

VERNIER THROTTLE SYSTEM  
for  
**Caterpillar  
Electronic  
Engines**

*Class1*

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## Throttle Interface Control Module

### System Overview

The *Class1* Vernier Throttle Interface is designed to allow industry standard vernier style controls (such as the Felsted Electronic Vernier II Control) and other potentiometer controls to be used with electronically controlled engines. This unit will work with electronically controlled Caterpillar Engines (C10, C12, 3176, 3406, 3116B and 3126B) using a Pulse Width Modulated (PWM) Signal.

The interface converts a linear voltage input (potentiometer) into a PWM signal to control the engine. True variable speed control is attained and the unit will maintain a selected engine RPM irrespective of the engine load within it's horsepower and torque capabilities. The interface can be used to govern engine speed for various applications including PTO driven generators and pumps. There is an internal fast idle function that can be activated with a remote fast idle input (12 VDC)

**Included in the package** The throttle control is available alone or as a package shipped with the following components.

- Interface module
- Vernier control
- User manual
- Mating Connector and wiring

### Operation

**Variable Throttle Control** When the interface has power provided by the interlock circuit, variable engine control is available to the operator using the vernier control. If the vernier control is open more than 50% when power is applied to the interface, the interface will maintain the engine at idle RPM until the throttle is closed and then re-opened. This feature prevents sudden unexpected increases in engine speed when the unit is initially activated.

**High Idle Control** An input is available to bring the engine speed to a pre-determined engine RPM (High Idle) from a remotely mounted switch or load management device. This speed is set by an internal potentiometer.

### Installation

**Control Module** The interface module requires minimal space (5" x 6" x1.5"). The module is watertight and may be mounted in any location that is not subject to extreme temperature or vibration.

**Wiring** The interface package comes with cables and leads to make the following connections:

- Vernier Control
- Power and Ground
- Engine Control Signal
- High Idle connection

Refer to the diagrams in the manual for specific wiring requirements.

Refer to the engine manufacturer's Electronic Application & Installation Guides for detailed information on engine electrical interfacing.

**Class 1** provides a variety of engine controls that are used in a broad range of applications, therefore it is impossible for **Class 1** to determine the suitability of a particular control for any specific application. The flexibility of our products allows them to be used in a limitless number of custom applications. **Class 1** can advise you of the features that are available on a given product so that you can determine what product will meet your needs. We believe that the Original Equipment Manufacturer's (OEM) engineering departments should be qualified experts in their product field and are the authorities on product application and safety. Since our products are typically used in safety critical applications, the OEM must undertake appropriate testing to prevent injury to the end user.

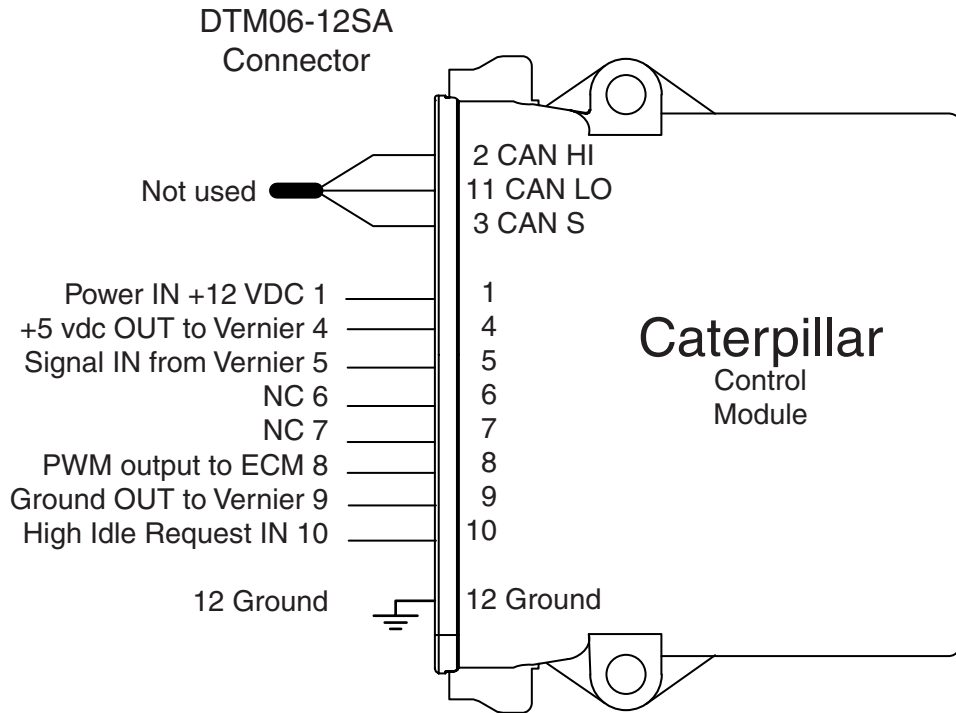
## WARNING



**IT IS THE PURCHASER'S RESPONSIBILITY TO DETERMINE THE SUITABILITY OF ANY PRODUCT FOR AN INTENDED APPLICATION, AND TO INSURE THAT IT IS INSTALLED AND GUARDED IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, LOCAL AND NFPA SAFETY AND HEALTH REGULATIONS, CODES AND STANDARDS.**

**NOTE:** The interlock schemes shown in this manual are examples only and may not be suitable for specific applications. The throttle interface is active whenever power is applied.

**Special Programming** The ECM must be programmed for remote throttle operation and there are several considerations including vehicle speed and max RPM that need to be configured.

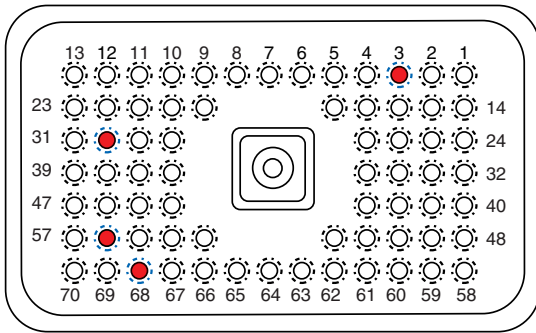
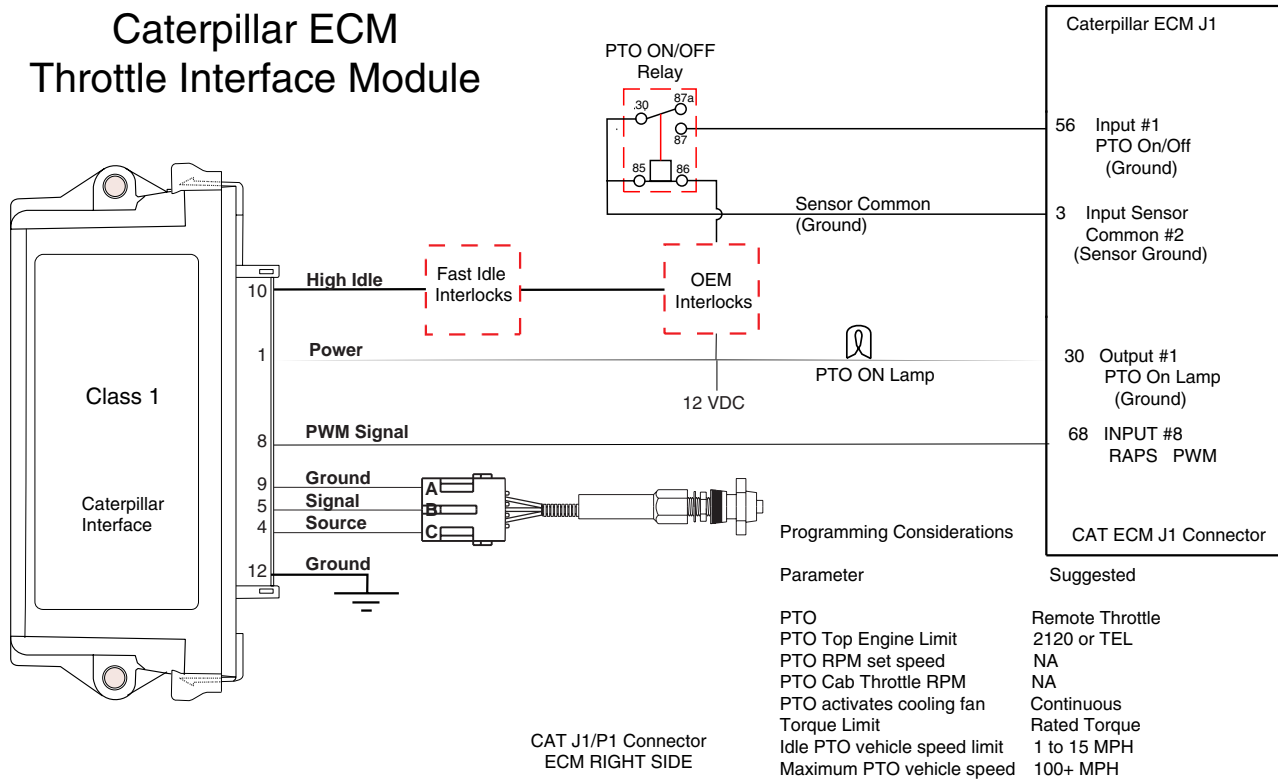


Connector Information

Connector Deutsch DTM06-12SA Terminal

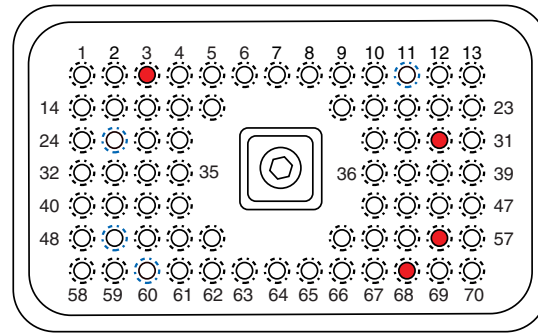
<u>Position</u>	<u>Description</u>
1	12 VDC Module Power Supply
2	Not Used
3	Not Used
4	Vernier Supply Voltage (+5 VDC)
5	Vernier Analog Signal (0-4.5 VDC)
6	Not Used
7	Not Used
8	Pulse Width Modulated Engine Control Signal (12%-87%)
9	Vernier Signal Ground
10	High Idle Request Input (12 VDC)
11	Not Used
12	Module Ground Supply

## Caterpillar ECM Throttle Interface Module



Vehicle Harness Connector  
ECM Side

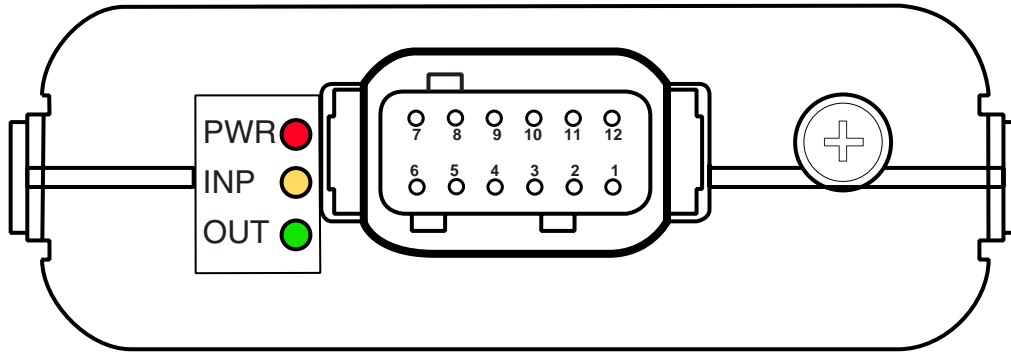
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Vehicle Harness Connector  
Harness Side

The Caterpillar ECM has two 70 pin AMP Connectors. The J1 connector is for OEM use and is located on the right side of the ECM toward the rear of the engine. The mating connector is an AMP 776183-1 and terminals can be AMP 776093-1 for 14, 16 or 18 Gauge wire or Deutsch 0462-209-16141 for 14 Ga. and Deutsch 0462-201-16141 for 16 and 18 Ga. wires. Caterpillar uses a Pulse Width Modulated Control Signal for remote throttle operations. This is a single wire input to the OEM Input #8, terminal 68. Idle is 10% to 22% duty cycle and Maximum Throttle is 75% to 90% duty cycle. The Class1 Interface signal is 12% for idle and 87% for maximum throttle.

The ECM must be programmed for **Remote Throttle** under Dedicated PTO Operations. Input #1 at terminal 56 is the PTO ON/OFF switch. Supplying Input Sensor Common #2 (ground) from terminal 3 turns on the Remote Throttle. Output #1 (PTO ON Lamp) at terminal 56 switches to ground when the PTO ON /OFF switch is enabled.



On Unit Troubleshooting:

Is the PWR LED (Red) illuminated?

It requires 12 VDC at terminal #1 and Ground at terminal #12 to operate.

Is the INP LED (Yellow) Flashing?

The flash rate should increase as the vernier is turned out.

If the flash rate changes with the vernier position, then the interface is correctly reading the input.

Does the intensity of the OUT LED (Green) increase as the vernier is turned out?

The intensity is based on the PWM duty cycle. If the LED changes from dim at closed throttle to full bright at fully open throttle, then the interface output is correct.

Does the INP LED stay on for 2 seconds and then off for 2 seconds repeatedly?

This indicates you are in Fast Idle Mode and the Throttle Input is ignored.

Does the INP LED flash twice rapidly and then pause for 1 second and repeat?

This indicates too high a signal input voltage.

Unplug the vernier and check to see if the INP LED returns to a slow flash rate.

A missing ground to the vernier or a short to the signal wire can cause this.

**SPECIFICATIONS:**

Suggested mounting hardware: 1/4" Hex Bolt

Mating Connector: Deutsch DTM06-12SA

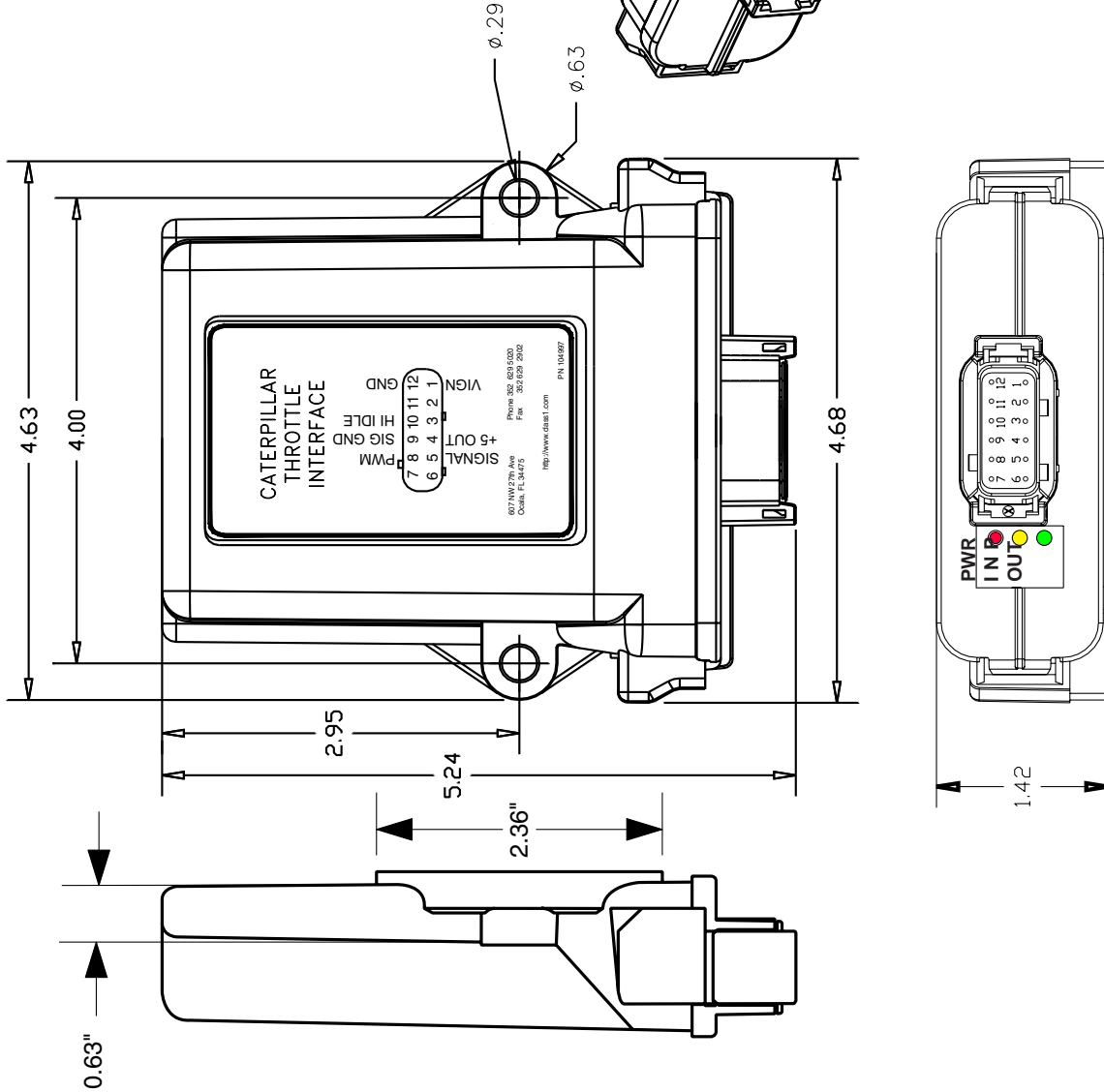
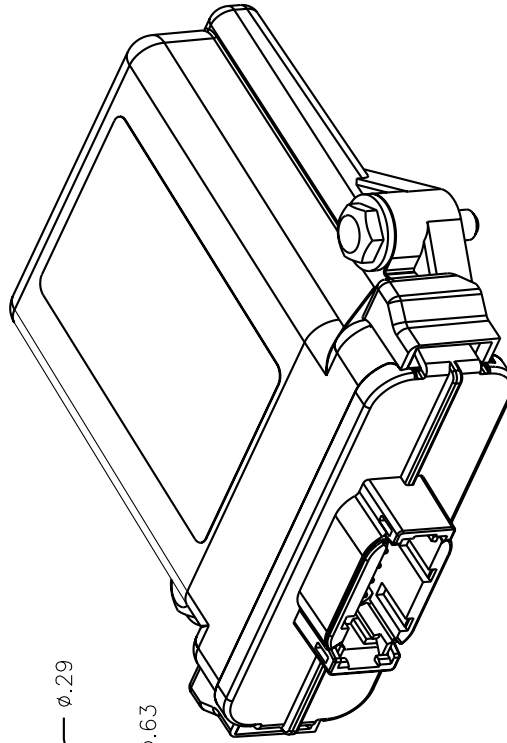
**Mating Terminals**

16-20 Ga 1062-20-0122  
 18-24 Ga 0462-201-20141  
 Gold\* 18-24 Ga 0462-201-2031

**Hand Crimp Tool**

DTT-20-00  
 HDT-48-00  
 HDT-48-00

\*Gold Contacts recommended for CAN BUS



When the throttle interface module is powered up, it performs a self check and the module then outputs an idle PWM signal of 12 % if the throttle is in the closed position.

The interface will verify that the throttle is not open more than half way. If the throttle is open more than half way, the interface module will not increase the PWM until the throttle is closed to less than half way.

When finished operating the remote throttle, the operator should return the throttle to idle and turn the control to it's full clockwise position. This will insure a zero throttle position.

NOTE: Caterpillar Engines perform their own idle validation for remote throttle operations.

For questions or concerns regarding the interface module, call *Class1* at 352-629-5020  
FAX 352-629-2902