

SERVICE INFORMATION LETTER

COMPONENT MAINTENANCE RECOMMENDATIONS

Date: January 27, 2016

Subject: Scheduled Maintenance on Woodward Turbomachinery Auxiliary Components

The following recommendations regarding Woodward designed and manufactured auxiliary components have been developed to properly ensure the reliability, availability, and “safety of operation” expectations established for turbine engines. These recommendations include Woodward gas valves, actuators and mechanical controls. While there are electronic control systems designed to monitor and diagnose the operational performance of these components, control monitoring cannot replace normal preventative maintenance practices. It is important to follow these recommendations in order to avoid unnecessary and unscheduled shutdowns.

A detailed analysis has compared repair records of returned units, field data and design criteria to determine the following recommendations. An overhaul of the component should be completed on or before the unit reaches the recommended range of “Operating Hours” not to exceed 6 years in service. Recommendations are appropriately aligned with the standard OEM turbine maintenance schedules which are based on “normal” operating conditions, environment, fuel quality, and past maintenance history. Installations that do not meet “normal” operating conditions may require customized maintenance cycles to maximize reliability, performance and asset life. Contact your local Woodward representative for a detailed evaluation of your site conditions to determine the right maintenance cycles for your installation.

Woodward recommends the application of self-service kits for preventative maintenance between scheduled overhaul periods. The service kits can be applied by customers to valves while still installed in pipe during combustion and hot gas path outages. Hydraulic manifold and electric actuation preventative maintenance kits are available through your local distributor.

Woodward’s overhaul services will return the unit to “like new” condition ready for another full operating cycle to your next planned maintenance outage. Upon reaching the recommended maintenance cycle of the auxiliary component, please contact either the sites turbine OEM service representative, local Woodward Distributor or Woodward Authorized Independent Service Facility to facilitate services. A directory of your local Woodward authorized distributor or service facility can be found on the Woodward website at www.woodward.com/support/directory.cfm.

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Woodward Turbine Systems

Woodward Product Maintenance Recommendations

Revision 5 Date: January 27, 2016

| Product Name | Maintenance Recommendation | |
|---|----------------------------|------------------|
| | Operating Hours* | Years in Service |
| AERO DERIVATIVE: | | |
| Hydraulic Control Unit | 50,000 Hours | 6 years |
| Variable Geometry Hydromechanical Control | 50,000 Hours | 6 years |
| Variable Geometry Electromechanical Control | 50,000 Hours | 6 years |
| Variable Stator Vane Actuators | 50,000 Hours | 6 years |
| 1907 Small Liquid Valves | 25,000 Hours | 3 years |
| 1907 Large Liquid Valves | 50,000 Hours | 6 years |
| Liquid Shutoff Valves | 50,000 Hours | 6 years |
| LQ25 & LQ25T Liquid Metering Valves | 50,000 Hours | 6 years |
| 1907 Small Gas Valves | 25,000 Hours | 3 years |
| 3103/3171 Gas Valve with Hydraulic Actuator | 50,000 Hours | 6 years |
| 3103/3171 Gas Valve with Electric Actuator | 50,000 Hours | 6 years |
| Gas Shutoff Valve | 50,000 Hours | 6 years |
| GS3/GS10 Gas Metering Valve | 25,000 Hours | 6 years |
| GS6/GS16 Gas Metering Valve | 50,000 Hours | 6 years |
| 3151 Water Metering Valve | 50,000 Hours** | 6 years** |
| CIT/CDP Sensor | 50,000 Hours | 6 years |
| 2057 Pump | 50,000 Hours | 6 years |
| Electric Gas Metering Valve (EGMV) on LMS100 | 50,000 Hours*** | 6 years*** |
| Electric Water Metering Valve (EWMV) on LMS100 | 50,000 Hours*** | 6 years*** |
| Electric Liquid Metering Valve (EMLV) on LMS100 | 50,000 Hours*** | 6 years*** |
| Variable Bleed Vane (VBV) on LMS100 | 50,000 Hours | 6 Years |

| HEAVY FRAME: | | |
|---|-----------------|------------|
| Globe Gas Fuel Control Valve (Hydraulic and Electric Actuated) | 50,000 Hours*** | 6 years*** |
| SonicFlo Gas Fuel Control Valve (Hydraulic and Electric Actuated) | 50,000 Hours*** | 6 years*** |
| Rotary Fuel Control Valve (Hydraulic, Electric, Pneumatic Actuated) | 50,000 Hours*** | 6 years*** |
| 3-Way Liquid Fuel Control Valve (Hydraulic Actuated) | 50,000 Hours | 6 years |
| 2 - Way Liquid Fuel Valve (Hydraulic and Electric Actuated) | 50,000 Hours*** | 6 years*** |
| 2 – Way Water Metering Valve (Hydraulic and Electric Actuated) | 50,000 Hours*** | 6 years*** |
| Inlet Guide Vane (IGV) Actuator | 50,000 Hours | 6 years |
| Variable Guide Vane (VGV) | 50,000 Hours | 6 years |

*Woodward considers its valves and actuators as key components in the overall fuel efficiency, emissions control and safety of the gas turbine. Therefore, we recommend that our products be overhauled at the same regular intervals that the gas turbine “Hot Section” or “Major Inspections” occur. Please consult the Gas Turbine OEM guidelines for recommended service intervals for your turbine. Woodward provides self-maintenance service kits that should be applied between major service intervals normally at combustion and hot gas path intervals. Self-maintenance kits can be applied by customer with the valve still in pipe on the turbine.

** Per the product manual guidance complete sleeve indexing maintenance procedure as recommended.

Manual 40120 “3151A Water Valve/TM-40LP Actuator Assembly for Gas Turbine Water Injection System”

Manual 40181 “3151A Water Valve EML100 Actuator Assembly for Gas Turbine Water Injection System”

*** Per the product manual guidance for electric actuation, complete re-greasing maintenance procedure at recommended intervals. Contact your local Woodward distributor for re-greasing kits.