ROLLS-ROYCE AVON MK 1533-754® GAS TURBINE GENERATOR DRIVE APPLICATION CONTROL PACKAGE

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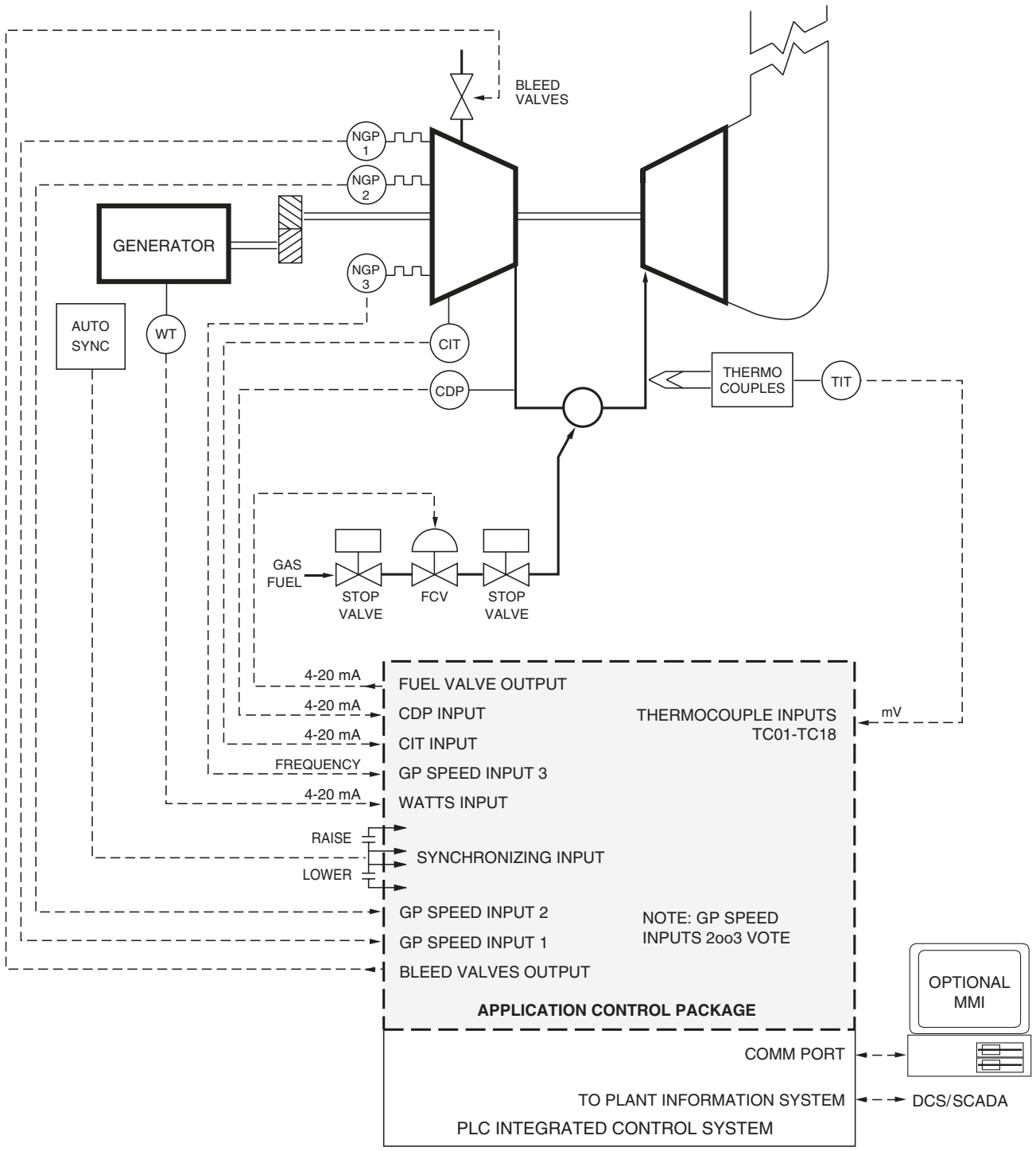

Simplified schematic showing a Petrotech Rolls-Royce Avon MK 1533-754® gas turbine generator drive application control package integrated into an advanced PLC-based control system.

APPLICATION

The Rolls-Royce Avon MK 1533-754® GEN gas turbine application control package replaces older mechanical/hydraulic/electronic/ pneumatic fuel regulators with a modern, reliable application control package which runs on an advanced PLC-based system. The control package for the gas turbine provides fuel control and bleed valve control.

ADVANTAGES

- **Hardware independent system:**
  Application control package's portability allows customer choice of platform, reducing need for additional spare parts and training expenses. Available PLCs include General Electric, Siemens/TI, Allen-Bradley, and Modicon.
- **Fault tolerant:**
  Control package is available on fault tolerant controllers for critical control applications.
- **Simplified interface to DCS or SCADA:**
  Communication tasks are handled with a separate, dedicated module in the PLC, increasing data rate and simplifying network installation.
- **Improved fuel regulation:**
  Fast loop sampling rate, combined with modern digital control techniques improve steady-state setpoint control, and reduce overshoot during transients.
- **Improved start-up reliability:**
  Special "lean lightoff" procedure ignites all combustors with essentially 100% reliability, and with greatly reduced thermal stress.
- **Improved engine temperature monitoring and control:**
  Advanced statistical algorithms detect turbine hot/cold spots and automatically reject failed thermocouples.
- **Fail-safe features:**
  Redundant overspeeds; open/short monitoring of mA and thermocouples; readback monitoring of outputs, and special self-check features improve safety.
- **Non-proprietary interfaces:**
  Simple 4- 20 mA, RTD, thermocouple, and dry contact I/O allow simple interface to existing sequence/protection logic unit, making low-cost partial upgrades practical, and system troubleshooting simple.
- **Improved operator information with optional MMI:**
  Optional Man-Machine Interface MS Windows-based graphic operator interface displays system status, trending and data logging, which can be used as part of a preventative maintenance program.

SCOPE OF SUPPLY

The application control package for the olls-Royce Avon MK 1533-754® gas turbine generator drive system, includes:

Analog inputs, 4-20 mA:
- Watts (load control).
- Compressor discharge pressure (CDP).
- Ambient temperature (CIT).

Analog inputs, frequency:
- Three (3) redundant NGP.

Analog inputs, mV:
- TIT (up to 18 thermocouples).

Analog outputs, 4-20 mA:
- Fuel control valve position setpoint.
- Bleed valve position setpoint.

Operating states:
- Firing.
- Warm-up.
- Accelerate.
- Load.
- Synchronize.

Status, alarms, and shutdowns:
- Fault.
- GP overspeed alarm.
- GP underspeed shutdown.
- GP overspeed shutdown.
- Redundant GP overspeed shutdown.
- △GP alarm
- High TIT alarm.
- High TIT shutdown.
- Low TIT shutdown.
- Low TIT delayed alarm.
- Rejected thermocouple.
- Too few thermocouples shutdown.
- △T alarm
- △T shutdown
- Thermocouple spread alarm.
- Thermocouple spread shutdown.
- Turbine maximum limit.
- Turbine minimum limit.
- GP speed #1.
- GP speed #2.
- GP speed #3.
- GP speed #4.
- GP speed #5.
- TIT switch #1.
- Manual.
- High firing fuel pressure shutdown.
- Transmitter failure alarms.
- Transmitter failure shutdowns.

- Output failure shutdowns.
- Control mode.

Controllers/special features:

- Start-up controller for fuel valve.
- NGP controller for fuel valve.
- TIT controller for fuel valve.
- TIT rate of rise controller.
- Fuel acceleration schedule.
- Fuel deceleration schedule.
- Deceleration rate limiter.
- Corrected speed (CNGP) override.
- Bleed valve controller.
- Combustion monitoring system.
- Stagnation detection system.

Ramps:

- Firing (lean lightoff) ramp.
- Start-up ramp.
- Loading ramp.
- Cooldown ramp.

Does not include:

- PLC hardware.
- Gas turbine sequencing and protection discrete logic.
- Generator sequencing and protection discrete logic.
- Synchronizing and regulation equipment.
- End elements.

OPTIONS FOR COMPLETE CONTROL SYSTEM UPGRADE

- Gas turbine sequencing and protection discrete logic.
- Generator sequencing and protection discrete logic.
- Communication interface to DCS or SCADA.
- PLC hardware.
- Man machine interface unit with WonderWare InTouch® licensed software package.
- Complete custom engineered control panel, factory tested and ready to install.
- Fuel control valve system upgrade.
- Bleed valve actuator system upgrade.
- Thermocouple upgrade.
- Synchronizing and regulation equipment.
- Vibration system upgrade.
- Installation and commissioning.
- Training.

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