

**VERNIER THROTTLE SYSTEM
for
CUMMINS CELECT
and
CELECT PLUS ENGINES**

Class1
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Throttle Interface Control Module

System Overview

The Class 1 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 Cummins Engines (Celect and Celect Plus) using the J-1922 control data bus to send control signals to the Engine Control Module (ECM). ***This unit will not work with the Cummins ISB, ISC or ISM engines.***

The interface converts a linear voltage input (potentiometer) into the appropriate 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 its horsepower and torque capabilities. The interface can be used to govern engine speed for various applications including PTO driven generators and pumps and has an input that allows for a fast idle activation.

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

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 10% 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 (C4) is available to bring the engine speed to a pre-determined engine RPM (High Idle) from a remotely mounted switch or load management device. When the interface is powered up with this input active, the idle validation routine is bypassed and the interface will increase the engine speed to the preset RPM. This speed can be set by an external potentiometer or resistor network.

Installation

Control Module The interface module requires minimal space (3.63" x 4.75" x 1.00"). 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:
Engine control data link extension cable
Connector kit with terminals

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 There are no special programming configurations required for the Cummins Celect and Celect Plus engines. The control data link (J-1922) connection is typically close to the engine ECM.

Error Codes

The **Class1** Vernier Throttle Interface continuously checks for several errors. Errors are displayed on the green diagnostic LED. When an error is detected, the error number is flashed on the LED.

Example: If the data link is not detected, (error 2) the LED will flash twice, pause two seconds and repeat while the error is present.

Defined Errors

ERROR 1 Thottle Error This error occurs when the controller does not detect an idle throttle position. The interface will not take active control until the throttle is returned to its idle position. This can also be caused by a miswired throttle connection or shorted wiring.

ERROR 2 No RPM Data This error indicates that the interface module cannot find engine RPM data on the J-1922 data link. This usually indicates that the data bus is not connected correctly or is a bus that does not transmit engine speed.

ERROR 3 Data Link Error This error indicates that there is a problem with the data bus. This could be a short to ground or reversed connections.

ERROR 4 Transmit Error This would indicate that there is a transmit conflict with another device on the data bus.

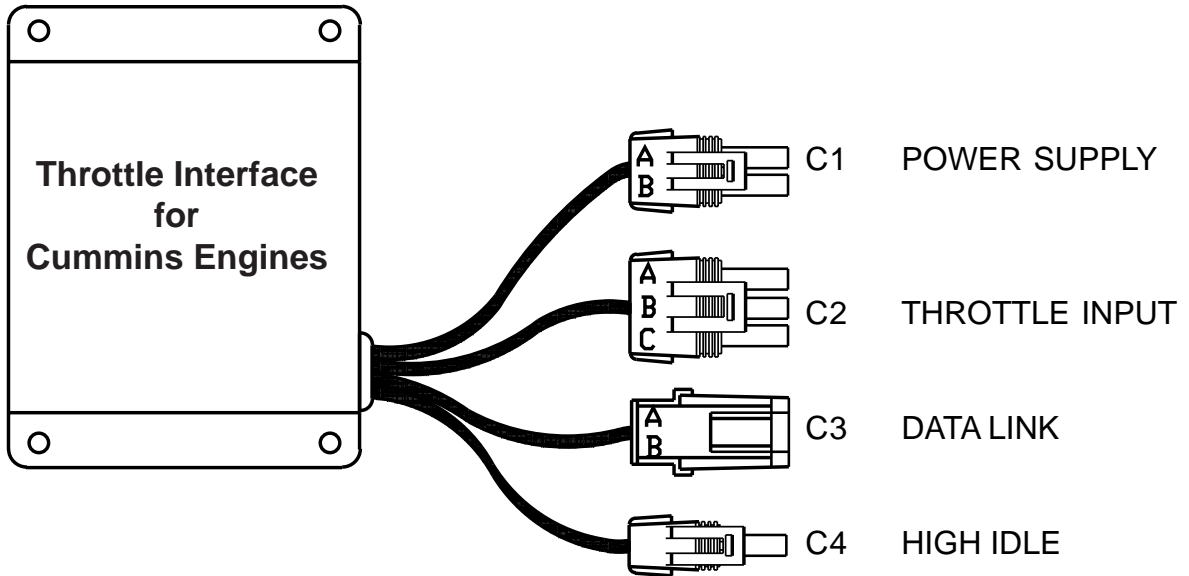
ERROR 5 Device Conflict This error indicates that there is another device on the data bus transmitting the same commands to the engine.

ERROR 6 J1922 Data This error indicates that the device does not recognize the data bus as J1922.

For questions or concerns regarding the Class1 throttle interface:

Call **Class1** at 352-629-5020 or Fax at 352-629-2902

J-1922 Function	Conn.	Pin	Circuit	
CELECT	Data +	A	10	22
	Data -	A	20	23
CELECT PLUS	Data +	A	5	20
	Data -	A	23	21
CELECT PLUS	Data +	OEM IN	P	20
	Data -	OEM IN	N	21

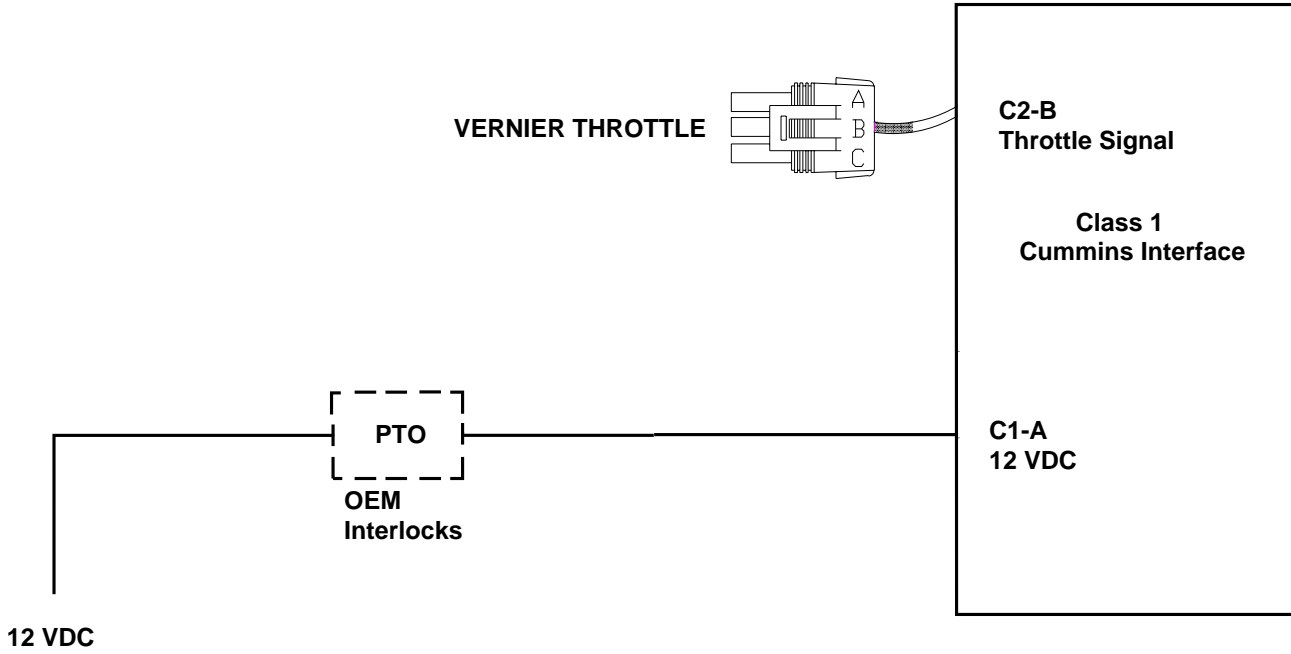


Connector Information

Connector	Connector	Terminal	Seal
C1	Connector 12015792	Terminal 12089188	Seal 12015899
<u>Position</u>	<u>Wire Color</u>	<u>Description</u>	
A	Red	Throttle Interlock	
B	Black	Ground	
C2	Connector 12015793	Terminal 12089188	Seal 12015899
<u>Position</u>	<u>Wire Color</u>	<u>Description</u>	
A	White	Throttle ground	
B	Blue	Throttle Signal	
C	Orange	Throttle Source	
C3	Connector 12010973	Terminal 12089040	Seal 12015899
<u>Position</u>	<u>Wire Color</u>	<u>Description</u>	
A	Wht/Red	Data A	
B	Wht/Black	Data B	
C4	Connector 12015791	Terminal 12089188	Seal 12015899
<u>Position</u>	<u>Wire Color</u>	<u>Description</u>	
A	Green	Fast Idle*	

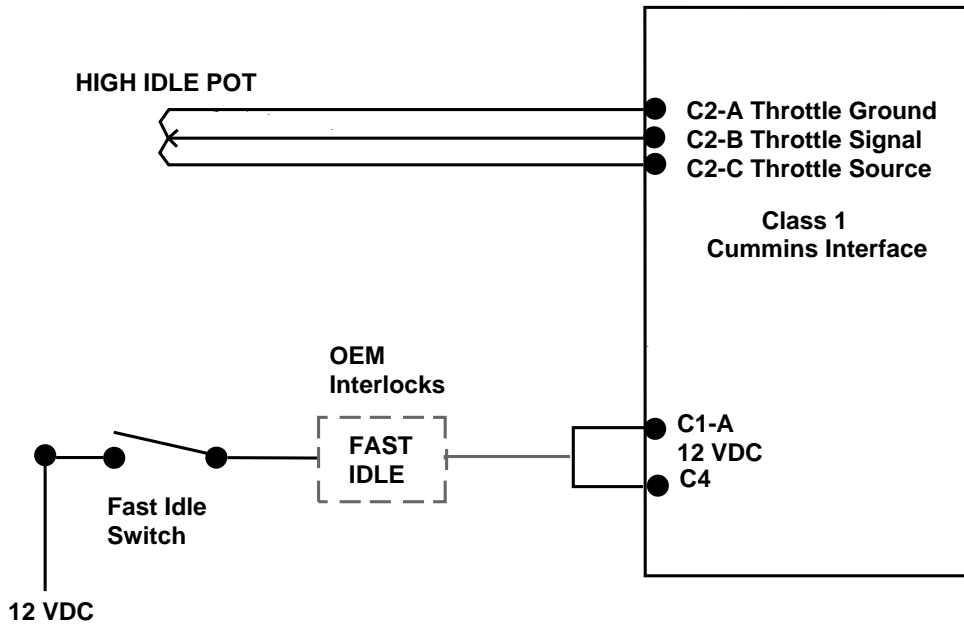
* This input bypasses idle validation and allows the interface to command engine torque as soon as power is applied.

Wiring the Class1 Vernier Throttle

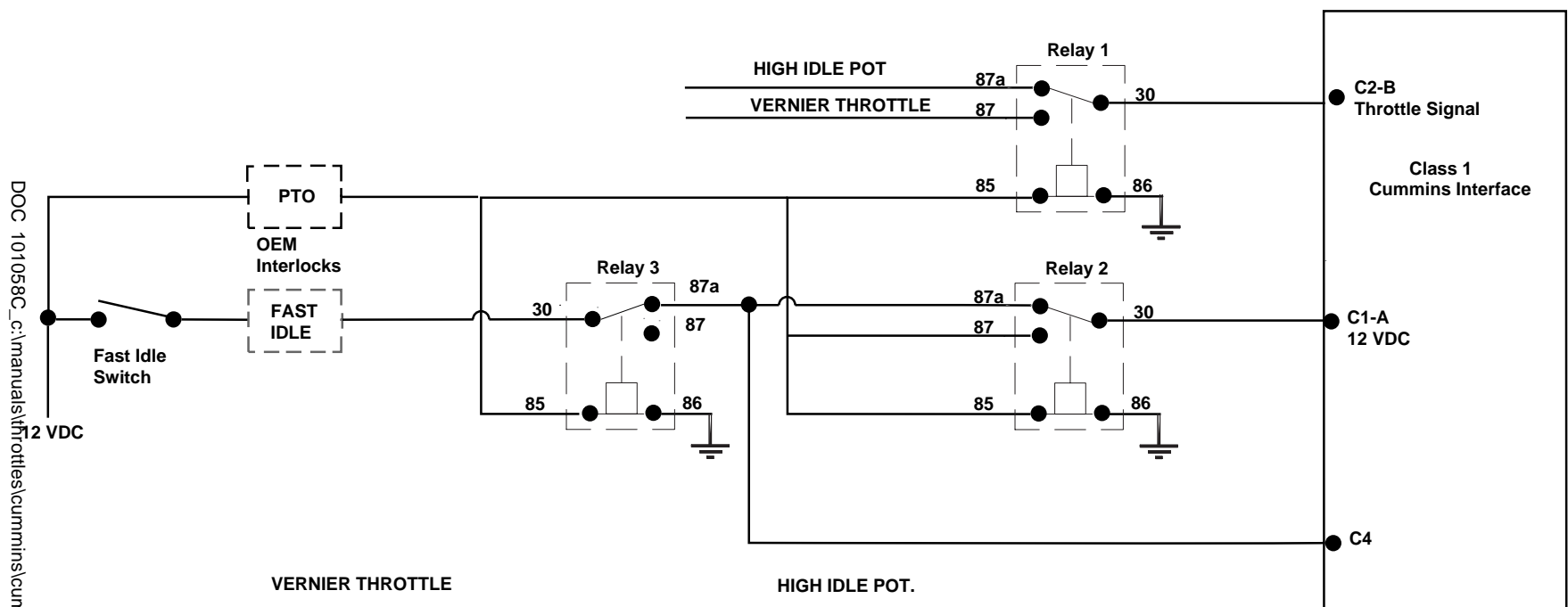


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Wiring the Class1 Vernier Throttle with high idle option only



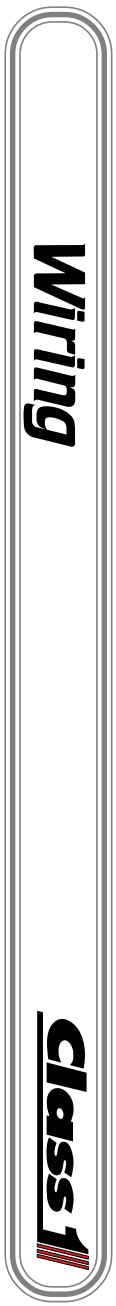
Wiring the Class1 Vernier Throttle with a remote high idle option

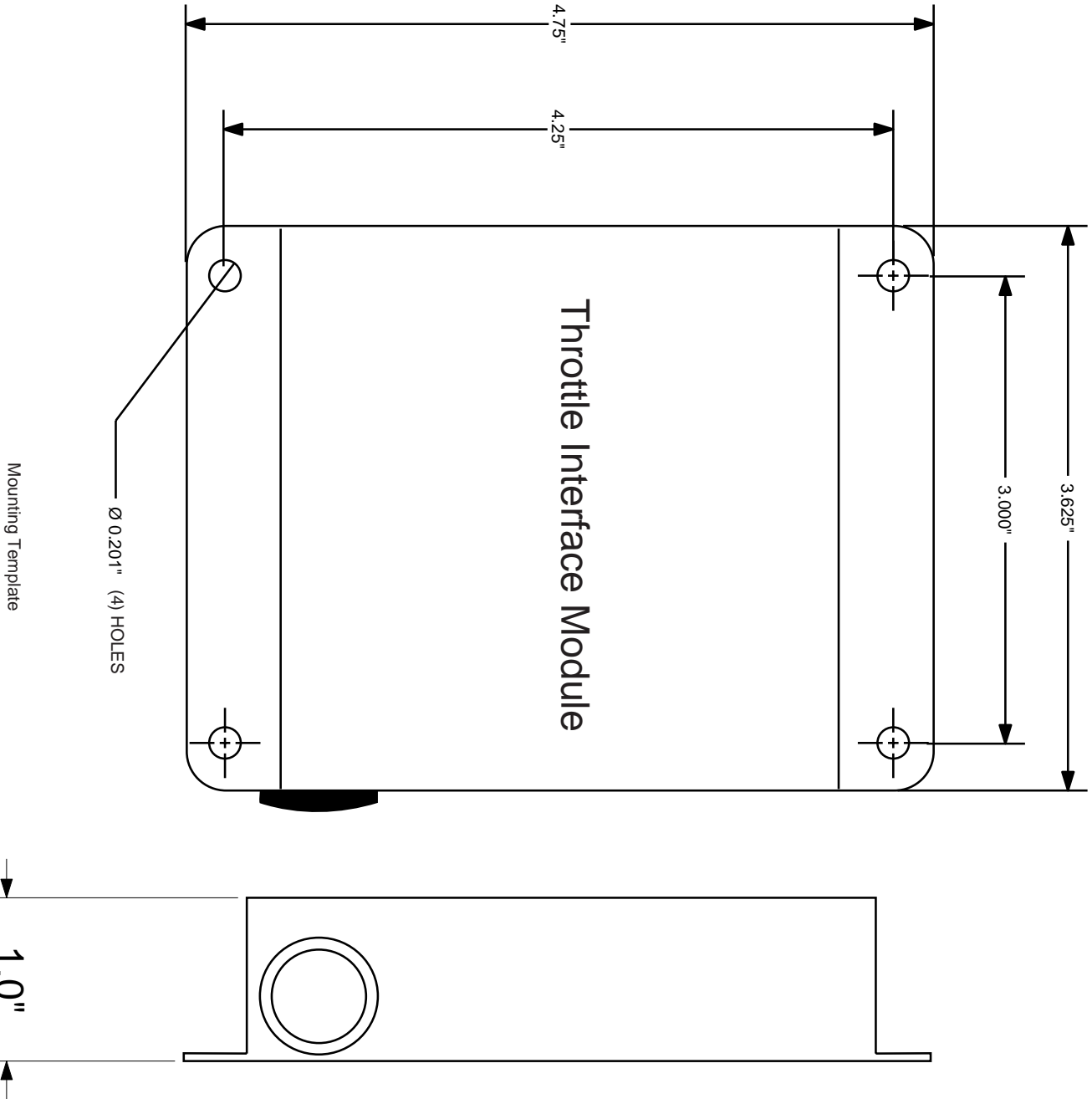


		VERNIER THROTTLE		HIGH IDLE POT.
5 VDC	C2-C	HOOKED IN PARALLEL TO HIGH IDLE POT.		FROM C2-C
SIGNAL	C2-B	CONNECT TO VERNIER THROTTLE INPUT AT RELAY 1		CONNECT TO HIGH IDLE POT INPUT AT RELAY 1
GROUND	C2-A	HOOKED IN PARALLEL TO HIGH IDLE POT.		FROM C2-A

- RELAY 3 DISABLES HIGH IDLE WHEN OK TO PUMP/PTO ENGAGED SIGNAL IS PRESENT
- RELAY 2 SELECTS THE SOURCE OF THE INTERLOCK (HIGH IDLE OR PTO)
- RELAY ONE SELECTS WHICH THROTTLE SIGNAL (HIGH IDLE OR VERNIER) IS DELIVERED TO THE INTERFACE MODULE

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When the throttle interface module is powered up by the safety (interlock) system the throttle module will perform a self check and the LED on the module will turn on and then turn off after the self check if everything passes. (approx. 4 secs)

After the self check, the interface will verify that the throttle is fully closed. If the throttle is not fully closed, the LED on the interface module will flash once every 2 seconds until the zero position is detected.

IMPORTANT The throttle interface module will not command increased torque from the engine until the zero position is detected.

This feature is present to avoid unintentional increases in engine speed should the throttle be left in the open position.

The fast idle input overrides this feature and should be used with caution.

After the interface module passes the self test and detects zero throttle, it is ready to control the engine. The interface module controls the engine electronically by sending torque commands to the Engine Control Module (ECM).

Once the throttle has been opened approximately 1/4 turn, the interface module will begin to control the engine. The interface module will override the foot throttle in the cab. There will be a short delay of 1-2 seconds when the interface module initially takes control from the foot throttle. Once control is established, the throttle response will be immediate and precise. For best operation, open the throttle from 1/4 to 1/2 turn and wait until you hear or see the engine RPM increase to 800. At this time the interface module is in control of the engine and normal operation of the vernier throttle is supported from 800 to full engine speed.

When finished operating the remote throttle, the operator should return the throttle to idle and turn the control to it's full clockwise position. When the interface module detects this position, and engine speed is at or below 800 RPM, it will release control to the foot throttle after 3-4 seconds.

Each time the throttle is moved from idle or back to idle, the transfer of control takes place and the operator should expect a short delay in control response at these times.

Note: When the throttle interface is not powered, it is physically disconnected from the engine so that it cannot under any circumstance control engine speed or interfere with another engine speed control.

For questions or concerns regarding the governor, call **Class 1** at 352-629-5020 or FAX 352-629-2902.