1301-8.2
Revision 5
12/01/77

THREE MILE SLAND NUCLEAR STATION
UNIT #1 SURVEILLANCE PROCEDURE 1301-8.2
DIESEL GENERATOR ANNUAL INSPECTION

CENTRAL FILE

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Unit 1 Staff Recommends Approval

Approval N/A Date —

Cognizant Dept. Head

Unit 2 Staff Recommends Approval

Approval N/A Date —

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By — Date —

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SURVEILLANCE PROCEDURE 1301-8.2

Diesel Generator Annual Inspection
Required Interval - Annually

1.0 Purpose

1.1 To accomplish inspection of the emergency diesel generators in accordance with manufacturer's recommendations and Technical Specification 4.6.1.c.

2.0 Plant Status

2.1 The reactor may be operating or shutdown except as specified in section 3.1 and 3.2.

3.0 Limits and Precautions

3.1 The reactor shall not be made critical unless both diesel generators are operable and at least 25,000 gallons of fuel oil are available in the storage tank.

3.2 From the date that one of the diesel generators is made inoperable, reactor operation is permissible for the succeeding seven days provided that during such seven days the operable diesel generator is tested immediately and daily. In the event two diesel generators are inoperable, the unit shall be placed in hot shutdown in 12 hours. If one diesel is not operable within an additional 24 hour period the plant shall be placed in cold shutdown within an additional 24 hours thereafter.

3.3 Prior to commencing inspection, ensure that air start manual shut-off valve (EG-V15A or EG-V15B) associated with unit to be inspected is closed. Open only as necessary to perform this procedure.

3.4 Exercise caution when fuel system has been opened. Fuel oil is flammable and vapors are explosive.

3.5 When inspection covers are removed or when cleaning installed parts, exercise care to prevent foreign matter from entering engine.

4.0 Location of Assembly

4.1 Diesel generators 1A and 1B are located in the diesel generator building.

5.0 Equipment Required

See section 6.0 of Maintenance Procedure 1405- 3.2.

6.0 Procedure

6.1 Start and load the engine in accordance with SP 1303-4.16. Allow the engine to reach operating temperature and stabilize (about 10 minutes). While the engine is operating, check the following:

6.1.1 Turbocharger Performance

Check turbocharger performance by recording the parameters detailed on data sheet one, if any conditions are found to be unacceptable, repair as necessary in accordance with Maintenance Procedure 1405-3.2.

6.1.2 Check the fuel oil filter pressure drop and record on data sheet one. If the pressure drop exceeds 10 psid, the filter cartridge must be replaced in accordance with MP 1405-3.2, section 7.5.1.

6.1.3 Check the lube oil strainer pressure drop and record on data sheet one. If the pressure drop exceeds 18 psid, the strainer must be cleaned i.a.w. MP 1405-3.2 section 7.3.2.

6.1.4 Inspect the Fuel Control Governor linkage for proper operation and record findings on data sheet one. Linkage should be mechanically sound and properly transmit motion from the Governor to the Fuel Control.

6.1.5 Examine the fuel oil injection racks for proper balance and operation. All mechanical joints should be tight and all rack settings should be the same (± 1). Record findings on data sheet one.

6.1.6 Inspect all engine associated piping for leakage while the engine is operating. Re-inspect after the engine has been shutdown. Record findings on data sheet one.

6.1.7 Complete the operating log sheet from SP 1303-4.16 and attach a copy to data sheet one. The vendor's representative and the cognizant engineer may use this log as the basis for recommending the inspection of areas not specified below.

6.1.8 Secure the engine in accordance with SP 1303-4.16.

6.2 Mechanical Inspections

With the engine shutdown and tagged out, perform the following inspections:

NOTE: In many of the below listed steps, inspection covers are to be removed. In all cases, the inspection covers are to be replaced as soon as possible. When replacing covers, new gaskets are to be used if the old gasket is torn, damaged or otherwise deteriorated.

6.2.1 Injection Nozzle Operation

6.2.1.1 Removal from Engine

a. Clean injection tube connections with fuel oil and wipe dry with clean cloth before disturbing connections.

b. Remove injection and drain tubes.

c. Remove collar stud nuts.

CAUTION: DURING NOZZLE REMOVAL, DO NOT STRIKE

END OF NOZZLE ASSEMBLY AGAINST ANY HARD SURFACE. NICKING OR OTHER DAMAGE TO NOZZLE MAY RESULT.

d. Remove nozzle assembly using puller.

e. Cover open end of injection tube and nozzle hole in cylinder liner to prevent entry of dirt, etc.

6.2.1.2 Nozzle Test

a. Connect nozzle to bench type nozzle test pump and pump handle rapidly for several short strokes prior to checking nozzle.

b. Check nozzle opening pressure by slowly operating pump while observing test pump pressure indicator. The highest pressure indicated is the opening pressure. Stop pumping after pressure drops.

c. Correct opening pressure is 2200 +100, -0 psig.

d. If opening pressure is incorrect, adjust as follows while testing nozzle in accordance with steps a and b:

(1) Loosen locknut on nozzle assembly.

(2) Set desired pressure.

(3) Tighten locknut.

e. Evaluate nozzle suitability for use as follows:

WARNING: KEEP HANDS, ETC., AWAY FROM NOZZLE SPRAY. OIL IS EJECTED WITH SUFFICIENT FORCE TO PUNCTURE SKIN AND MAY CAUSE BLOOD POISONING.

(1) Observe nozzle spray cone pattern. Pattern should be symmetrical with no heavy droplets, no side stringers or other irregular forms.

NOTE: Heavy streamers of fuel in the pattern, specially on slow lift action during testing, usually indicates dirt in the nozzle and can be corrected by cleaning parts.

NOTE: Chatter may or may not occur.. Chatter is not abnormal.

(2) Drops of fuel from the nozzle tip indicate valve seat leakage.

(3) If spray cone pattern is not correct or if seat leakage is indicated, nozzle should be replaced.

f. Record results on data sheet two.

6.2.1.3 Replacement of Nozzle

a. Fit collar on studs as nozzle holder is inserted into adapter.

b. Ensure that spring sleeve and inlet plug are in a horizontal position when nozzle assembly is on engine and that assembly is positioned so that nozzle will spray to right of cylinder as viewed from each side of engine (nozzle on each side of engine sprays to right of cylinder as viewed from its side.)

c. Tighten collar stud nuts to 20 to 25 ft. torque.

6.2.2 Exhaust Manifold

6.2.2.1 When this inspection is due in an even numbered year, the Opposite Control Side exhaust manifold is to be removed. For inspection due in odd numbered years, the Control Side exhaust manifold is to be removed.

NOTE: Control Side is the side with the governor.

6.2.2.2 Exhaust manifolds - removal

a. Remove exhaust compartment covers.

b. Remove exhaust manifold to extension pipe bolts and capscrews using special wrenches at combined exhaust fitting to remove extension pipes.

c. Remove capscrews securing exhaust manifolds to exhaust bolts.

6.2.2.3 Inspect the exhaust ports for carbon deposits. Clean as necessary. Record findings on data sheet

two.

6.2.3 Air Manifold

6.2.3.1 Remove the air port inspection covers (located on the control side of the engine). Inspect the air manifold for cleanliness, corrosion, and pieces of broken piston rings. Record findings on data two.

6.2.4 Ring Catcher

6.2.4.1 Remove the ring catcher inspection plate from the bottom of the turbocharger inlet of the exhaust manifold that was not removed above. Check the ring catcher for pieces of broken piston rings. Record findings on data sheet two.

6.2.4.2 Replace ring catcher.

6.2.5 Inspection of Piston Rings

6.2.5.1 Jack the engine as necessary so the piston rings are visible through the exhaust and air ports. Visually inspect the rings for wear by examining the grooves in the compression rings. If the rings have been worn smooth they must be replaced in accordance with applicable sections of MP 1405-3.2 part 7.8. Record findings on data sheet two.

6.2.5.2 Inspect the cylinder liners for any abnormal wear patterns. (Such as linear patterns or pitting) Any such patterns must be evaluated by the vendors representative and the cognizant engineer before proceeding. Record findings on data sheet two.

6.2.5.3 When all pistons and liners have been inspected, replace the air port inspection covers.

6.2.5.4 Replace the exhaust manifold as follows:

a. Assemble exhaust manifold and extension pipe to the exhaust belts and extension elbows starting with the inner manifold (first section nearest turbocharger).

b. Tighten bolts and capscrews to following torque values:

Thread Size	Ft-Lb Torque
3/8 in.	30-35
1/2 in. and 9/6in.	50-55

c. Install remaining exhaust manifolds and extension pipes in sequence.

d. Tighten flange bolts on long extension to 50 - 55 ft-lb.

NOTE: The heat shields may be left off until after the engine has been run in section 6.5 in order to check for exhaust leaks.

6.2.6 Crankcase and Bearings

6.2.6.1 Remove inspection covers as necessary to inspect the upper and lower crankcase.

6.2.6.2 Inspect the main bearings for evidence of flashing. (A flashed bearing will have bubbles on the edges). Check all bearings with a 0.002 inch feeler guage. If the feeler can slide between the crankshaft and the bearing, the bearing has failed and must be replaced in accordance with applicable sections of MP 1405-3.2 part 7.7. Record findings on data sheet two.

6.2.7 Crank Strain

6.2.7.1 Measure the lower crank strain by installing a strain gauge on the #12 crank throw. Jack the engine forward and measure the strain on the crank throw. Jack the engine in reverse and measure the throw. Acceptable strain is +0.002 in. to -0.002 inches. Record results on data sheet two.

6.2.8 Crank Lead

6.2.8.1 Bar engine until No. 1 lower crankpin is the crank lead past inner dead center (refer to figure 6.28-1). Use protractor or lead gauge on machined surface to check crank position.

6.2.8.2 Check position of upper crankshaft.

6.2.8.3 Machined surface on No. 1 upper crankweb must be in vertical position so that crankpin is at inner dead center.

6.2.8.4 Bar engine in reverse rotation 25^{o} to 30^{o}:

(a) Then bar engine in direction of rotation and recheck crankshaft lead timing.

(b) If timing is not $18^{o} \pm 1/2^{o}$, crankshaft must be raised and a different gear tooth engaged or the vertical drive coupling hub must be repositioned.

6.2.8.5 Record crank lead on data sheet two.

6.2.8.6 Replace upper and lower crankshaft inspection covers.

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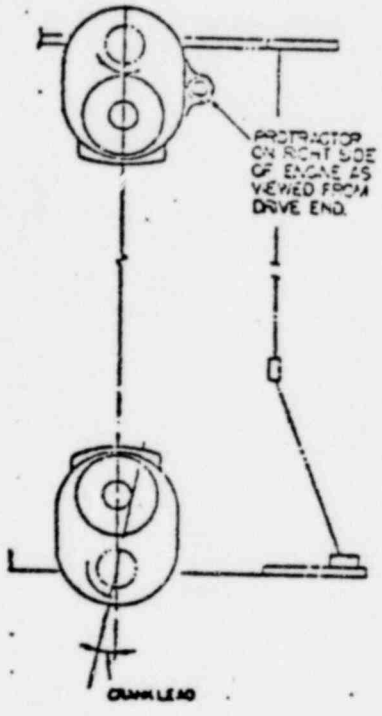
6.2.9 Vertical Drive

6.2.9.1 Remove inspection covers from the vertical drive



Crank Lead Timing

Fig. 6.23-1

cover.

6.2.9.2 Visually inspect the vertical drive for broken springs, loose nuts and any other mechanical abnormalities. Record findings on data sheet two.

6.2.9.3 Replace inspection cover.

6.2.10 Timing Chain

6.2.10.1 Remove the top inspection cover.

6.2.10.2 Visually inspect the timing chain for indications of being worn out of pitch or elongation.

6.2.10.3 Reach into the front cover and check the chain tension at the chain centerline between the tightener sprocket and the control side sprocket. There should be 3/8" to 1/2" total slack in the chain. Record findings on data sheet two.

NOTE: Due to the inaccessibility of the chain centerline, this measurement will be an approximation.

6.2.10.4 Replace the timing chain inspection cover.

6.2.11 Air Blower and Drives

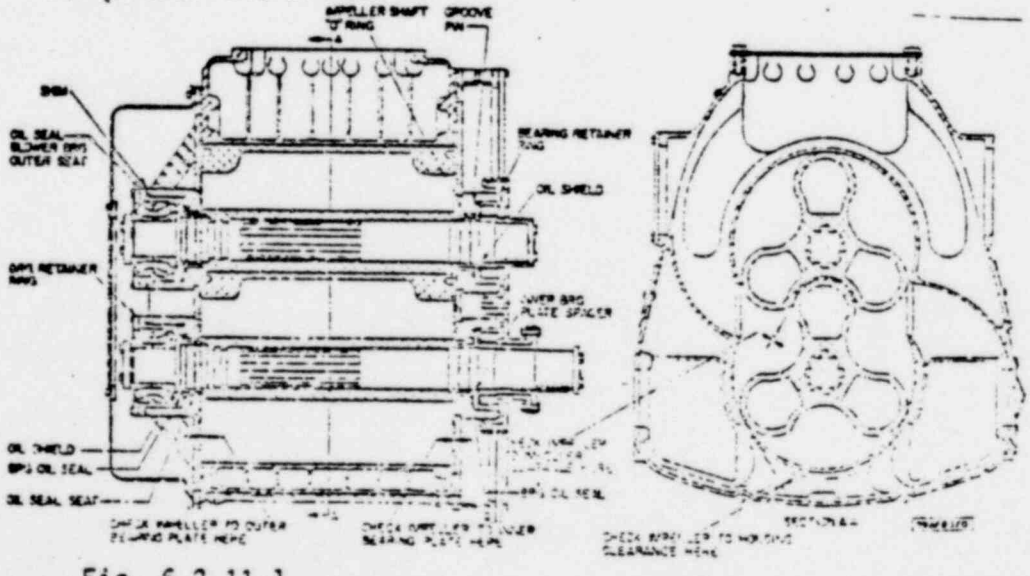


Fig. 6.2.11-1 Location of Clearance Check Points

6.2.11.1 Remove outer end cover and check condition of thrust bearing rollers.

6.2.11.2 Using a feeler gauge, check for excessive clearance between roller and race. Initial clearance was less than 0.0015 EG-Y-1 (A & B).

6.2.11.3 Check end clearances of thrust bearings by indicating lateral movement of impeller shafts. Initial end clearances were:

	EG-Y-1A	EG-Y-1B
(1) Upper shaft	< 0.001	< 0.001
(2) Lower shaft	< 0.001	< 0.001

6.2.11.4 Remove inspection plugs on outer bearing plate and check condition of ends of impellers. (Refer to figure 6.2.11-2).

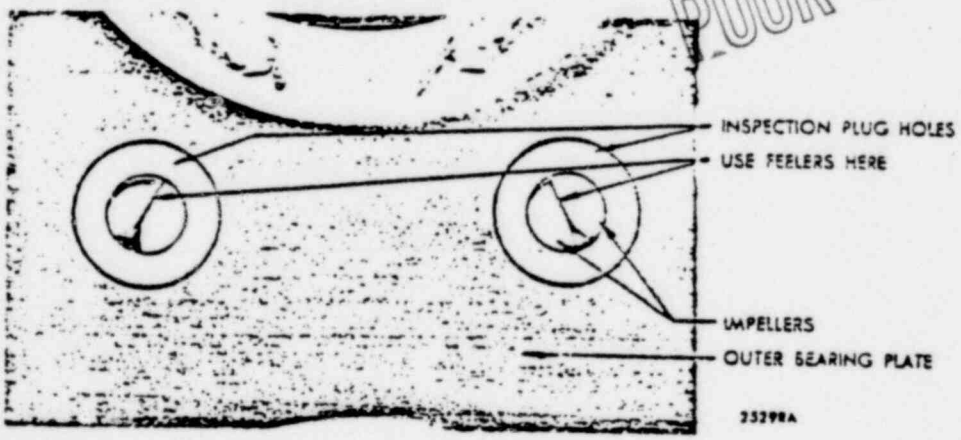


Figure 6.2.11-2 Inspection Plug Holes

6.2.11.5 Check impeller clearances using feeler gauge through inspection plug holes. Any variation from values stamped on the end plate is an indication of need for more thorough blower inspection.

6.2.11.6 If inside of blower appears to be extremely oily, check the following potential causes in the order listed:

(1) Dirty air intake filters.

(2) Unseated oil rings.

(3) Blower oil seals.

6.2.11.7 If more thorough inspection is required, blower must be removed in accordance with MP 1405-3.2.

6.2.11.8 Record all findings on data sheet two.

6.2.11.9 Replace inspection plugs and outer end cover.

6.2.12 Blower Drive

6.2.12.1 Remove blower drive inspection cover.

6.2.12.2 Visually inspect blower drive for wear and mechanical integrity. Record findings on data sheet two.

6.2.12.3 Replace blower drive inspection cover.

6.2.13 Torsional Dampers

6.2.13.1 Remove torsional damper inspection covers.

6.2.13.2 Visually inspect the upper and lower torsional dampers for mechanical integrity. Record findings on data sheet two.

6.2.13.3 Replace torsional damper inspection covers.

6.2.14 Governor Drive

6.2.14.1 Remove governor drive inspection cover.

6.2.14.2 Visually inspect governor drive for wear and mechanical integrity. Record findings on data sheet two.

6.2.14.3 Replace governor drive inspection cover.

6.2.15 Attached Pump Drives

6.2.15.1 Remove attached pump drive inspection covers.

6.2.15.2 Visually inspect attached pump drives for wear and mechanical integrity. Record findings on data sheet two.

6.2.16 Air Start System

6.2.16.1 Remove the air start distributor inspection cover.

6.2.16.2 Visually inspect the air start distributor for wear, mechanical integrity and evidence of moisture. Record findings on data sheet two.

6.2.16.3 Replace air start distributor inspection cover.

6.2.16.4 Choose one air start valve for inspection by consulting the diesel generator machinery history. Choose the valve with the least recent inspection or any valve that has never been inspected.

6.2.16.5 Remove the chosen air start valve, disassemble and inspect for wear, mechanical integrity and evidence of moisture. Record results on data sheet two.

6.2.16.6 Reassemble the air start valve and replace.

6.2.17 Air Filters

6.2.17.1 Check the air inlet filters and replace dirty elements as necessary. Record completion on data sheet two.

6.2.18 Water System

6.2.18.1 Remove the expansion tank inspection cover.

6.2.18.2 Inspect the expansion tank for evidence of scale or corrosion products in the jacket water system. Record findings on data sheet two.

6.2.19 Engine Timing

NOTE: Special Precautions

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a. After determining a timing setting, the setting should be rechecked before proceeding to the next step.

b. During operations performed in setting injection timing, always bar engine in direction of rotation.

c. If setting is overrun, bar in reverse beyond desired point and again come up to desired setting. This results in always taking up slack in timing chain in the same direction.

d. Check tension and condition of timing chain prior to checking fuel injection timing. This procedure is provided in paragraph 6.2.10.

6.2.19.1 Check crankshaft lead in accordance with paragraph 6.2.8.

6.2.19.2 Install stroke gauge on the No. 1 (right side) injection pump.

(1) Remove injection tube and discharge valve cage yoke, cage and valve stop, if free from cage, and valve and spring. Leave valve seat and gasket in place.

(2) Insert stroke gauge plunger through hole in the discharge valve seat. Ensure that beveled end of gauge is positioned so that it may be easily seen.

(3) Tighten thumb nut.

6.2.19.3 Bar engine so that coupling pointer is between 15^{o} and 20^{o}.

6.2.19.4 Bar engine in direction of rotation until hairline on stroke gauge plunger lines up with hairline on stroke gauge body. Record reading indicated by coupling pointer.

6.2.19.5 Continue barring engine until plunger of stroke gauge moves to bottom of stroke and returns to positions where hairlines are again lined up. Record reading indicated by coupling pointer.

6.2.19.6 The two flywheel coupling readings locate points on the camshaft lobe equal distances on either side of the cam high point. This is shown graphically by figure 6.2.19-1.

6.2.19.7 Find the center between these points with reference to inner dead center of the lower crankshaft or "0" on the flywheel coupling as follows:

(1) Add first and second coupling pointer readings.

(2) Divide by 2. The resulting number is the desired center or cam high point.

NOTE: In figure 6.2.19-1: 16 + 58 = 74; 74 ÷ 2 = 37; 37 is the center or cam high point. Actual cam shaft high point should be approximately 37° after inner dead center of No. 1 piston. Optimum injection timing should be determined by manufacturer during initial testing and may vary from 37°. Initial values are as follows: Oposite Control Side 1A Diesel Generator: 38° ; 1B Diesel Generator 37 3/4°; Control Side 1A Diesel Generator: 38°; 1B Diesel Generator: 37 1/2°.

6.2.19.8 If center (cam high point) determined in step 6.2.19.5 above is not correct, governor side camshaft timing with respect to lower crankshaft must be changed.

6.2.19.9 If the determined cam high point is less than 38° for 1A Diesel Generator (38° for 1B Diesel Generator), timing is early; if greater timing is late. The difference is the number of degrees to advance or retard the camshaft.

NOTE: Advance timing requires rotation of camshaft opposite the direction of lower

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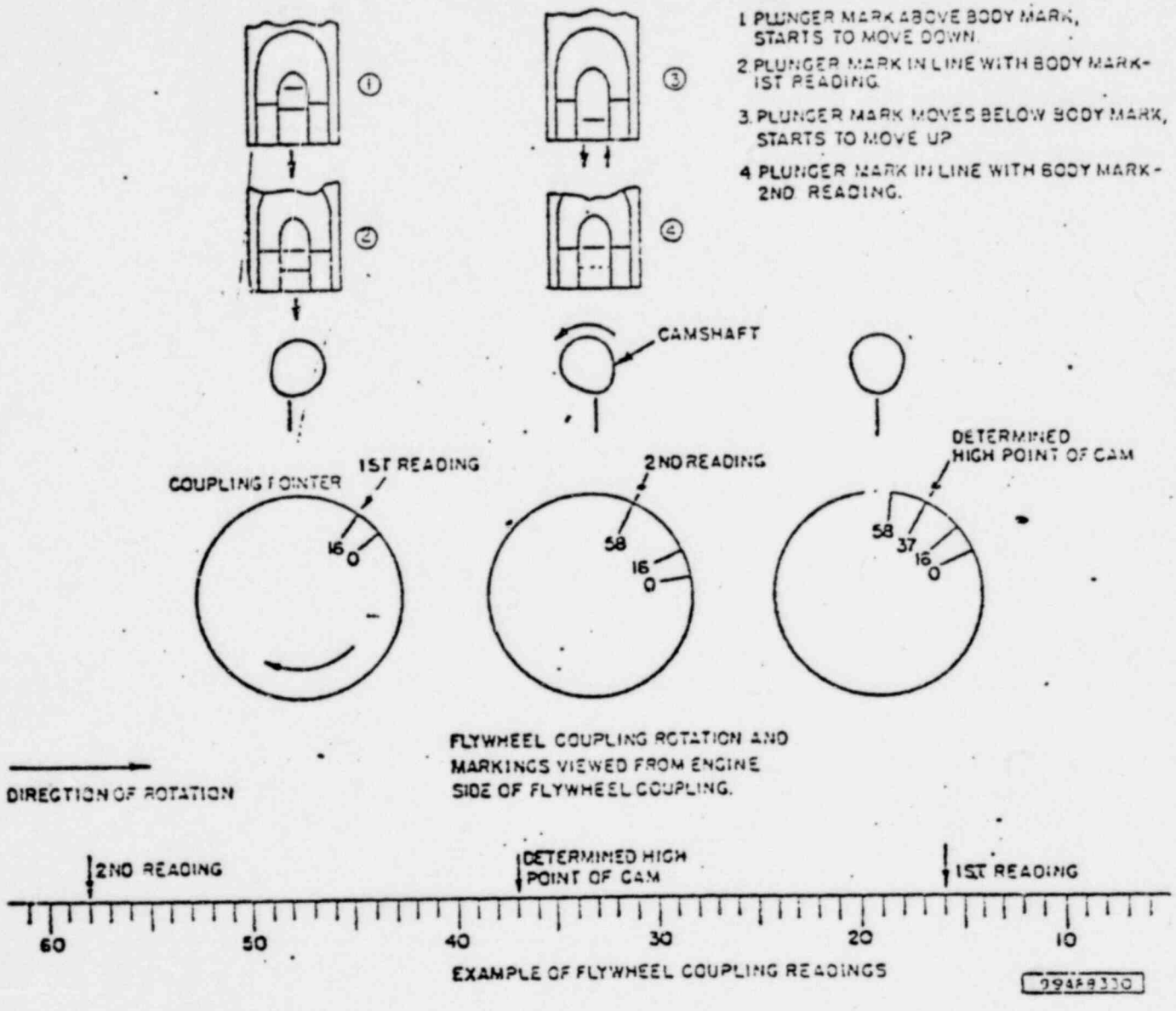

Graphic Procedure to Determine High Point of Cam

Figure: 6.2.19-1

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crankshaft rotation. Retard timing requires camshaft rotation in the direction of lower crankshaft rotation.

6.2.19.10 Change timing as follows:

(1) Remove cover plate and loosen locknut.

(2) Rotate timing adjusting nut in direction indicated by the following:

a. To advance timing, rotate nut counterclockwise.

b. To retard timing, rotate nut clockwise.

(3) Tighten locknut and replace cover.

6.2.19.11 Remove stroke gauge and reinstall discharge valve.

a. Install discharge valve seat and cage gasket in pump body.

b. Place valve cage, valve stop (if free from cage), valve spring and discharge valve in the valve cage yoke.

c. Raise the valve cage yoke on pump body studs.

d. Note the position of the discharge valve with respect to the valve seat as the yoke is raised.

e. Tighten cage yoke stud nuts to 60-80 ft-lb torque.

6.2.19.12 Install stroke gauge on No. 1 (left side) injection pump in accordance with 6.2.19.2 above.

6.2.19.13 Check cam high point for left hand pump using procedure provided by steps 6.2.19.3 through 6.2.19.7.

6.2.19.14 If the determine cam high point is not correct, camshaft sprocket must be shifted in relation to the camshaft.

6.2.19.15 If cam highpoint is less than 38° for 1A Diesel

Generator (38° 1B Diesel Generator), timing is early; if greater, timing is late.

6.2.19.16 Change timing as follows:

NOTE: Slotted holes are provided in the camshaft sprocket to permit adjustment.

(1) Loosen camshaft sprocket nuts.

(2) Bar engine in direction indicated by the following:

a. If timing is late, rotate crankshaft in direction opposite to normal engine rotation the required number of degrees.

b. If timing is early, rotate crankshaft in direction of normal rotation the required number of degrees.

(3) Tighten nuts to 80 to 90 ft-lb torque.

Remove stroke gauge and reinstall discharge valve in accordance with step 6.2.19.11 above.

6.2.19.17 Record as found timing, any adjustments made and final timing on data sheet two.

6.3 Electrical Checks

6.3.1 Generator Cleanliness

6.3.1.1 Remove generator inspection cover.

6.3.1.2 Inspect generator and exciter for cleanliness. Clean as necessary with ZEP.

6.3.1.3 Record findings on data sheet three.

6.3.2 Collector Rings and Brushes

6.3.2.1 Inspect brushes as follows:

(1) Brushes should move freely in the brush holders and the shunts or pigtails should not be loose.

(2) Brushes should not be chipped, broken or worn to 7/8" or less.

(3) Brush pressure, as measured with a spring scale should be 2 to 3 pounds. Insure that the measurement is made in the direction of brush motion.

6.3.2.2 Record findings and brush pressure on data sheet three.

6.3.2.3 Inspect collector rings for burned spots or pitting. Record results on data sheet three.

6.3.3 Check timer settings.

6.3.3.1 Using a stop watch or timer accurate to ± 1 second, check each timer listed on Data Sheet 3A.

6.3.3.2 For each timer except TDL and TDR three operations of the timer shall be checked to assure that the timer operation is consistant.

6.3.3.3 If the timer does not meet the required tolerance (on all three tests) adjust, clean, or replace the timer as required. Record as left data and initial the Data Sheet.

6.4 Instrumentation

Check and calibrate as necessary, the setpoints on the following switches and relays. Record results on data sheet four.

6.4.1 TS-OTLA Low Lube Oil Temperature Alarm. Set normally closed set of contacts to close at 90°F (± 5°F) on decreasing temperature.

6.4.2 TS-OTHA High Jacket Coolant Temperature Alarm. Set normally open contacts to close at 195°F (+5°F, -2°F) on increasing temperature.

6.4.3 TS-CHT Water Heater Thermostat. Set normally closed contacts to open on increasing temperatures at 135°F (+5°F, -0°F) and reclose at 130°F (+5°F, -0°F) on decreasing temperature.

6.4.4 TS-GBT Fan Gear Box Thermostat. Set normally closed contacts to open at 80°F (±5°F) on increasing temperature.

6.4.5 PS-OPLS Low Speed Low Oil Pressure Alarm and Shutdown Pressure Switch. Two sets on contacts. Set #1 to close at 5 psi (± 1) on decreasing pressure and open at 7 psi (± 1) on increasing pressure. Set #2 set to open as 5 psi (± 1) on decreasing pressure and close at 7 psi (± 1) on increasing pressure. After returning diesel to service have operations start diesel and operate at idle speed. Loosen fitting at OPLS and bleed air from the line.

NOTE: Do not disconnect fitting or OPLS will trip the diesel.

Wipe up any oil spilled. Assure fittings are tight.

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6.4.6 PS-OPL 1, 2, & 3 Low Pressure Alarm and Shutdown Switches. OPS 1 has two sets of contacts. OPL 2 & 3 have one set of contacts each. OPL 1 Contact Set #1, OPL 2 & 3 set to close at 16 psi (+3, 0) on decreasing pressure and open on increasing pressure at 18 psi or that pressure required for a differential of 2 psi (± 1/2). OPL 1 Contact Set #2 set to open at 16 psi (+3, 0) on decreasing pressure and close on increasing pressure at 18 psi or that pressure required for a differential of 2 psi (± 1/2) After returning the diesel to service have operations start diesel and operate at idle speed. Loosen fitting at the oil pressure gauge and bleed the air from the oil line. Catch the oil or wipe up after bleeding line. Assure fittings are tight.

6.4.7 PS-CCP 1, 2, & 3 Crankcase Pressure Alarm and Shutdown Switches. Set normally open contacts to close at 0.5 inches of H_2O pressure (+0.2, 0.0) on increasing pressure. Set differential at minimum.

6.4.8 PS-FPLA Fuel Oil Low Pressure Alarm. Set normally closed contacts to close on decreasing pressure at 10 psi (± 2) and reopen on increasing pressure at 15 psi (± 1).

6.4.9 PS-APLA (PS-534) Low Air Pressure Alarm. Set normally closed set of contacts to close at 150 psi (± 10) on decreasing pressure and re-open on increasing pressure at 200 psi or that pressure required for a differential of 50 psi (± 5).

6.4.10 PS APS 1 (PS-533 A & C) and APS 2 (PS-533 B & D). Cranking Air Pressure Switch. Set normally open contacts of each switch to close at 150 psi (± 10) on increasing pressure and reopen on decreasing pressure at 100 psi or that pressure required for a differential of 50 psi (± 5). 1412 329

6.4.11 PS-CPLA Low Jacket Coolant Pressure Alarm. Two sets of con-

tacts. Contact set #1, set to close at 12 psi (±2) on decreasing pressure and to open at 18 psi (±2) on increasing pressure. Contact set #2, set to open on decreasing pressure at 12 psi and to close on increasing pressure at 18 psi.

6.4.12 PS-APC 1 (PS-531 A & B) and (PS 532 A & B). Air Compressor Motor Start-Stop Switch. Set to stop motor at 250 psi (±5) on increasing pressure and start motor at 225 psi (±5) on decreasing pressure.

6.4.13 LS-CLLA Expansion Tank Low Level Alarm. Functional test of the normally closed contacts by pushing the float down. The alarm should actuate at 3" level (+2", -0").

6.4.14 LS-OLLA Low Lube Oil Level Alarm. A functional test of this capacitance probe type switch may be made by removing the probe from its well. The alarm should energize when the probe is removed & clear when it is returned.

NOTE: 1) The following instruments are to be checked and/or calibrated at intervals not to exceed 24 months + 25%.

2) The instruments in parenthesis are located on EG-Y-1B.

	Instrument	Range	Tolerance
6.4.15	PI-529 A (PI-530A)	0-600 psi	± 6 psi
6.4.16	PI-529 B (PI-530B)	0-600 psi	± 6 psi
6.4.17	PI-535 A (B)	0-400 psi	± 2 psi
6.4.18	TI-J500A (B)	30-240°F	Adjust scale to read correctly @ ambient check @ 32°F & 212°F
6.4.19	TI-J501 A (B)	" "	" "
6.4.20	TI-502 A (B)	" "	" "
6.4.21	TI-J503 A (B)	" "	" "

	Instrument	Range	Tolerance
6.4.22	TI-J504 A (B)	20-220°F	Check @ Ambient
6.4.23	TI-J505 A (B)	0-1200°F	" "
6.4.24	TI-J506 A (B)	30-240°F	Check at 32 & 212°F Adjust scale as required Compare actual level with indication
6.4.25	LI-501 A (B)	Empty-Full	" "
6.4.26	PI-J501 A (B)	0-60 psi	± 0.3 psi
6.4.27	PI-J502 A (B)	0-60 psi	± 0.3 psi
6.4.28	PI-J503 A (B)	0-30 psi	± 0.15 psi
6.4.29	PI-J504 A (B)	0-5" H_2O Vac.	Insure that manometer Fluid level reads zero
6.4.30	PI-J505 A (B)	0-160 psi	± 0.8 psi
6.4.31	PI-J505 A (B)	0-400 psi	± 2 psi
6.4.32	PI-J507 A (B)	0-30 psi	± 0.15 psi

6.5 Engine Operation

6.5.1 Start the engine in accordance with SP 1303-4.16.

6.5.2 Emergency Stop

6.5.2.1. Before engine has been brought to rated speed, test the local emergency stop button (located on the engine, above the governor) by pushing it. The engine should coast to a stop.

6.5.2.2 Reset fuel racks by pulling lever beneath the stop button towards front (control end) of the engine.

6.5.2.3 Decrease governor speed back to minimum, then restart engine.

6.5.2.4 Record results on data sheet five.

6.5.3 Operation

6.5.3.1 Put the engine on the line in accordance with SP 1303-4.16 and load to 1500 KW.

6.5.3.2 When exhaust temperatures have stabilized, complete the operating log from SP 1303-4.16, and attach a copy to data sheet five. Insure that the data sheet is clearly labeled for 50% load.

6.5.3.3 Load the engine to 100% (3000 Kw).

6.5.3.4 When exhaust temperatures have stabilized, complete the operating log from SP 1303-4.16 and attach a copy to data sheet five. Insure that the data sheet is clearly labeled for 100% load.

6.5.4 Make a complete visual check of the engine. Look especially for lube oil leaks in the vicinity of the exhaust manifolds. Make repairs as necessary. Make note of any leakage (and whether or not it was repaired) or any other abnormal conditions on data sheet five.

6.5.5 Shutdown the engine in accordance with SP 1303-4.16.

7.0 Acceptance Criteria

7.1 All inspections and checks must have been performed and equipment found satisfactory (as shown on data sheets) or repaired/replaced.

Surveillance Procedure 1301-8.2
DATA SHEET ONE
Engine Operating EG-Y-1____

6.1.1 Turbocharger Performance

Cooling Water Pressure _____psi (<40 psig)

Lube Oil Pressure _____psi (30-40 psi at full load)

Combined Exhaust Temp. _____^{o}F (<1200^{o} F)

Vibration _____ (Sat or Unsat)

_____
initials

6.1.2 Fuel Oil Filter

Pressure Drop _____psid (<10 psid)

_____
initials

If Δ P is greater than 10 psid initial here when filter is replaced:

_____
initials

6.1.3 Lube Oil Strainer

Pressure Drop _____psid (<18 psid)

_____
initials

If Δ P is greater than 18 psid, initial here when strainer is cleaned: _____
initials

6.1.4 Fuel Control Governor Linkage

Findings _____

_____

_____
initials

(linkage tight, motion properly transmitted)

DATA SHEET ONE CONTINUED

6.1.5 Fuel Oil Injection Racks

Findings _____

_____

_____

initials

(Mechanically tight, all rack settings the same ± 1)

6.1.6 Engine Associated Piping

Lube Oil _____

_____

Fuel Oil _____

_____

Jacket Water _____

_____

_____

initials

6.1.7 Attach Operating Log from SP 1303-4.16

_____ _____

Data Sheet Completed by Date

_____

Approved Date

Surveillance Procedure 1301-8.2
DATA SHEET TWO
Mechanical Inspection

EG-Y-1____

6.2.1 Injection Nozzles

Cylinder Number	Nozzle Operation CS	Nozzle Operation OCS	Operating Pressure CS	Operating Pressure OCS	Initials
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

(2200 + 100 - 0 psig)

Note: CS = Control Side

OCS = Opposite Control Side

6.2.2 Exhaust Manifold and Ports

Findings_____

_____

_____

initials

(no carbon in exhaust ports)

6.2.3 Air Ports_____

_____

_____

initials

(manifold clean, no corrosion, no pieces of broken rings)

1412 336

DATA SHEET 2 (con't.)
SP 1301-8.2

EG-Y-1____

6.2.4 Ring Catcher_____

_____
initials

(No broken rings)

6.2.5

Cylinder Number	Upper Piston	Lower Piston	Cylinder Liner	Initials
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

DATA SHEET 2 (con't.)
SP 1301-8.2

EG-Y-1____

6.2.6 Crankshaft and Bearings

Bearing Number	Upper Crank	Lower Crank	Initials
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			

(Sat or Unsat)

6.2.7 Crank Strain

Strain Forward _____

Reverse _____
(+.002 in. to -002 in.)

Analysis _____

_____

_____
initials

DATA SHEET 2 (con't.)
SP 1301-8.2

EG-Y-1____

6.2.8 Crank Lead

As Found _____

Adjustments _____

_____

Final _____ _____
$(18^0 \pm \frac{1}{2}^0)$ initials

6.2.9 Vertical Drive

Findings _____

_____

_____
initials

(No Broken springs, no loose nuts, mechanically sound)

6.2.10 Timing Chain

Findings _____

_____

_____
initials

(No elongation)

6.2.11 Air Blower

Clearance between roller and race _____in.

End clearance of thrust bearings

Upper shaft _____in.

Lower shaft _____in.

Impeller clearance _____in.

Condition of ends of impellers: _____

_____

Condition of inside of blower: _____

_____

(not extremely oily) initials

1412 339

DATA SHEET 2 (con't.)

EG-Y-1____

6.2.12 Blower Drive

Findings_____

_____

_____ initials

(no excessive or abnormal wear; mechanically sound)

6.2.13 Torsional Dampers

Upper_____

_____

Lower_____

_____ initials

(no excessive or abnormal wear; mechanically sound)

6.2.14 Governor Drive

Findings_____

_____

_____ initials

(no excessive or abnormal wear; mechanically sound)

6.2.15 Attached Pump Drives

Fuel Oil Pump_____

_____

_____ initials

Water Pump_____

_____

_____ initials

(no excessive or abnormal wear; mechanically sound)

6.2.16 Air Start Distributor

Findings_____

_____

_____ initials

1412 749

DATA SHEET 2 (con't.)
SP 1301-8.2

EG-Y-1____

6.2.16 con't.

(no abnormal wear, no moisture, mechanically sound)

Air Start Valve Number_____

Findings _____

_____

_____
initials

(no abnormal wear, no moisture, mechanically sound)

6.2.17 Air Filters

Filters Checked:_____
initials

Number of elements replaced:_____

6.2.18 Water System

Findings_____

_____

_____
initials

6.2.19 Engine Timing

As Found CS_____ OCS_____

Adjustments _____

_____

Final: CS_____ OCS_____ _____
(about 37°) initials

All inspections complete:

All results satisfactory: _____
Mechanical Maintenance Foreman Date

Approved:

_____
Cognizant Engineer Date

1412 241

DATA SHEET THREE

SP 1301-8.2
Electrical Inspection EG-Y-1____

6.3.1 Cleanliness

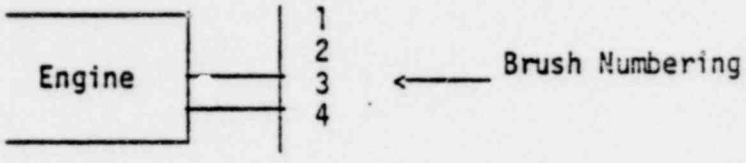
Findings_____

_____

_____ _____
initials

(no accumulations of dirt)

6.3.2 Collector Rings and Brushes



Brush Number	Brush Movement	Brush Wear	Brush Pressure	Initials
1	_____	_____	_____	_____
2	_____	_____	_____	_____
3	_____	_____	_____	_____
4	_____	_____	_____	_____
	(sat or unsat)	(wear less than 7/8")	(2-3 lbs.)	

Collector Rings_____

_____

_____

(no burned spots, no pitting)

ALL INSPECTIONS COMPLETE:
ALL RESULTS SATISFACTORY:

_____
Electrician Date

APPROVAL:

_____
COGNIZANT ENGINEER Date

1412 342

DATA SHEET 4

SP 1301-8.2

EG-Y-1_____

Note: * As required for proper differential

SECTION	INSTRUMENT	SETPOINT	TOLERANCE OR DIFFERENTIAL	AS FOUND	AS LEFT	INITIALS
6.4.1	TS-OTLA	COD @ 90 F	±5°F			
6.4.2	TS-CTHA	COI @ 195 F	+5, -2°F			
6.4.3	TS-CHT	OOI @ 135 F COD @ 130 F	+5, -0°F +5, -0°F			
6.4.4	TS-GBT	OOI @ 80 F	±5°F			
6.4.5	PS-OPLS SW1	COD @ 5psi OOI @ 7psi	±1 psi ±1psi			
	PS-OPLS SW2	OOD @ 5psi COI @ 7psi	±1 psi ±1 psi			
6.4.6	PS-OPL 1 SW1	OOI * COD @ 16 psi	diff;2psi ±½ +3, -0psi			
	PS-OPL 1 SW2	COI * OOD @ 16 psi	diff;2psi ±½ +3, -0 psi			
	PS-OPL 2	OOI * COD @ 16 psi	diff;2psi±½ +3, -0 psi			
	PS-OPL 3	OOI * COD @ 16 psi	diff;2psi±½ +3, -0 psi			
6.4.7	PS-CCP 1	COI @ 0.5" H_2O	+0.2,-0.0"H_2O diff; min.			
	PS-CCP 2	COI @ 0.5" H_2O	+0.2,-0.0"H_2O diff; min.			
	PS-CCP 3	COI @ 0.5" H_2O	+0.2,-0.0"H_2O diff; min.			
6.4.8	PS-FPLA SW 1	COD @ 10 psi OOI *	± 2psi diff;5psi±1			
6.4.9	PS-APLA (PS-534)	COD @ 150 psi OOI *	± 10 psi diff;50psi±5			
6.4.10	PS APS 1 (PS 533 A+C)	COI @ 150psi OOD *	±10 psi diff;50psi±5			
	PS APS 2 (PS 533 B+D)	COI @ 150 psi OOD *	±10 psi diff;50psi±5			
6.4.11	PS-CPLA SW #1	COD @ 12psi OOI @ 18psi	±2 psi ±2 psi			
	PS-CPLA SW#2	OOD @ 12psi COI @ 18psi	±2 psi ±2 psi			
6.4.12	PS-APC 1 (PS 531 A/B)	OOI @250psi COD @225psi	±5 psi ±5 psi			
	PS 532 A/B	OOI @250psi COD @225psi	±5 psi ±5 psi			
6.4.13	LS-CLLA	3" level	+2", -0"			

DATA SHEET 3A

SP 1301-8.2 Electrical Inspection

Section 6.3 EG-Y-1__

Timer	Setpoint	Required Tolerance	As Found	As Left	Initial
T3A (TDDO)	20 Sec.	± 2 Sec.			
T3B (TDDO)	20 Sec.	± 2 Sec.			
T3C (TDDO)	20 Sec.	± 2 Sec.			
5 (TDDO)	60 Sec.	± 10 Sec.			
T2A (TDOE)	9 Sec.	+ 1 Sec. (Setting of 9 Sec. or greater is desirable)			
T2B (TDOE)	9 Sec.	+ 1 Sec. (Setting of 9 Sec. or greater is desirable)			
TDL (TDOE)	180 Sec.	± 15 Sec.			
TDR (TDOE)	180 Sec.	± 15 Sec.			

Performed By_____ Date_____

Reviewed By_____ Date_____

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Revision 2
02/13/76

DATA SHEET 4

SP 1301-8.2

EG-Y-1____

Note: as required for proper differential

SECTION	INSTRUMENT	SETPOINT	TOLERANCE OR DIFFERENTIAL	AS FOUND	AS LEFT	INITIALS
6.4.14	LS-OLLA	Low lube oil level	functional check only			
NOTE: THE FOLLOWING INSTRUMENTS ARE TO BE CHECKED WHEN THE INSPECTION IS DUE IN EVEN NUMBERED YEARS.						
6.4.15	PI 529A (PI 530 A)	0-600 psi	± 6 psi			
6.4.16	PI 529 B (PI 530 B)	0-600 psi	± 6 psi			
6.4.17	PI 535A(B)	0-400 psi	± 2 psi			
6.4.18	TI-J500A(B)	30-240°F	see body of procedure			
6.4.19	TI-J501A(B)	30-240°F	" "			
6.4.20	TI-J502A(B)	30-240°F	" "			
6.4.21	TI-J503A(B0	30-240°F	" "			
6.4.22	TI-J504A(B)	20-220°F	" "			
6.4.23	TI-J505A(B)	0-1200°F	" "			
6.4.24	TI-J506A(B)	30-240°F	" "			
6.4.25	LI-501A(B)	empty-full	" "			
6.4.26	PI-J501A(B)	0-60 psi	±0.3psi			
6.4.27	PI-J502A(B)	0-60 psi	±0.3psi			
6.4.28	PI-J503A(B)	0-30 psi	±0.15 psi			
6.4.29	PI-J504A(B)	0-5"H$_2$O vac	see body of procedure			
6.4.30	PI-J505A(B)	0-160 psi	±0.8psi			
6.4.31	PI-J506A(B)	0-400 psi	±2psi			
6.4.32	PI-J507A(B)	0-30 psi	±0.15psi			

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DATA SHEET FIVE
SP 1301-8.2
Engine Operation

6.5.2 Emergency Stop

Stop Button Works Properly _____
initials

6.5.3 Attach Operating Log for 50% and 100% work load

Evaluation of operation_____

_____

_____

_____

Cognizant Engineer_____

6.5.4 Leakage Check

List any leaks found_____

_____

_____
initials

ENGINE ACCEPTABLE FOR OPERATION: _____
Date

APPROVED: _____
Cognizant Engineer Date

1412 346