Document Number:
XE-TGA1PM-R0A

PRESSURE GOVERNOR, ENGINE MONITORING, AND MASTER PRESSURE DISPLAY MODELS: TGA100, TGA200

TGA100

TGA200

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CONTENTS

Table of Contents

List of Tables

List of Figures

INTRODUCTION

Overview

The Fire Research INControl pressure governor and all-in-one instrument panel uses state of the art programmable microprocessor technology. It will maintain a steady pump discharge pressure by controlling engine speed or hold a selected engine RPM. It offers complete engine control and remote display in a single compact unit.

The INControl operates in one of two modes, pressure or RPM. In pressure mode the INControl maintains a constant pump discharge pressure. The discharge pressure is monitored and compared to the selected pressure setting, the engine RPM is varied to keep the discharge pressure at the selected setting. In RPM mode the INControl maintains a constant engine RPM. The pump discharge pressure is monitored and can vary but, as a safety feature it will be limited to an increase of 30 PSI. If the discharge pressure increases 30 PSI the governor will automatically lower the engine RPM to prevent a high pressure surge.

The panel has three 4-digit LED displays for pump discharge, pump intake, and engine RPM. The LEDs are more than 1/2" high. There is an LED bar graph to show PSI or RPM setting depending on the mode, and three LED bar graphs that provide a constant display of the battery voltage, engine coolant temperature, engine oil pressure, and optional transmission temperature.

All controls and indicators are located on the front of the control module.

Features

Power Up in Pressure Mode

Automatic Regulation of Pump Discharge Pressure

Manual Control of Pressure or Engine RPM Settings

Field Programmable Presets

Diagnostic Capabilities

No Pressure or RPM Variation When Changing Modes

Limits Increase of Pressure When in RPM Mode

Recognition of No Water Condition With Automatic Response

Interlock Signal Recognition and OK To Pump LED

Return to Engine Idle With the Push of a Button

Off-The-Shelf Programmable for Engine Type

TGA200 with Transmission Temperature Display

kPa °C Option

Specifications

The INControl is available in various models. Each model is programmed to interface with specific engines. All models provide the same functions, controls, and digital readouts for the management of pump discharge pressure.

Control Module

Supply Power:	12 VDC
Supply Current:	1.0 Amp
Dimensions:	9 3/4" Wide by 4 3/4" High by 2 3/4" Deep

LED Bar Graphs

Engine Oil Pressure:	10 to 90 PSI
Engine Coolant Temperature:	150 to 240 °F
Transmission Temperature:	140 to 300 °F
Battery Voltage:	11.5 to 15.5 VDC

Intake Pressure Sensor

Model Number:	XE-IO3100PT2
Pressure Range:	-30 in/Hg to 600 PSI (-100 to 4000 kPa)
Proof Pressure:	1200 PSI
Excitation Voltage:	5 VDC
Output Voltage:	0.5 to 4.75 VDC

Discharge Pressure Sensor

Model Number:	XE-FP4000PT1
Pressure Range:	0 to 600 PSI (0 to 4000 kPa)
Proof Pressure:	1200 PSI
Excitation Voltage:	5 VDC
Output Voltage:	0.5 to 4.75 VDC

Table 1. Pressure Sensor Output Voltage

	0psi	100psi	150psi	200psi	250psi	300psi	600psi
XE-IO3100PT2	0.604vdc	1.295vdc	1.640vdc	1.985vdc	2.331vdc	2.677vdc	4.75vdc
XE-FP4000PT1	0.5vdc	1.12vdc	1.56vdc	1.92vdc	2.27vdc	2.625vdc	4.75vdc

GENERAL DESCRIPTION

The INControl pressure governor and all-in-one instrument panel engine type can be programmed form the facyory or or or during installation. (Refer to Programming section.) It is compatible with the following engines:

TGA101/TGA201 Cummins IS Series

TGA102/TGA202 Detroit Diesel

TGA104/TGA204 Navistar

TGA105/TGA205 Caterpillar

TGA110/TGA210 Mercedes

All controls and indicators are located on the front of the control module.

Components

The information available on the J1587 databus varies depending on the particular engine type. The sensors (if any) that need to be installed will also vary depending on the engine.

The INControl pressure governor and monitoring display consist of the following components:

Control Module

Intake Pressure Sensor

Discharge Pressure Sensor

Audible Alarm Buzzer

Engine Oil Pressure Sensor (As Necessary)

Transmission Temperature Sensor (TGA200 As Necessary)

Cables

Control Module

The control module is waterproof and takes up 9 3/4 by 4 3/4 inches of panel space. All controls, indicators, and displays are located on the front of the control module. (Refer to Controls and Indicators.)

Intake Pressure Sensor

The pressure sensor is mounted on the pump intake manifold. It provides an input signal to the control module that is proportional to the intake pressure.

Note: The displays for the pump intake and pump discharge pressure may need to be calibrated for 0 PSI, refer to Calibration Section.

Discharge Pressure Sensor

The pressure sensor is mounted on the pump discharge manifold. It provides an input signal to the control module that is proportional to the discharge pressure.

Note: The displays for the pump intake and pump discharge pressure may need to be calibrated for 0 PSI, refer to Calibration Section.

Audible Alarm Buzzer

A ground is provided at the 8-pin connector pin 7 to activate the buzzer (max current: 300mA).

Engine Oil Pressure Sensor

The oil pressure sensor is installed as necessary.

Transmission Temperature Sensor (TGA200 only)

The transmission fluid temperature sensor is installed as necessary.

Cables

There are two cables that connect to the control module. One 8-pin connector and one 12-pin connector.

Controls and Indicators

All controls and indicators are located on the front of the control module. (Refer to Figure 1.) The LED digital display has daylight bright digits at least 0.56 inch high.

PUMP DISCHARGE Display

Shows the pump discharge pressure during normal operations.

PSI LED

The red PSI LED is on to indicate operation in the pressure mode.

PSI Button

Selects the pressure mode of operation.

PRESET Button

Press to change/select a pre-programmed value for pressure or RPM setting.

PSI/RPM Setting Display

The display will show the pressure or the RPM setting.

RPM Button

Selects the RPM mode of operation.

RPM LED

The red RPM LED is on to indicate operation in the RPM mode.

RPM Display

Shows the engine RPM during normal operations.

SILENCE Button

Suppresses audio alarms.

VOLTS LED Display

Shows battery voltage. LEDs will flash when voltage is outside normal limits.

TRANS. °F LED Display

Shows transmission temperature. LEDs will flash when the temperature high.

°F LED Display

Shows engine coolant temperature. LEDs will flash when the temperature high.

PSI LED Display

Shows engine oil pressure. LEDs will flash when the pressure low.

INC / DEC Buttons

During operations the buttons increase and decrease pressure or RPM setting.

THROTTLE READY LED (OK TO PUMP on some models.)

This LED will be on when the required interlock conditions are met and the governor is ready to begin pump operations.

IDLE Button

When pressed immediately sets the engine RPM to idle. This button can be used in an emergency or for normal shut down after operations.

Idle LED

This LED is on to indicate the engine RPM is at idle.

PUMP INTAKE Display

Shows the pump intake pressure during normal operations

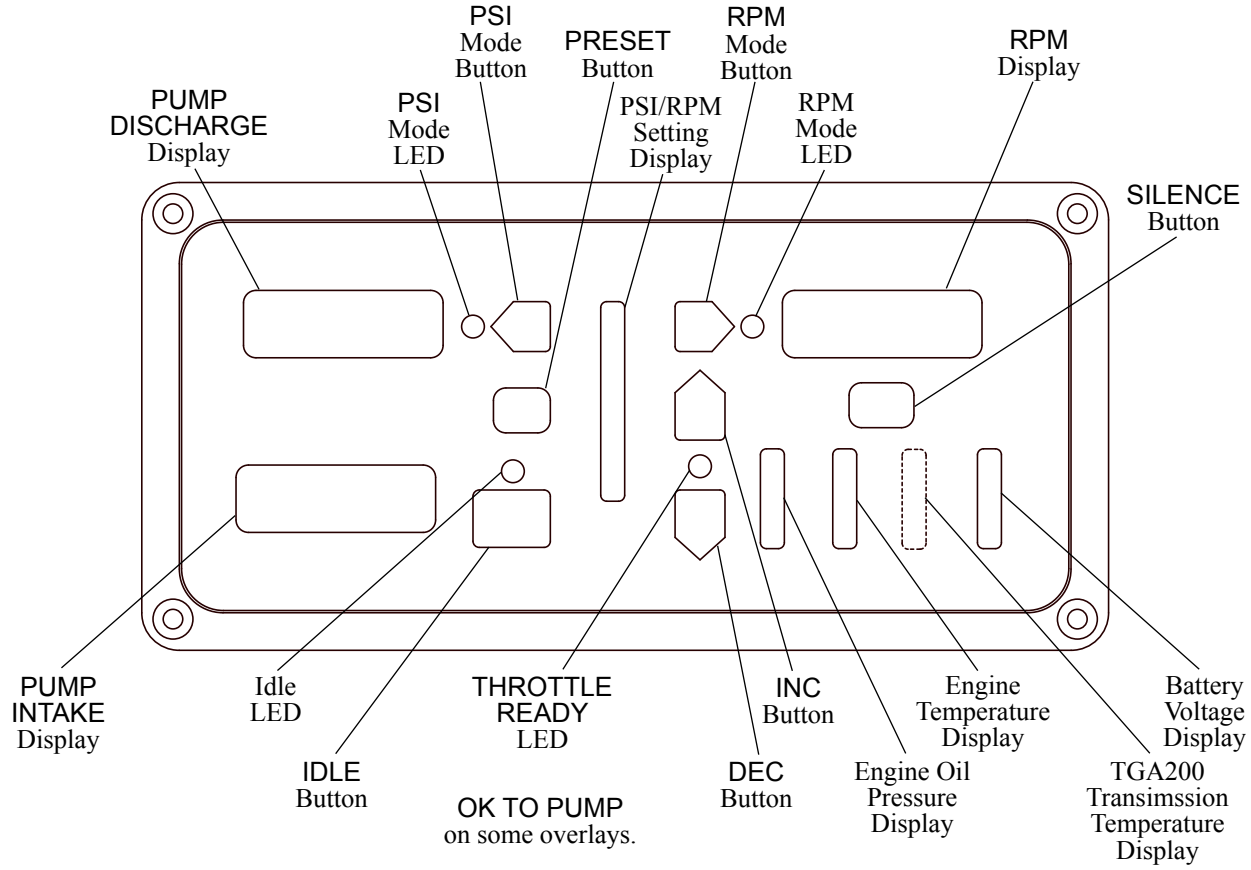


Figure 1. Controls and Indicators

INSTALLATION

When the governor is programmed at the factory there will be a label on the governor specifying the engine type. If there is no label on the governor the engine type must be verified/programmed per the Programming procedure.

Install Control Module

1. Measure and mark mounting location for control module panel cutout and mounting screw holes. Make sure there is clearance behind the panel for the module and cables before cutting holes. Refer to Figure 2 for layout and dimensions.
2. Cut out a 9 by 3 15/16 inch hole and drill four holes for mounting screws.
3. Place control module in position and secure with four screws (10-32 mounting hardware is recommended).
4. Connect cables at rear of the contol module. (Refer to Wiring section.)

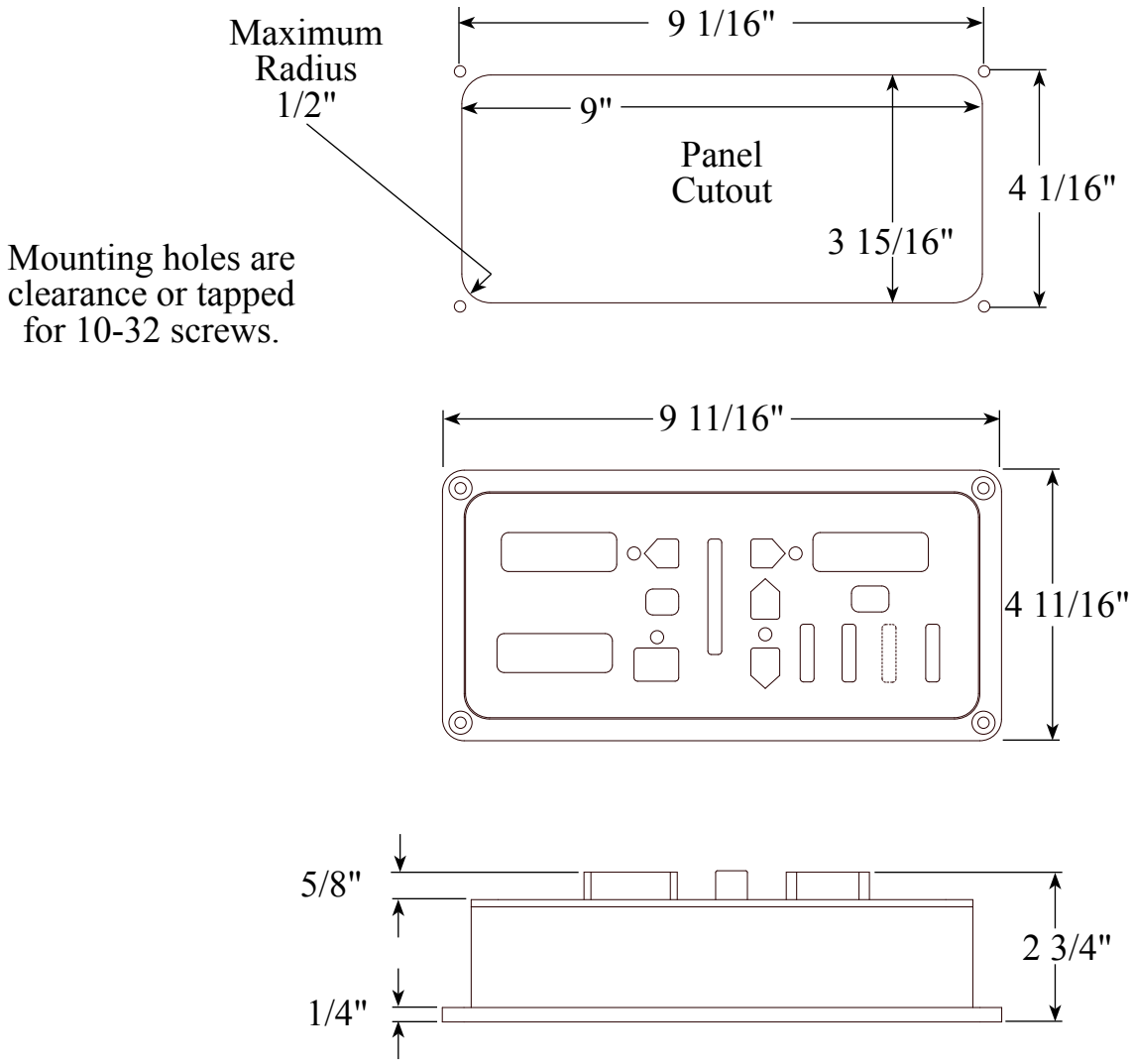


Figure 2. Control Module Mounting Dimensions

Install Pressure Sensors

The two pressure sensors are mounted on the discharge and intake manifolds of the pump. If there is a check valve in the discharge side of the pump, mount the discharge sensor before the check valve. T-fittings can be used to mount the pressure sensor.

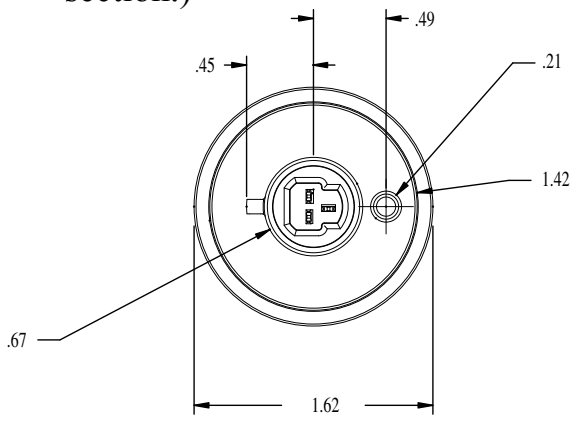
Note: Install the pressure sensor upright so that water in the end of the pressure sensor is able to drain back into the pipe.

1. Screw the sensor into a 1/4-18 NPT hole.

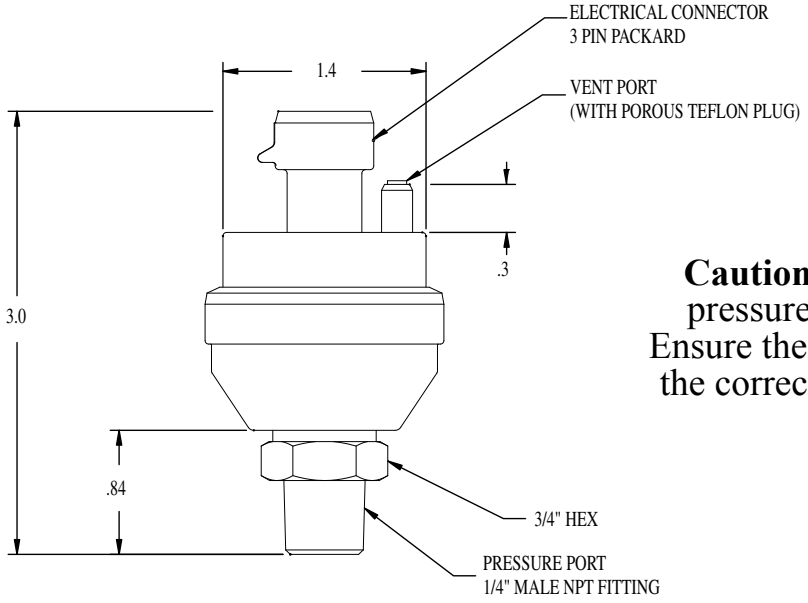
Caution: Do not use the main body that houses the electronics to tighten the pressure sensor. Damage to the sensor may occur.

2. Tighten the sensor with a 3/4 inch wrench on the lower hex fitting.
3. Connect the pressure sensor cable from the control module to the pressure sensor. (Refer to Wiring section.)

Note: The Pump Pressure Sensors calibration procedure should be run to set the intake and discharge displays for 0 PSI. (Refer to Calibration section.)



Caution: Do not use the main body that houses the electronics to tighten the sensor. Damage to the sensor may occur.



Caution: The discharge and intake pressure sensors are the same size. Ensure the correct sensor is installed on the correct manifold. Refer to Table 1.

Figure 3. Pressure Sensor Dimensions

Install Sensors

The information available on the J1587 databus varies depending on the particular engine type. The sensors (if any) that need to be installed will also vary depending on the engine.

The sensors are wired to the 12-pin and 8-pin connector at the rear of the control module. Refer to the Wiring section (Figures 4 and 5) for pinout and wire color information.

Standard Mounting Thread Size

Engine Oil Pressure	1/8" NPTF
Transmission Temperature	1/8" NPTF

Install Buzzer

Install the buzzer close to the control module so the audible warning is easily associated with the visual warning on the display.

The optional buzzer provided by FRC requires a cutout hole of 1-1/8" (1.125").

Pin 7 on the 8-pin connector at the rear of the control module is provided to connect an optional buzzer. Connect the ground side of the buzzer to pin 7. (Maximum current through pin 7 is 300 mA.) Refer to the Wiring section (Figure 5).

Install High Idle Kit

The high idle is activated when ground is provided to pin 4 (High Idle Active Input) of the 8-pin connector and +12 VDC to pin 3 (Interlock Input) of the 12-pin connector. Refer to High Idle Wiring.

Note: It is important that the connection to the Interlock Input from the High Idle circuit be isolated from the apparatus interlock wiring with the two diodes. The pump must NOT be engaged when using the high idle function and the THROTTLE READY (OK TO PUMP LED on some overlays) will be off.

On power up the INControl will be in the pressure mode of operation. The RPM display will show IdLE. If there is a problem, the RPM display will show an error code. Refer to the Diagnostics section for error code descriptions.

The minimum pump discharge pressure must be greater than 15 PSI for the INControl governor to take control of engine speed.

No variation in discharge pressure or RPM will occur when changing between pressure and RPM modes.

INC/DEC Buttons

The INC and DEC buttons are used to change pressure and RPM settings or program preset values. The rate and amount the numbers change when a button is pressed depends on the mode and how long the button is held.

In Pressure Mode. Press either button momentarily to change the pressure setting by 1 PSI. Press and hold the button for more than 2 seconds and the pressure setting will change by 5 PSI twice and then by 10 PSI until the button is released.

In RPM Mode. Press either button momentarily to change the RPM setting by 10 RPM. Press and hold the button for more than 2 seconds and the RPM setting will change by 50 RPM twice and then by 100 RPM until the button is released.

Pressure Mode Operation

In the pressure mode of operation the PSI LED will be on. The INControl will maintain a constant discharge pressure. It will adjust the engine RPM automatically to compensate for variations in pressure.

Note: When changing from RPM mode to pressure mode the pressure setting will be the pressure that the pump was operating at in RPM mode.

1. Press and hold PSI mode button for 3 seconds.

   Result: PSI LED goes on.

2. Press PRESET and/or INC/DEC button to select the operating discharge pressure.

3. Press IDLE button after operations to bring engine to idle RPM.

   Result: Display shows IdLE.

Switching Supply Water

When switching the water supply source from tank to hydrant, draft to hydrant, or draft to relay, water flow through the pump can become turbulent and the positive pressure from these sources may generate a sudden pressure surge. It is recommended that the INControl be set in RPM mode before changing the water supply source.

No or Low Supply Water

There are situations during pump operations when there may be no or low supply water. This can be due to an empty water tank, a problem on the intake line, or when switching the water supply source.

In pressure mode the INControl will increase the engine RPM and attempt to maintain the selected pressure setting. If the discharge pressure drops below 45 PSI but stays above 15 PSI the INControl will go into a low water cycle. It will set the engine to 1100 RPM, if the pressure does not rise above 45 PSI in 7 seconds the INControl will set the engine at idle RPM. The INControl will repeat the low water cycle as long as the discharge pressure is between 15 and 45 PSI.

If during the prime cycle the discharge pressure drops below 15 PSI the engine will be set at idle RPM. When the discharge pressure rises above 45 PSI the INControl will resume normal operation.

Opening/Closing Discharge Valves

In pressure mode the INControl will maintain the pressure setting regardless of the number of discharge lines that are opened or closed providing there is a sufficient water supply. As lines are opened the discharge pressure will start to drop and the INControl will raise the engine RPM to maintain the required pressure. As lines are closed the discharge pressure will start to rise and the INControl will lower the engine RPM to maintain the required pressure.

RPM Mode Operation

In the RPM mode of operation the RPM LED will be on. The INControl will maintain a constant engine RPM.

The pump discharge pressure can vary but, as a safety feature, the INControl limits the increase in pressure to 30 PSI over the last established PSI value. As the discharge pressure approaches this limit the INControl will automatically lower the RPM to prevent a high pressure surge. The RPM LED will blink as the INControl sets a lower RPM. This lower RPM will be the new operating RPM setting. Press any button and the LED will stop blinking.

Note: When changing from pressure mode to RPM mode the RPM setting will be the RPM that the pump was operating at in pressure mode.

1. Press and hold RPM mode button for 3 seconds.

   Result: RPM LED goes on.

2. Press PRESET and/or INC/DEC button to select the operating RPM.

3. Press IDLE button after operations to bring engine to idle RPM.

   Result: Display shows IdLE.

Switching Between Operating Modes

- No variation in discharge pressure or RPM will occur when changing between pressure and RPM modes.
- When changing to RPM mode, the RPM setting will be the RPM that the pump was operating at in pressure mode.
- When changing to pressure mode the pressure setting will be the pressure that the pump was operating at in RPM mode.

When the INControl RPM display shows IdLE:

Press the mode button and the INControl switches modes immediately.

When the INControl RPM display shows a value (operating at some setting):

Press and hold the mode button for 3 seconds and the INControl changes modes. (This is to avoid an accidental change over if the buttons get bumped.)

High Pump Discharge Pressure at Engine Idle

Once the governor has set the engine to idle, it can do no more to reduce discharge pressures. To reduce discharge pressure the pump operator can gate incoming water, reduce pressure at the intake relief valve, gate discharges, or disable the pump.

Change Preset Settings (Pressure or RPM)

The preset button allows the operator to go to a pre-programmed pump pressure or engine RPM during operations. The setting will be shown on the PSI/RPM setting display. This procedure is to change the setting in the program.

Note: The engine must be running and the pump engaged interlock circuit must be closed, the THROTTLE READY LED must be on (OK TO PUMP on some overlays).

1. Press IDLE button.

   Result: Display shows IdLE.

2. Press PSI or RPM mode button to select the setting to be changed.

   Result: LED indicator goes on for mode selected.

Note: The RPM display must show IdLE before changing the preset.

3. Press and hold PRESET button. (Continue to hold through step 4.)

   Result: PUMP DISCHARGE or RPM display flashes previous programmed preset. Wait for PSEt to flash in the other display.

4. Press INC or DEC button to change preset setting.

5. Release PRESET button.

   Result: The new preset is programmed. RPM display shows IdLE.

High Idle

The INControl programming includes a high idle function that is controlled by the High Idle Switch.

To activate the high idle set interlocks as called for by SOP (normally this would include the transmission in neutral and the parking brake on). Set the High Idle switch to ON.

Note: The pump must NOT be engaged when using the high idle function and the THROTTLE READY LED will be off (OK TO PUMP on some overlays).

Change High Idle Setting

Note: The high idle is set at about 1000 RPM at the factory. (This value will vary depending on the specific engine.)

1. With the engine running, set the high idle switch to ON.

   Result: Engine RPM goes to high idle.

2. Press and hold PRESET button.

   Result: RPM display will flash and show the high idle setting.

3. Press INC/DEC button to change the high idle RPM setting.

4. Release PRESET button to store the new high idle setting.

PROGRAMMING

This program information is provided for installers and should not be changed once the apparatus is put into service. The governor response speed may need to be adjusted if changes are made in the pump drive system after the governor is installed.

Program Governor Response Speed

Due to variations in pump drive systems the INControl program may be adjusted if necessary to improve performance. There are five programmable speed settings (S1 fastest to S5 slowest) for pressure and RPM that adjust how fast the governor reacts to changes in pressure or RPM. The default setting for both is S3.

Note: The engine must be running and the pump engaged interlock circuit must be closed (the THROTTLE READY LED must be on).

1. Press IDLE button.

   Result: Display shows IdLE.

2. Press PSI or RPM mode button.

   Result: LED indicator goes on for mode selected.

Note: The RPM display must show IdLE before changing the preset.

3. Press and hold PRESET button. (Continue to hold through step 6.)

   Result: PUMP DISCHARGE or RPM display flashes previous programmed preset. Wait for PSEt to flash in the other display.

4. Press IDLE button.

   Result: The display shows responce speed current setting (default is S3).

5. Press INC or DEC button to change the setting (S1 is fastest S5 is slowest).

6. Release PRESET button.

   Result: Display will return to normal. The new response speed setting is programmed.

Program Engine Type

Note: The engine type is programmed from the factory or during installation and will not need to be changed once the governor is in service.

Engine Type Must be Verified

When the engine type is programmed at the factory there will be a label on the governor specifying the engine type.

If there is no label on the governor the engine type must be verified/programmed per the following procedure.

Preliminary Set-up

This procedure can be performed prior to installing the INControl on the apparatus. Connect 12 volt power as follows:

12-Pin connector pin 1 (red wire) +12 VDC

12-Pin connector pin 2 (black wire) Ground

If the INControl is installed on the apparatus, turn on electrical power. Do not operate the engine. The pump engaged interlock circuit must be open. No input information from sensors or the engine is needed.

Program Engine Type Code 441

Note: Do not operate the engine. The pump engaged interlock circuit must be open to do this procedure (the THROTTLE READY LED must be off).

Note: There is a time out feature that will return the program to normal operation in three seconds if input is not detected at the buttons

1. Press the SILENCE button and hold it for 5 seconds until the RPM display shows four dashes. The program is ready for a three digit program code to be input.

Note: The RPM and PSI buttons are used to enter the code. The RPM button will select the digit that is to be changed. The PSI button will change the digit.

2. Press PSI button first and enter code 441.

   Results: After a few seconds the RPM display will flash the current engine type setting. The timeout feature is disabled.

3. Press INC or DEC button to change the setting. (Refer to Table 2.)

4. Press the SILENCE button and hold it for 5 seconds.

   Result: Display will return to normal.

5. Power down the INControl to reset the program and the new engine type setting is programmed.

Table 2. Engine Type Setting

Engine Type	Engine Type Setting
Cummins	101A
Detroit Diesel Series 50/60	102A
Navistar RESCM	104A
Navistar MAXFORCE	104d
Caterpillar	105A
Mercedes 2006 and Older	110A
Mercedes 2007	110d

Program Low Battery Voltage Warning

The INControl monitors and provides audible and visual warnings for the low voltage electrical system. There are two low battery voltage alarms, one for when the engine is running and one for when the engne off. Both of these are set from the factory at 11.7 volts.

Because of possible differences between the voltage at the battery and the voltage at the input to the INControl, the low voltage alarm triggers are programmable.

Program Low Battery Voltage Warning
Code 417 Engine Off or Code 418 Engine Running

Note: There is a time out feature that will return the program to normal operation in three seconds if input is not detected at the buttons

1. Press the SILENCE button and hold it for 5 seconds until the RPM display shows four dashes. The program is ready for a three digit program code to be input.

Note: The RPM and PSI buttons are used to enter the code. The RPM button will select the digit that is to be changed. The PSI button will change the digit.

2. Press PSI button first and enter code 417 or 418.

   417 Results: After a few seconds the RPM display will show the current setting. The timeout feature is disabled.

   418 Results: After a few seconds the RPM display will flash the current battery voltage that the INControl is sensing. The timeout feature is disabled. After 20 seconds the RPM display will show the current setting.

3. Press INC or DEC button to change the setting.

4. Press the SILENCE button and hold it for 5 seconds.

   Result: Display will return to normal.

Program Engine Idle Voltage

The INControl engine control output signal is factory set to be 0.6 volts at idle and increases when there is a request for higher RPM. The ECM will reconize even a slight increase and raise the RPM accordingly.

Because the output signal voltage at idle may have to be set higher for some ECMs to improve the initial responce from idle to a higher RPM, the engine idle voltage is programmable.

Program Engine Idle Voltage Code 436

All interlocks must be made and the THROTTLE READY LED on.

Note: There is a time out feature that will return the program to normal operation in three seconds if input is not detected at the buttons.

1. Press the SILENCE button and hold it for 5 seconds until the RPM display shows four dashes. The program is ready for a three digit program code to be input.

Note: The RPM and PSI buttons are used to enter the code. The RPM button will select the digit that is to be changed. The PSI button will change the digit.

2. Press PSI button first and enter code 436.

   Results: After a few seconds the RPM display will show the engine RPM. The timeout feature is disabled.

3. Press INC or DEC button to change the idle voltage setting. (Press the increase button until the engine starts to respond, then back down slightly.)

4. Press the SILENCE button and hold it for 5 seconds.

   Result: Display will return to normal.

CALIBRATION

Pump Pressure Sensors

Governors manufactured after November 2007 (starting with serial number 349248) have a software change. The program that automatically calibrates the pump intake and pump discharge displays to 0 psi on power-up is removed. A new calibration program is added that requires operator input to calibrate the pump intake and pump discharge displays to 0 psi.

When the calibration program is activated it looks at the signal from the sensor, assumes this to be 0 PSI, and sets the display to show 0.

Note: If there is pressure in the plumbing where the sensor is mounted this will cause the program to be calibrated to a false 0. To avoid this drain the pump and plumbing to ensure there is no residual pressure before running the calibration procedure.

Calibrate Pressure Sensors Code 111

Note: There is a time out feature that will return the program to normal operation in three seconds if input is not detected at the buttons

1. Press the SILENCE button and hold it for 5 seconds until the RPM display shows four dashes. The program is ready for a three digit program code to be input.

Note: The RPM and PSI buttons are used to enter the code. The RPM button will select the digit that is to be changed. The PSI button will change the digit.

2. Press PSI button first and enter code 111.

   Results: After a few seconds PUMP DISCHARGE display shows dCAL.

3. Press and hold the SILENCE button until the RPM display shows DONE and the DISCHARGE display shows 0. Release the SILENCE button.

   Results: After a few seconds PUMP INTAKE display shows ICAL.

4. Press and hold the SILENCE button until the RPM display shows DONE and the INTAKE display shows 0. Release the SILENCE button.

   Result: Display will return to normal.

The information listed below is to aid in troubleshooting.

Table 3. Fault Codes

Code	Problem	Probable Cause
F1	No data communication on datalink	>No voltage at the interlock input >Datalink cable not connected / incorrectly wired >Broken wire / bad connector contact on datalink cable
F2	The engine is not responding to the governor	>Broken wire / bad connector contact on engine control cable >ECM programmed incorrectly
F3	RPM not detected Electronic Engine Non-Electronic Engine	>Engine not running / ignition key on >Datalink cable not connected / incorrectly wired >Broken wire / bad connector contact on alternator cable
F4	Cannot transmit over datalink (No responce from ECM)	>No voltage at the interlock input >Internal datalink problem - bad control module >Datalink noisy/shorted
F5	Discharge pressure sensor not detected	>Sensor cable not connected >Broken wire / bad connector contact on sensor cable >Defective pressure sensor
F6	Intake pressure sensor not detected	>Sensor cable not connected >Broken wire / bad connector contact on sensor cable >Defective pressure sensor
F7	Pump pressure below 15 PSI when RPM was above 900	>Low supply water, intake line problem, valve closed, pump not primed, etc. >Defective pressure sensor
F8	N/A	N/A
F9	Oil pressure sensor not detected	>Sensor cable not connected >Broken wire / bad connector contact on sensor cable >Defective pressure sensor
F10	Engine temperature sensor not detected	>Sensor cable not connected >Broken wire / bad connector contact on sensor cable >Defective sensor

WIRING

The following figures include the schematics, wiring diagrams, block diagrams, and cables for the INControl.

Connectors and Cables

For most electronic engines, the INControl receives engine oil pressure and transmission temperature data over the J1587 databus from the engine ECM. Some engines do not broadcast this data over the databus and sensors may need to be installed.

12 Pin Connector/Cable

Pin	Wire Color	Description
1	Red	+12 VDC Supply Voltage
2	Black	Ground
3	White	Interlock Input (+12 VDC)
4	Red	J1587 (+)
5	Black	J1587 (–)
6	Red	+5 VDC Discharge Sensor
7	Black	Ground Discharge Sensor
8	White	Signal Discharge Sensor
9	Red	+5 VDC Intake Sensor
10	Black	Ground Intake Sensor
11	White	Signal Intake Sensor
12	White	Engine Oil Pressure Senor

Note: The Interlock Input pin 3 must be made for the governor to control the engine.

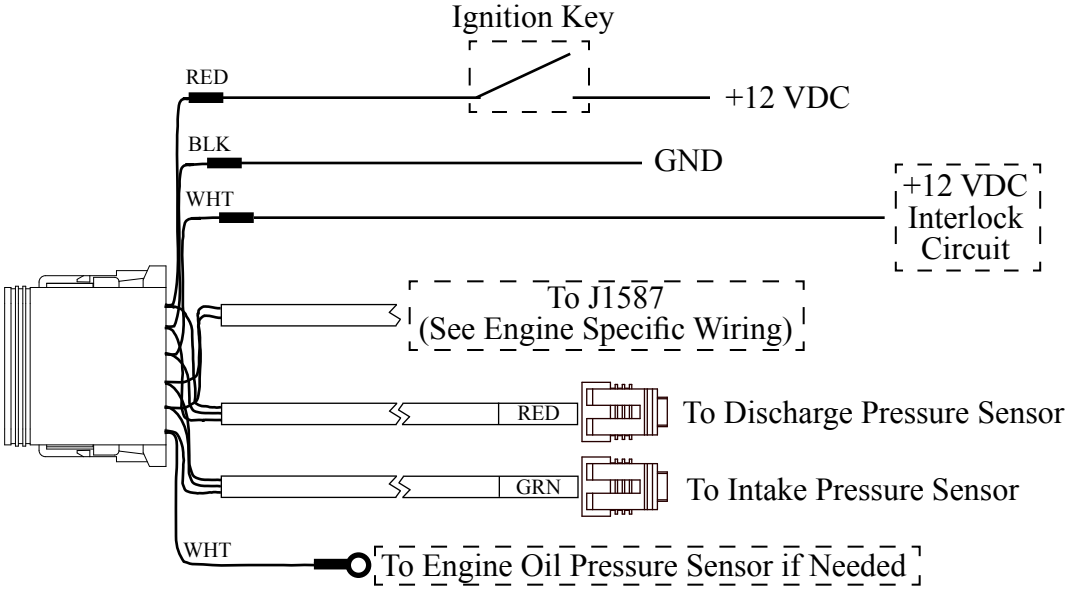
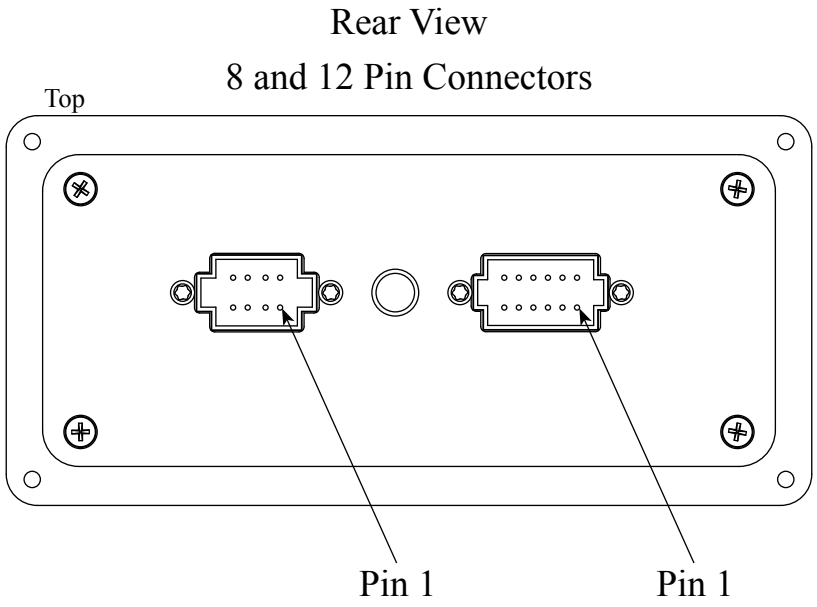


Figure 4. TGA 12-Pin Connector Wiring



8 Pin Connector/Cable

Pin	Wire Color	Description
1	Red	+5 VDC Reference From ECM
2	Black	ECM Ground
3	White	Engine Control Signal To ECM
4	White	High Idle Active Input (Ground)
5	N/C	N/C
6	N/C	N/C
7	Black	Buzzer Ground (300 mA max)
8	Blue	Transmission Temp. Sensor

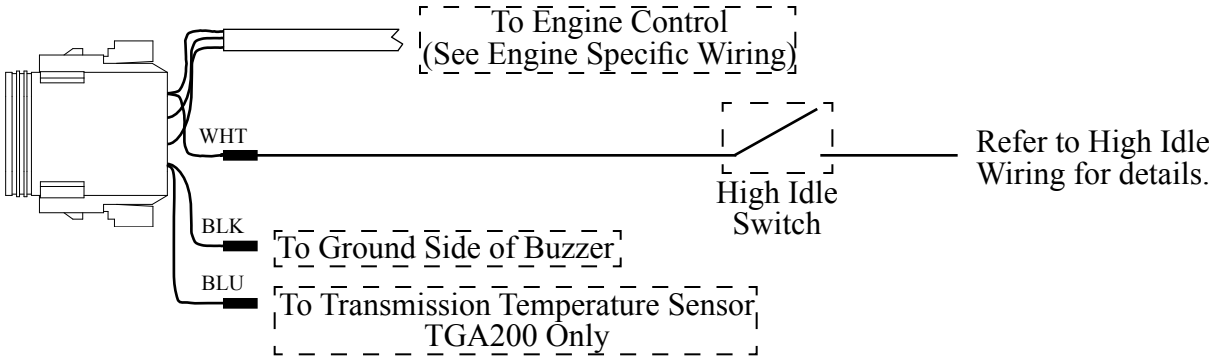
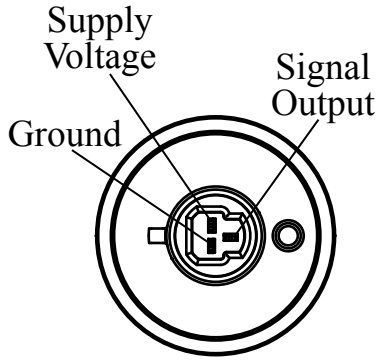


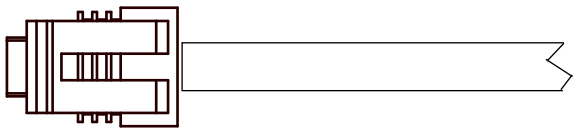
Figure 5. TGA 8-Pin Connector Wiring

Pressure Sensor

Pressure Sensor
(Top View)



Pressure Sensor Cable
from 12-Pin Connector



Pressure Sensor Cable
3-Pin Connector

Pin/Wire	Description
A/Black	Ground
B/Red	Supply Voltage
C/White	Signal

Pressure Sensor
(Side View)

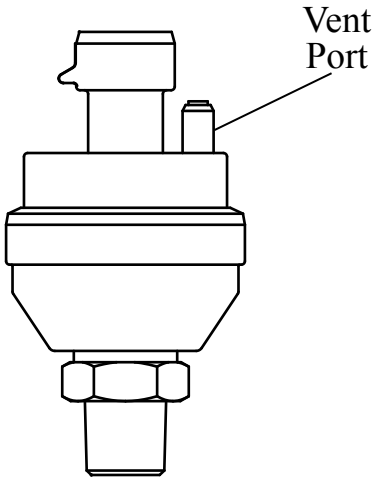
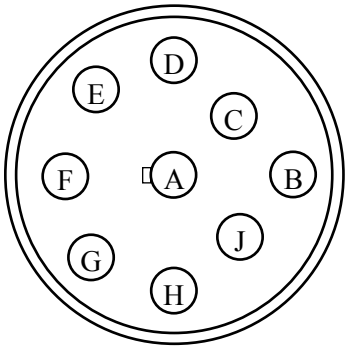


Figure 6. Pressure Sensor Wiring

Common OEM Diagnostic Connector

Typical 9-pin Deutsch Diagnostic Connector.
Commonly found under the driver side dashboard.



FRONT
VIEW

9-Pin Connector

Pin	Description
A	BATTERY GROUND
B	+12 VDC
C	J1939 DATA LINK (+)
D	J1939 DATA LINK (–)
E	J1939 SHIELD
F	J1587 DATA LINK (+)
G	J1587 DATA LINK (–)
H	PLUG
J	PLUG

Figure 7. Common OEM 9-Pin DiagnosticConnector

Cummins Harness Connections

Interface Information

The ECM Remote Accelerator (Throttle) Option has to be set to ON. The diagnostic tool cannot be used to do this, an Insight service tool must be used. Refer to an authorized dealer to program this option.

Note: Refer to Figure 4. TGA 12-Pin Connector Wiring for power and interlock wire connections.

2007
ISB07/ISC07/ISL07 CM 2150D Model Engines

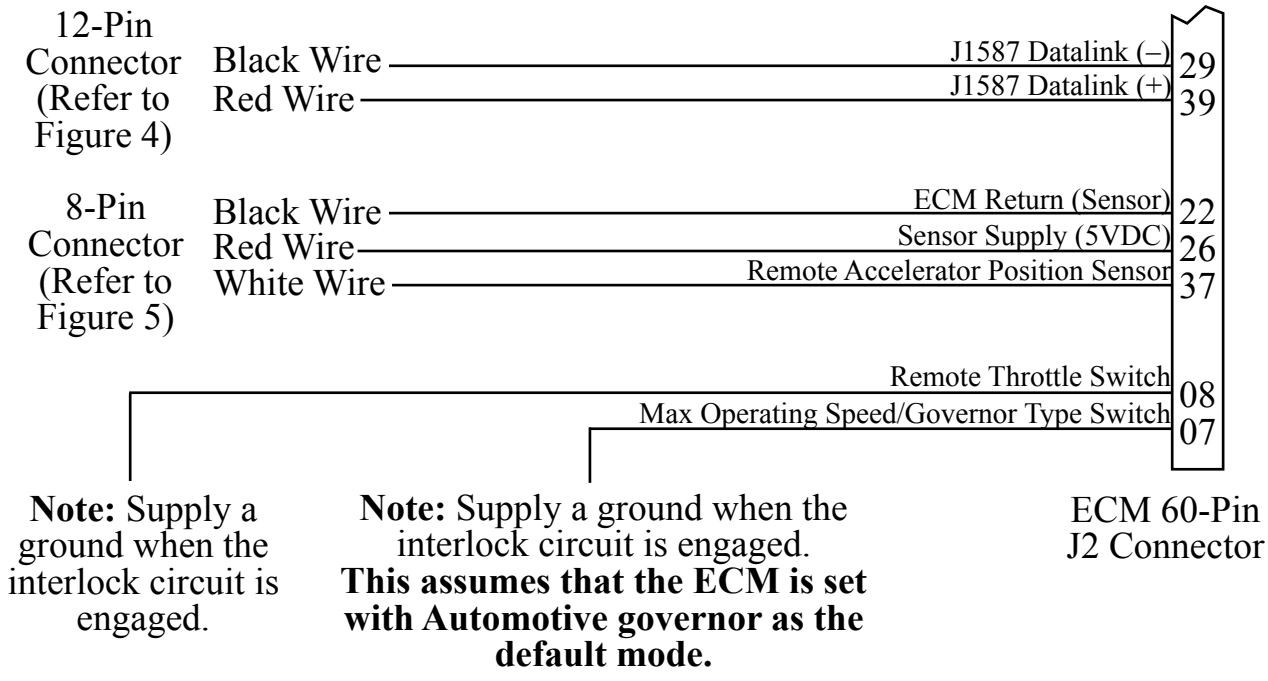


Figure 8. Cummins TGA101/201 Wiring (Sheet 1 of 2)

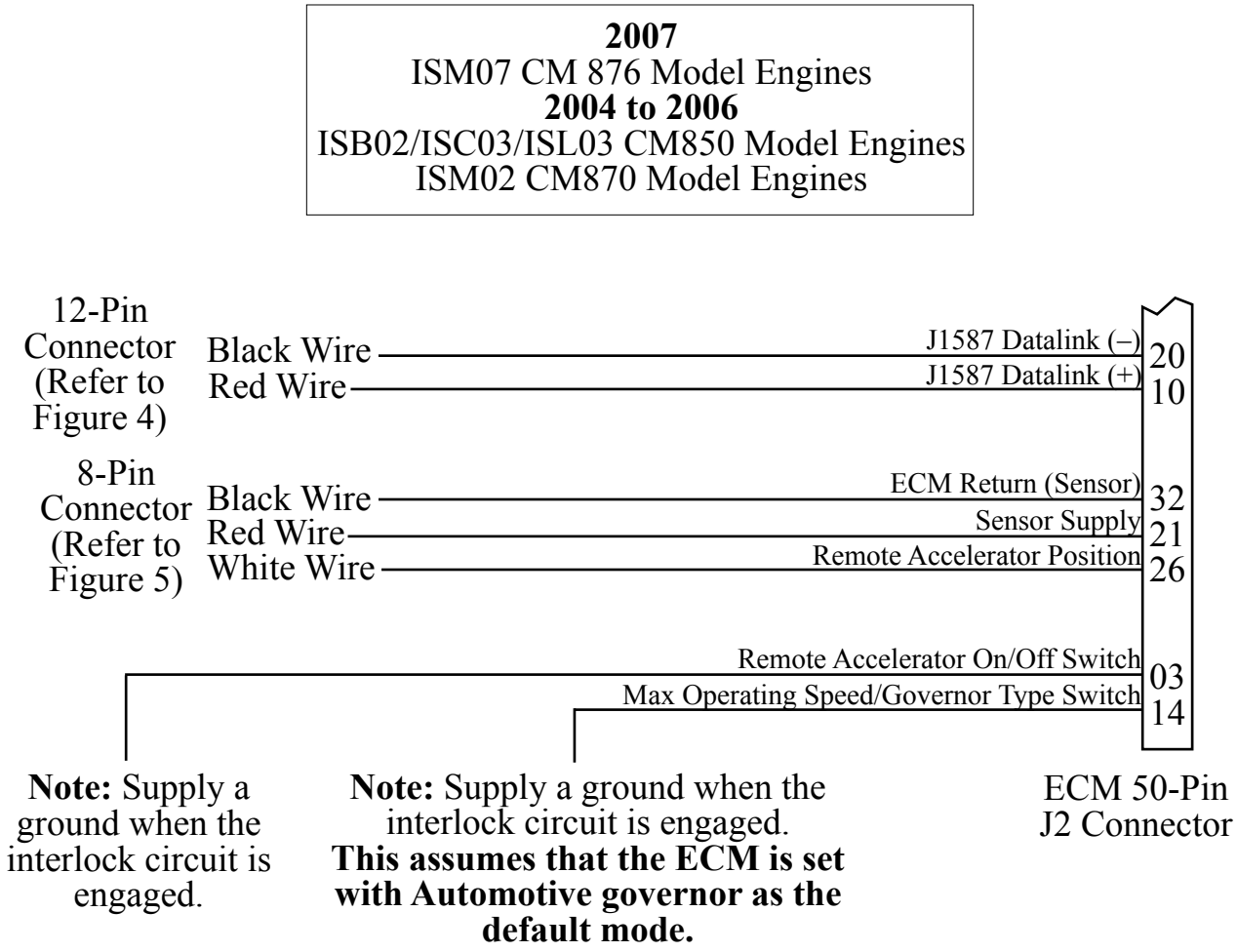


Figure 8. Cummins TGA101/201 Wiring (Sheet 2 of 2)

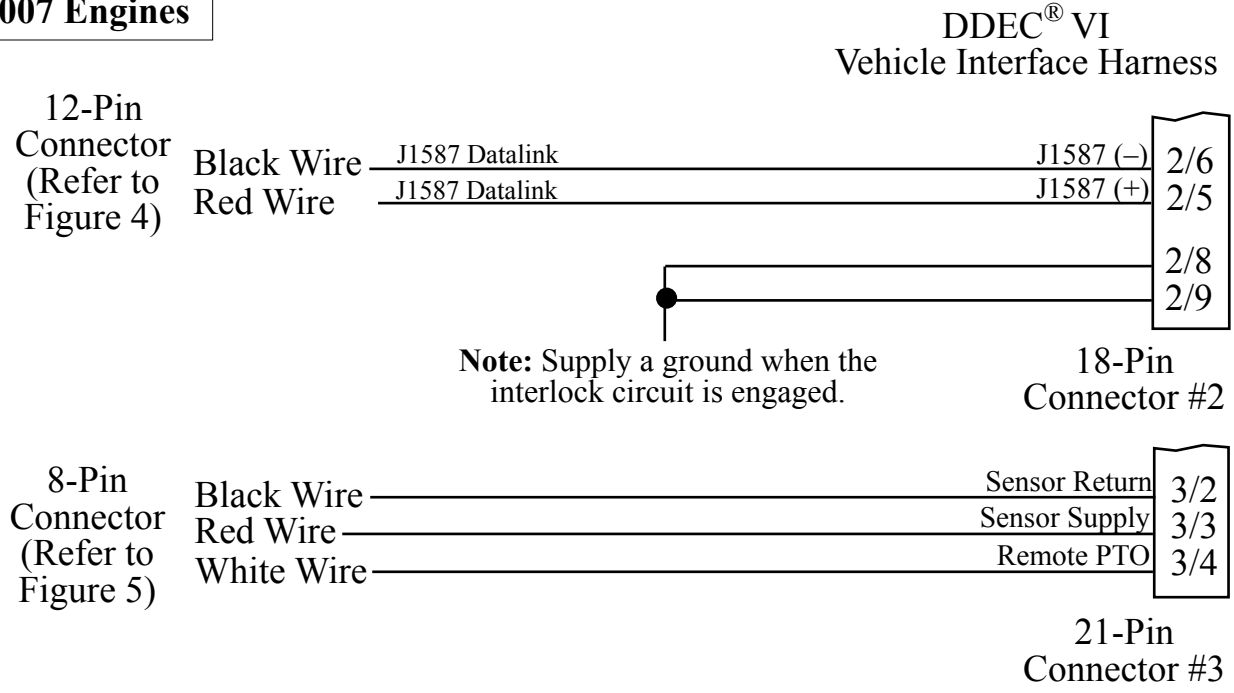
Detroit Diesel (Series 50 and 60) Harness Connections

Interface Information

Not available for Detroit Diesel engine model year 2008 and newer.

Note: Refer to Figure 4. TGA 12-Pin Connector Wiring for power and interlock wire connections.

2007 Engines



2006 and Older Engines

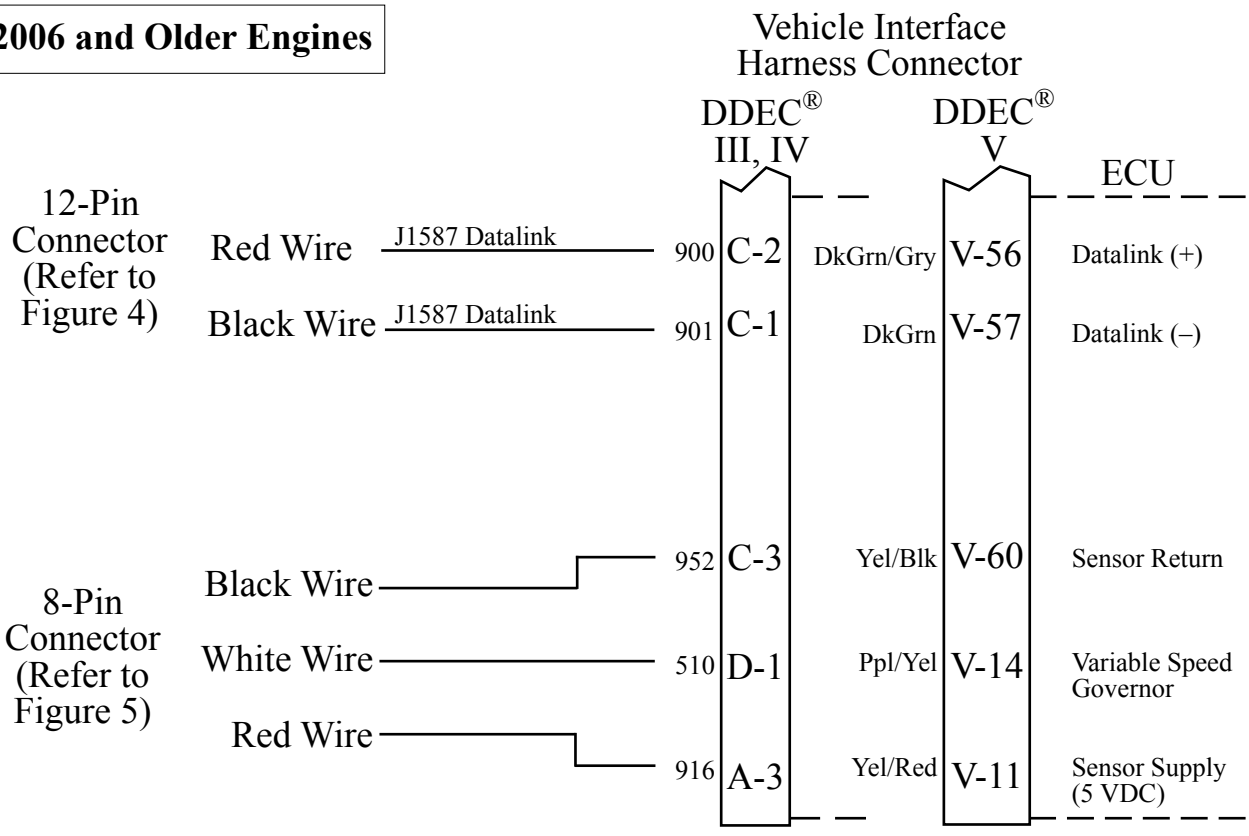


Figure 9. Detroit Diesel (Series 50 and 60) TGA102/202 Wiring

Navistar Harness Connections

Interface Information

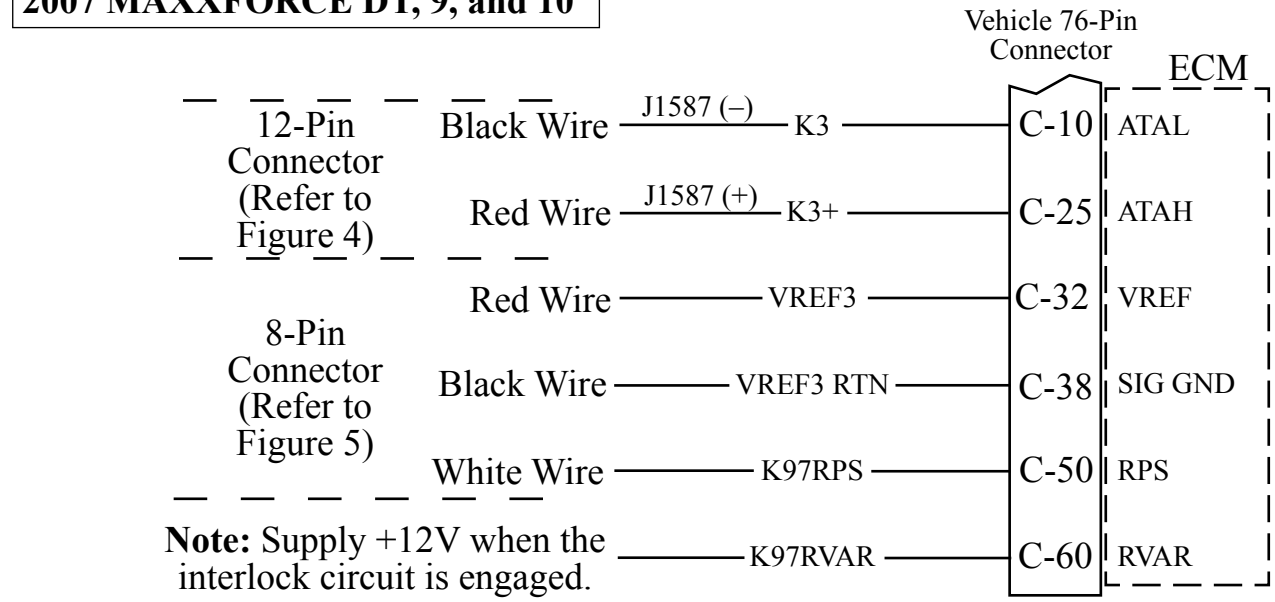
The ECM must be programmed for a remote throttle input. When using code 12VZA or 12VXY, the following parameters need to be set:

PTO-REMOTE-PEDAL to 1-Yes; PTO-REM-PEDAL-RTZ to 1-RTZ-not;

PTO-DISABLE-CAB-INTERFACE to 1-Yes; DRIVELINE-MODE to 1

The RVAR (VARIABLE PTO ENABLE) input has to be at +12 VDC to activate the remote throttle. (12 VDC can be picked up from the interlock circuit.)

2007 MAXXFORCE DT, 9, and 10



RESCM

Note: 2004 to 2006 model engines with code 12VXY and the Remote Engine Speed Controller Module (RESCM) installed.

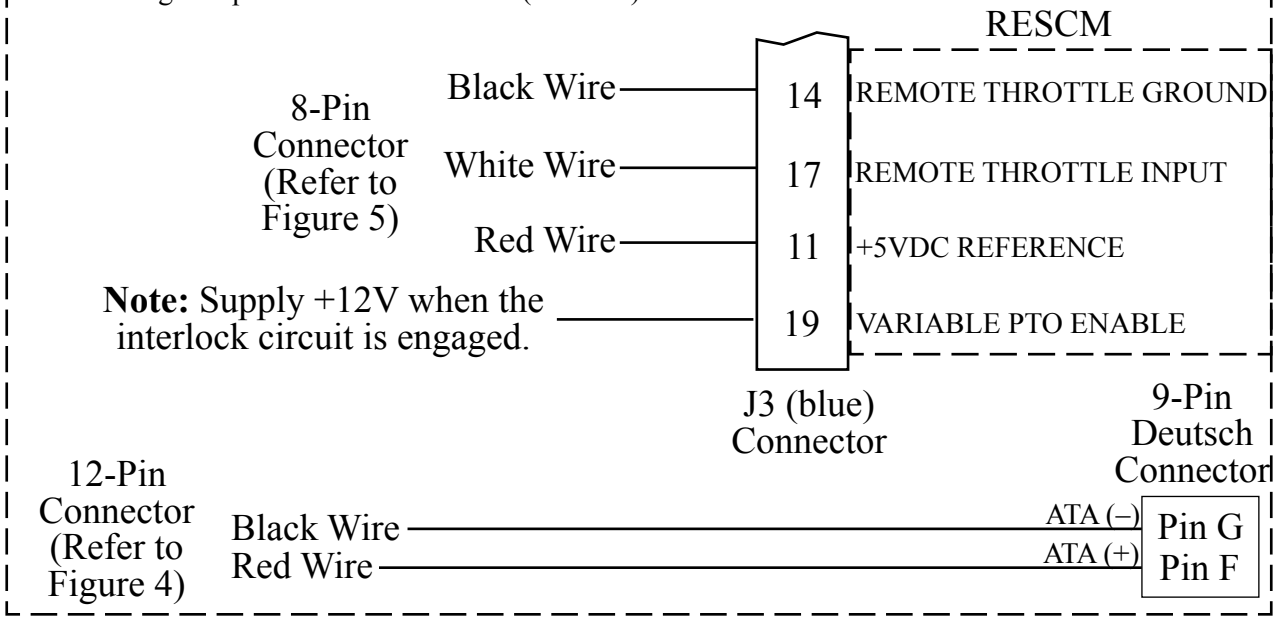


Figure 10. Navistar TGA104/204 Wiring

Caterpillar Harness Connections

Interface Information

The ECM Remote Throttle Option has to be enabled. Refer to an authorized dealer to program this option.

3116B, 3126B, 3176B, 3406E, C7,C9,C10,C11,C12,C13,C15 Engine Interface

Engines with 70-pin OEM connector.

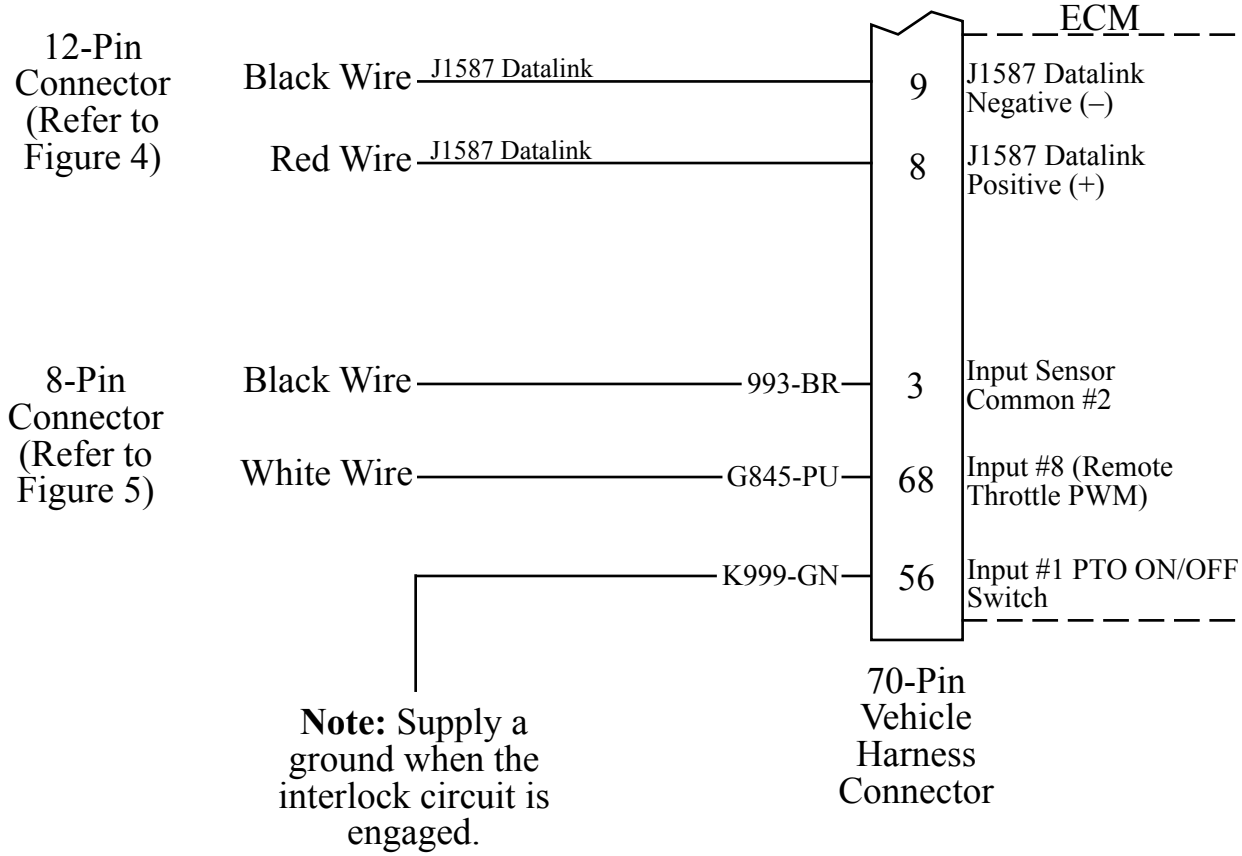


Figure 11. Caterpillar TGA105/205 Wiring (Sheet 1 of 3)

3176B, 3406E, C10, C12 Engine Interface

Engines with 40-pin OEM connector.

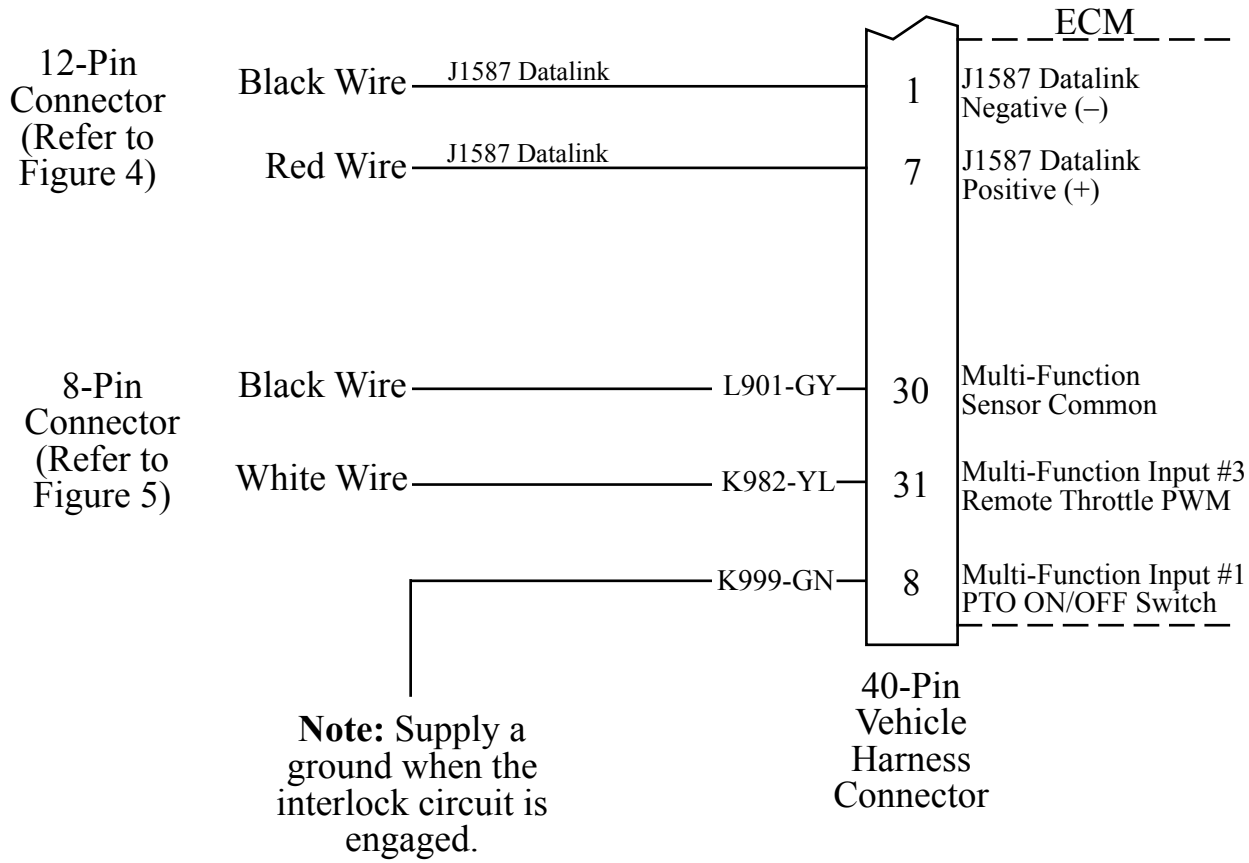


Figure 11. Caterpillar TGA105/205 Wiring (Sheet 2 of 3)

Some Older Engine Interface

Engines with 40-pin OEM connector.

If the remote throttle option is not available in the ECM program, a relay needs to be installed to provide this capability. Wire the relay into the cab foot throttle harness, connect the INControl Engine Control cable, and supply 12 volts to the coil form the interlock circuit. Refer to the wire diagram below.

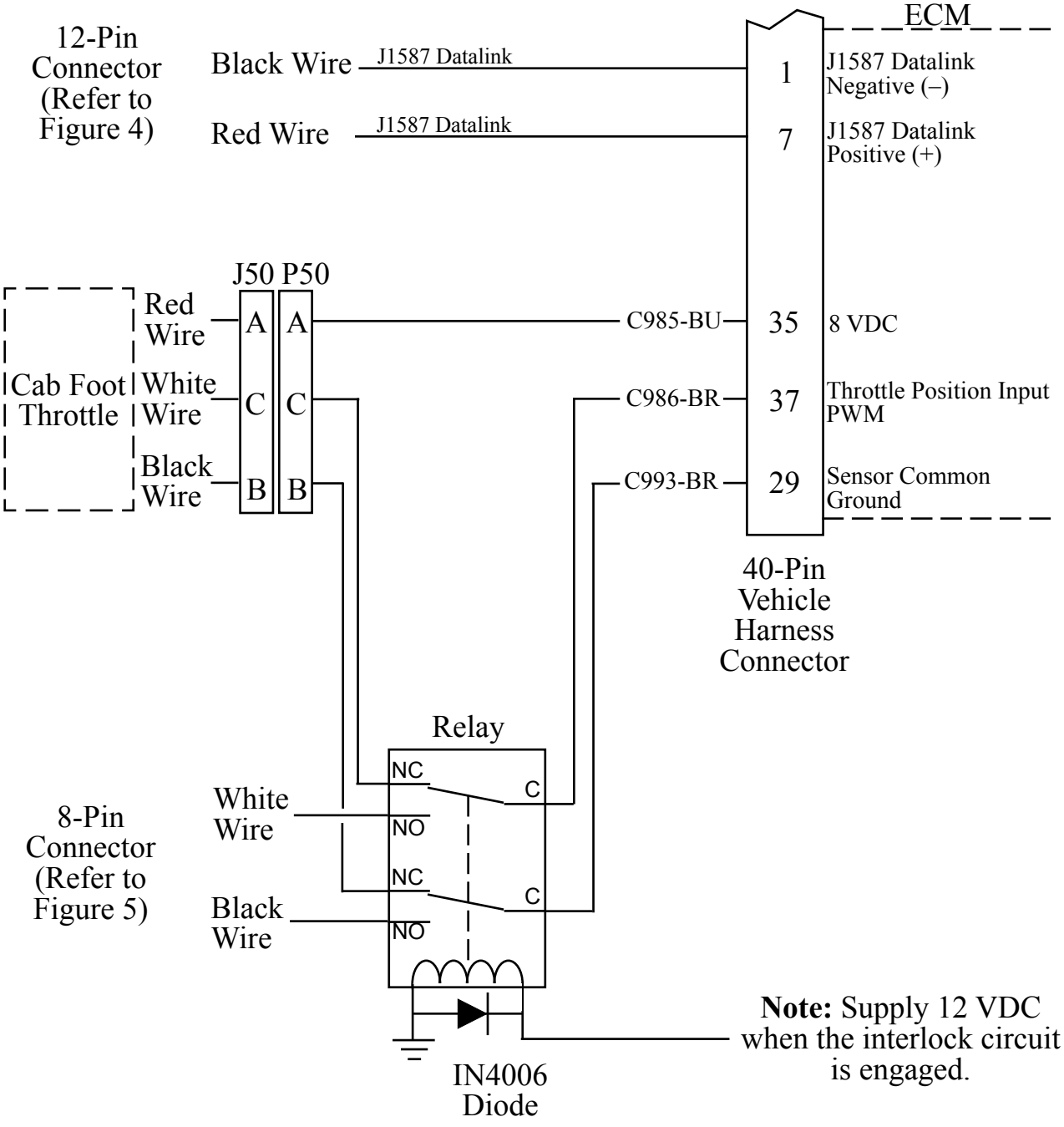


Figure 11. Caterpillar TGA105/205 Wiring (Sheet 3 of 3)

Mercedes Harness Connections

Interface Information

Not available for Mercedes engine model year 2008 and newer.

Note: Refer to Figure 4. TGA 12-Pin Connector Wiring for power and interlock wire connections.

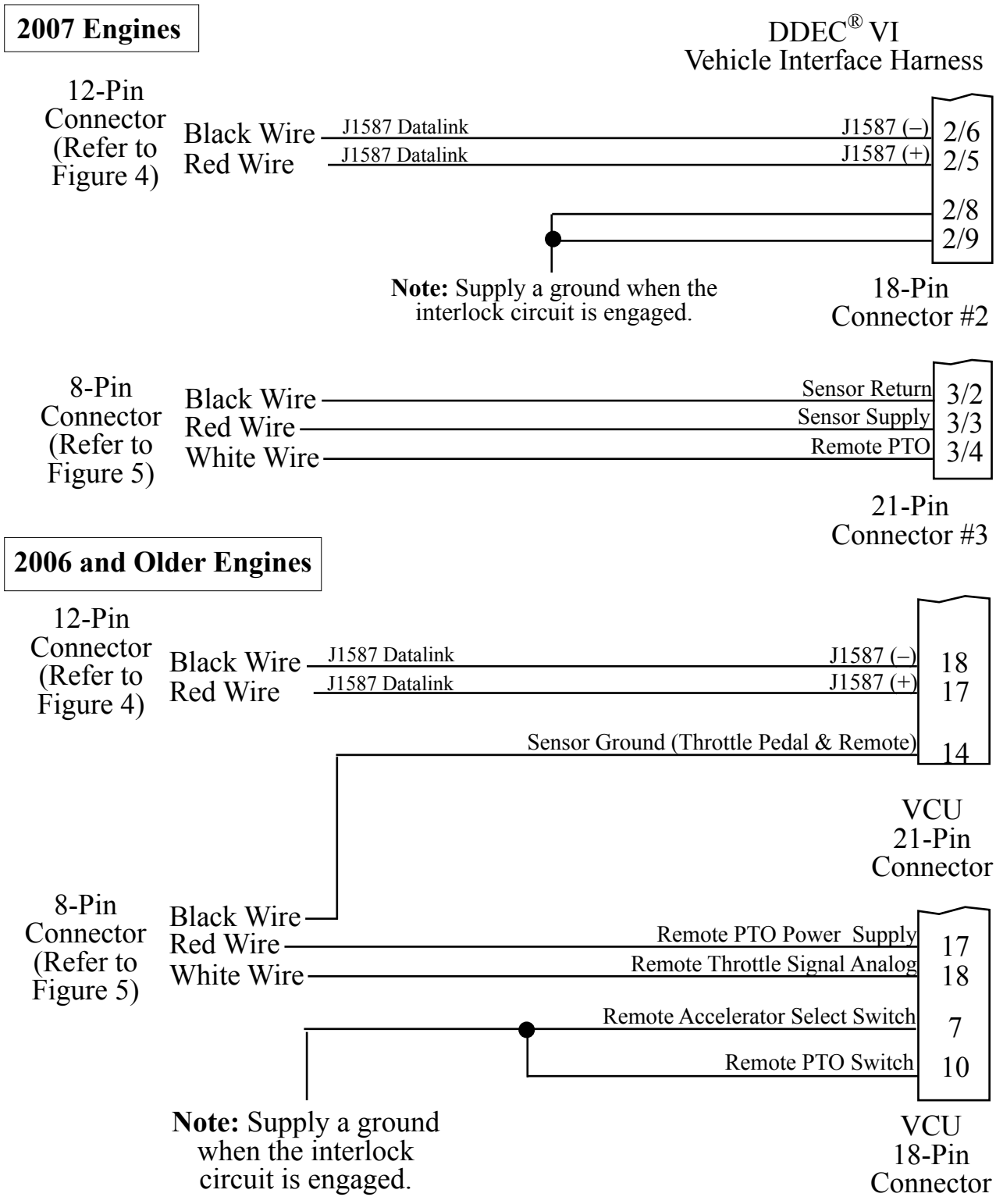


Figure 12. Mercedes TGA110/210 Wiring

High Idle Wiring

The INControl programming includes a high idle function. To activate the high idle provide a ground to pin 4 (High Idle Active Input) of the 8-pin connector and +12 VDC pin 3 (Interlock Input) of the 12-pin connector. The high idle connection to pin 3 must be isolated form the interlock circuit using two diodes (see schematic).

Note: It is important that the connection to the Interlock Input from the High Idle circuit be isolated from the apparatus interlock wiring with the two diodes. Refer to the wiring diagram. **The pump must NOT be engaged when using the high idle function.**

The high idle is set at about 1000 RPM at the factory. (This value will vary depending on the specific engine.) To adjust this setting refer to High Idle in the Operation Section.

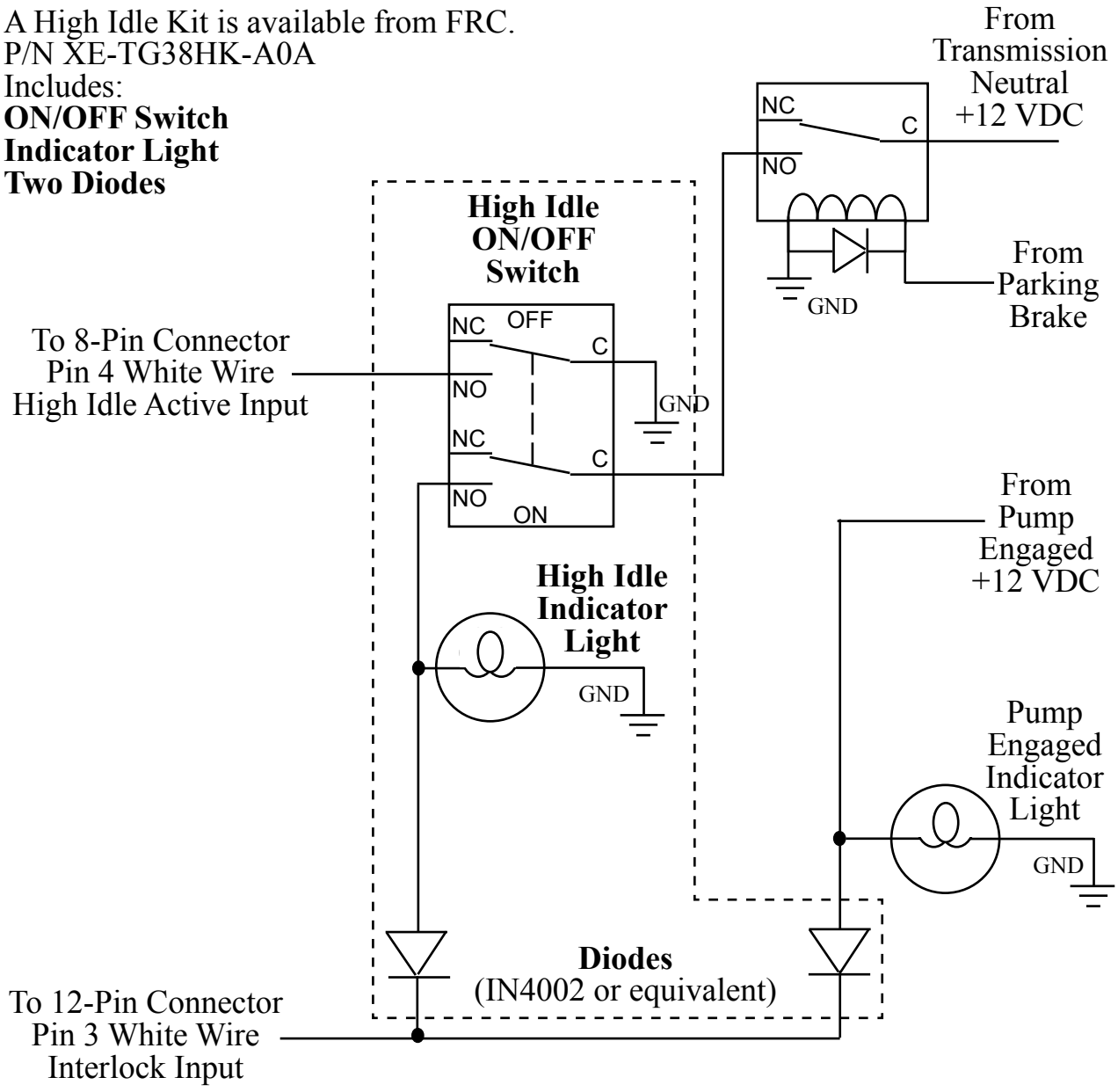


Figure 13. High Idle Wiring

FLYBACK DIODE INFORMATION

It is good engineering pratice to include a flyback diode when switching an inductive load (soleniod coil, relay coil, electric motor winding, etc.). It is recommended that a flyback diode be installed on inductive devices that share a common power source/ ground with a FRC governor.

Typical circuit showing a flyback diode installed across an inductive load.

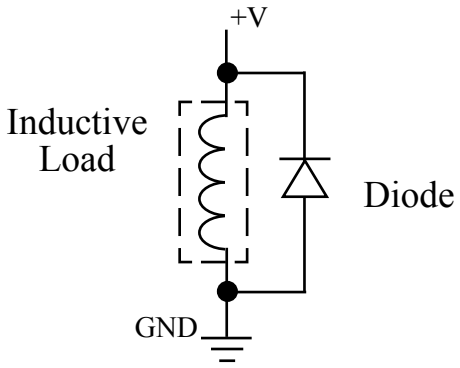


Diagram showing a flyback diode connected on a typical pump primer motor solenoid.

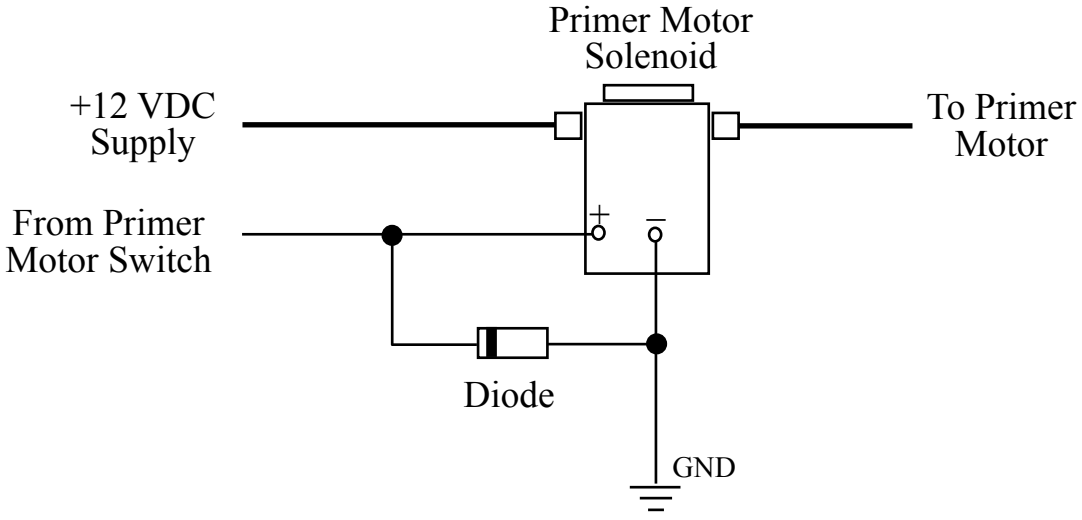


Figure 14. Flyback Diode