Generator Set Engines - All Models
Periodic Testing of Emergency Generator Set Engines

Effective January 1, 2000, changes were implemented in Joint Commission on Accreditation of Healthcare Organizations standard EC.2.14 regarding the testing of emergency power supply systems (EPSS).

These changes included the acceptance of NFPA-99-1999 Section 3-4.4.1.1(b) which calls for the EPSS to be tested a minimum of 12 times per year at intervals of no less than 20 days and no more than 40 days. Also effected were the requirements for the minimum acceptable load that should be applied to the EPSS during testing.

Prior to January 1, 2000, the requirements were to apply a minimum of 30% of the nameplate rating of the generator set or 50% of the greatest known load on the EPSS. They also required that the organization look for evidence of "wet stacking"* of the exhaust system.

The technical committee for NFPA 110-1999 reviewed this and recommended three options for testing the EPSS. One - using building load, as long as the load is in excess of 30% of the nameplate rating of the EPSS. Two - operate the engine maintaining a minimum exhaust gas temperature as recommended by the engine manufacturer to prevent "wet stacking" of the exhaust. Three - using resistive load banks to perform an annual exercise with supplemental loads at 25% and 50% load for 30 minutes each, followed by 75% load for 60 minutes for a total of two continuous hours. After completion of the annual test, they may test the EPSS monthly with all essential loads connected for 30 minutes establishing baseline temperatures for a healthy engine. If temperatures are consistently below the manufacturer recommendation then they will need to perform the annual load test.

It is the recommendation of Detroit Diesel Corp. that the standby generator set is exercised under load at least once per month.

In order to be sure that any condensation in the engine and generator has been eliminated, the set must be operated, under load utilizing building load or resistive load banks, for a sufficient period of time to allow all operating temperatures to stabilize.

Operating a diesel engine with little or no load will not build up sufficient internal heat to raise engine, or generator, temperature levels up to the point where accumulated condensation is driven off. In order to achieve normal operating temperatures within the engine and generator, the generator set should be operated at 30% load, or with engine exhaust temperatures as tabulated below.

The exhaust gas temperature should be measured after the turbocharger, but before the exhaust silencer.
Some instruments that measure the surface temperature of exhaust piping may indicate temperatures that differ from the temperature of the exhaust gas. If surface temperature devices are used, they must be calibrated to indicate actual gas temperature.

** "Wet-stacking" is a field term used to describe the condition when unburned hydrocarbons in the exhaust gases condense in the exhaust system. Unchecked this condition can lead to degradation of performance and compromise the integrity of the EPSS.*

Recommended minimum exhaust temperatures:

Two Stroke Cycle Engines	
Engine Family	**Exhaust Temperature**
53 Series	450° F (232° C)
71 Series	450° F (232° C)
92 Series	450° F (232° C)
149 Series	450° F (232° C)

Four Stroke Cycle Engines	
Engine Family	**Exhaust Temperature**
Series 40	600° F (316° C)
Series 50/60	550° F (288° C)
Series 2000	650° F (343° C)
Series 4000	600° F (316° C)

generators is the **lack of sustainment training** by using units.

During Total Package Fielding of the TQGs, the Project Manager - Mobile Electric Power and ATCOM we provide full New-Equipment-Training (NET) to each receiving installation and unit. This training consists of both operator and maintainer training. HOWEVER, this training is "TRAIN-THE-TRAINER" type training only.

During visits to units we are continuing to **find soldiers operating and maintaining TQGs that have not received sustainment training** on the TQGs. In addition to "wetstacking", this is the MAJOR problem we have encounted in units maintaining high readiness rates on the TQGs.

HELP YOURSELF! GET YOUR SOLDIERS PROPERLY TRAINED!

Contact the US Army Ordnance Center and School for a copy of a videotape that outlines the highlights of proper operation of the TQGs -- it's good, and it's useful in your sustainment training.

TRANSITION TO PRODUCTION

We are the first to admit, that the transition from RDTE to production has caused some initial problems during the fielding of the TQGs -- which is no surprise and quite typical. These items -- voltage regulators, auxiliary fuel pumps, rubber fuel collars and return lines, etc. -- have been addressed already under the Safety-of-Use messages (see Table of Contents).

Most of these problems have been relatively minor, and have not involved any of the major components of the TQGs. Furthermore, we maintain continual surveillance through our Sample Data Collection (SDC) program to identify any additional systemic problems. As these are identified, we will derive "fixes" and get instructions and/or parts to the field. Keep an eye on the "WHAT'S HOT" area for more info.

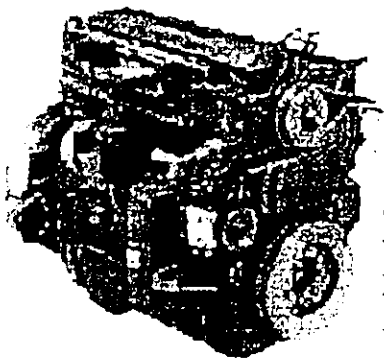
Points of Contact Return to PM MEP Home Page

"World Class Power for World Class Military Forces"

Making Your TQG's Work Better!

Having problems with your Tactical Quiet Generators? Three problem areas are discussed below.

"WETSTACKING" -- THE MAJOR CULPRIT



"Wetstacking" is the buildup of unburned residues, diesel fuel and carbon residues in the engine and exhaust system of our generator sets. This leads to cooler, but rougher running engines and increased vibration.

Our Sample Data Collection efforts have shown that approximately **60-70% of maintenance problems are directly attributable to wetstacking** problems. Thus, if you are having maintainability problems, this is a good first place to look.

What causes "wetstacking"? The **principal cause is underloading of the generator** set -- that is, running the generator set at loads of less than 50% of rated load. We are finding units frequently are opertaing there sets at less than 10-20% of capacity.

What's the solution? There are **three principal ways to help reduce "wetstacking"**.

Increase Power Loads

The most obvious way to reduce wetstacking is to increase power consumption to above 50%, and preferably above 70%. This will cause the engines to runner hotter, improve combustion and reduce vibration -- which will result in fewer maintenance problems. Hook up more of the equipment that the generator was programmed to use.

Reduce Numbers of Generators Used

Or you can reduce the numbers of generators being used. In many cases we have found that units overestimate their power requirements. They base it on "peaking starting loads" -- not sustained power requirements. They assume that every piece of equipment will be operating simultaneously -- when in reality this rarely occurs. Or they add a "fudge" factor when estimating future requirements -- "if I need 9.8 kW, I'll use a 15 kW rather than a 10 kW." BOTTOM LINE -- reduce the number of generators used and run more applications from them.

Use a Load Bank Occasionally

While units do not need load banks in combat, there is nothing wrong with using load banks at the local Director of Logistics or Director of Public Works to "burn out" the generators periodically.

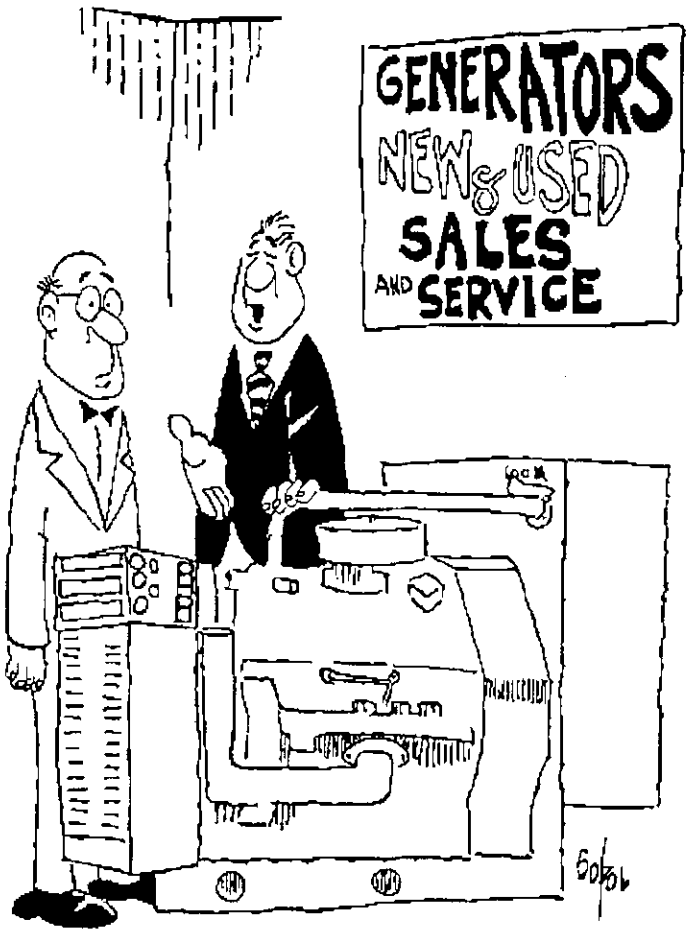
INADEQUATE OPERATOR/MAINTAINER TRAINING

One of the **major contributors to poor operations and maintainability** on the new TQG family of

WETSTACKING

"Wetstacking" is a field term used to describe the condition when unburned fuel builds up in the engine. This build up can lead to several maintenance problems, increased fuel consumption, or premature failure of the engine.

The most common cause of wetstacking is lightly operation of a Gen-Set.



"Now here's a real cream puff. Only test-run for a few minutes on Sundays and never operated above half load."