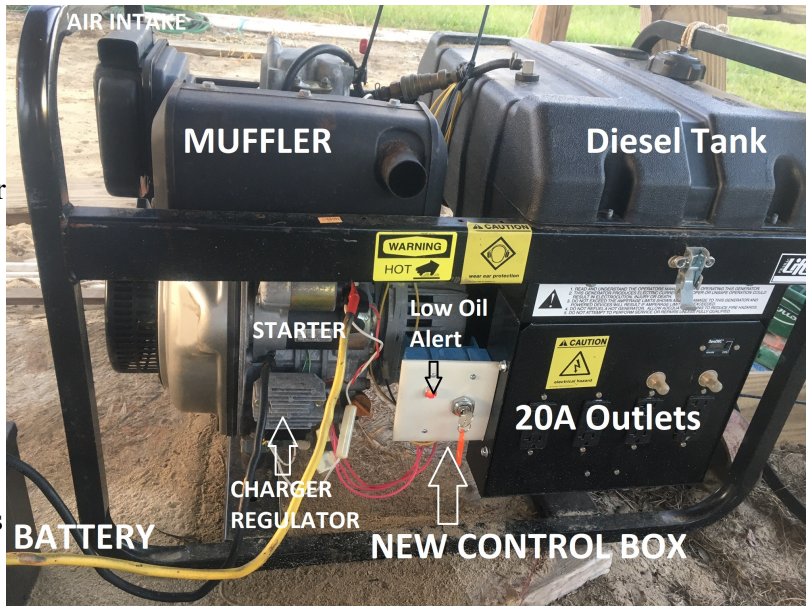
Alachua County Diesel Generator - Part Two

by Gordon Gibby KX4Z



Background:

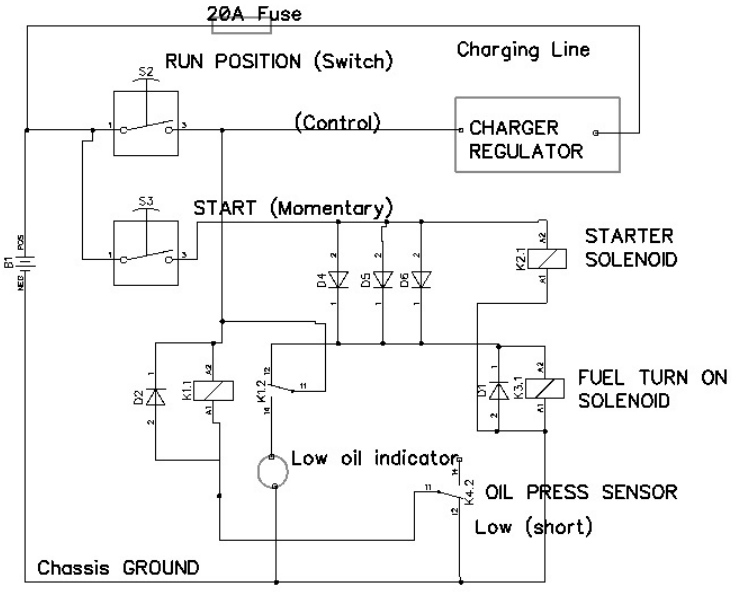
I wanted a diesel generator available for our Alachua County ARES(R) / NFARC club for Field Day and deployments, because of their stoutness, less-explosive fuel, and near total lack of any HF radio frequency interference. An odd-ball 5kW generator powered by a 10HP diesel became available with a dubious running history at about 50 cents or less on the dollar. A lot of work was required to fix the fuel system...see https://qsl.net/nf4rc/2022/NewsletterArticleGenerator1.pdf

FINAL TIMING: In October I tackled the timing of the fuel injector for the last time, and determined it was truly at or slightly before 15o before top dead center, and the spec is more like 12-14 depending on source. Based on information from the manual, I decided to add yet one more 0.3mm copper shim -- and the timing now measured just about perfect. Back on went the protective hood over the spinning fan blades! Back on went the pull-start spring assembly.

Now the challenge was to create a control panel to connect to the Molex connector with unmarked control wires.

CONTROL PANEL:

The oil pressure sensor *closes* when oil pressure too low--and is grounded. The Fuel solenoid needs 12V to provide fuel. Relay K1 (ordinary automotive SPST 12V relay, contacts rated as much as 40A) provides the required inversion. Drawing no current normally, if oil pressure declines, the relay will activate and remove power from the fuel turn on solenoid. A typical 12V automotive LED indicator assembly (with built-in resistor) provides a visible "LOW OIL" indication. (See photo, where it is visibly lit.)



A 3-position (off/run/start) ignition key (hefty version found at an auto-parts store shelf) provides power to the fuel solenoid during RUN, and powers the starter solenoid to crank the diesel engine. Three 1N4007 diodes in parallel (overkill, but allows plenty of current for the solenoid) allow power from the START position to momentarily turn on the fuel solenoid during cranking -- once cranked, the oil pressure sensor opens and K1 provides power for the turn-on solenoid. Snubber diodes were added to circuit around K1 relay and also around the fuel turn-on solenoid just to avoid unexpected high-voltage transients.

The control circuitry worked perfectly for these functions the first time installed.

With some care, the final "control" wire from the charging regulator was connected to the RUN position of the ignition switch -- and the charger worked! A DC (hall-effect) clamp-on ammeter indicated charging of the depleted starting battery of as much as 13A DC. The frequency of AC output measured about 59.7 Hz. ***This is now a very usable generator! It starts quickly and runs strong!***

The remaining modification needed is to add a momentary switch to allow fuel-solenoid turn-on if the user wishes to crank manually with the pull cord, rather than advancing the key all the way to the START position.