Instrumentation & Controls

- Types of Control Systems
- Control System Issues
- Control System Support
- Control System Upgrades
- Control Related TILS 2017/2018
- Instrumentation
- Gas Valves
- DLN Tuning
- Q&A
Instrumentation & Controls

Types of control systems (Poll)
- Mark IV
- Mark V
- Mark VI
- Mark Vle
- Mark Vle S
- Other

System Upgrade
- Mark IV to VI
- Mark V to Vle
- Mark VI to Vle
- Other
Instrumentation & Controls

Control system issues
  Processors
  Terminal Boards
  Cards
  I/O Packs
  Network Switches

Available support
  OEM
  Third Party

Parts Availability
  OEM
  Third Party
Instrumentation & Controls

- Control system upgrades
- Drivers
- Lessons learned
- Results

Mark V to V1e Upgrade
- The Upgrade (Before)

Mark V to V1e Upgrade
- The Upgrade (After)
Instrumentation & Controls

GE Control Related TILS 2017/18

- TIL 1566-R2
- TIL 2028
- TIL 2046
- TIL 2051
- TIL 2081
TECHNICAL INFORMATION LETTER

HAZARDOUS GAS DETECTION SYSTEM RECOMMENDATIONS

APPLICATION
All gas turbine enclosures that utilize catalytic bead gas LEL (Lower Explosive Limit) detectors to detect the presence of hazardous gas.

PURPOSE
To inform users of best practices for Hazardous Gas Detection System configuration, response to alarms, system upgrades and recommended enhancements.

REASON FOR REVISION
To communicate updated requirements for units that are performing fuel system modifications.
CONTROL SETTINGS FOR GE REUTER STOKES FLAME SENSORS

APPLICATION
This TIL is applicable to all GE gas turbines using Mark™ V controls and GE Reuter Stokes flame sensors. In addition, units retrofitted to Mark Ve or Ve migration panels that use GE Reuter Stokes flame sensors may be affected. Units using Honeywell or McGraw Edison type flame sensors are not affected.

PURPOSE
To advise users to check, and if necessary, correct the control panel settings that determine when the flame sensor reading is considered a valid flame detection reading.
Instrumentation & Controls

POWER SERVICES ENGINEERING
PRODUCT SERVICE

GE Power

TIL 2046
24 JULY 2017
Compliance Category – M
Timing Code – 6

TECHNICAL INFORMATION LETTER

DLN1 PURGE VALVE SYSTEM AND 3-WAY VALVE ORIENTATION

APPLICATION
Gas turbines with Dry Low Nox (DLN) 1 gas only combustion systems.

PURPOSE
To communicate purge valve maintenance and inspection recommendations to mitigate the potential for a combustion wrapper deflagration.
MARK* V TO MARK VIE MIGRATION DIGITAL INPUT TOGGING

APPLICATION
All units with Mark* V to Mark Vle migration control panels

PURPOSE
To inform users of a Mark V to Mark Vle migration PMVD module firmware upgrade and/or DTBA terminal board replacement to improve the controller’s ability to handle direct current (DC) power supply voltage transients.
TECHNICAL INFORMATION LETTER

UNIT TRIP RISK WITH SPECIFIC CONFIGURATION OF PPRO/VPRO

APPLICATION
All Mark® VI control systems which include a VPRO card or Mark VIe control systems with a PPROH1A pack.

PURPOSE
To inform users about a potential unit trip risk with a specific configuration of the PPRO/VPRO.
Instrumentation & Controls

LVDT’s (Linear Variable Differential Transformer)

- SRV 96SR
- GCV’s 96GC
- IGV’s 96TV
  - Calibration
  - Replacement Frequency (PM)
Instrumentation & Controls

Servos

- SRV 90SR
- GCV’s 65GC
- IGV’s 90TV
  - Calibration
  - Replacement Frequency (PM)
## Instrumentation & Controls

### Gas Turbine Moog Servo Identification

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<tr>
<th>Model Number</th>
<th>IGV (90TV)</th>
<th>SRV (90SR)</th>
<th>GCV (65GC)</th>
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### Servos @ Cogen

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<thead>
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<th>A-Train</th>
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<th>C-Train</th>
<th>D-Train</th>
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<td>5</td>
<td>3</td>
<td>4</td>
<td>13</td>
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</tbody>
</table>

- A-Train = 3: SRV/GCV/IGV
- B-Train = 5: SRV/GCV/IGV
- C-Train = 3: SRV/GCV/IGV
- D-Train = 4: SRV/GCV-1/GCV-2/IGV

Model Types (3)

- **G771K200A**: 7 (A-Train = 2 / B-Train = 2 / C-Train = 2 / D-Train = 1)
- **G771K202A**: 4 (A-Train = 1 / B-Train = 1 / C-Train = 1 / D-Train = 1)
- **G772K240A**: 2 (D-Train = 2)
Instrumentation & Controls

Dump Valves
- Gas Valve 20FG
- IGV’s 20TV
  - Replacement Frequency (PM)
Instrumentation & Controls

- Compressor Bleed Valve Solenoid 20CB
- Porous Stone Filter FA6
  - Replacement Frequency (PM)
Instrumentation & Controls

- Fill/Drain Torque Converter Valve 20TU
- Replacement Frequency (PM)
Instrumentation & Controls

Fuel Valves
Hydraulic or Electric
Instrumentation & Controls

• SRV/GCV (Speed Ratio/Stop Valve – Gas Control Valve)
  • Young & Franklin YF-9500
Instrumentation & Controls

- SRV/GCV (Speed Ratio/Stop Valve – Gas Control Valve)
  - Young & Franklin YF-9500
Instrumentation & Controls

- SRV/GCV (Speed Ratio/Stop Valve – Gas Control Valve)
  - Woodward
Instrumentation & Controls

- DLN Tuning
- Duration
- Frequency
- OEM / Self / Non-OEM

DLN1 Fuel Staging

**DLN1 Operational Modes:**

**Primary Mode**
- Diffusion Flame
- 100% Primary Fuel Ignition - 19% Load

**Lean-Lean Mode**
- Diffusion Flame
- ~60% Primary / 40% Secondary Fuel
- 19% - 50% Load

**Transfer Mode**
- Diffusion Flame
- 100% Secondary Fuel
- 50% Load

**Premixed Mode**
- Premixed Flame / Diffusion Pilot
- 81% Primary / 19% Secondary Fuel
- 50% - 100% Load
Q & A