



**June, 2010**

**Subject:** Complete Rewiring of Package Power Plants using *Home-Run* Concept

**Applies to:** GE Gas Turbine Package Power Plants (PPP)

**Examples Used:** Era 1960 through 1980

**Models:** MS5001D thru P and MS7001 B thru E

**Related Topics:** “Home-Running Thermocouple Wiring” July 2005

In response to high demand for emergency and peaking power, reacting to the Northeast Blackout of November 1965, General Electric shipped hundreds of so-called gas turbine **Package Power Plants (PPP)**. In the last half of the 1960s decade, GE’s product was the MS5001LA-PPP made in Schenectady, NY, and rated at 15 megawatts at base load for NEMA inlet conditions (80F, 1000 ft, 14.17 psia). By 1970, GE began manufacturing the MS7001B-PPP at their new Greenville, SC, plant (NEMA rating of 40 MW).

The GE gas turbines were tested at these respective manufacturing factories (that is, run up to full speed, no load, FSNL) on liquid fuel. If they were to be gas fuel operating units, the conversions were made thereafter in the factory before packaging for shipment. All of the turbines were tested with plant auxiliaries and controls but not their generators. Thus, when received for installation, field personnel had to interconnect and fully test the gas turbines and generators “under load” coupled together for the **first** time.

**Note:** The term “full speed, no load” or the abbreviation FSNL is somewhat erroneous. Since the gas turbine drives its own compressor, running the turbine uncoupled at rated speed, as in the factory, develops approximately 2/3 of the horsepower of rated load. Once coupled to the generator at the installation site, the PPP would be run up to speed, synchronized to the power grid, and eventually loaded to base level where the remaining 1/3 power output was first achieved.

The major components involving PPP had another distinction: they were manufactured at many *different* facilities. Take, for instance, MS5001N (circa 1971-72), which had major components made at these GE's facilities:

- Gas Turbine and Accessory Base (Schenectady, NY)
- Reduction Gear and Generator (Lynn, MA)
- Control Cab (Salem, VA)
- Switchgear and Main Circuit Breaker (Chamblee, GA)
- Step-up Power Transformer (Pittsfield, MA)

Using so many facilities presented challenges for field engineers and the eventual plant owners/operators. For instance, mechanical components had to be aligned and couplings installed.

Electrical devices had to be interconnected in the field where they met for the *first* time! Interconnections were done using pre-fabricated cables with multi-pin plugs. They were then connected through junction boxes. Almost no wiring was “*home run*” to and from the device and the control room. The junction boxes were often difficult to access as well. Most were located on the I-beam bases. See Figure 1 below. Some junction boxes were only accessible by removing the control cab metal floor (JB1 and JB2).



Fig. 1 – Original JB and New Pull-through Box and Conduit for “Home-Run” Wiring

Some clients opt to relocate PPP after decades at their original installation site. In so doing, they have also decided to rewire electrical components. They strive to eliminate difficult-to-access junction boxes. This allows electricians to avoid locations where water, rodents, and rust can cause nuisance grounds, short circuits and insulation issues that manifest themselves in turbine trips or failure-to-start problems.

Newly incorporated JB's in the control room vicinity make troubleshooting easier for plant personnel. Also, power wires to motors can be easily isolated (using separate conduits) from such signal wires as pressure transducers and thermocouples. Spare wires are typically pulled through the new conduits as well. New wiring often permits one continuous pair of wires to be run through new conduits directly to the device in the field. Wires can be tagged and properly identified using GE terminology (e.g. pressure switch 63QT).



Fig. 2: Pull Boxes, Conduit and New Thermocouples “home run” to Control Room

### ***Summary:***

1. Various major components of General Electric Package Power Plants (PPP) are built at many different manufacturing facilities and never meet each other until they arrive at the installation site.
2. Therefore, they must be interconnected at the site and tested together for the first time.
3. Electrical interconnections pass through junction boxes (JB) on the I-beam bases. These JB are often difficult to access once the bases were joined together (e.g. JB-1 and JB2 under the floor of the control cab on the accessory base I-beam). New junction boxes can minimize interconnections.
4. Wiring ran through multi-pin plugs sometimes experienced short circuits or grounds. Rodents, rust, grounds and short circuits can be mitigated with new, home-run wiring.

For more on this ***Home-Run*** concept for new wiring, contact Dave Lucier of ***PAL Turbine Services, LLC*** at his office on 518-371-1971 or mobile phone 518-330-4801.