.782
21-JUL-04 09:12:00.0	528.281	4249.219	360.703	59.981	2546.250	78.926	78.746
21-JUL-04 09:13:00.0	1004.062	4265.625	379.453	59.981	2611.875	78.890	78.710
21-JUL-04 09:14:00.0	945.000	4261.523	365.391	59.981	2516.719	78.872	78.710
21-JUL-04 09:15:00.0	971.250	4257.422	364.687	59.987	2506.875	78.962	78.782
21-JUL-04 09:16:00.0	938.437	4257.422	363.516	59.987	2510.156	78.980	78.782
21-JUL-04 09:17:00.0	1056.563	4261.523	368.906	59.994	2503.594	78.980	78.800
21-JUL-04 09:18:00.0	1194.375	4265.625	376.172	59.994	2490.469	79.106	78.890
21-JUL-04 09:19:00.0	1237.031	4265.625	380.625	59.987	2483.906	79.088	78.872
21-JUL-04 09:20:00.0	1191.094	4261.523	377.578	59.987	2506.875	79.142	78.944
21-JUL-04 09:21:00.0	1109.063	4261.523	374.062	59.981	2533.125	79.250	79.016
21-JUL-04 09:22:00.0	1063.125	4257.422	372.656	59.975	2533.125	79.268	78.998
21-JUL-04 09:23:00.0	1020.469	4257.422	371.016	59.975	2542.969	79.322	79.070
21-JUL-04 09:24:00.0	984.375	4257.422	369.609	59.969	2546.250	79.286	79.070
21-JUL-04 09:25:00.0	1092.656	4261.523	373.828	59.975	2539.688	79.304	79.052
21-JUL-04 09:26:00.0	1191.094	4265.625	381.328	59.969	2546.250	79.322	79.088
21-JUL-04 09:27:00.0	1158.281	4265.625	378.984	59.981	2542.969	79.358	79.142
21-JUL-04 09:28:00.0	1069.688	4261.523	374.531	59.981	2546.250	79.394	79.160
21-JUL-04 09:29:00.0	1050.000	4261.523	371.953	59.994	2536.406	79.430	79.214
21-JUL-04 09:30:00.0	971.250	4257.422	368.906	59.987	2539.688	79.502	79.322
21-JUL-04 09:31:00.0	1004.062	4257.422	372.422	59.975	2549.531	79.538	79.340
21-JUL-04 09:32:00.0	1017.187	4257.422	373.594	59.962	2556.094	79.610	79.430
21-JUL-04 09:33:00.0	1158.281	4261.523	382.031	59.962	2569.219	79.610	79.430
21-JUL-04 09:34:00.0	1230.469	4265.625	384.141	59.969	2552.813	79.574	79.412
21-JUL-04 09:35:00.0	1187.813	4265.625	380.625	59.981	2539.688	79.574	79.412
21-JUL-04 09:36:00.0	1115.625	4261.523	376.875	59.987	2536.406	79.628	79.394
21-JUL-04 09:37:00.0	1089.375	4261.523	376.875	59.987	2549.531	79.646	79.430
21-JUL-04 09:38:00.0	1030.313	4257.422	373.125	59.994	2539.688	79.754	79.538
21-JUL-04 09:39:00.0	984.375	4257.422	370.781	59.987	2539.688	79.772	79.574
21-JUL-04 09:40:00.0	994.219	4257.422	371.953	59.987	2542.969	79.880	79.646
21-JUL-04 09:41:00.0	1089.375	4261.523	377.109	59.981	2542.969	79.916	79.682
21-JUL-04 09:42:00.0	1200.938	4265.625	382.734	59.981	2539.688	79.844	79.628
21-JUL-04 09:43:00.0	1217.344	4261.523	383.203	59.981	2539.688	79.862	79.628
21-JUL-04 09:44:00.0	1135.313	4261.523	379.453	59.975	2539.688	79.880	79.628
21-JUL-04 09:45:00.0	1082.813	4261.523	378.750	59.969	2552.813	79.916	79.718
21-JUL-04 09:46:00.0	1063.125	4257.422	378.516	59.969	2556.094	79.952	79.754
21-JUL-04 09:47:00.0	1010.625	4257.422	375.937	59.969	2549.531	80.042	79.808
21-JUL-04 09:48:00.0	1027.031	4257.422	376.641	59.975	2549.531	80.042	79.808
21-JUL-04 09:49:00.0	1023.750	4253.320	377.578	59.969	2562.656	80.006	79.826
21-JUL-04 09:50:00.0	1112.344	4257.422	380.156	59.975	2542.969	80.006	79.808
21-JUL-04 09:51:00.0	1227.188	4261.523	386.953	59.975	2546.250	80.096	79.844
21-JUL-04 09:52:00.0	1246.875	4261.523	387.891	59.975	2549.531	80.096	79.862
21-JUL-04 09:53:00.0	1200.938	4257.422	385.781	59.975	2546.250	80.186	80.006
21-JUL-04 09:54:00.0	1105.781	4257.422	380.625	59.969	2549.531	80.222	80.024
21-JUL-04 09:55:00.0	1063.125	4257.422	379.922	59.969	2556.094	80.240	80.042
21-JUL-04 09:56:00.0	1023.750	4257.422	376.406	59.975	2549.531	80.222	80.060
21-JUL-04 09:57:00.0	987.656	4257.422	373.125	59.994	2533.125	80.330	80.150
21-JUL-04 09:58:00.0	984.375	4257.422	371.719	59.994	2526.563	80.348	80.132
21-JUL-04 09:59:00.0	948.281	4253.320	368.906	60.006	2510.156	80.384	80.186
21-JUL-04 10:00:00.0	1030.313	4257.422	373.828	60.006	2526.563	80.420	80.222
21-JUL-04 10:01:00.0	1155.000	4261.523	379.687	60.006	2529.844	80.456	80.258
21-JUL-04 10:02:00.0	1151.719	4261.523	378.984	60.012	2526.563	80.510	80.294
21-JUL-04 10:03:00.0	1112.344	4261.523	375.703	60.019	2513.438	80.618	80.402
21-JUL-04 10:04:00.0	1076.250	4257.422	374.297	60.012	2513.438	80.744	80.510
21-JUL-04 10:05:00.0	1017.187	4257.422	373.125	60.006	2526.563	80.870	80.654
21-JUL-04 10:06:00.0	1000.781	4257.422	373.125	60.006	2529.844	80.924	80.708
21-JUL-04 10:07:00.0	984.375	4257.422	373.125	60.000	2536.406	80.924	80.744
21-JUL-04 10:08:00.0	967.969	4253.320	371.719	59.994	2526.563	80.996	80.798
21-JUL-04 10:09:00.0	967.969	4253.320	372.187	60.000	2529.844	81.176	80.960
21-JUL-04 10:10:00.0	945.000	4257.422	372.422	59.987	2539.688	81.482	81.302
21-JUL-04 10:11:00.0	928.594	4257.422	372.422	59.987	2539.688	81.752	81.572
21-JUL-04 10:12:00.0	981.094	4257.422	374.062	59.987	2536.406	81.986	81.842
21-JUL-04 10:13:00.0	1105.781	4257.422	379.219	59.987	2529.844	82.256	82.130
21-JUL-04 10:14:00.0	1102.500	4257.422	322.734	60.006	2063.906	82.418	82.292
21-JUL-04 10:15:00.0	938.437	4249.219	256.406	59.994	1584.844	82.598	82.454
21-JUL-04 10:16:00.0	495.469	4241.016	142.266	59.994	889.219	82.652	82.526
21-JUL-04 10:17:00.0	423.281	4241.016	135.000	59.981	862.969	82.742	82.634
21-JUL-04 10:18:00.0	275.625	4232.813	78.750	59.981	495.469	82.778	82.706
21-JUL-04 10:19:00.0	6.562	4232.813	1.289	58.781	6.562	83.012	82.904
21-JUL-04 10:20:00.0	0.000	2186.133	0.176	58.775	0.000	83.282	83.120
21-JUL-04 10:21:00.0	0.000	2157.422	0.176	58.769	0.000	83.336	83.228
21-JUL-04 10:22:00.0	0.000	2169.727	0.176	59.950	0.000	83.552	83.426

Voltage indication

Power Indication

Marks on original ST indicating that DG ran for > 1hour.