TURBINE TIPS
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May 2002

Testing the Emergency Lube Oil Pump

Most GE gas turbines provide a method of testing the emergency lube oil pump ***during turbine operation***. The emergency pump (a.k.a. the **DC Oil Pump** or **88QE)** should be tested while the turbine is operating at full speed, no load (FSNL); or when the generator is on-line, synchronized to the power grid. This test should be done **at least** annually.

Fig. 1: Emergency Lube Oil Pump and Motor (motor on top, 88QE)

It is not sufficient to simply turn the switch from **NORMAL to TEST** during turbine operation to test the pump. This action does not "prove" that a low lube oil **header** pressure signal will start the pump in an emergency. Furthermore, during turbine start-up, when the piggyback DC motor starts, you have not tested the ***emergency*** operation of the pump during turbine operation.

Fig. 2: Operation Switch for 88QE -Normal Stop Test

Fig 3: Motor Control Center – Emergency Lube Oil Pump – 88QE

Refer to the DC motor in **Fig. 1** above (typical piggyback motor style). The lube oil header supplies lubricant to the bearings of the gas turbine, accessory gear, generator, and reduction gear at a nominal pressure of **25 psig**. If the header pressure should drop below the setting of a pressure switch (called **63QL)**, the DC motor/pump should start. This setting is usually low enough that another pressure switch (**63QT**) would have initiated a turbine trip; **63QT** is located at the generator pedestal bearing, the farthest location from the oil pumps. In a tripped- or coast-down mode due to low oil pressure, **88QE** is asked to provide oil to the header to help save the bearings and gears.

Fig. 4: Lube Oil Pressure Switch Trip, 63QT, Located at Generator Pedestal

Another observation: if you refer to the **Motor Control Center - Electrical Elementary Diagram** for your particular plant for DC motor **88QE**, you will notice that the control circuitry has no fuses. It is felt by GE that operation of the motor should not depend upon fuses, which could be "**blown**" without the operator knowing it. GE would rather risk burning up a motor than have the DC pump not provide lubricating oil in emergency conditions.

Test of the Lube Oil Pump During Turbine Operation:

There is a ***test valve*** located on the side of the pressure gauge panel. See **Fig. 5** below. A ***restricting orifice*** allows the test valve to be opened to test the start of the emergency pump during turbine operation ***without*** actually tripping the gas turbine on low lube oil pressure. It would be good to review the **Schematic Piping Diagram – Lube Oil** for the turbine being tested.

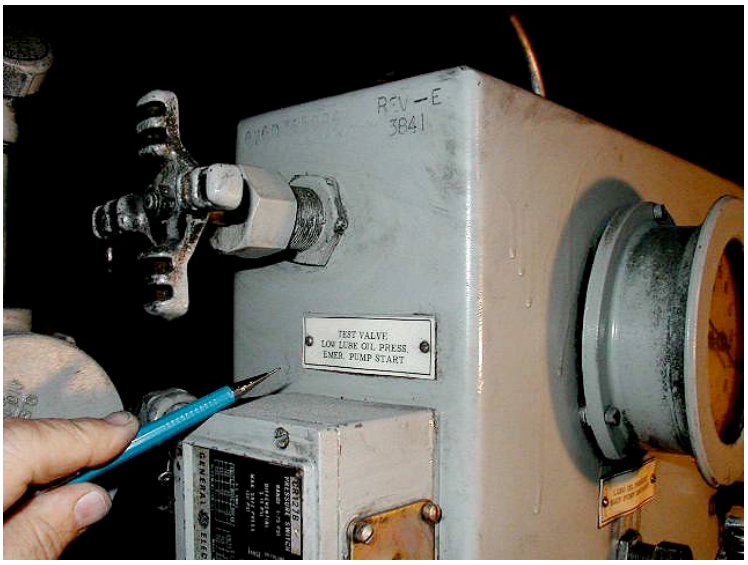

Fig. 5: Test Valve for Low Lube Oil Pressure – Emergency Pump Start

Test Procedure:

This test typically requires two operators with radio communications capability. One operator should be in the control compartment and one out on the accessory base next to the pressure gauge panel.

With the gas turbine operating at full speed/no load (**FSNL**), do the following:

1. Gradually open the small test valve on the left side of the gauge panel. Observe that the gauge indicating lube oil **header** pressure (nominally **25 psig**) begins to decrease. The gauge is located to the left of the **.125-inch** orifice in the **Lube Oil Schematic Piping Diagram**. Thus, the pressure gauge for the main lube oil header will indicate a slowly decreasing pressure.

***NOTE*:** The pressure in the header does not actually drop because pressure-regulating valve **VPR-2** will sense a slight decrease in pressure and open to maintain the header at **25 psig**. Thus, there is no danger of "starving" the bearings because the bleed orifice is very small (1/8 inch diameter).

2. The operator should continue opening the valve slowly until the **LOW LUBE OIL PRESSURE - EMERGENCY LUBE OIL PUMP RUNNING** alarm occurs in the control room. The operator in the control room should silence the alarm and notify the other operator. The other operator should record the pressure when the alarm occurs. This is the setting of pressure switch **63QA.** Refer to the turbine electrical elementary diagram for the alarm circuits.

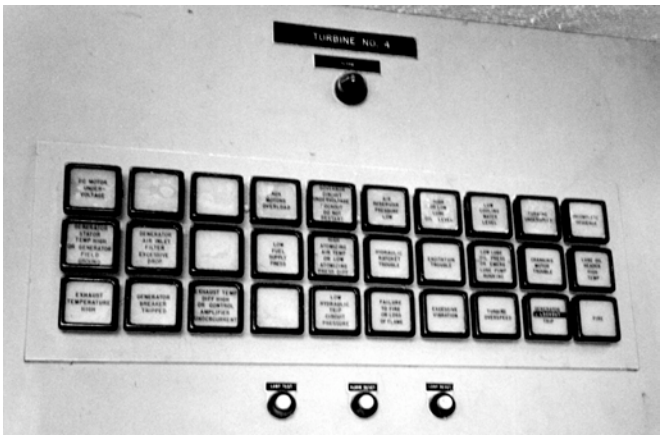

Fig. 6: Low Lube Oil Pressure Alarm, (Second Row, 8th from the left, **Drop #18** here)

3. Continue opening the valve until the emergency DC motor/pump starts (**88QE**). The gauge at the discharge of the pump should show a discharge pressure of **18 to 20 psig.** The alarm will not sound again because the drop is already illuminated.

***NOTE*:** Refer to the Schematic Piping Diagram – Lube Oil again. Lube oil does not flow through the check valve at the emergency pump discharge because the pressure on the opposite side is greater. The main gear-driven oil pump is delivering oil to the gas turbine during this test. Thus, **88QE** runs "dead headed" up to its discharge check valve. This is not a problem because it is a centrifugal pump.

4. Now begin to close the hand valve ***very slowly.*** Observe and record the header pressure when the motor for **88QE** stops.

5. Close the valve ***very slowly*** and record the pressure when the alarm can be cleared. The operator in the control room should try to reset the alarm. Keep pushing the reset button until it can be cleared. Notify the other operator. This is the ***opening pressure*** of **63QA**.

6. Fully close the test valve. This is the completion of the test. Record your findings in the site Log Book with the time and date of the test. All operators should sign their names.

If you have any questions about testing the **Emergency Lube Oil Pump, 88QE,** during turbine operation, contact **PAL**. We will help you perform the test.