Truck Mounted Equipment

Engine Throttle Control Manual

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This manual contains important safety information.

Do not destroy this manual.

This manual must be available to the personnel who operate and maintain this machine.

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Book: 22244305 (5/08) Rev 5.0
Revised (10-12)

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Introduction

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Overview

The Portable Power Engine Throttle Control is a state of the art control system that is capable of regulating the compressor air pressure, engine RPM, or generator frequency.

The “–R” option allows the operator to switch between regulating the compressor air pressure or maintaining the engine RPM. The “–G” option allows the operator to switch between regulating the compressor air pressure or maintaining the generator frequency.

1. If the vehicle is equipped with a manual transmission and PTO driven generator, a steady frequency output from the generator may be obtained using RPM regulation. Use the (-R) option in this type of installation.
2. If the vehicle is equipped with an automatic transmission and PTO driven generator, a steady frequency output from the generator may be obtained using frequency regulation. Use the (-G) option in this type of installation.
3. If the vehicle is equipped with a hydraulic driven generator, a steady engine speed is required to produce the required hydraulic pressure. Use the (-R) option in this type of installation.

Additionally, the (-DP) option provides for the addition of a dual pressure switch to set the compressor output to preset low and high pressures.

Specifications

Control Module

Electronics Control:	8 Bit Microcontroller
Supply Power:	12 VDC
Supply Current:	0.65 mA
Power Consumption:	5W (max)
Dimensions:	5.6"W x 3.3"L x 1.4"D
Housing Material:	ABS Plastic

Pressure Transducer

Model:	PRO31PT2
Pressure Range:	0 – 300 PSI
Excitation Voltage:	5 VDC
Output Voltage:	0.5 – 4.75 VDC

General Description

General Description

The PCA model Engine Throttle Control is compatible with the engines listed in Table 2.1 and consists of the following components:

Control Module

Pressure Transducer

Throttle Control Enable Switch

Wire Harness

Mode Select Switch (“-R” and “–G” Options)

Dual Pressure Switch (“-DP” Option)

Control Module

The potentiometers for adjusting pressure and engine or generator RPM settings are located on the control module.

Wire Harness

Each wire harness is custom made for a specific engine and options. (Refer to Wiring Section)

Switch Options

The “–R” option allows switching between pressure or engine RPM control. The “–G” option allows switching between pressure and generator frequency control. The “–DP” option allows for a second pressure control setting.

Table 2.1:PCA Models & Engines

Model	Part Number	Engine Compatibility
PCA-1-R	24906695	Cummins (Press & RPM)
PCA-1-R-DP	24907982	Cummins (Dual Press & RPM)
PCA-1-G-DP	24907990	Cummins (Dual Press & Freq)
PCA-1B-R	22370878	Dodge/Cummins (Press & RPM)
PCA-1B-R-DP	22370886	Dodge/Cummins (Dual Press & RPM)
PCA-1B-G-DB	22370894	Dodge/Cummins (Dual Press & Freq)
PCA-4-R	24908014	Navistar (Press & RPM)
PCA-4-R-DP	24908048	Navistar (Dual Press & RPM)
PCA-4-G-DP	24908055	Navistar (Dual Press & Freq)
PCA-5-R	24908071	CAT (Press & RPM)
PCA-5-R-DP	24908089	CAT (Dual Press & RPM)
PCA-5-G-DP	24908097	CAT (Dual Press & Freq)
PCA-6-R	24908105	Ford 7.3L Powerstroke (Press & RPM)
PCA-6-R-DP	24908113	Ford 7.3L Powerstroke (Dual Press & RPM)
PCA-6-G-DP	24908139	Ford 7.3L Powerstroke (Dual Press & Freq)
PCA-6B-R	22361497	Ford 6.0L Powerstroke (Press & RPM)
PCA-6B-R-DP	22361489	Ford 6.0L Powerstroke (Dual Press & RPM)
PCA-6B-G-DP	22361471	Ford 6.0L Powerstroke (Dual Press & Freq)
PCA-9-R	24908147	GMAC (Press & RPM)
PCA-9-R-DP	24908154	GMAC (Dual Press & RPM)
PCA-9-G-DP	24908162	GMAC (Dual Press & Freq)
PCA-9B-3500	22285373	GMAC Gasoline Engine (3500)
PCA-98-6500	22393227	GMAC Gasoline Engine (6500)
PCA-10-R	24908170	Mercedes (Press & RPM)
PCA-10-R-DP	24908188	Mercedes (Dual Press & RPM)
PCA-10-G-DP	24808196	Mercedes (Dual Press & Freq)
PCA-11-R	24908204	Isuzu (Press & RPM)
PCA-11-R-DP	24908857	Isuzu (Dual Press & RPM)
PCA-11-G-DP	24908865	Isuzu (Dual Press & Freq)

Installation

Installation

This section provides general installation information. There may be engine specific requirements (ECM programming, extra parts needed, wire verification tests, etc.) not covered here. Refer to the Wiring section for specific details.

> **NOTE: When the installation is complete, perform the calibration procedure to ensure all settings are correct.**

Control Module

The control module dimensions are 5.6"Wx3.3"Lx1.4"D. The control module is not waterproof; the recommended mounting location is underneath the dashboard. Make sure that there is clearance to get at the adjustment potentiometers.

Pressure Transducer

⚠ CAUTION

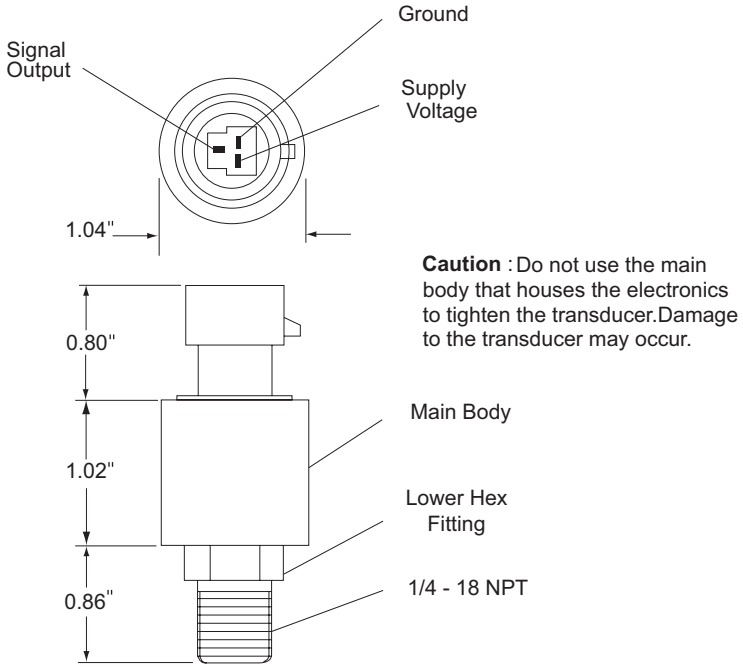
> **Do not use the main body that houses the electronics to tighten the pressure transducer. Damage to the transducer may occur.**

The pressure transducer is mounted in the electric speed control group, pressure regulator\blow down valve manifold. The pressure transducer supplied has a male 1/4-18 NPT fitting. Tighten the transducer with a wrench on the lower hex fitting. (Refer to Figure 3.1.)

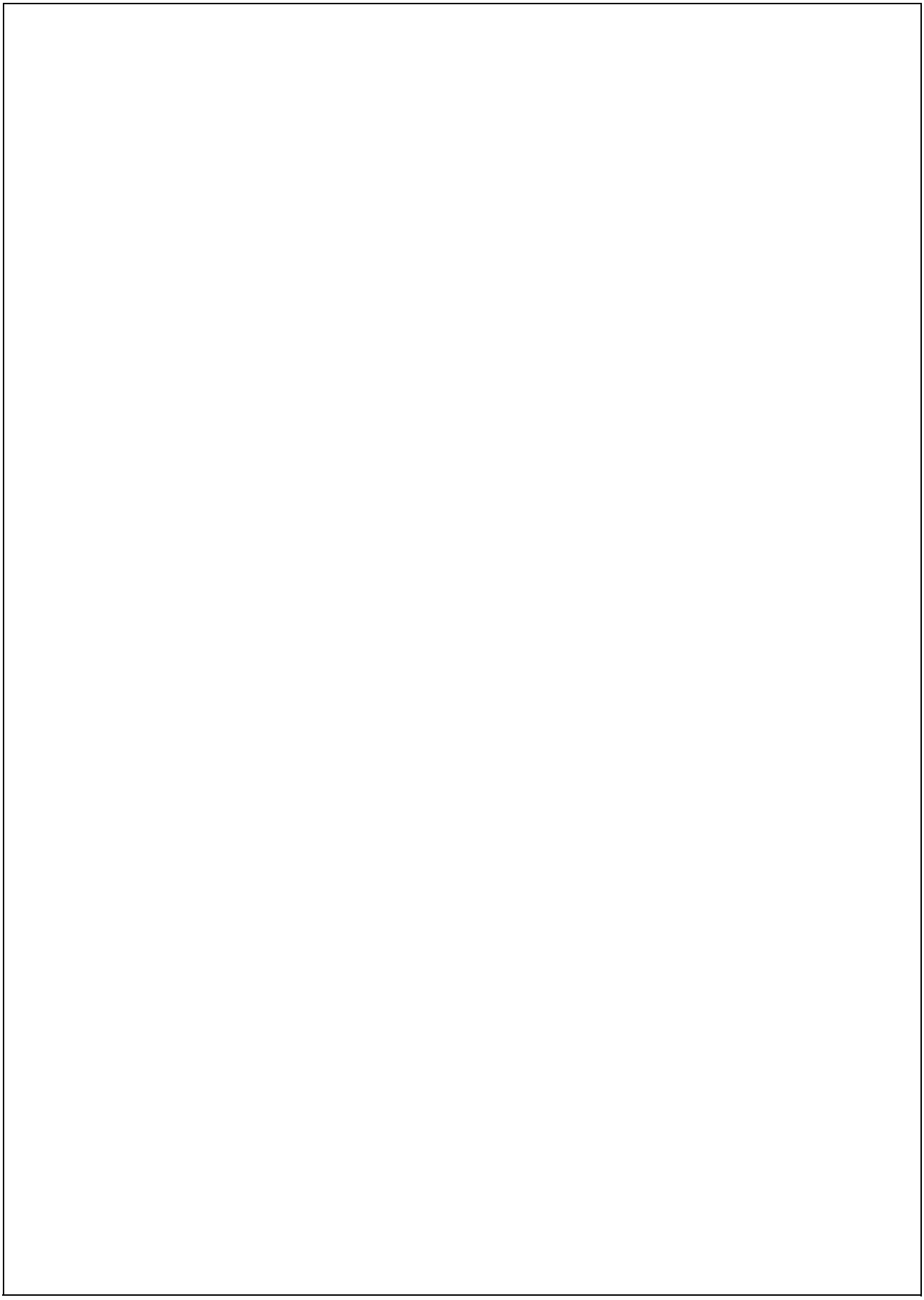
Switches and Wire Harness

Mount each switch in a location that is convenient for operations. The wiring harness includes connectors, terminations, and wires as required by the specific engine type and options. Refer to the Wiring section.

Figure 3.1:Pressure Transducer



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



Calibration

Calibration

There are up to five potentiometers located on the control module used to calibrate the engine throttle control. Depending on the options installed, they are used for adjusting compressor pressure, engine RPM, and generator frequency settings. (Refer to Figure 4.1.)

Pressure Setting

The **SET PSI** potentiometer is used to set the response pressure for the throttle control. The pressure range is from 70-180 PSI. Normal operating pressure is 100-120 PSI. The “–DP” option (Dual Pressure option) adds a second pressure setting potentiometer (SET PSI-2).

Maximum RPM Setting

The **MAX. RPM** potentiometer is used to adjust the maximum operating RPM for the compressor (for Pressure Mode). The adjustment range is 800-2400 RPM. Normal maximum RPM setting is around 1600-1800 RPM.

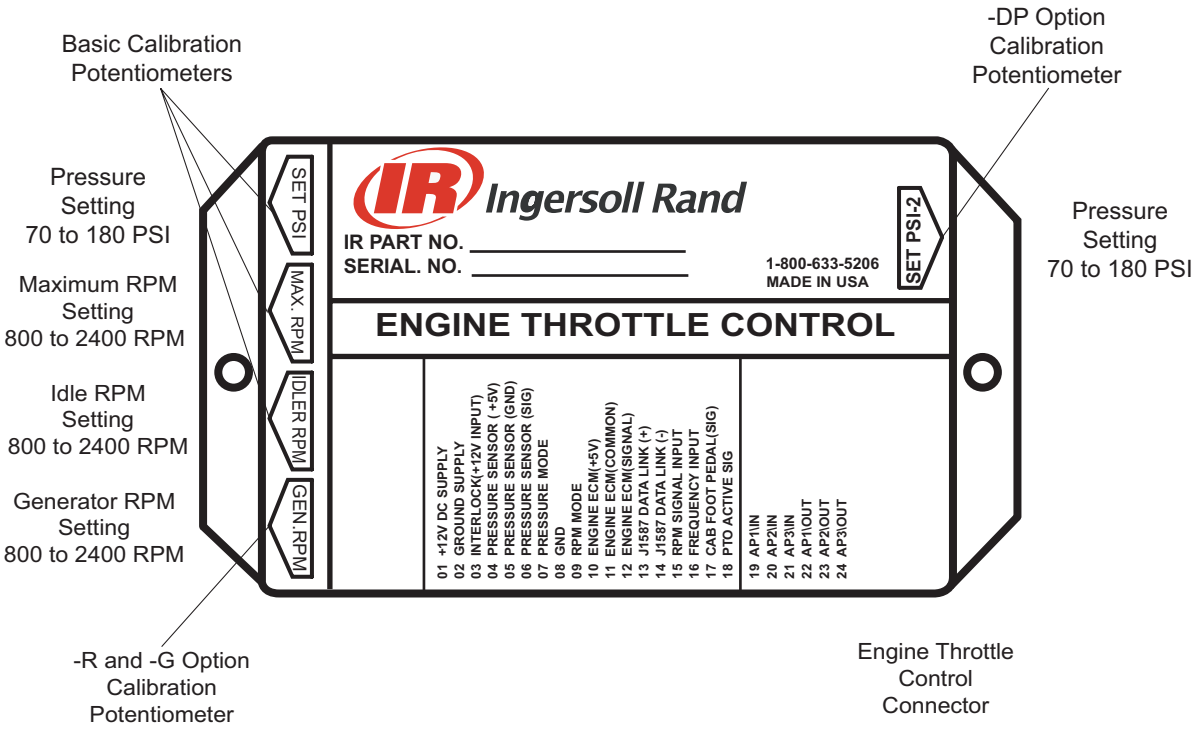
Idle RPM Setting

The **IDLE RPM** potentiometer is used to adjust the normal operating RPM for the compressor when it reaches the operating pressure (this setting corresponds to the minimum engine speed when the throttle control is on). The adjustment range is 800-2400 RPM. Normal operating RPM is between 1100-1200.

Generator RPM Setting

The **GEN. RPM** potentiometer is used to adjust the operating RPM to maintain a 60Hz output from the generator.

Figure 4.1:Engine Throttle Control



Basic Calibration

A small flathead screwdriver is needed to adjust the potentiometers. Turn the potentiometer clockwise to increase the settings. Turn the potentiometer counterclockwise to decrease the setting.

1. Place Throttle Control switch to OFF.
2. Remove the jumper from the control module connector pins 7, 8, and 9 (or disconnect wires from mode selector switch if “-R” or “-G” options are being used).
3. Place Pressure Select switch (if “–DP” option is installed) to pressure setting 1.
4. Place Throttle Control switch to ON and engage the compressor.
5. To adjust **MAX. RPM** potentiometer:

   - Turn potentiometer quickly for no more than 2 turns to activate adjustment.
   - Turn potentiometer slowly and set at desired maximum RPM.
     Result: After six seconds of inactivity, a timeout feature will set the engine to idle if no other change is detected at the potentiometer.

6. To adjust **IDLE RPM** potentiometer:
   - Turn potentiometer quickly for no more than 2 turns to activate adjustment.
   - Turn potentiometer slowly and set at desired maximum RPM.
     Result : After six seconds of inactivity, a timeout feature will set the engine to idle if no other change is detected at the potentiometer.
7. Place Throttle Control switch to OFF.
8. Install the jumper (at control module connector pins 7 and 8) that was removed or reconnect the Mode Selector Switch (pins 7, 8, and 9).
9. Place Mode Select switch (if "–R" or "–G" option is installed) to PSI.
10. Adjust **SET PSI** potentiometer slowly and set at desired operating pressure.
11. Continue with the Options Calibration if necessary.
12. After making all initial adjustments, fine adjustments can be made to maximum RPM and Idle RPM potentiometers by slowly turning the potentiometer while unit is operating. (Adjustments are active when jumpers on pins 7, 8, and 9 are in place).

Options Calibration

NOTE: The Basic Calibration procedure must be completed before doing the Options Calibration.

DP Option

1. Change Pressure Select switch to pressure setting 2.
2. Adjust SET PSI-2 potentiometer slowly and set at desired operating pressure.

"-R" and "–G" Option

NOTE: The GEN. RPM potentiometer should be set at a minimum level, turned CCW, at the start of this adjustment.

1. Place Mode Select switch to RPM or GEN.
2. Adjust **GEN. RPM** potentiometer slowly and stop just as desired operating frequency is reached. (Back the potentiometer off slightly and come back up to set it just at the threshold of the operating frequency.)

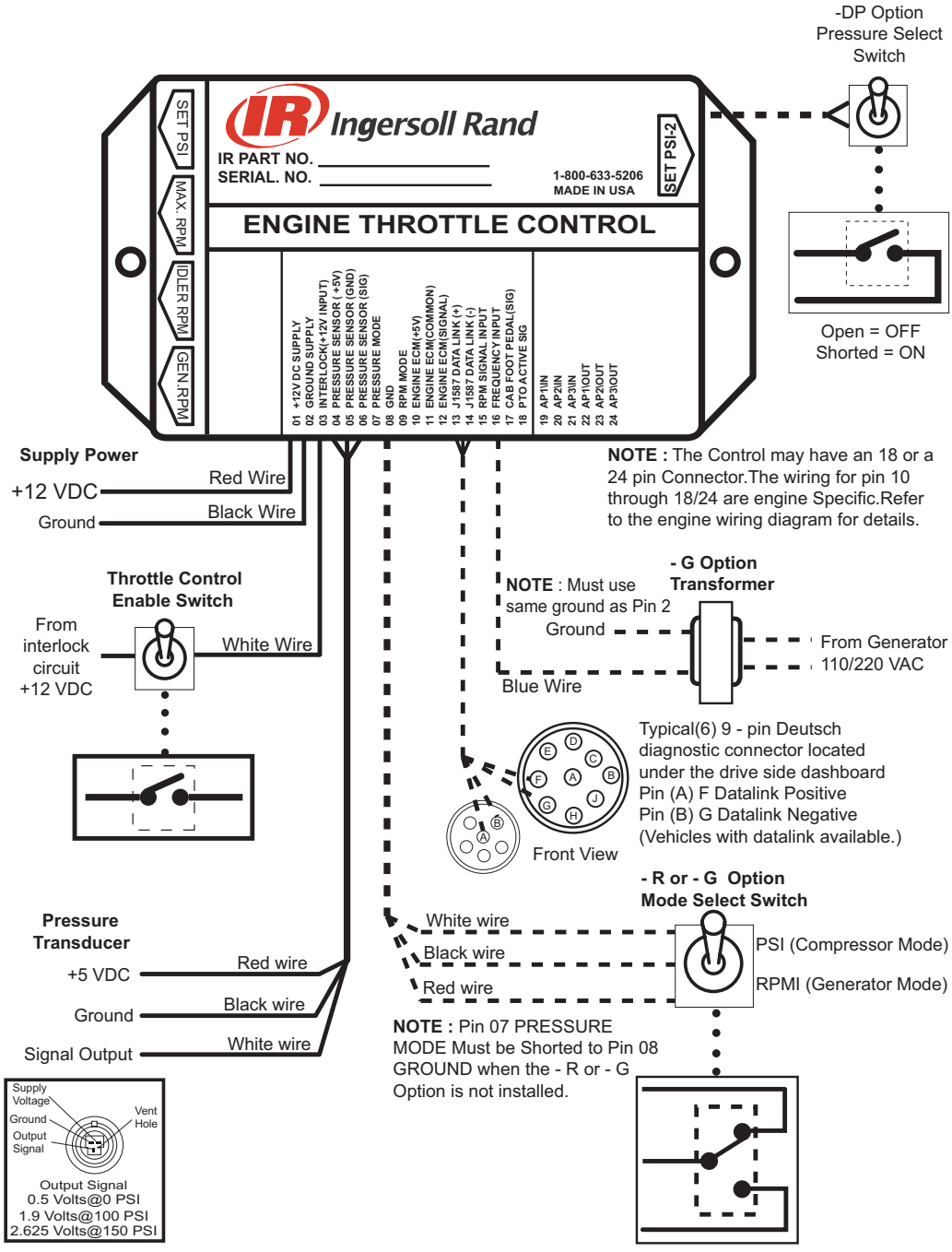
Wiring

Wiring

The following figures include the schematics, wiring diagrams, block diagrams, and cables for the Engine Throttle Control.

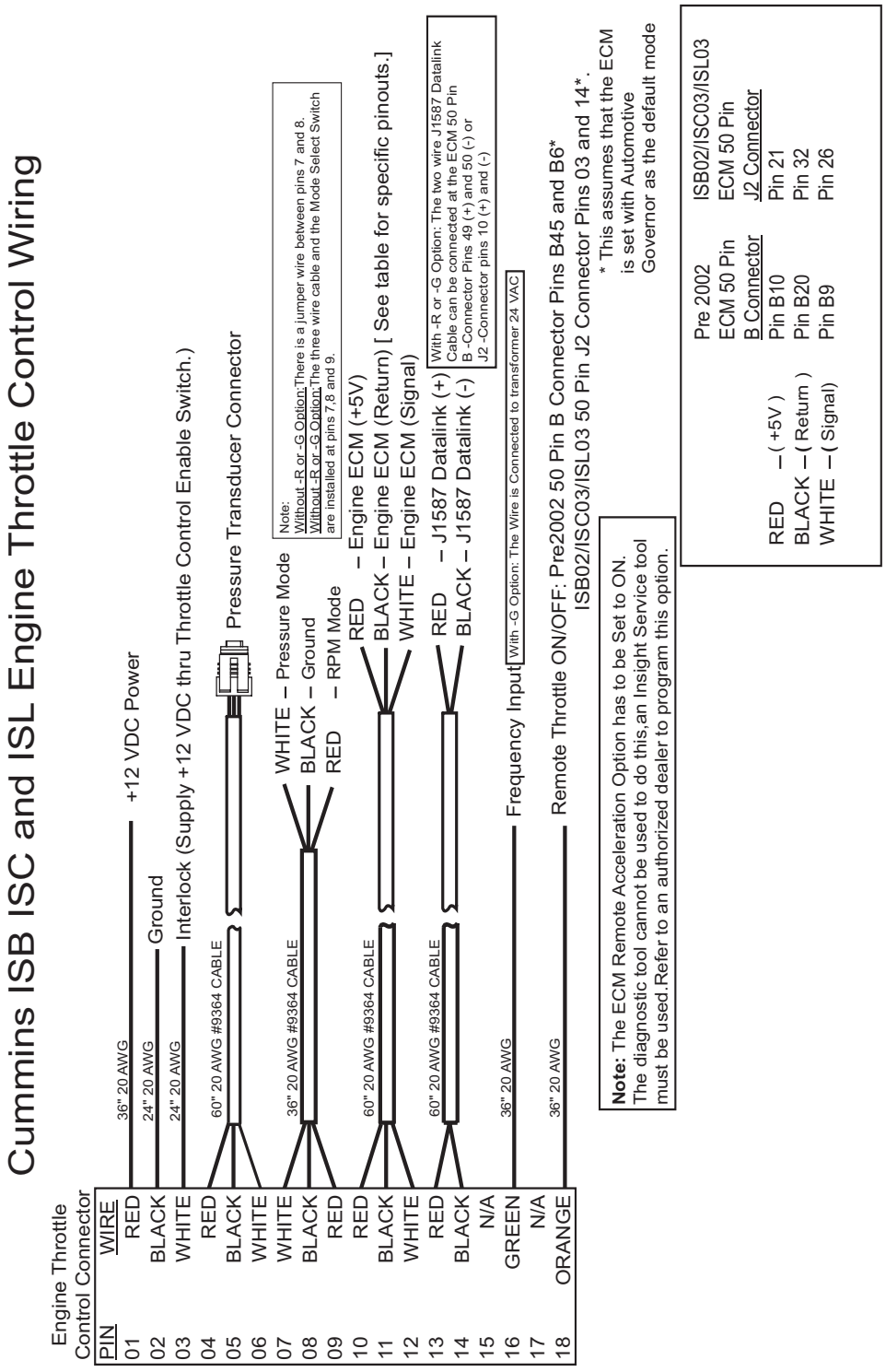
Standard Wiring Block Diagram

Figure 5.1



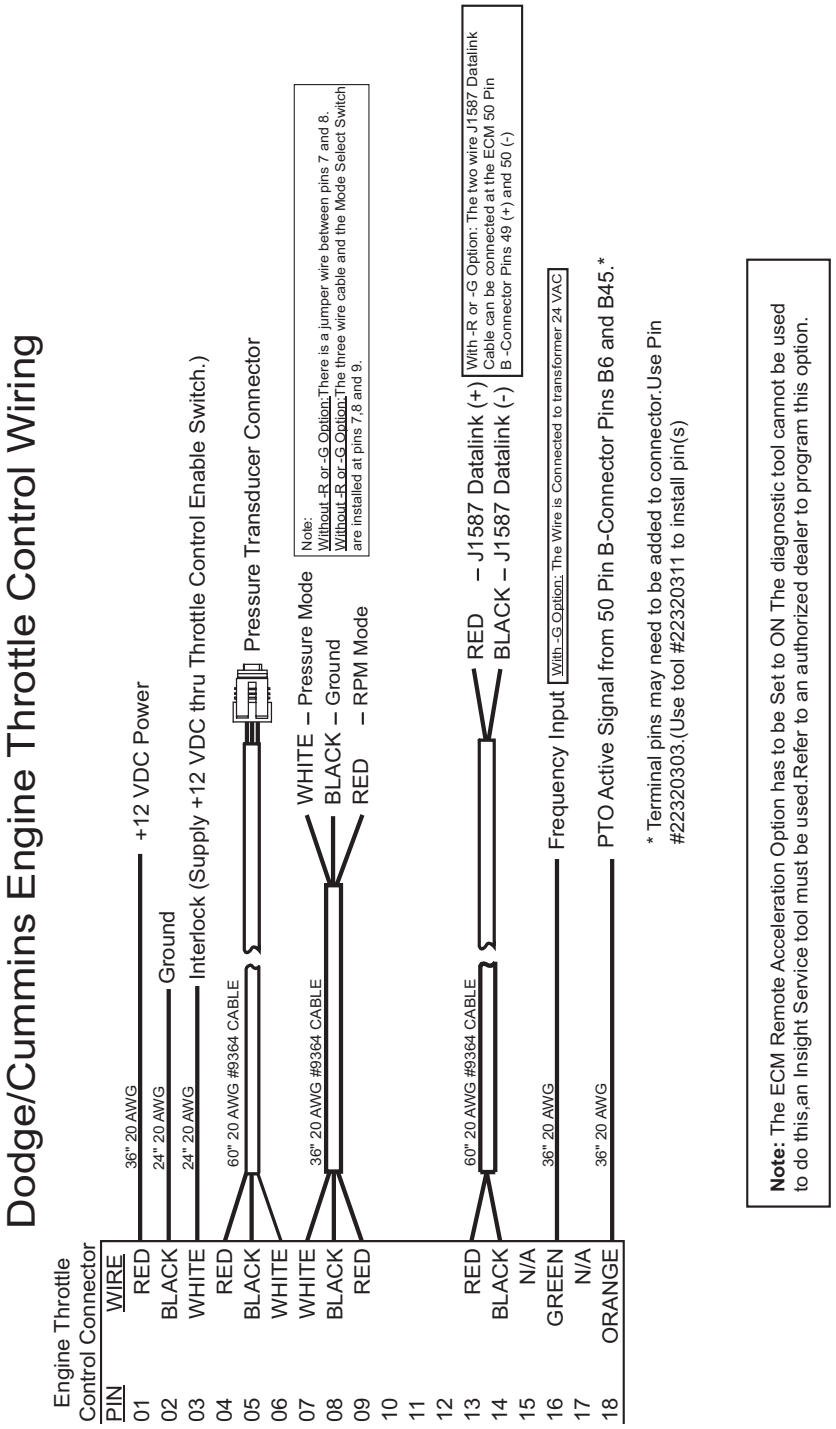
Cummins PCA-1 Wiring

Figure 5.2



Dodge/Cummins PCA-1B Wiring

Figure 5.3

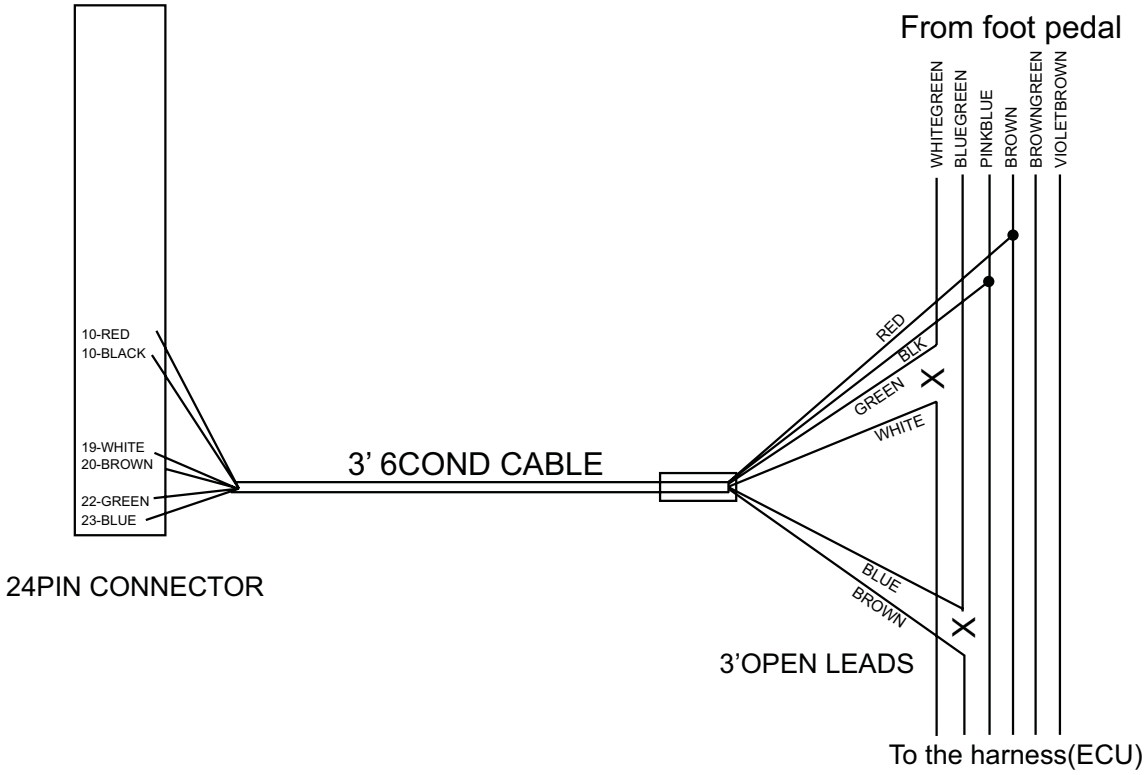


SUPPLEMENTARY DRAWING

Supplementary drawing for Doge Chassis with Cummins ECM (PCA-1B)

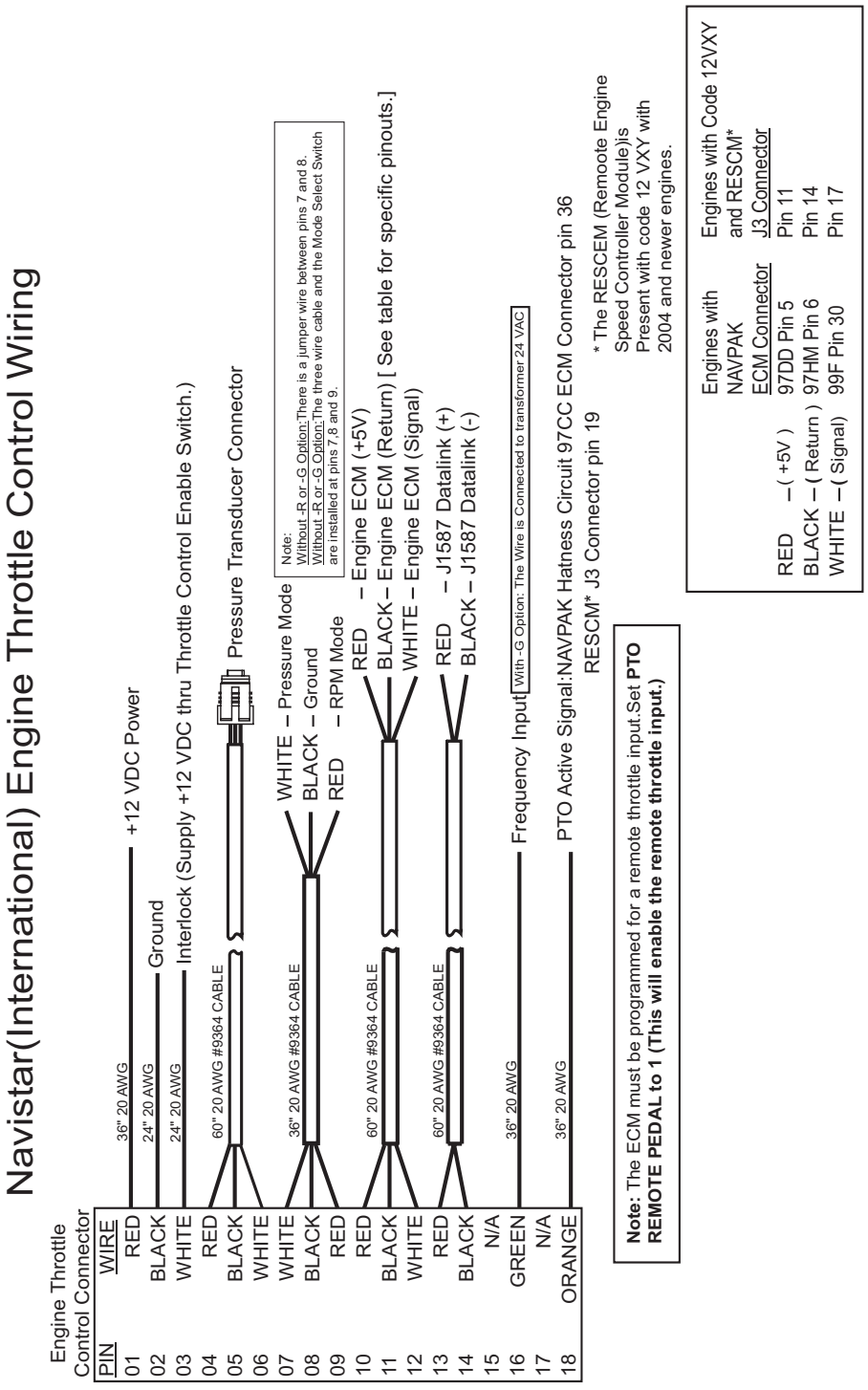
Connection to the foot throttle,

- Please follow the standard wiring diagram for rest of the connections.
- Red wire uses +5v supply from the harness, black wire is ground reference.
- If there is any drop in +5v supply after the connection (brown or violet\brown), please call factory.
- Cut the green\white and green\blue wires, and connect green\white, blue and brown wires as shown in the example below.



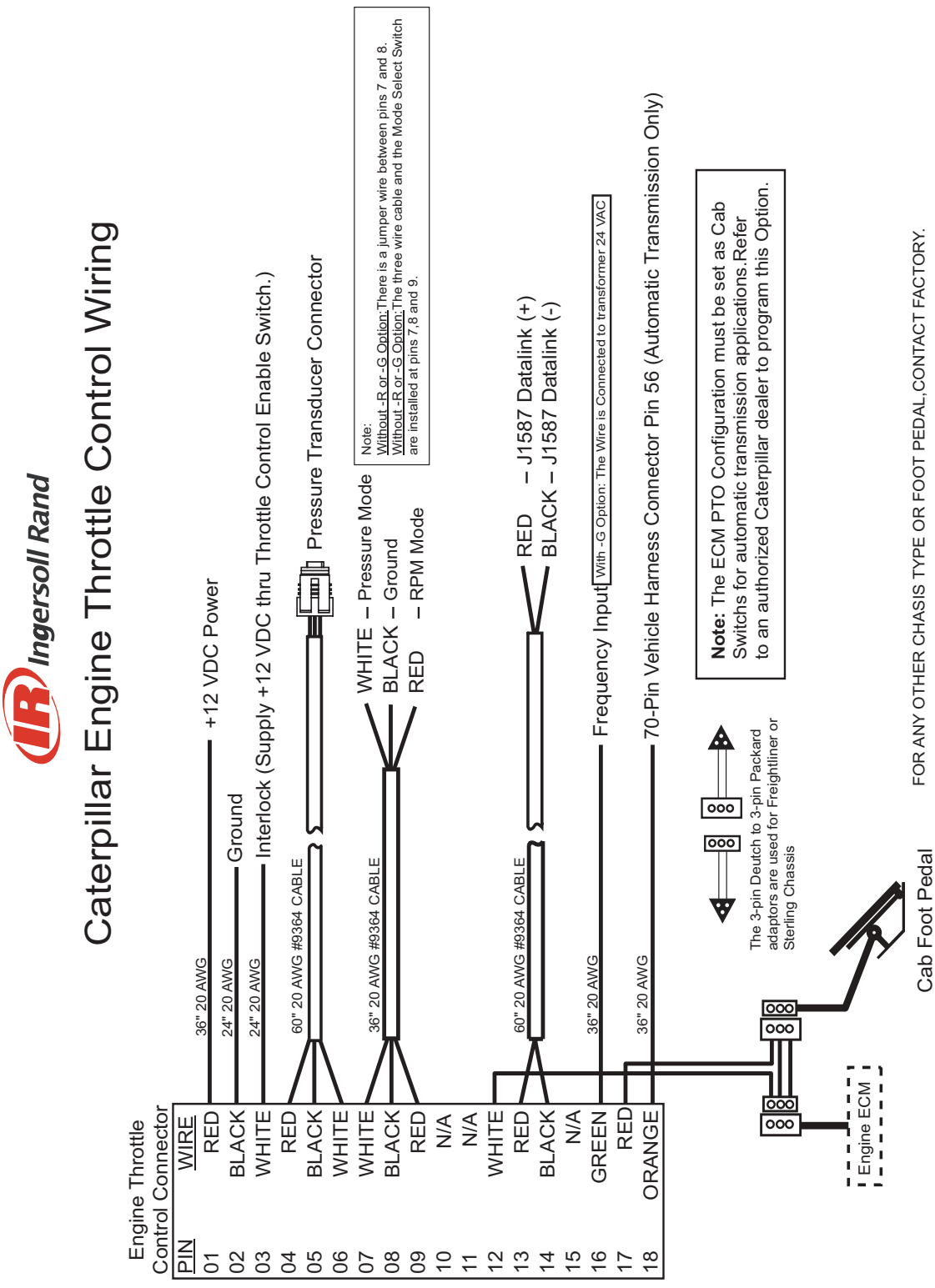
Navistar (International) PCA-4 Wiring

Figure 5.4



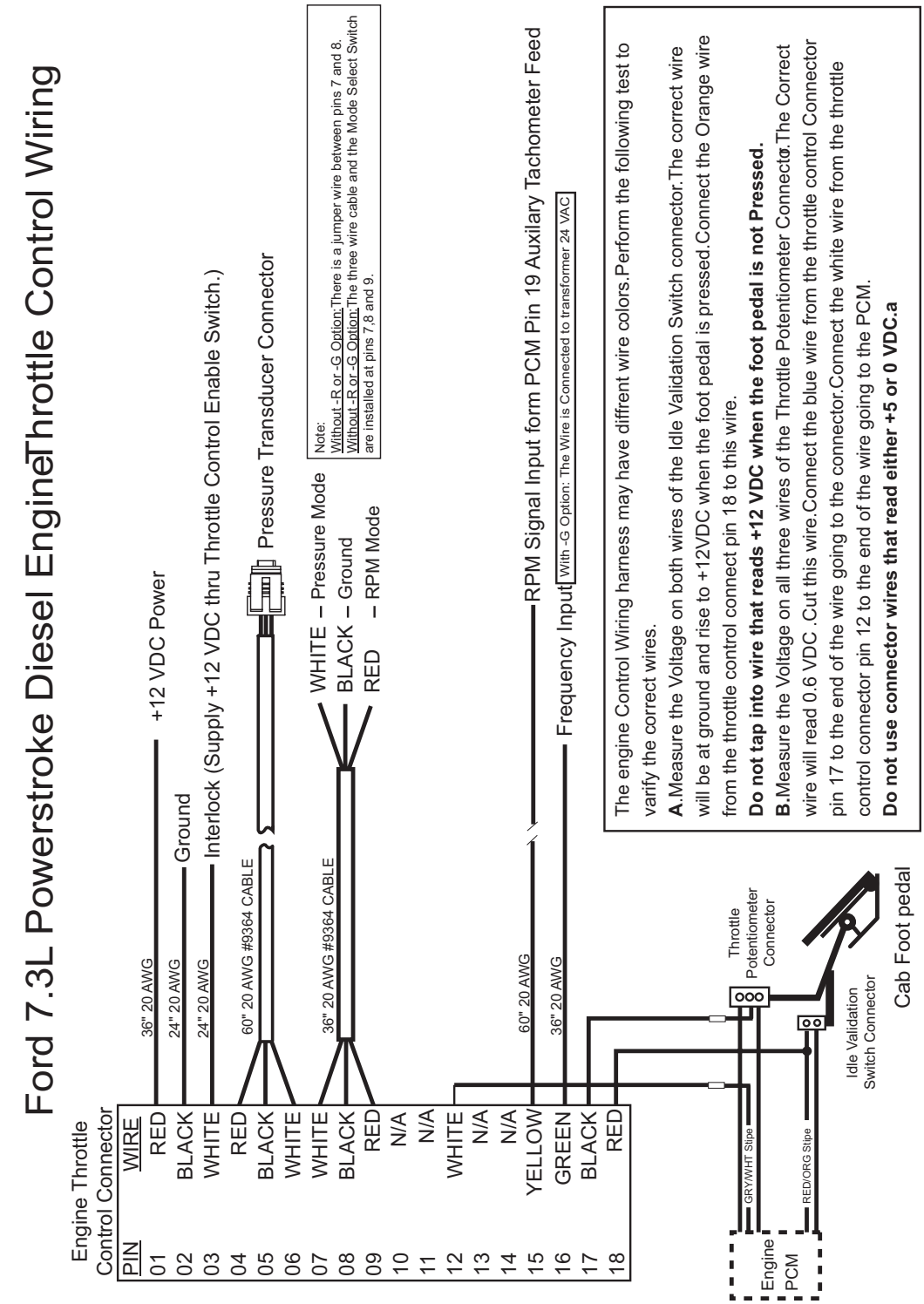
Caterpillar PCA-5 Wiring

Figure 5.5



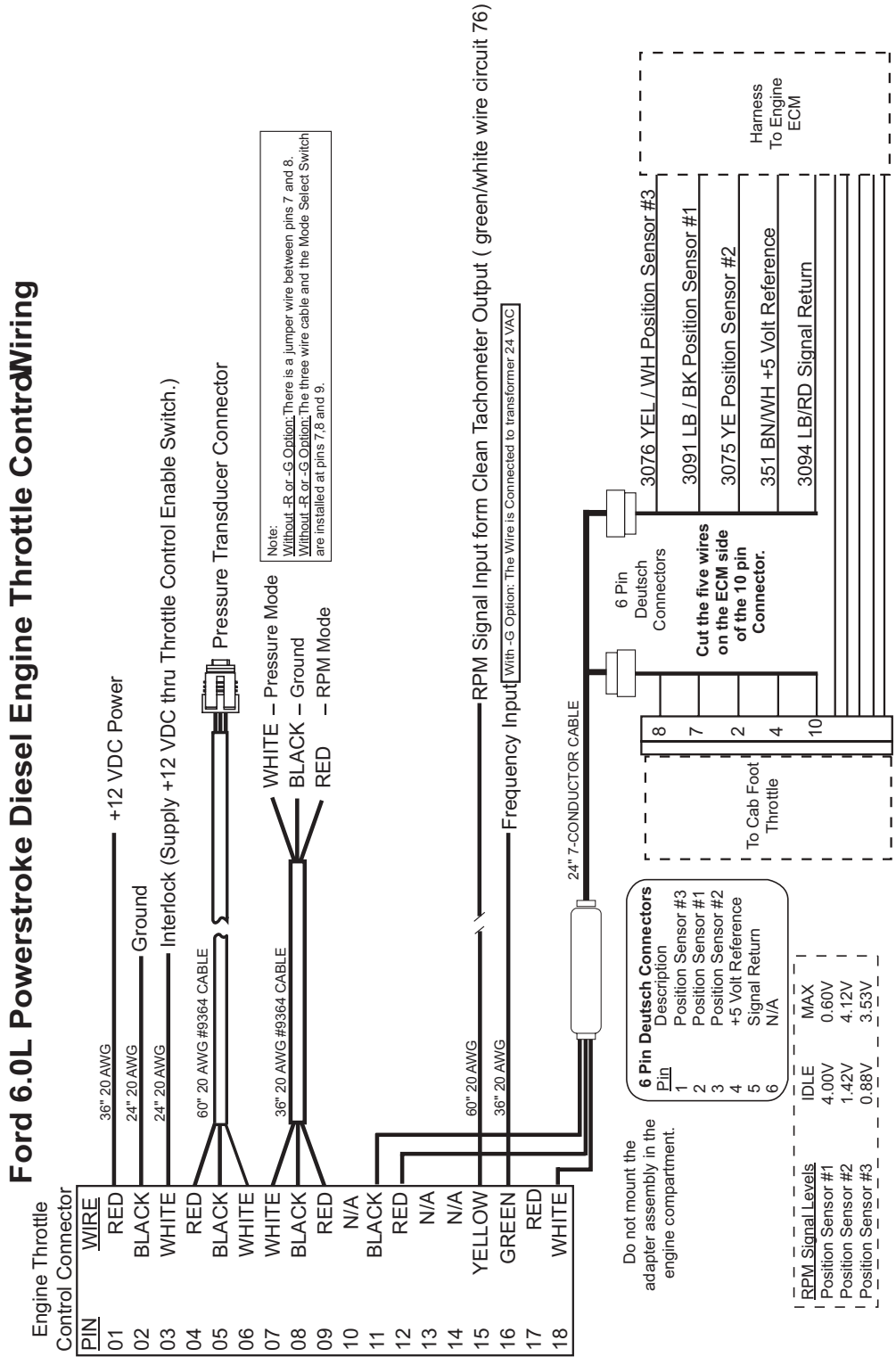
Ford 7.3L Powerstroke Diesel PCA-6 Wiring

Figure 5.6



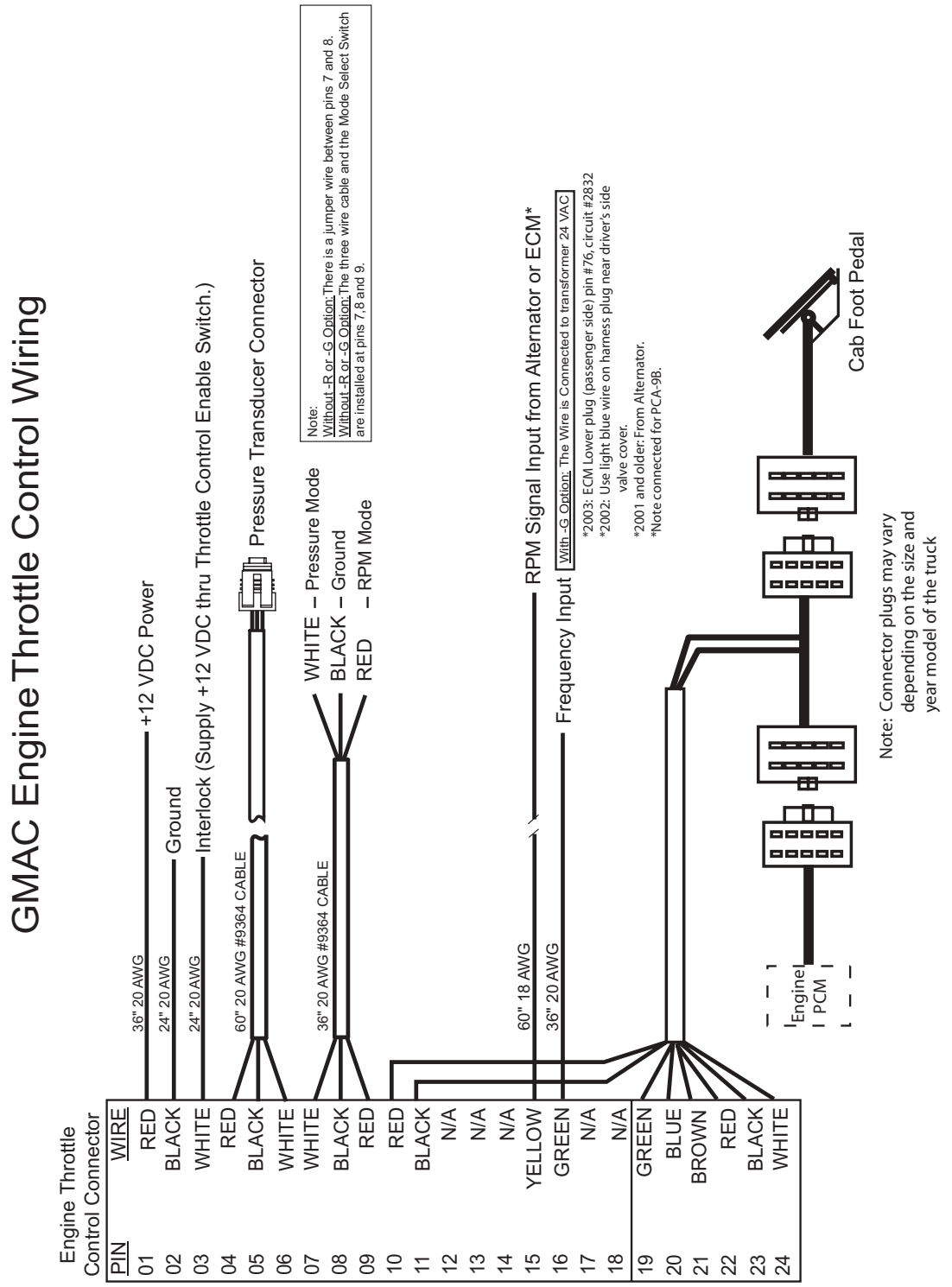
Ford 6.0L Powerstroke Diesel PCA-6B Wiring

Figure 5.7



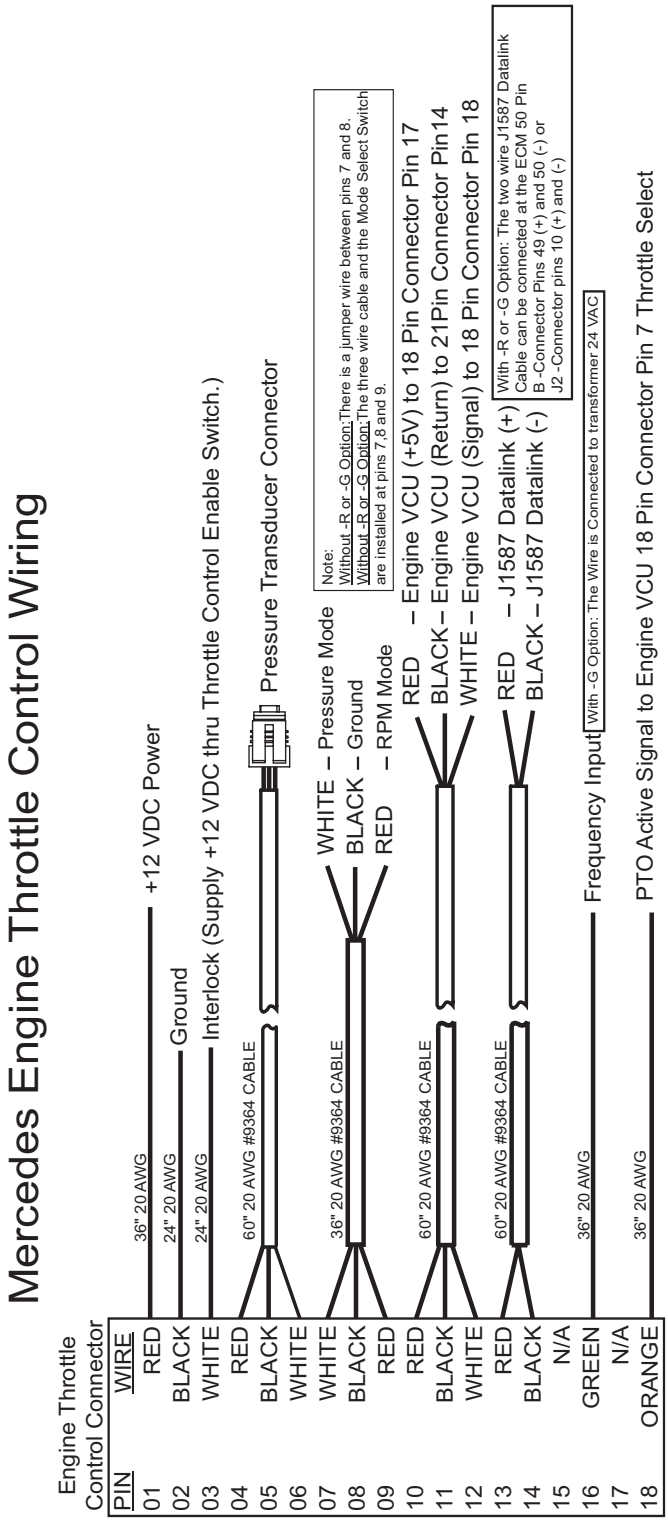
GMAC PCA-9 Wiring

Figure 5.8



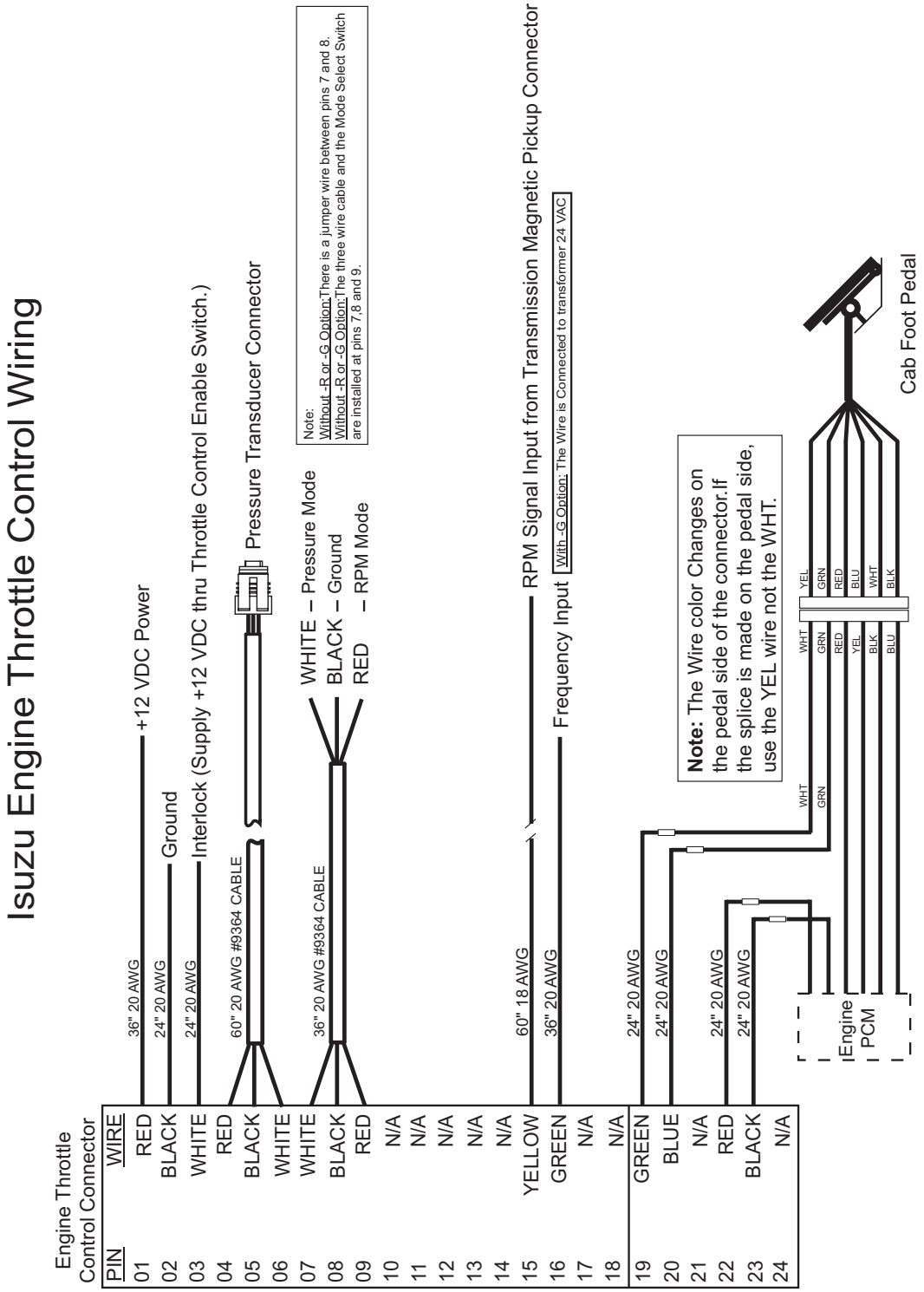
Mercedes PCA-10 Wiring

Figure 5.9



Isuzu PCA-11 Wiring

Figure 5.10



Troubleshooting

Troubleshooting

This troubleshooting section may be used to assist the installer or service technician diagnose problems should any arise during the installation or operation of the Engine Throttle Controller. There are detailed explanations of each pin on the Controller's connector. A symptom table and diagnostic flowcharts can help guide the service technician to locate problems. Please read the entire section carefully before beginning.

ESD Sensitivity Warning

The controller and the vehicle's Electronic Control Module (ECM) contain Electrostatic Discharge (ESD) sensitive components. When handling or probing connector pins or wiring, follow these procedures to reduce the possibility of electrostatic charge build-up on the body and inadvertent discharge into the components, which may cause permanent damage:

1. Always touch a known good ground before handling the controller, especially after sliding across a seat, sitting down from a standing position, working near an open compressed air outlet, or walking a distance.
2. Avoid touching the electrical terminals of the controller unless instructed to do so by a diagnostic procedure.
3. When using a voltmeter, be sure to connect the ground lead first. Check that the DVM is set for VDC for reading Direct Current measurements and VAC for Alternating Current measurements. Using the continuity setting inappropriately may damage components.

Troubleshooting Tools

When diagnosing a problem in an electrical circuit, these common tools are necessary:

- Jumper Wire – This is a test wire used to connect two points of a circuit. It can be used to bypass an open circuit. Warning: never use a jumper wire across a supply feed and ground.
- Digital Volt Meter (DVM) – This instrument is used to check for voltage on a circuit. Always connect the black lead to a known good ground and the read lead to the positive side of the circuit. Caution: Most of the electrical components used in today's vehicles are solid state. When checking voltages in these circuits, use a meter with high impedance of 10-megohms or greater.
- Small Straight-Slot Screwdriver – This tool will be required when making adjustments to the potentiometers ("Pots") that control the calibration settings.
- WAGO connector tool – This small plastic device is inserted in the small square opening above each connection opening to release the spring tension so that a wire may be removed or inserted. Any similar nonconductive device may be substituted.

About Wiring

Intermittent or Poor Connections

Most intermittent electrical problems are caused by faulty electrical connections or wiring. It is also possible for a “sticky” relay to cause a problem. Before concluding that a component or wiring assembly is bad, check the following items:

1. Connectors are fully seated.
2. Terminals are not spread, and terminals have not pushed out of housings.
3. Check for dirt or corrosion on terminals. Any amount of corrosion, dirt, or moisture could cause an intermittent problem.
4. Damaged connector/component casings exposing items to dirt and moisture.
5. Wire insulation that has rubbed through, causing shorts.
6. A broken wire inside a PVC insulation.

Wiring Installation and Repair

When installing, repairing, or replacing wiring, it is important that the correct wire size be used. All wires and modules must be held securely in place with ties to prevent damage to the insulation. It is recommended that multiple connections in a tight area, such as the foot pedal, should be staggered to permit better stress relief and prevent bulging of the wiring harness.

Repairing or Inserting a Wire:

1. Disconnect the negative battery cable.
2. Remove 1 of insulation from each end of the wire.
3. Place a piece of heat-shrink tubing over one side of the wire. Be sure that the tubing will be long enough to cover and seal the entire connection area.
4. Spread the strands of the wire apart on each end, into a “Y” shape.
5. Push the two ends of wire together until the strands of wire are close to the insulation. In other words, the two “Y” ends should be inserted into each other.
6. Twist the wires together.
7. Solder the connections using rosin core solder only. Avoid cold solder joints, by heating the wire only, and allowing the wire to heat the solder so that it flows smoothly into the joint. DO NOT USE ACID CORE SOLDER.
8. Center the heat shrink tubing over the joint and use a heat gun until the connection is tightly sealed.
9. Secure the wire to existing ones to prevent chafing or damage to the insulation.
10. Connect the battery and test system operation.

Detailed Pin Descriptions

Power and Interlock Input Pins

Pin01 is the +12V supply input to the Controller. Normally, this supply voltage is provided to the Controller after all interlocks are closed, but before the PTO Engage Switch and the Throttle Enable Switch are turned on. Interlocks may include relays in series, such as the Parking Brake Set Switch and the Neutral Safety Switch.

Pin02 is the Controller chassis ground. It must be directly connected to a good chassis ground point as close to the Controller as possible. Pin02, Pin05, and Pin08 are internally connected together.

Pin03 is the Throttle Enable Switch input. Applying +12VDC to this pin activates the Controller. This pin should be connected to a SPST switch that is mounted at the rear of the vehicle near the generator or compressor controls. Power must always be provided to Pin01 before Pin03 is enabled. The following sequence prolongs the life of system components and prevents detrimental effects:

To start the compressor or generator:

1. Move PTO Engage Switch to ON.
2. Wait for PTO Light to come ON.
3. Move Throttle Enable Switch to ON.

To shut down the system, use the reverse sequence:

1. Move Throttle Enable Switch to OFF.
2. Wait for the engine to return to idle.
3. Move PTO Engage Switch to OFF.

Pressure Sensor Pins

Pin04 is a +5VDC output which supplies power to the pressure sensor. No other connections should be made to this pin. The pressure transducer contains sensitive electronic components and should be treated with care.

Pin05 is the sensor ground. It must be connected to the pressure sensor through the cable provided, i.e., do not make a ground connection directly at the sensor.

Pin06 is the analog pressure sensor signal. Table 6.2 shows the voltage values expected at this pin for corresponding pressures. Use a PRO31PT-2, 0-300PSIG, 5VDC sensor only.

Mode Select Switch Pins

Pin07 is the Pressure Mode Select pin. Grounding this pin to Pin08 enables Pressure Mode. A SPDT switch is normally connected across Pin07, Pin08, and Pin09 whenever a (-R) or (-G) option is used (see Figure 3). If generator options (-R) or (-G) are not used, a jumper wire should be permanently placed between Pin07 and Pin08.

Pin08 is connected to supply ground internally, and is to be wired to the center terminal on the Mode Select Switch.

Pin09 is the RPM/FREQ Mode Select pin for (-R) or (-G) options. Grounding this pin to Pin08 enables the RPM or generator mode. Pin07 and Pin09 should never be grounded at the same time. If neither is grounded, the Controller enters RPM Calibration Mode.

Engine ECM Pins

Pin10 is a +5VDC reference input from the ECM. It is not the same as the +5VDC output on Pin04, and they must not be connected together. This pin may be connected to the foot pedal supply in some installations (see wiring diagrams).

Pin11 is a ground reference input from the ECM. It is not the same as the chassis ground found on Pin02, Pin05 and Pin08, and must not be connected to these or any other signals. This pin may be connected as a supply ground to the foot pedal in some installations (see wiring diagrams).

Pin12 is the main output signal to the ECM that controls the engine speed. This pin may be connected to the foot pedal for some installations. (Refer to specific engine wiring for details and see Table 6.3).

J1587 Data Link Input Pins

Pin13 & Pin14 are for the J1587 Data Link input. The Controller monitors the engine RPM from this data link. Note that one is positive (red) and the other is negative (black). These two wires must not be reversed. J1587 is not used on the PCA6, PCA9 and PCA11 series. Instead, an external “clean” tach signal must be applied to Pin15.

External RPM Input

Pin15 is the External RPM Input. It should be connected to a clean tach signal on the vehicle. It is must be a sine or square wave of at least 5VAC. A special algorithm in the PCA software filters and averages readings taken from the tach. The PCA automatically calibrates itself to the incoming frequency.

External Frequency Input

Pin16 is a low voltage generator frequency input and is used when the (-G) option is installed. This signal must be wired to one side of the secondary winding of the voltage transformer. The other side of the transformer secondary winding is connected to a local chassis ground (this

ground should be at the same connection as the ground for Pin02). It is important for the ground path from the transformer to the Controller to be of low resistance. The primary coil of the transformer is connected across the high voltage generator output.

Cab Foot Pedal Signal Input

Pin17 is an input to the Controller from the foot pedal. An internal relay passes the foot pedal signal through Pin12 whenever the Throttle Enable Switch is off.

PTO Active Signal Output

Pin18 (output) is activated when the Throttle Enable Switch is turned on. On PCA4, PCA6 and PCA6B, this output provides +12VDC when on. All other models provide a ground when on. When the Throttle Enable Switch is off, this output is open circuited. It may be used to signal the ECM to activate a remote throttle, or act as an Idle Validation Signal, or to activate a foot pedal adapter.

APIN and APOUT (PCA9 Series Only)

Pin19 (AP1IN), **Pin20** (AP2IN), and **Pin21** (AP3IN) are connected as inputs to the ECM. When the Throttle Enable Switch is off, the foot pedal signals on **Pin23** (AP2OUT) and **Pin24** (AP3OUT) are connected to the ECM through an internal relay. When Throttle Enable Switch is on, the Controller provides the required voltage levels to control the engine speed.

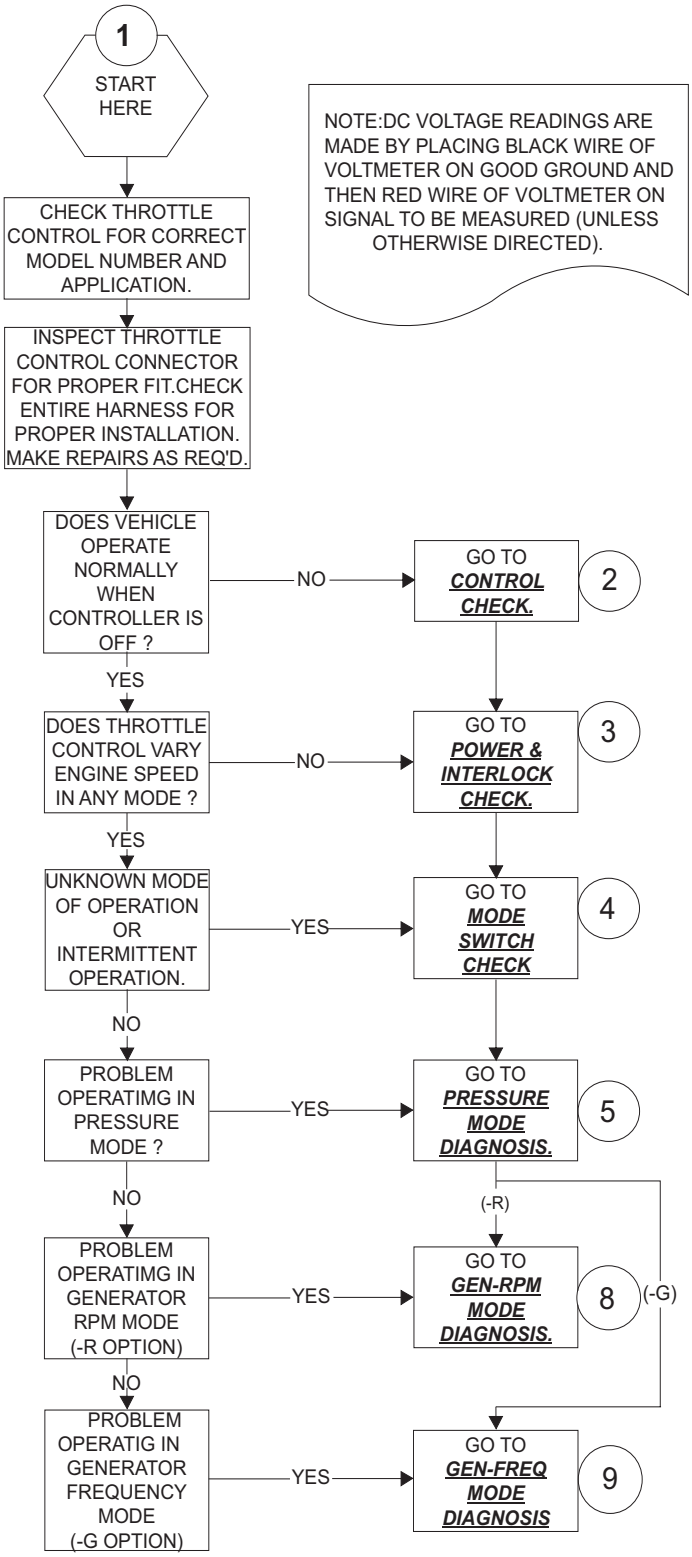
Controller Symptom Chart

Symptom	Possible Cause	Correction
Foot pedal does not work properly even though compressor and generator is off. Check Engine light is lit.	Wrong model of Controller. Bad foot pedal wiring. Defective foot pedal adapter. Shorted Throttle Enable Signal. Problem unrelated to Controller.	Correct bad wiring. Replace as required. Check for poor connections. Use a scan tool to diagnose problem. Disconnect foot pedal adapter and reconnect original wiring as a test. Flowchart 6.1: **Control Check.**
PTO switch to on, but nothing happens. Throttle Enable Switch does nothing.	Burned fuse / open breaker. Wrong wiring installation. Parking brake not set. Neutral Safety Switch not set. Oil overheated. Defective PTO pressure switch Defective PTO light. Defective Throttle Enable Switch. Defective Mode Switch.	Close and verify proper operation of all intrlocks and switches. Check for stuck relays Check for mechanical problems. Flowchart 6.2**:** **Power & Interlock Check.** Flowchart 6.4**: Mode Switch Check.**

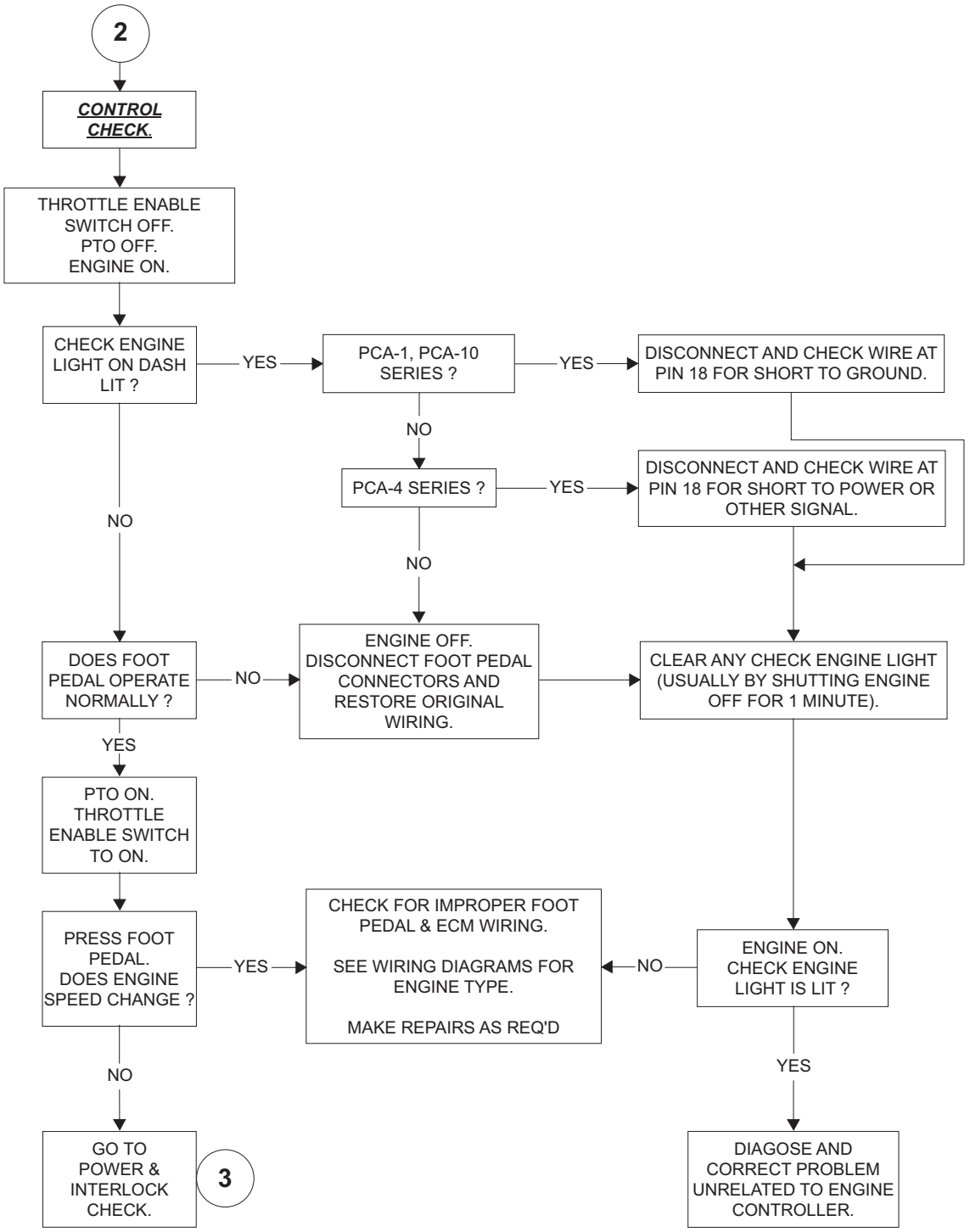
Symptom	Possible Cause	Correction
Controller does not throttle engine. Desired pressure cannot be reached or maintained.	Defective wiring. Remote throttle not activated, Pressure not calibrated correctly. Bad pressure relief valve. Defective pressure sensor. Controller output voltages incorrect.	Use RPM Calibration Mode to verify engine response. Check ECM programming. Measure Controller output voltages. Flowchart 6.5**: RPM Calibration.** Flowchart 6.6**: Sensor Check.** Flowchart 6.7**: Calibration.**
Engine speed is wrong, or not stable in RPM mode.	Bad or missing tachometer signal. Bad or missing data link signal. Incorrect calibration.	Flowchart 6.8**: GEN-RPM Mode.**
Generator output is not 60Hz in frequency mode.	Bad frequency input signaL Open transformer windings. Poor grounding.	Flowchart 6.9**: GEN-FREQ Mode.**

Diagnostic Flowcharts

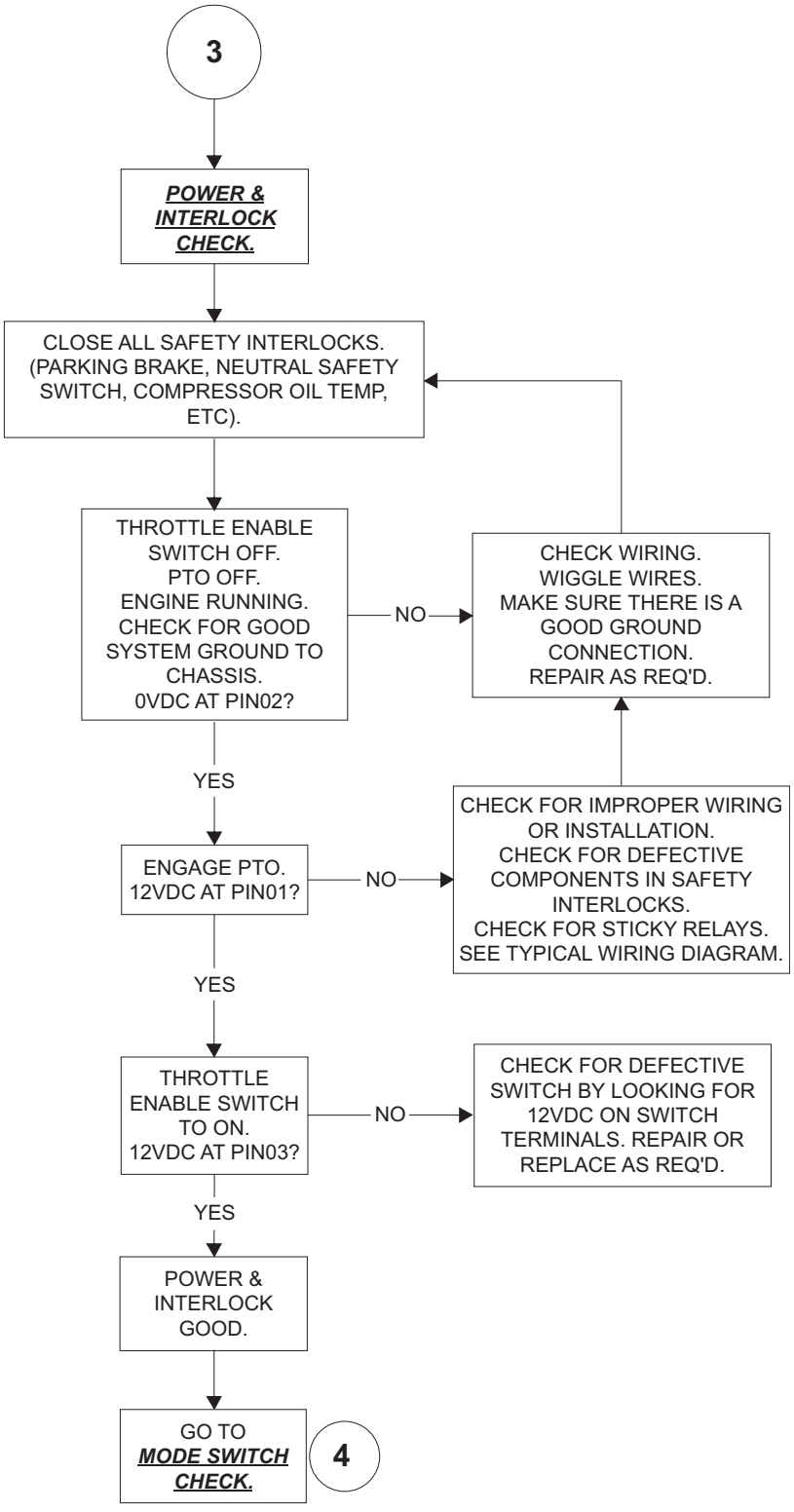
Flowchart 6.1:Start Here



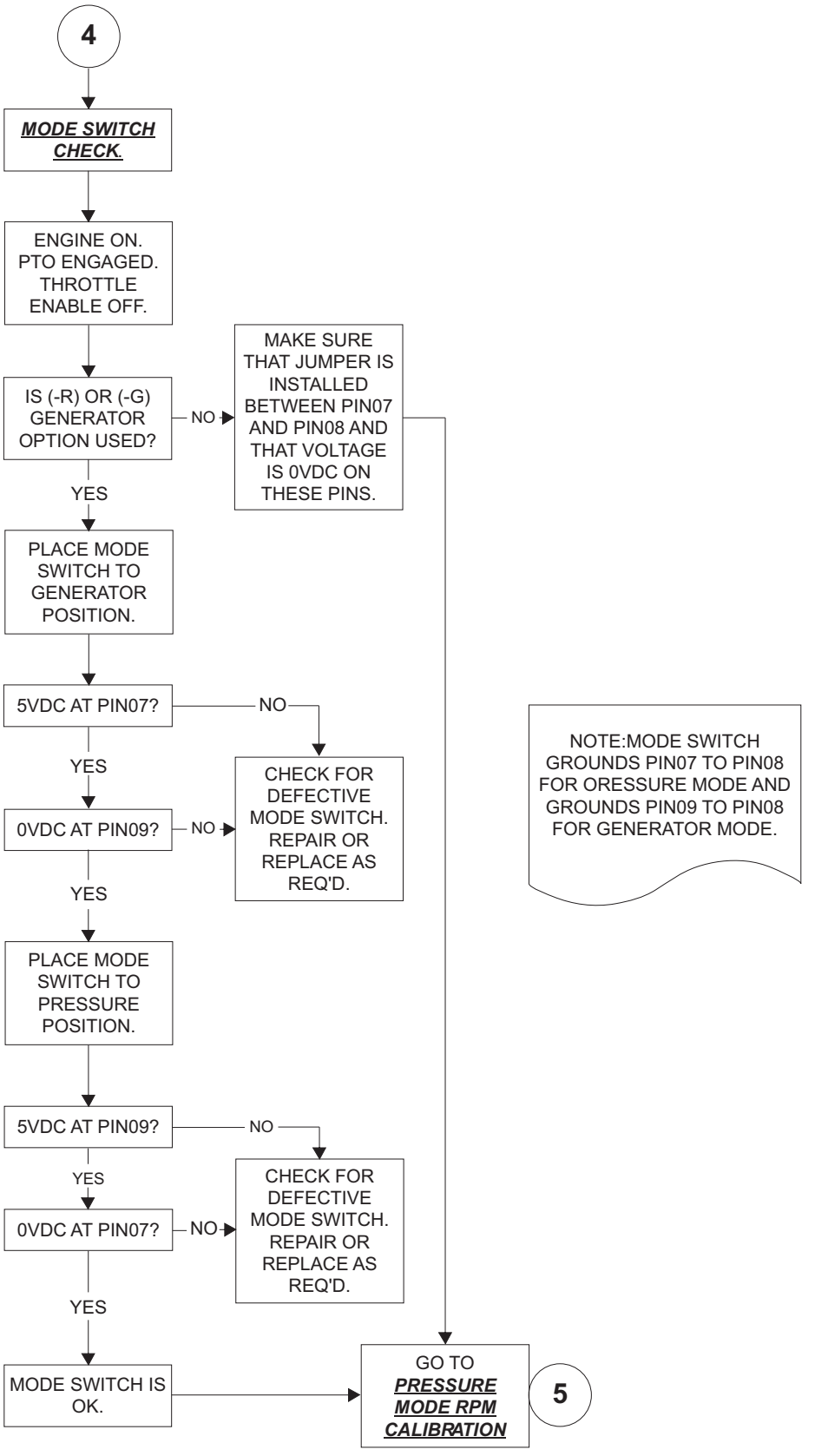
Flowchart 6.2:Control Check



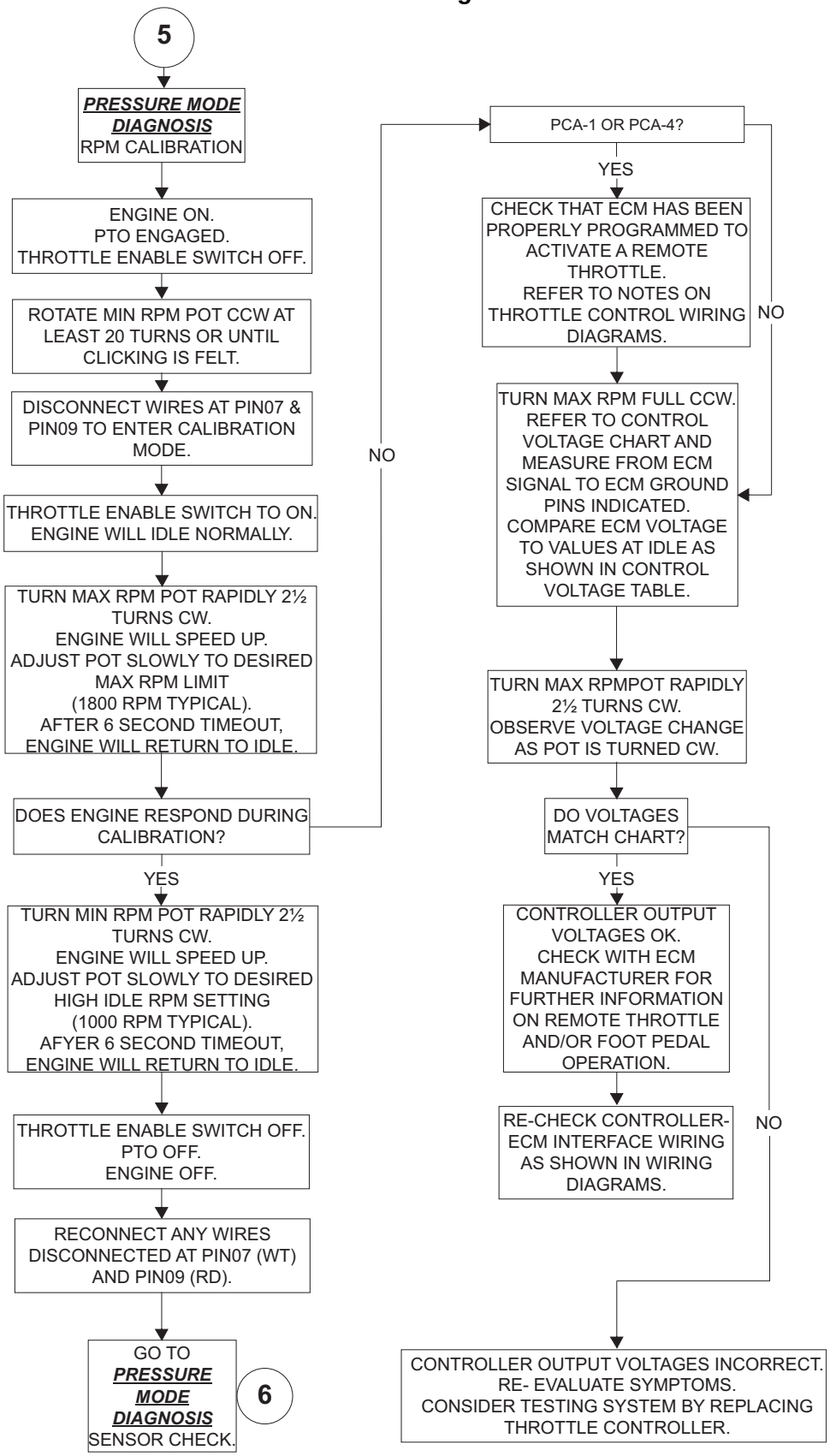
Flowchart 6.3:Power & Interlock Check



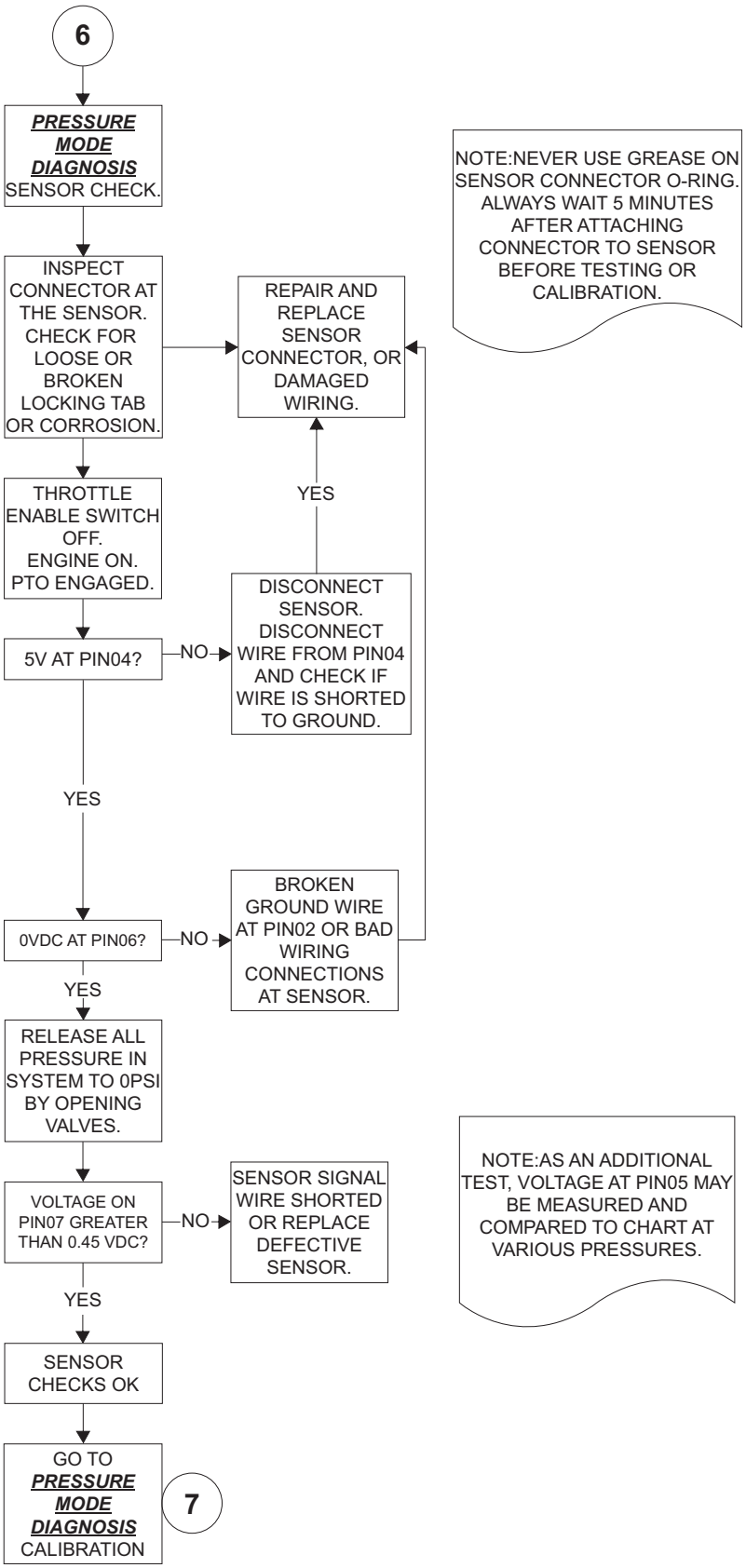
Flowchart 6.4:Mode Switch Check



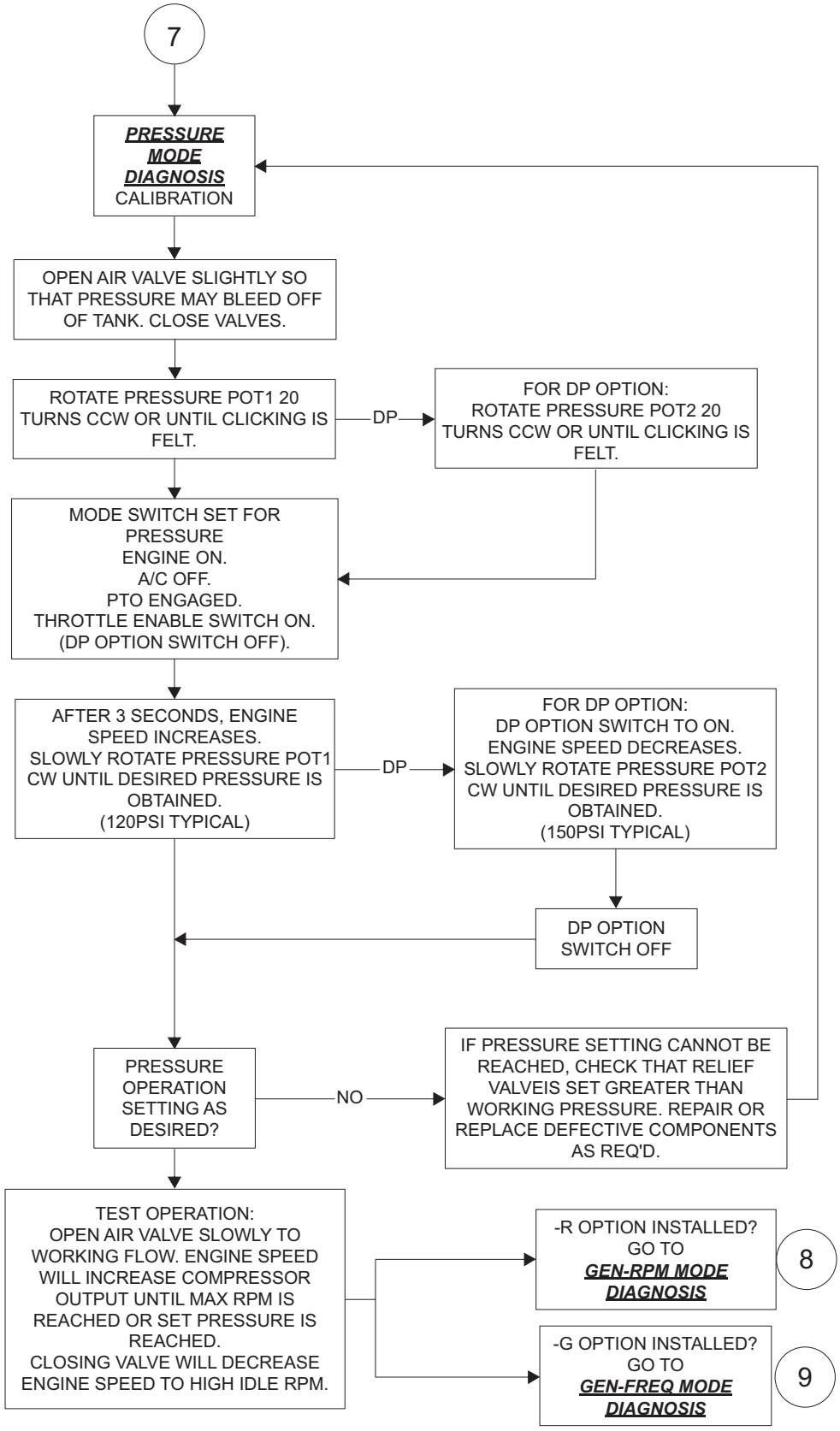
Flowchart 6.5:Pressure Mode Diagnosis: RPM Calibration



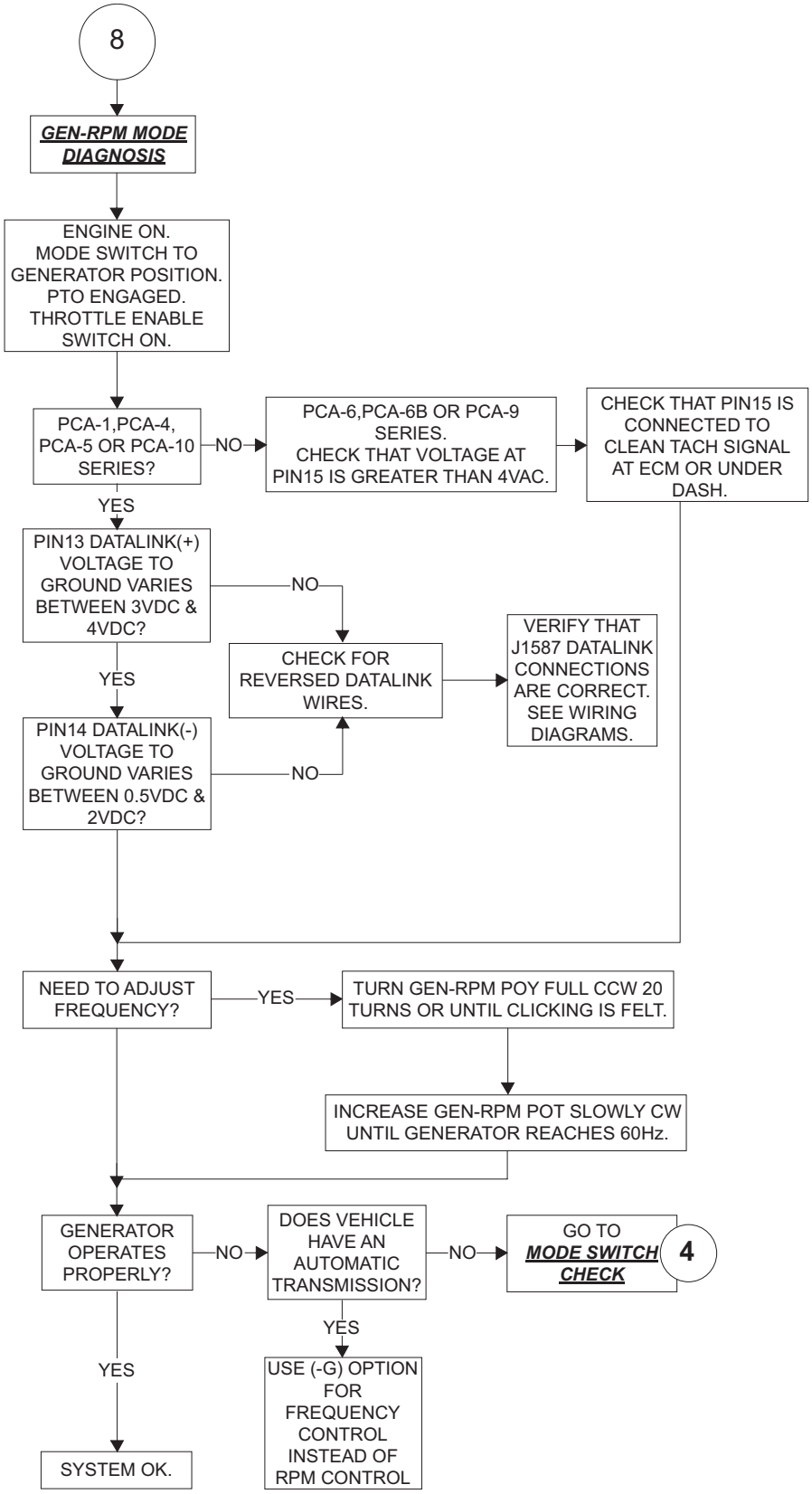
Flowchart 6.6:Pressure Mode Diagnosis: Sensor Check



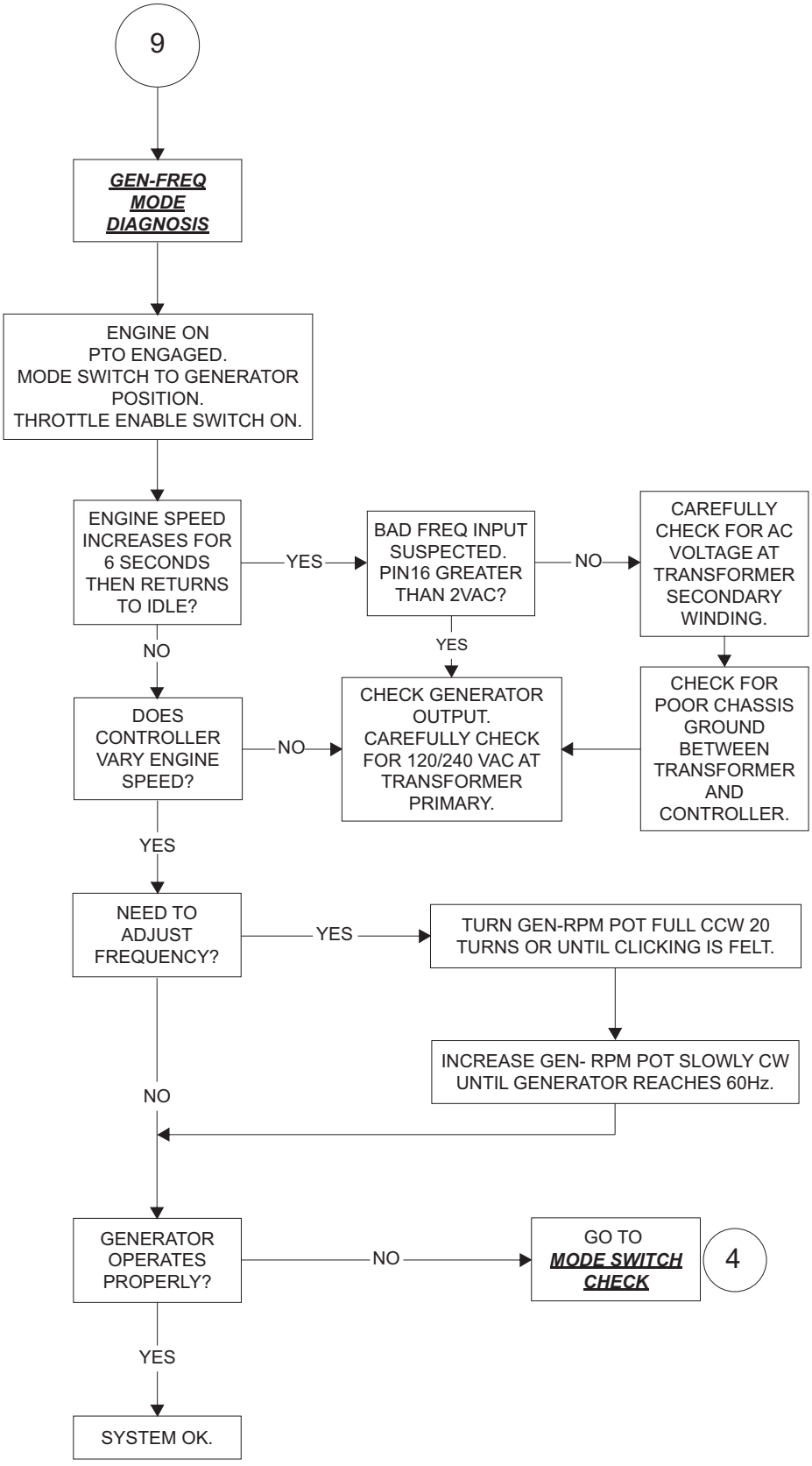
Flowchart 6.7:Pressure Mode Diagnosis: Calibration



Flowchart 6.8:GEN - RPM Mode Diagnosis



Flowchart 6.9:GEN - FREQ Mode Diagnosis



Reference Tables

Pressure Sensor

The Engine Throttle Controller is designed to work with a 0-300PSI pressure sensor with a 0.50VDC output at 0PSI. If the Controller reads a voltage below 0.4VDC, it considers the pressure sensor defective and will keep the engine at idle. This voltage is measured from Pin06 (red probe) to Pin05 (black probe).

Table 6.2:Pressure Sensor Voltage

Pressure	Voltage	Pressure	Voltage	Pressure	Voltage
10	0.64	110	2.06	210	3.48
20	0.78	120	2.20	220	3.62
30	0.93	130	2.34	230	3.76
40	1.07	140	2.48	240	3.90
50	1.21	150	2.63	250	4.04
60	1.35	160	2.77	260	4.18
70	1.49	170	2.91	270	4.33
80	1.63	180	3.05	280	4.47
90	1.78	190	3.19	290	4.61
100	1.92	200	3.33	300	4.75

Control Voltages

Note that these are typical values that may vary on different vehicles. Place the Digital Volt Meter black probe on the ECM Ground pin from the chart and place the red probe on the ECM signal pin.

Table 6.3:Typical Operating Control Voltages

Series	Model	ECM Signal	ECM Ground	Min. Control Voltage @ 800 RPM	High Idle Pot Setting @ 1000 RPM	Max. RPM Pot Setting @1800 RPM	Max. Throttle Voltage @2400 RPM	PTO Active Signal @Pin18
PCA-1	Cummins	Pin12	Pin11	0.70	1.04	2.39	3.4	0 (ground)
PCA-4	Navistar	Pin12	Pin11	0.70	1.04	2.39	3.4	12 (supply)
PCA-5 (NOTE)	Caterpillar	Pin12	Pin02	0.75	1.25	2.50	4.25	-
PCA-6	Ford	Pin12	Pin02	0.60	0.86	1.19	2.70	12 (supply)
PCA-6B	Ford	Pin12	Pin11	0.88	1.21	2.54	3.53	12 (supply)
PCA-9	GMAC	Pin19	Pin11	0.60	0.98	2.48	3.60	-
		Pin20	Pin11	4.50	4.13	2.63	1.50	-
		Pin21	Pin11	4.50	3.75	2.75	2.00	-
PCA-10	Mercedes	Pin12	Pin11	0.60	0.98	2.48	3.60	0 (ground)

NOTE: PCA-5 output signal is a Pulse Width Modulated (PWM) signal. Voltage readings shown in this table are to be measured with a Digital Volt Meter on the VDC setting and are used for diagnostic purposes only.

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