

CAT ESCM Replacement

APPLICATION:

Natural Gas Gathering

ENGINE:

CAT 3516 TALE with ESCM/EIS,
Ariel JGE4, 3

LOCATION:

Exterran, Northern Louisiana

ALTRONIC PRODUCTS:

DE-3000E

OVERVIEW:

A DE-3000E retrofit kit had already been installed inside the legacy FW Murphy panel in order to regain proper control of all systems pertaining to the compressor and engine.

The area technical representatives from Exterran continued to be plagued by intermittent electrical problems with the CAT engine systems. All problems experienced to date were results of the CAT ESCM (Electronic Status Control Module). CAT no longer manufactures or supports the ESCM. Instead, they offer a retrofit application called an OCP (Operator Control Panel). The OCP (\$10,000) has a substantially higher price than the ESCM (\$2,500).

The ESCM is nothing more than a smart relay box. It receives input signals from the main control panel (DE-3000E) and relays the information to the CAT EIS (Electronic Ignition System). It offers three points of protection for the engine — RPM over speed, low engine oil PRS, and high engine water temperature. These protected points were simply moved to the DE-3000E.

Once the ESCM was removed from the system, new wires were connected from the DE-3000E panel



Original ESCM before modifications.



Wires have been disconnected; the ESCM is isolated and no longer a part of the system.

directly to the EIS. The original ESCM enclosure was retained, and the terminal blocks inside were used to make these connections.

Once the hardware portion of the installation was completed, a simple program re-configuration with the DE-3000E terminal software was required. This pertained to the sequence of operation for the output module commands, located on the power supply board.

Output four remained the pre- and post-lube control of the engine. Output three remained the starter control. Output two was modified from a DER (Driven Equipment Ready) signal to an ignition ON signal. Output one was modified from a start signal to a fuel valve ON signal.

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CAT items reused: terminal blocks, data port harness and cannon plug, umbilical cable from engine, and reset switch. New LED indicators were mounted in place of the OEM incandescent lights. Future systems will not reuse this housing. All components will be mounted inside a new Altronic control panel with new LED indicators, reset switch and terminal blocks. A small cannon plug with cable assembly (16 wires) will be used to connect the panel to the engine. A 10AMP relay replaced the OEM rotary switch.



All wiring remains intact inside the engine-mounted panel. Future applications could replace the engine-to-ESCM panel's umbilical cable with a small 16-wire harness from Altronic.

The engine valley. Forward is the new K thermocouple in the thermostat housing; lower is the added K thermocouple for manifold temperature; at bottom is the original EWJ sensor, which is no longer used.



Disconnecting the ESCM also disconnected the EWJ sensor from the system.

The EOP sensor was left in the engine block.

Because the EIS module expects to see a requested ignition signal any time the engine is rotating, a 331-11 code is set into the EIS warning code system and a warning light is powered on at start up. This can be eliminated by reversing the logic of the output three module for the starter to switch a ground on and off and then using a jumper between output three and output two. This method will turn the ignition on as soon as the engine starts to crank and allows the ignition to stay on (output two) as soon as the crank termination is reached and output three is de-energized. The drawback to this method is that the engine will not receive any purge at start up before turning on the ignition.

The CAT design depends heavily on the fuel valve working properly at shutdowns to prevent a backfire through the engine exhaust from the ignition of raw fuel remaining in the combustion chambers. Altronic recommends that the system be configured for a crank purge before turning on the ignition, and clearing the 331-11 code after the unit is running, as fuel valves often function improperly.

Per CAT documentation, the 331-11 code only serves as an indication that engine RPM was present with the absence of an ignition request.

Eliminating the ESCM provides a dramatically improved reliability. Allowing the DE-3000E to directly control requests to the EIS module eliminates a source of potential misdiagnosis.

The cost of the DE-3000E in a completely new panel is substantially less than the cost of the CAT OCP system that was intended to replace the ESCM. Adding the increased reliability of a new monitoring system for the whole compressor package increases the value for any Altronic customer.

The Altronic Garland facility is capable of producing a completely new panel—built-to-order—for any customer. Several quotes have been issued to Exterran and USA Compression. New designs will incorporate all necessary terminations inside the Altronic panel, eliminating the need to retain the CAT ESCM enclosure.

With assistance from the factory, a small harness could be developed to replace the CAT harness that connects the ESCM panel to the main engine-mounted panel.



The back of the original engine Oil PRS gauge. The source for this and the original engine oil PRS transducer are located on the side of the engine block at cam bearings. The engine oil cooler does not allow the new Altronic sensor to mount directly at those points. The next best location is here. The PRS supply is coming from the same location (cam bearing).



The front of the panel and the ESCM housing.



The new LED indicators are visible and the rotary switch is turned off.