

Lube tips for dog days

HOW TO STOP YOUR GE TURBINE FROM TRIPPING ON HIGH LUBE OIL TEMPERATURE

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During summer, lube oil temperatures become a concern in power plants. In August the ambient temperature can climb over 100°F. When this happens the cooling water system becomes marginal at best.

In lube oil systems for GE Frames 5, 6 & 7, the lube oil temperature regulator (Figure 1) is set at 130°F and can maintain that temperature when the outside air temperature is 75°F or below. Once the outside air temperature climbs above 75°F, the cooling water system is at its limit and the lube oil temperature increases with outside air temperature.

If the system is not in "tip-top shape," you will get the high lube oil temperature alarm (device labelled 26QA) and ultimately the high lube oil temperature trip (device labelled 26QT). If you find that your system is overheating despite your best efforts you may have to spray water on the radiators to get through the hottest part of the day.

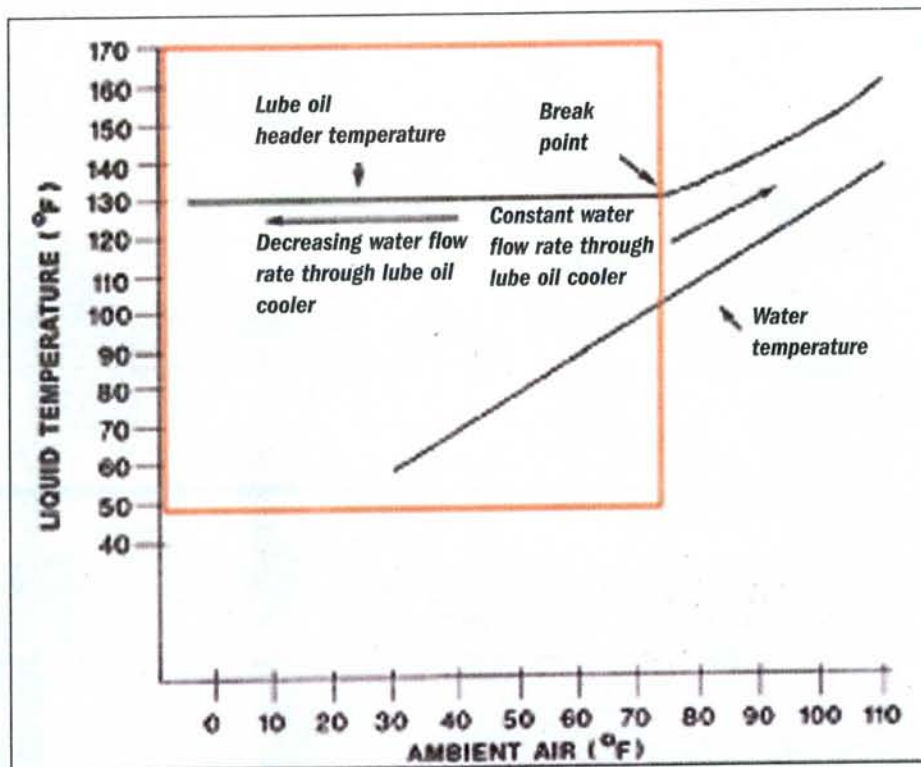
Guidelines that can save you money

The following are tips that will help you ensure that your GE turbine does not trip on high lube oil temperature (Some of the tips are applicable to lube oil systems of other turbines, as well):

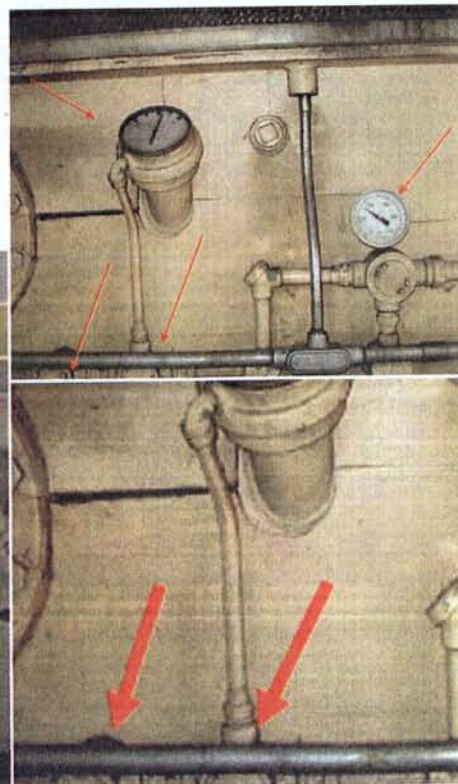
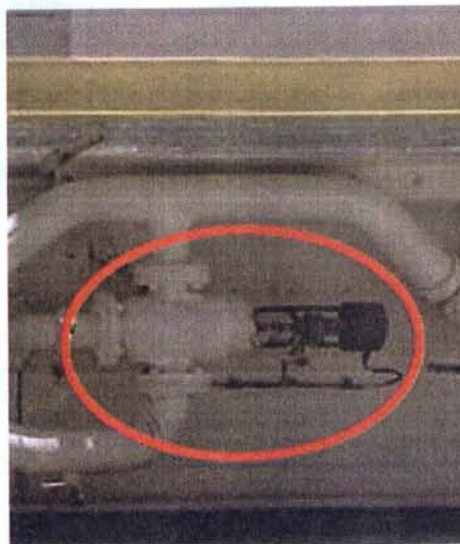
- Ensure that cooling water is a 50:50 mix of water and ethylene-glycol
- Ensure the cooling water system is full
- Ensure the lube oil system is full
- Ensure the radiators are clean
- Ensure water pump pressure is normal
- Calibrate 26QA and 26QT temperature switches once a year.
- Service the Robert Shaw valve before each summer

Tip 1: Ensure cooling water is a 50:50 mix of water and ethylene-glycol. The reason for this is that the 50:50 mix has better heat transfer characteristics and will carry the heat away better and transfer it to the radiators better. The anti-freeze also lubricates the water pump, prevents system corrosion and foaming.

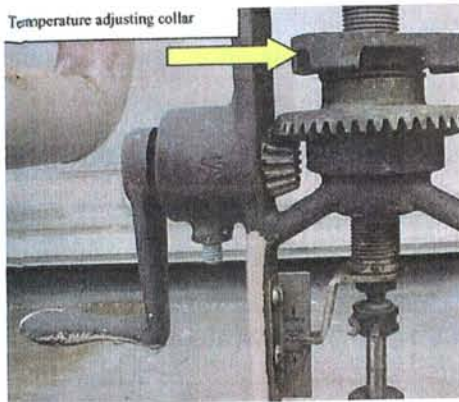
Tip 2: Ensure the cooling water sys-



Clockwise from top
 Figure 1: Cooling water system performance
 Figure 2: Lube oil tank level gauge, bearing temperature gauge, 26QA and 26QT
 Figure 3: 26QA and 26QT temperature switches
 Figure 4: Robert Shaw valve and capillary tube



Temperature adjusting collar



Clockwise from top

Figure 5: The bearing header temperature is adjusted by turning the adjusting collar, not the hand crank

Figure 6: The temperature bulb controls the pressure head which regulates the Robert Shaw valve in auto mode

Figure 7: The pressure head that adjusts the valve

tem is full. A full system acts like a heat sink and allows for better cooling. On most units the water level gauge is hidden behind the radiators on the right side of the accessory base. You need to open a little door and look carefully with a flash light to see the gauge.

Tip 3: Ensure the lube oil system is full, but not overfilled. Having a full tank

acts like a heat sink. (Figure 2 shows the lube oil tank level gauge and bearing header thermometer.) The level gauge also has a switch built in for "High Lube Oil Level Alarm." This alarm will be set off if you overfill or if a cooler is leaking water into the oil system.

You need to remember that the oil will expand when it gets hot and will

raise the level in the tank by about 1/4 on the level gauge. That isn't really 1/4 of a tank because the level gauge only registers the last 75% of the tank capacity. Therefore, when the level gauge reads empty the tank is at about 75% capacity. Refer to your lube oil piping schematic to fill the tank perfectly. The oil level is measured from the ceiling of the tank. If you overfill you could spill oil on the ground when the oil gets hot. (Figure 2 shows lube oil tank level gauge, bearing header temperature gauge, 26QA & 26QT.)

Tip 4: Ensure the radiators are clean. This will allow for maximum air flow and better cooling. Some units have reverse flow such that the air gets sucked in the top and blown out over the catwalk. In this case you will have to go into the roof of the accessory compartment to clean the back side of the radiators. You can clean the radiators with a garden hose or a power washer. Be careful not to bend the fins. Do not ever paint the radiators.

Tip 5: Ensure water pump pressure is normal. A new water pump will produce about 100 psig. This is read on the gauge panel at the front of the accessory base. If the pressure is low, the flow will be low and the system will overheat sooner. If the pressure is low it is time to replace the water pump. This will require that you

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drain the system. When installing the new water pump you will have to carefully set the clearance between the housing and the impeller with a feeler gauge (typically 0.004 inches).

Tip 6: Calibrate 26QA and 26QT temperature switches once a year. They are located on the left side of the accessory base below the level indicator (Figure 3). These are very important temperature switches because if the lube oil temperature was allowed to go too high you could wipe your bearings. This would require a major overhaul to repair. If 26QA (alarm) is set higher than 26QT (trip) or 26QA is disconnected, the unit will trip without any alarm. There is no annunciator on the alarm panel for 26QT. Therefore, this will be rather hard to troubleshoot if there is no alarm to tell you why it tripped.

Tip 7: Service the Robert Shaw valve before each summer (Figure 4).

Adjusting oil temperature

The lube oil header temperature and atomizing air temperature is adjusted by the Variable Temperature Regulator (VTR-1 & VTR-2), manufactured by Robert Shaw. It may be the most misunderstood and neglected valve on the turbine. The valve modulates water flow to control the oil temperature (and atomiz-

ing air temperature). The bearing header temperature is adjusted to 130°F by turning the adjusting collar, not the hand crank (Figure 5). As we learned in Figure 1, this must be done on a cold day. The valve stem must be clean and should be polished with no paint applied.

It is important to note that VTR-2 is set at exactly 225°F to ensure that any water in the air flashes to steam before it reaches the atomizing air pump.


The hand crank is for emergency manual operation in the event the capillary tube is damaged or the valve stem is stuck. Cranking clockwise will open the valve and allow more cooling water to flow, thus lowering lube oil header temperature.

Normally, the hand crank is turned so that the pointer is pointing to "Auto." When in Auto, the temperature is set by the temperature adjusting collar.

In the auto mode the valve is moved by the pressure head (Figure 7). The pressure head is controlled by the temperature bulb located in the bearing header (Figure 6). The temperature bulb has a wax substance that expands when heated, and which travels through the copper capillary tube to the pressure head on the valve. When the temperature is too hot the wax expands and pushes down on the valve stem to open the valve and allow more water flow. It is very common for

the capillary tube to be damaged by workers standing on it. Make sure this never happens.

If you do get a high lube oil temperature alarm do the following:

- Confirm the temperature is high on the thermometer
- Turn the hand crank clockwise to ensure the valve is wide open
- Spray water on the radiators for better cooling
- Reduce MW load if necessary 

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