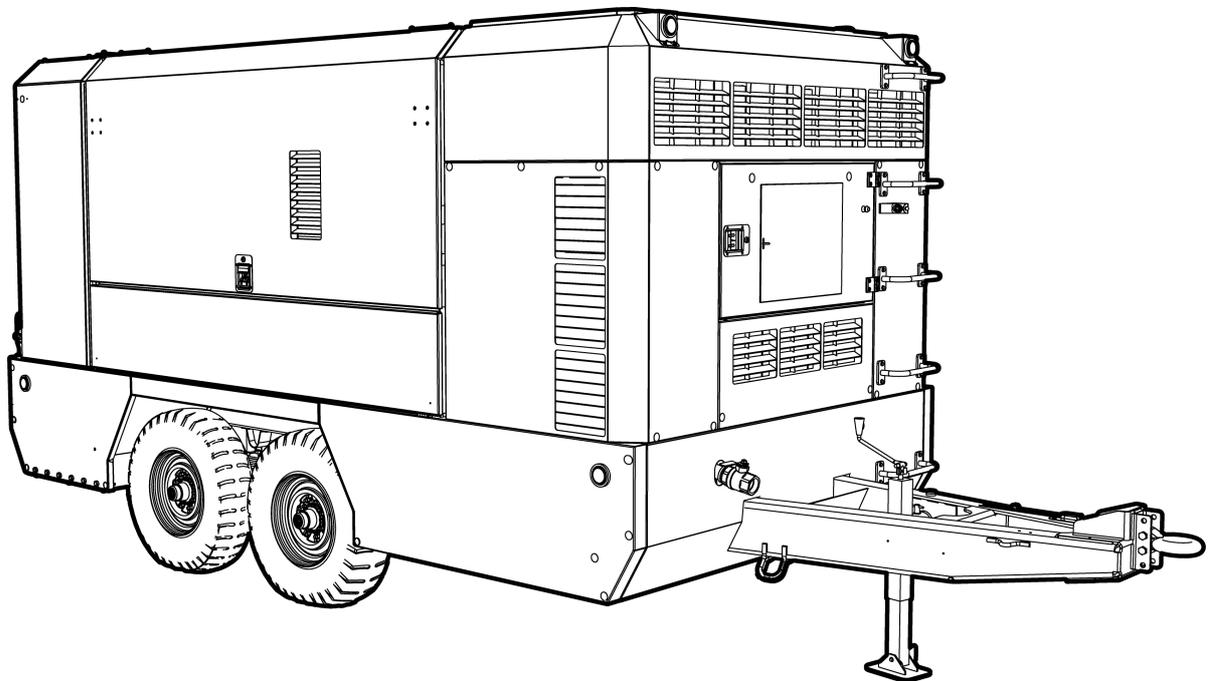




Portable Power

HP915, XP1000, XHP750 ELECTRONIC SERVICE MANUAL Original Instruction



This manual contains important safety information and must be made available to personnel who operate and maintain this machine.

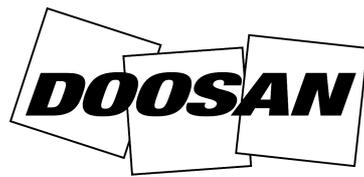
HP915, XP1000
XHP750

SERIAL No : 894000->
SERIAL No : 894500->



Portable Power

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Portable Power

GENERAL INFORMATION

4 GENERAL INFORMATION

Operational Theory

The HP915, XP1000, XHP750 Stage 4 – Tier 4F compressors have an electronic system that provides discharge air pressure control and package monitoring functions. The system uses the Titan controller to perform these functions. The electrical system connects all the necessary switches, sensors and transducers to the Titan controller in order for it to perform the monitoring and control functions.

Titan Controller

The Titan controller is the heart of the compressor monitoring and control system. It provides data collection, package monitoring, and control functions for compressor operations. It is a microprocessor-based controller with analog and digital inputs and outputs.

The Titan controller is mounted inside the control panel enclosure.

The first function of the Titan controller is to scan all inputs at a fixed interval. The analog values are compared to minimum and maximum values and an ALERT or FAULT is issued if a value is out of range. The various ALERTS and FAULTS are listed in the Compressor Diagnostic Code Troubleshooting section.

The second function of the Titan controller is compressor discharge pressure control. The Titan monitors the regulation system air pressure and varies the engine throttle to maintain the setpoint discharge air pressure. The setpoint pressure is set by adjusting the pressure regulator. For compressors equipped with dual pressure option, the setpoint pressure for each mode is set by adjusting the high and low pressure regulators.

The third function of the Titan controller is to communicate with the engine ECM and other control modules over the J1939 CAN network. Diagnostic and control information is passed between the Titan, engine ECM, ViewPort, and other optional controllers over the J1939 CAN network. The engine throttle setting is sent from the Titan to the engine ECM. Figure 1-1 shows the connection layout between the Titan controller and engine ECM.

Temperature Sensors and Pressure Transducers

The electronics system uses temperature sensors and pressure transducers to monitor the compressor operation. The temperature sensors used to measure compressor temperatures are thermistor type devices. The resistance output of the temperature sensor changes with a temperature change of the parameter being monitored. The Titan controller receives the resistance value of the sensor and converts it to a temperature value. The Titan uses the temperature value to ensure the parameter being monitored is within its operating limits and sends the value to the ViewPort for operator viewing.

The pressure sensors used to measure compressor pressures are transducer type devices. These devices have an output signal range of 0.5 VDC to 4.5 VDC where 0.5 VDC corresponds to 0 BAR (0 psi) and 4.5 VDC corresponds to the maximum BAR rating for a particular transducer. Pressure sensors are provided with 5 VDC from the Titan controller for excitation voltage. Also the sensor return or ground connects to the Titan controller. The output voltage of the pressure sensor changes with a pressure change of the parameter being monitored. The Titan controller receives the voltage of the sensor and converts it to a pressure value. The Titan uses the pressure value to ensure the parameter being monitored is within its operating limits and sends the value to the ViewPort for operator viewing.

Digital Inputs and Output

The Titan controller scans digital inputs such as switch contacts. These are 24 VDC, 12 VDC or 0 VDC. Digital inputs with 24 VDC or 12 VDC represent a closed switch contact. Digital inputs with 0 VDC represents an open switch contact.

The Titan controller provides 24 VDC digital outputs to control solenoids, relays, and other devices. These are 24 VDC "ON" and 0 VDC "OFF". They are current limited and short circuit protected.

Controller Outputs

The Titan controller has 24 VDC digital (ON/OFF) type outputs.

Pressure Control

The discharge pressure is controlled by manipulating engine speed and compressor inlet valve position. The inlet valve position is controlled pneumatically and the engine speed is controlled by the Titan controller. The Titan measures the pneumatic system regulation pressure and computes the engine throttle setting. This throttle setting is sent to the engine ECM via the J1939 CAN network. This throttle technique is referred to as J1939 throttle. The engine ECM will control engine speed to this throttle setting.

Engine Electronics

The HP915, XP1000, XHP750 model compressors contain a Stage 4 – Tier 4F emissions certified diesel engine. This engine has an electronic control system. The engine ECM handles all monitor, alarm, and control functions for the engine. The Titan controller communicates with the engine ECM over the J1939 CAN network.

ViewPort Display Module

The ViewPort display module displays compressor and engine operational information to the operator. The ViewPort contains a 7 inch color display and a navigation button to navigate through the information screens.

The ViewPort is connected to the J1939 CAN network for communication with other devices on the network. The ViewPort stores various events in the system log for historical use. The ViewPort contains an on-board manual documentation package.

J1939 CAN Network

The J1939 CAN network is a twisted pair of wires located in the compressor and engine harnesses. These wires are the network link between all electronic control modules. The wires are color coded yellow and dark green. The yellow wire is referred to as CAN High (+) and the dark green wire is referred to as CAN Low (-). Figure 1-2 shows the connection layout of the CAN network.

Located on each end of the J1939 CAN network are termination resistors (terminator). The terminators prevent reflections on the transmission line and must be in place for the network to function properly.

Electrical System

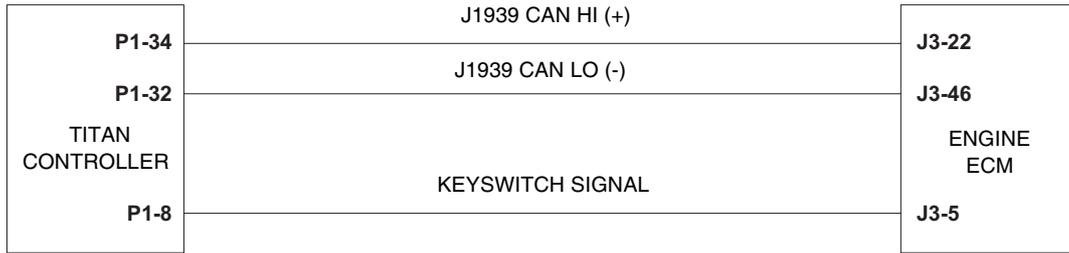
The electrical system consists of the wiring harnesses and associated electrical devices such as relays, switches, sensors and solenoids. There are five wiring harnesses on this compressor:

- Gauge Panel Harness
- Control Panel Harness
- Compressor Harness
- Engine Harness
- Engine Intake Air Heater Harness

Figure 1-3 shows the connection layout of the harness system.

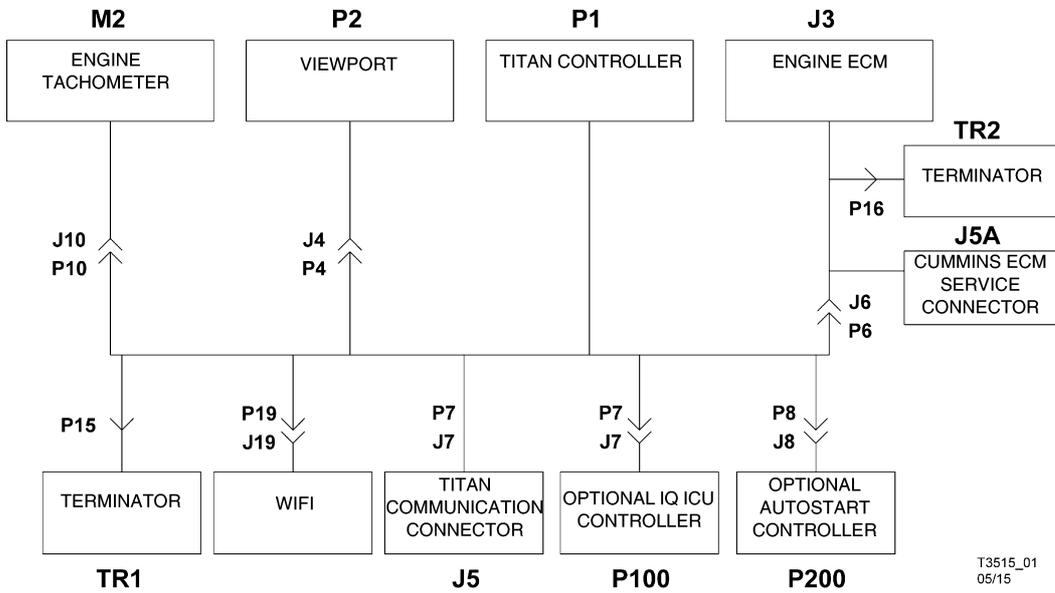
The electrical circuits are protected by ATM mini style fuses. A fuse should only be replaced with one of the same rating. Installing a larger rated fuse could lead to wiring harness damage.

TITAN TO ENGINE ECM CONNECTION LAYOUT
CUMMINS CM2350 ENGINE ECM



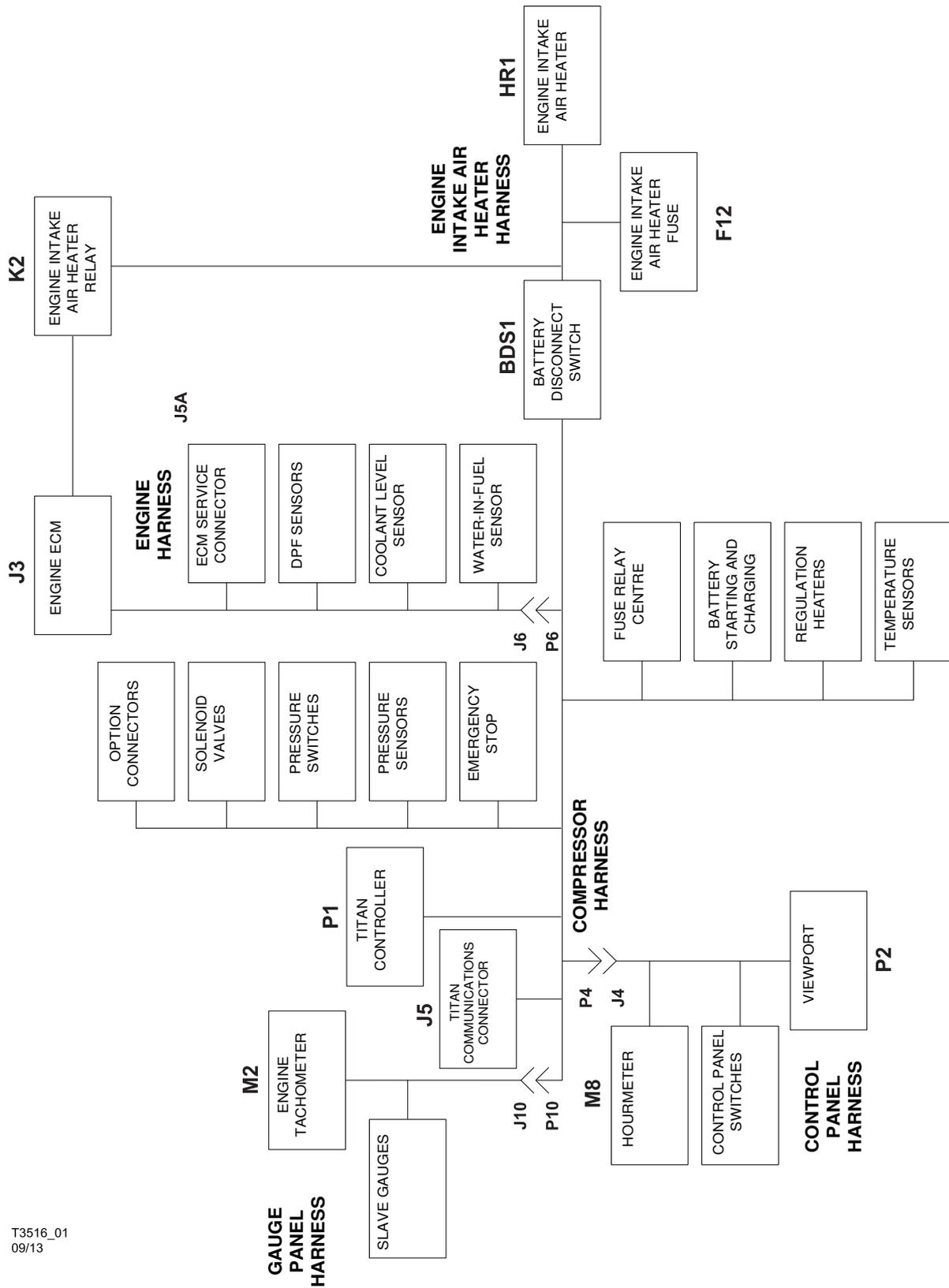
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J1939 CAN BUSS CONNECTION LAYOUT



T3515_01
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HARNESS SYSTEM CONNECTION LAYOUT



T3516_01
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COMPRESSOR OPERATION SEQUENCE

10 COMPRESSOR OPERATION SEQUENCE

Power On

When the main control switch is turned to the ON position:

- 1 Key ON/OFF signal (24 VDC) supplied to Titan controller, ViewPort display, and switched power relay (FB1-K5).
- 2 ViewPort display and gauges will initialize.
- 3 Panel lamp and gauge backlights power on.
- 4 Regulation heaters are powered on if ambient temperature is below 7°C (45°F).

Run

When the main control switch is turned to the RUN position:

- 1 Keyswitch signal (24 VDC) supplied to engine ECM from Titan.
- 2 Start compressor is powered on for 10 seconds.
- 3 Unloader solenoid valve (L2) is closed (de-energized).

Start

When the start button is pressed:

- 1 Start compressor is powered on.
- 2 Start/Run solenoid valve (L1) is opened (energized).
- 3 Unloader solenoid valve (L2) is closed (de-energized).
- 4 Engine starter is energized.

When the engine speed reaches 600 RPM (engine start declared):

- 1 Engine starter is de-energized.
- 2 Engine speed is set to 1500 RPM.

When the engine speed reaches 1450 RPM:

- 1 Start/Run solenoid valve (L1) is closed (de-energized).
- 2 Unloader solenoid valve (L2) is opened (energized).
- 3 Start compressor is powered off.

When the separator tank reaches 3.45 bar (50 psi):

- 1 Start/Run solenoid valve (L1) is opened (energized).
- 2 Engine speed remains at 1500 RPM until engine coolant temperature reaches 38°C (100°F). Then engine speed is set to idle speed, 1200 RPM (HP915, XP1000) or 1350 RPM (XHP750).
- 3 Service air button is unavailable for 5 seconds.

Load

When the service air button is pressed:

- 1 Engine speed is set to 1800 RPM.

When the engine speed reaches 1700 RPM:

- 1 Start/Run solenoid valve (L1) is closed (de-energized).

After 2 seconds, if the regulation system pressure is 0.28 bar (4 psi) or greater:

- 1 Engine speed control is engaged.

Stop

Close the service valve(s). Allow the compressor to run at idle speed for 3 to 5 minutes to allow cool down. Use Emergency Stop only for emergency conditions.

When the main control switch is turned to the ON position:

- 1 Keyswitch signal (24 VDC) from Titan to engine ECM is de-energized.
- 2 The engine will stop.
- 3 Key ON/OFF signal (24 VDC) will remain supplied to Titan controller, ViewPort display, and switched power relay (FB1-K5).
- 4 The ViewPort will remain on for viewing operating parameters and any active diagnostic codes.
- 5 Compressor gauges will remain active. Engine gauges will power off.
- 6 Panel lamp and gauge backlights will remain on.

When the main control switch is turned to the OFF position:

- 1 Key ON/OFF signal (24 VDC) supplied to Titan controller, ViewPort display, and switched power relay (FB1-K5) is de-energized.
- 2 ViewPort display, gauges, and compressor control system will power off.

COMPRESSOR DIAGNOSTIC CODE TROUBLESHOOTING

TROUBLESHOOTING PROCEDURES AND TECHNIQUES**General**

A thorough analysis of the problem is the key to successful troubleshooting. The more information known about a problem, the faster and easier the problem can be solved.

Troubleshooting charts are included to act as a guide to the troubleshooting process. They are organized so the easiest and most logical things are performed first. It is not possible to include all the solutions to problems that can occur or list all possible problems. The charts are designed to stimulate a thinking process that will lead to solution of the problem.

Basic Troubleshooting Steps

- Review the controller fault log for clues as to the problem.
- Collect all facts concerning the problem.
- Analyze the problem thoroughly.
- Relate the symptoms to the basic electrical / electronic systems and components.
- Consider any recent repairs that could relate to the problem.

General Measuring Guidelines

Since the electrical system uses sealed connectors and splices, access of test points can be difficult. It is recommended that a test probe kit be used to access the signals to prevent damage to wires and connectors. Back-probing connectors and insulation-piercing test probes can cause damage that can cause future failures.

Measuring Voltage

A digital voltmeter is recommended to make measurements. Voltage measurements are made by connecting the Red (+) lead to the desired signal and the Black (-) lead to the common. The test lead connections must be secure or incorrect readings will result. Do not use chassis ground or other metal connection. Circuit common will be any of the brown wires or battery negative.

IMPORTANT INFORMATION

DO NOT USE MACHINE FRAME, SHEET METAL, PIPING OR OTHER METAL COMPONENTS AS COMMON OR GROUND WHEN MAKING VOLTAGE OR FREQUENCY MEASUREMENTS.

Measuring Resistance

Extra care must be taken when making resistance measurements. Test probe connections are crucial to correct readings. Ensure the test probe makes a solid connection with the wire(s) or connector pin(s) under test. The test probe kit may help with these types of measurements. Make sure electrical system is powered OFF while making resistance measurements.

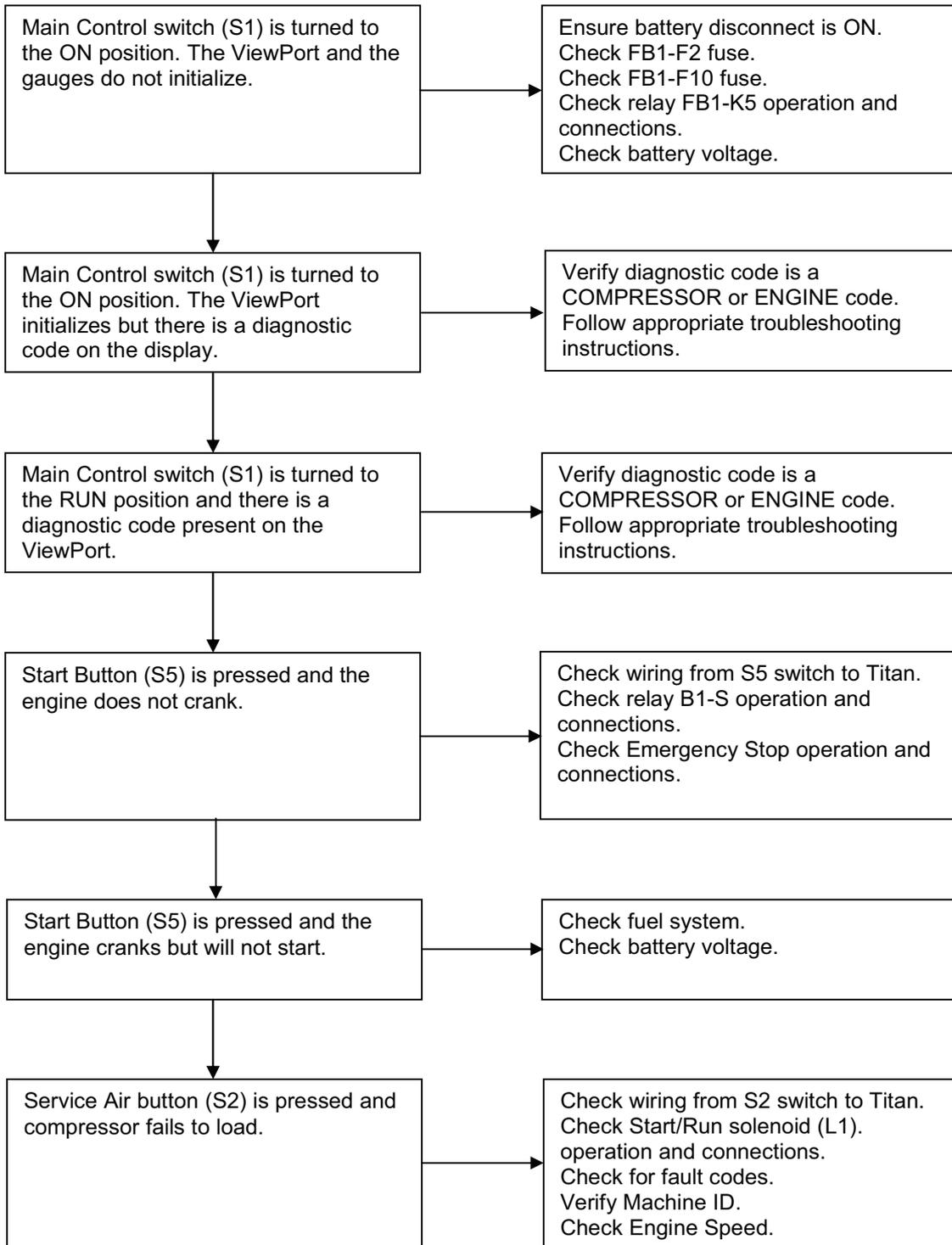
Measuring Frequency

Frequency is measured in the same manner as voltage, but the meter is set for "HZ" or frequency. Good connections are important or false readings will occur.

Measuring Duty Cycle

To measure duty cycle, setup the meter as if measuring frequency or voltage. Select the "%" or duty cycle function and take the measurements.

Troubleshooting Flow Chart



Compressor Diagnostic Codes

Compressor Code	Display Name	Description	Code Type
1	Low Engine Speed	Engine speed less than 800 RPM (HP915, XP1000) or 950 RPM (XHP750) for 30 seconds.	FAULT
2	High Engine Speed	Engine speed greater than 1900 RPM for 30 seconds.	FAULT
3	Engine Crank Timeout	Engine crank attempt longer than 15 seconds.	ALERT
4	Out of Fuel	Fuel level in tank below usable limit.	FAULT
9	Engine Diagnostic Code	Engine diagnostic code present in ViewPort history log.	ALERT
10	Engine Speed Response	Engine target idle speed not met within 10 seconds after loading compressor.	ALERT
11	AutoStart Attempts Exceeded	Compressor not started after 3 crank attempts.	FAULT
12	Low Fuel Level	Fuel level in tank approaching empty.	ALERT
29	Engine Shutdown Unknown	Engine stopped without an engine diagnostic code.	FAULT
30	High Airend Discharge Temperature	Airend discharge temperature greater than or equal to 120°C (248°F).	FAULT
31	Low Airend Oil Pressure	Airend oil pressure below 0.69 bar (10 psi).	FAULT
32	Airend Discharge Temperature Sensor	Airend discharge temperature sensor reading out of range.	FAULT
33	Separator Tank Pressure Sensor	Separator tank pressure sensor reading out of range.	FAULT
34	High Separator Tank Pressure At Start	Separator tank pressure greater than 1.38 bar (20 psi) at crank attempt.	ALERT
35	High Separator Tank Pressure	Air pressure in the separator tank exceeded limit.	FAULT
36	Safety Valve Open	Safety relief valve on separator tank opened.	FAULT
37	Low Airend Discharge Temperature	Airend discharge temperature -15°C (5°F) below calculated setpoint for 20 minutes.	FAULT
38	Intake Air Filters Restricted	Intake filters restricting air flow.	ALERT
39	Low System Voltage	Electrical system voltage below 25.5VDC.	ALERT

Compressor Diagnostic Codes

Compressor Code	Display Name	Description	Code Type
41	Airend Oil Pressure Sensor	Airend oil pressure sensor reading out of range.	FAULT
42	Fuel Level Sensor	Fuel level sensor reading out of range.	ALERT
43	Low Separator Tank Pressure	Separator tank pressure below 2.56 bar (40 psi) after compressor is loaded.	FAULT
44	High IQ Filter Restriction	IQ filters restricting air flow.	ALERT
50	High Separator Tank Temperature	Separator tank temperature greater than or equal to 120°C (248°F).	FAULT
51	Compressor ID Invalid	The Titan controller and ViewPort do not have a valid compressor ID.	FAULT
52	IQ Filters Restricted	IQ filters restricted past usable level.	FAULT
53	Separator Tank Temperature Sensor	Separator tank temperature sensor reading out of range.	FAULT
54	Regulation System Pressure Sensor	Regulation system pressure sensor reading out of range for 30 seconds.	FAULT
55	Emergency Stop Activated	Emergency Stop button has been activated.	FAULT
56	Low Start Pressure	Separator tank pressure below 3.45 bar (50 psi) 20 seconds after start.	ALERT
58	Ambient Temperature Sensor	Ambient temperature sensor reading out of range.	ALERT
59*	OTBV Solenoid Malfunction	Oil Temperature Bypass Valve Solenoid current out of range.	ALERT
60*	OTC System Temperature Sensor	OTC System Airend Discharge Temperature Sensor reading out of range.	ALERT
61	IQ Filter Pressure Error	IQ filter outlet pressure reading higher than inlet pressure.	ALERT
62	IQ System Louvers Malfunction	Louvers or louver actuator not operating properly.	ALERT
63	Primary IQ Pressure Sensor	IQ pressure sensor reading out of range.	ALERT
64	Secondary IQ Pressure Sensor	IQ pressure sensor reading out of range.	ALERT
66	IQ Aftercooler Temperature Sensor	IQ Aftercooler Temperature Sensor reading out of range.	ALERT
67	IQ Actuator Position Sensor	IQ Louver Actuator Position Sensor reading out of range.	ALERT
71	Engine ECM Communication	Communication between Titan controller and engine ECM not functional.	FAULT
73	AutoStart Controller Communication	Communication between Titan controller and AutoStart controller not functional.	ALERT
74*	OTC Controller Communication	Communication between Titan controller and OTC controller not functional.	ALERT
75	IQ TCU Controller Communication	Communication between Titan controller and IQ TCU controller not functional.	ALERT
76	Titan Controller Communication	Communication between Titan controller and ViewPort not functional.	ALERT

* Compressor Diagnostic Code does not apply to the HP915, XP1000 and XHP750 T4F family of compressors. If this problem occurs, check to ensure the proper ID is loaded in the ViewPort.

TITAN CONTROLLER LED STATUS DEFINITION

		LED STATUS		
		OFF	ON	BLINKING
TITAN LED COLOUR	GREEN	Titan Controller NOT Powered ON		Titan Controller Powered ON
	YELLOW	CAN BUS Communication to Engine ECM NOT Functioning		Titan Controller Powered ON
	RED	No ALERT / FAULT Codes Active	Active FAULT Code	Active Alert Code

COMPRESSOR CODE 1

Low Engine Speed

Explanation:

The Titan controller has received an engine speed value less than 800 RPM (HP915, XP1000) or 950 RPM (XHP750) for 30 seconds from the engine ECM.

Effect:

Code 1 is a FAULT condition and will stop the compressor. Code 1 and the FAULT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
<p>Step 1: Check ViewPort display for active engine diagnostic codes.</p>	<p>If active engine diagnostic codes are present, resolve the issues.</p>
<p>Step 2: Start and run the compressor at idle. Check ViewPort display to verify the engine target (RPM). If the engine coolant temperature is below 38°C (100°F), the engine target (RPM) will be 1500 RPM. If the engine coolant temperature is 38°C (100°F) or above, the engine target (RPM) will be 1200 RPM (HP915, XP1000) or 1350 RPM (XHP750).</p>	<p>If the engine target (RPM) is 1500 for cold idle or 1200 (HP915, XP1000) or 1350 (XHP750) for hot idle, the electronic system is commanding the engine to run at the correct speed. Proceed to step 3.</p>
<p>Step 3: Check the engine fuel system for restrictions.</p>	<p>If the fuel filters are dirty or have not been changed during regular service, replace fuel filters.</p> <p>If dirty fuel has been used, add clean fuel and replace fuel filters.</p> <p>If air has gotten into the fuel system, bleed the fuel system.</p> <p>If fuel hoses are damaged, replace fuel hoses.</p>
<p>Step 4: If steps 1 thru 3 checkout OK, refer to the engine manufacturer service dealer.</p>	

COMPRESSOR CODE 2

High Engine Speed

Explanation:

The Titan controller has received an engine speed value greater than 1900 RPM for 30 seconds from the engine ECM.

Effect:

Code 2 is a FAULT condition and will stop the compressor. Code 2 and the FAULT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
Step 1: Check ViewPort display for active engine diagnostic codes.	If active engine diagnostic codes are present, resolve the issues.
Step 2: Start and run the compressor at idle. Press the Service Air Button. Check ViewPort display to verify the engine target (RPM) is 1900.	If the engine target (RPM) is 1900, the electronic system is commanding the engine to run at the correct speed. Proceed to step 3
Step 3: If steps 1 and 2 checkout OK, refer to the engine manufacturer service dealer.	

COMPRESSOR CODE 3

Engine Crank Timeout

Explanation:

The operator has attempted to start the compressor longer than 15 seconds.

Effect:

Code 3 is a FAULT condition and will prevent further cranking. Code 3 and the FAULT name will be displayed on the ViewPort. Operator must wait 1 minute before electronic system will allow another start attempt.

Troubleshooting Steps

Action	Result
<p>Step 1: Wait 1 minute before attempting to start compressor.</p>	<p>After 1 minute, the electronic system will allow another 15 second start attempt.</p>
<p>Step 2: Check the engine fuel system for restrictions.</p>	<p>If the fuel filters are dirty or have not been changed during regular service, replace fuel filters.</p> <p>If dirty fuel has been used, add clean fuel and replace fuel filters.</p> <p>If air has gotten into the fuel system, bleed the fuel system.</p> <p>If fuel hoses are damaged, replace fuel hoses.</p>
<p>Step 3: If ambient temperature is below -12°C (10°F), verify cold weather kit is functioning (if equipped).</p>	<p>If cold weather kit is not functioning, then repair as needed.</p> <p>If cold weather kit is not installed, it is required to start compressor in ambient temperatures below -12°C (10°F).</p>

COMPRESSOR CODE 4

Out Of Fuel

Explanation:

The Titan controller has detected a condition from U1 fuel level sensor indicating the fuel level in the tank is below a usable limit.

Effect:

Code 4 is a FAULT condition and will stop the compressor. Code 4 and the FAULT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
Step 1: Check fuel level in tank.	If the fuel level is low, add fuel.
Step 2: Check all harness connections between Titan and U1 fuel level sensor.	If harness connections are loose or damaged, repair harness as needed.
Step 3: Remove fuel level sensor from fuel tank. With the fuel level sensor connected to the harness, turn the sensor upside down so float will go to the top. Turn the main control switch to the ON position. Verify the fuel level on the gauge is full and code 4 clears from the ViewPort.	If code 4 clears and the fuel level gauge shows full, the fuel level sensor is operating properly. If code 4 does not clear and the fuel level gauge shows empty, replace U1 fuel level sensor.
Step 4: With the fuel level sensor still removed from the tank and the main control switch in the ON position, tilt the fuel sensor so the float will move down. Verify the fuel level gauge is moving down the scale.	If the float in the fuel level sensor appears to be sticking while moving, replace U1 fuel level sensor.
Step 5: If steps 1 thru 4 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.	

COMPRESSOR CODE 9

Engine Diagnostic Code**Explanation:**

Compressor code 9 is used to define the list of engine diagnostic codes stored in the ViewPort history log.

Effect:

When viewing ALERT and FAULT history log stored in the ViewPort, the engine diagnostic codes stored will be found under compressor code 9.

COMPRESSOR CODE 10

Engine Speed Response

Explanation:

The engine has failed to reach target idle speed within 10 seconds after starting.

Effect:

Code 10 is an ALERT condition and will not stop the compressor, however minimum start pressure will not be met and pressure control will not be engaged. Code 10 and the ALERT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
Step 1: Use the ViewPort to verify the correct compressor ID is loaded.	If the correct compressor ID is not loaded, refer to the section "Entering Compressor ID" in Operation and Maintenance Manual.
Step 2: Check the engine fuel system for restrictions.	If the fuel filters are dirty or have not been changed during regular service, replace fuel filters. If dirty fuel has been used, add clean fuel and replace fuel filters. If air has gotten into the fuel system, bleed the fuel system. If fuel hoses are damaged, replace fuel hoses.
Step 3: If steps 1 and 2 checkout OK, refer to the engine manufacturer's service manual or service dealer.	

COMPRESSOR CODE 11

AutoStart Attempts Exceeded

Explanation:

The Titan controller has made three attempts to start the compressor as commanded by the AutoStart controller and the compressor failed to start.

Effect:

Code 11 is a FAULT condition and will prevent further cranking. Code 11 and the FAULT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
<p>Step 1: Start compressor manually to verify proper operation.</p>	<p>If the compressor operates properly in the manual mode, try starting the compressor in AutoStart mode again.</p> <p>If the compressor does not operate properly in the manual mode, proceed to step 2.</p>
<p>Step 2: Check the engine fuel system for restrictions.</p>	<p>If the fuel filters are dirty or have not been changed during regular service, replace fuel filters.</p> <p>If dirty fuel has been used, add clean fuel and replace fuel filters.</p> <p>If air has gotten into the fuel system, bleed the fuel system.</p> <p>If fuel hoses are damaged, replace fuel hoses.</p>
<p>Step 3: Check the condition of the compressor batteries.</p>	<p>If the batteries are discharged or not able to be charged, replace batteries.</p>
<p>Step 4: Verify the battery charger is operating properly.</p>	<p>If the battery charger is not operating properly, replace the battery charger.</p>
<p>Step 5: If ambient temperature is below -12°C (10°F), verify cold weather kit is functioning (if equipped).</p>	<p>If cold weather kit is not functioning, then repair.</p> <p>If cold weather kit is not installed, it is required to start compressor in ambient temperatures below -12°C (10°F).</p>

COMPRESSOR CODE 12

Low Fuel Level

Explanation:

The Titan controller has detected a condition from U1 fuel level sensor indicating the fuel level in the tank is approaching empty.

Effect:

Code 12 is an ALERT condition and will not stop the compressor. Code 12 and the FAULT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
Step 1: Check fuel level in tank.	If the fuel level is low, add fuel.
Step 2: Check all harness connections between Titan and U1 fuel level sensor.	If harness connections are loose or damaged, repair harness as needed.
Step 3: Remove fuel level sensor from fuel tank. With the fuel level sensor connected to the harness, turn the sensor upside down so float will go to the top. Turn the main control switch to the ON position. Verify the fuel level on the gauge is full and code 12 clears from the ViewPort.	If code 12 clears and the fuel level gauge shows full, the fuel level sensor is operating properly. If code 12 does not clear and the fuel level gauge shows empty, replace U1 fuel level sensor.
Step 4: With the fuel level sensor still removed from the tank and the main control switch in the ON position, tilt the fuel sensor so the float will move down. Verify the fuel level gauge is moving down the scale.	If the float in the fuel level sensor appears to be sticking while moving, replace U1 fuel level sensor.
Step 5: If steps 1 thru 4 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.	

COMPRESSOR CODE 29

Engine Shutdown Unknown

Explanation:

The engine has stopped and the Titan did not detect an engine diagnostic code from the engine ECM.

Effect:

Code 29 is a FAULT condition and will stop the compressor. Code 29 and the FAULT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
<p>Step 1: Check engine ECM fuse FB1-F6.</p>	<p>If fuse is blown, replace FB1-F6 fuse.</p>
<p>Step 2: Check the engine fuel system for restrictions.</p>	<p>If the fuel filters are dirty or have not been changed during regular service, replace fuel filters.</p> <p>If dirty fuel has been used, add clean fuel and replace fuel filters.</p> <p>If air has gotten into the fuel system, bleed the fuel system.</p> <p>If fuel hoses are damaged, replace fuel hoses.</p>
<p>Step 3: Check battery positive and negative connections to the engine ECM.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 4: Turn main control switch to the RUN position. Using a multimeter, measure the engine keyswitch signal voltage at J3-5.</p>	<p>Voltage measured should be 24 VDC at J3-5.</p> <p>If not, check all harness connections in the keyswitch signal circuit from Titan to engine ECM.</p>
<p>Step 5: If steps 1 thru 4 checkout OK, refer to the engine manufacturer service dealer.</p>	

COMPRESSOR CODE 30

High Airend Discharge Temperature

Explanation:

The Titan controller has detected a temperature from RT2 temperature sensor that is greater than or equal to 120°C (248°F).

Effect:

Code 30 is a FAULT condition and will stop the compressor. Code 30 and the FAULT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
Step 1: Check the coolers for air flow restrictions.	If the air flow through the coolers is being restricted, correct the issue.
Step 2: Check all harness connections between Titan and RT2 temperature sensor.	If harness connections are loose or damaged, repair harness as needed.
Step 3: Disconnect RT2 from harness and plug thermistor simulator (Part No. 22073878) into the RT2 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Airend Temperature value is between -20°C (-3°F) and -25°C (-13°F).	If temperature value on ViewPort is not between -20°C (-3°F) and -25°C (-13°F), check for defective harness connections. If temperature value on ViewPort is between -20°C (-3°F) and -25°C (-13°F), replace RT2 temperature sensor.
Step 4: If steps 1 thru 3 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.	

COMPRESSOR CODE 31

Low Airend Oil Pressure

Explanation:

The Titan controller has detected a pressure from PT3 pressure sensor that is below 0.69 bar (10 psi).

Effect:

Code 31 is a FAULT condition and will stop the compressor. Code 31 and the FAULT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
<p>Step 1: Check the compressor oil level in separator tank.</p>	<p>If the compressor oil level is low, add compressor oil as needed.</p>
<p>Step 2: Check all harness connections between Titan and PT3 pressure sensor.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 3: Disconnect PT3 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT3 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Airend Oil Pressure value is between 5.52 bar (80 psi) and 6.21 bar (90 psi).</p>	<p>If pressure value on ViewPort is not between 5.52 bar (80 psi) and 6.21 bar (90 psi), check for defective harness connections. If pressure value on ViewPort is between 5.52 bar (80 psi) and 6.21 bar (90 psi), replace PT3 pressure sensor.</p>
<p>Step 4: If steps 1 thru 3 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.</p>	

COMPRESSOR CODE 32

Airend Discharge Temperature Sensor

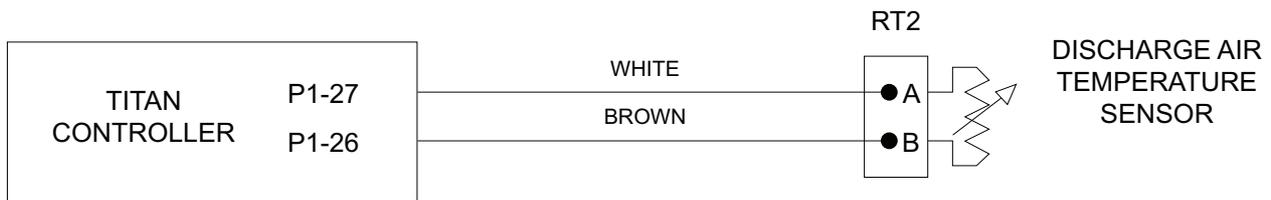
Explanation:

The Titan controller has detected an out of range reading from the RT2 temperature sensor.

Effect:

Code 32 is a FAULT condition and will stop the compressor. Code 32 and the FAULT name will be displayed on the ViewPort.

RT2 Temperature Sensor Circuit:

**Circuit Description:**

The temperature sensor connects to the Titan controller as shown in the circuit diagram. RT2 is a 10K ohm thermistor type temperature sensor. The white wire is the sense line to the Titan. The brown wire is the sensor ground.

Component Location:

RT2 temperature sensor is located in the discharge pipe of the airend.

Troubleshooting Steps

Action	Result
Step 1: Check all harness connections between Titan and RT2 temperature sensor.	If harness connections are loose or damaged, repair harness as needed.
Step 2: Disconnect RT2 from harness and plug thermistor simulator (Part No. 22073878) into the RT2 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Airend Temperature value is between -20°C (-3°F) and -25°C (-13°F).	If temperature value on ViewPort is not between -20°C (-3°F) and -25°C (-13°F), check for defective harness connections. If temperature value on ViewPort is between -20°C (-3°F) and -25°C (-13°F), replace RT2 temperature sensor.
Step 3: If steps 1 and 2 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.	

COMPRESSOR CODE 33

Separator Tank Pressure Sensor

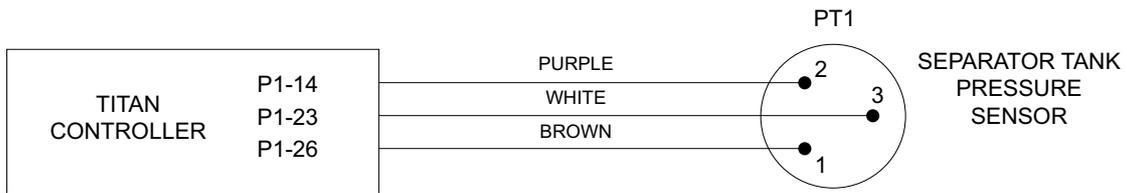
Explanation:

The Titan controller has detected an out of range reading from the PT1 pressure sensor.

Effect:

Code 33 is a FAULT condition and will stop the compressor. Code 33 and the FAULT name will be displayed on the ViewPort.

PT1 Pressure Sensor Circuit:



Circuit Description:

The pressure sensor connects to the Titan controller as shown in the circuit diagram. The purple wire is the 5 VDC excitation supply from the Titan. The white wire is the signal output to the Titan with a range of 0.5 to 4.5 VDC. The brown wire is the sensor ground. The pressure range of PT1 is 0 bar (0 psi) (0.5 VDC) to 15.5 bar (225 psig) (4.5 VDC).

Component Location:

PT1 pressure sensor is located on top of the separator tank.

COMPRESSOR CODE 33

Troubleshooting Steps

Action	Result
<p>Step 1:</p> <p>Check all harness connections between Titan and PT1 pressure sensor.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 2:</p> <p>Disconnect PT1 connector from the harness. Turn the main control switch to the ON position. Using a multimeter, measure the voltage between PT1-1 and PT1-2.</p>	<p>Voltage measured should be 5 VDC between PT1-1 and PT1-2.</p> <p>If voltage measured is not 5 VDC, check for defective harness connections.</p>
<p>Step 3:</p> <p>Disconnect PT1 connector from the harness and P1 connector from the Titan. Using a multimeter, measure resistance between PT1-1 and P1-26.</p> <p>Using a multimeter, measure resistance between PT1-2 and P1-14.</p> <p>Using a multimeter, measure resistance between PT1-3 and P1-23.</p>	<p>Continuity should be shorted between PT1-1 and P1-26.</p> <p>Continuity should be shorted between PT1-2 and P1-14.</p> <p>Continuity should be shorted between PT1-3 and P1-23.</p> <p>If not, check for defective harness connections.</p>
<p>Step 4:</p> <p>Disconnect PT1 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT1 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Air Pressure value is between 5.52 bar (80 psi) and 6.21 bar (90 psi).</p>	<p>If pressure value on ViewPort is not between 5.52 bar (80 psi) and 6.21 bar (90 psi), check for defective harness connections.</p> <p>If pressure value on ViewPort is between 5.52 bar (80 psi) and 6.21 bar (90 psi), replace PT1 pressure sensor.</p>
<p>Step 5:</p> <p>If steps 1 thru 4 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.</p>	

COMPRESSOR CODE 34

Separator Tank Pressure Sensor

Explanation:

The Titan controller has detected a pressure from PT1 pressure sensor that is greater than 1.38 bar (20 psi) at the time of engine start.

Effect:

Code 34 is a FAULT condition and will prevent starting until the separator tank pressure is below 1.38 bar (20 psi). Code 34 and the FAULT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
<p>Step 1: Wait until Air Pressure is below 1.38 bar (20 psi) before trying to start the compressor.</p>	<p>If Air Pressure is not below 1.38 bar (20 psi) and the system continues to hold pressure, proceed to step 2.</p>
<p>Step 2: Open the manual service valve to ensure the system is completely blown down. Check the Air Pressure value on the ViewPort display and the mechanical display to verify the value is 0 bar (0 psi).</p>	<p>If the air system is completely blown down and the Air Pressure value on the ViewPort display is 1.38 bar (20 psi) or greater, proceed to step 3.</p>
<p>Step 3: Check all harness connections between Titan and PT1 pressure sensor.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 4: Disconnect PT1 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT1 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Air Pressure value is between 5.52 bar (80 psi) and 6.21 bar (90 psi).</p>	<p>If pressure value on ViewPort is not between 5.52 bar (80 psi) and 6.21 bar (90 psi), check for defective harness connections. If pressure value on ViewPort is between 5.52 bar (80 psi) and 6.21 bar (90 psi), replace PT1 pressure sensor.</p>
<p>Step 5: If steps 1 thru 4 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.</p>	

COMPRESSOR CODE 35

High Separator Tank Pressure

Explanation:

The Titan controller has detected a pressure from PT1 pressure sensor that is greater than or equal to 12.07 bar (175 psi) and a pressure from PT2 that is less than 1.0 bar (15 psi).

Effect:

Code 35 is a FAULT condition and will stop the compressor. Code 35 and the FAULT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
<p>Step 1: Start and load compressor. With the service valve closed and the engine speed at idle, check ViewPort display to verify Air Pressure value is close to the same pressure as the air pressure gauge. Also check ViewPort display to verify regulation pressure value is above 1.0 bar (15 psi).</p>	<p>If the Air Pressure value on the ViewPort is different than the mechanical gauge, proceed to step 2. If the regulation pressure value is below 1.0 bar (15 psi), proceed to step 4.</p>
<p>Step 2: Check all harness connections between Titan and PT1 pressure sensor.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 3: Disconnect PT1 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT1 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Air Pressure value is between 5.52 bar (80 psi) and 6.21 bar (90 psi).</p>	<p>If pressure value on ViewPort is not between 5.52 bar (80 psi) and 6.21 bar (90 psi), check for defective harness connections. If pressure value on ViewPort is between 5.52 bar (80 psi) and 6.21 bar (90 psi), replace PT1 pressure sensor.</p>
<p>Step 4: Check all harness connections between Titan and PT2 pressure sensor.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 5: Disconnect PT2 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT2 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Regulation Pressure value is between 2.28 bar (33 psi) and 2.96 bar (43 psi).</p>	<p>If pressure value on ViewPort is not between 2.41 bar (35 psi) and 3.10 bar (45 psi), check for defective harness connections. If pressure value on ViewPort is between 2.28 bar (33 psi) and 2.96 bar (43 psi), replace PT2 pressure sensor.</p>
<p>Step 6: If steps 1 thru 5 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.</p>	

COMPRESSOR CODE 36

Safety Valve Open

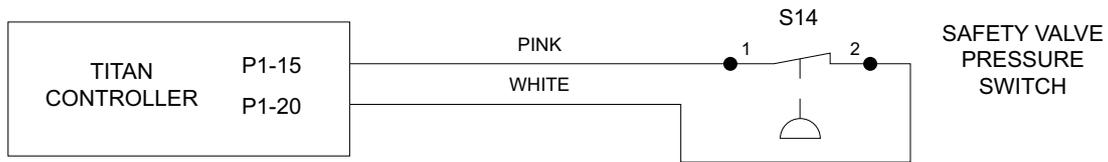
Explanation:

The Titan controller has detected an open contact from S14 pressure switch indicating the safety valve has opened.

Effect:

Code 36 is a FAULT condition and will stop the compressor. Code 36 and the FAULT name will be displayed on the ViewPort.

S14 Pressure Switch Circuit:



Circuit Description:

The pressure switch connects to the Titan controller as shown in the circuit diagram. S14 is a normally closed pressure switch that opens when the pressure rises above 0.83 bar (12 psi). When the switch opens the 12 VDC input to the Titan is removed. The pink wire is the switch common supply voltage (12 VDC). The light-blue wire is the input to the Titan.

Component Location:

S14 pressure switch is located in the safety valve on the separator tank.

COMPRESSOR CODE 36

Troubleshooting Steps

Action	Result
Step 1: Verify that the safety valve is operating properly.	If the safety valve is not operating properly, replace the safety valve.
Step 2: Check all harness connections between Titan and S14 pressure switch.	If harness connections are loose or damaged, repair harness as needed.
Step 3: Disconnect S14 connector from the harness. Using a multimeter, check resistance across pins 1 and 2 of the pressure switch to verify the switch is closed.	If there is no continuity across the pressure switch terminals, replace S14 pressure switch.
Step 4: Disconnect S14 connector from the harness. Turn the main control switch to the ON position. Using a multimeter, measure the voltage between S14-1 and battery negative.	Voltage measured should be 12 VDC between S14-1 and battery negative. If voltage measured is not 12 VDC, check for defective harness connections.
Step 5: Disconnect P1 connector from the Titan. Ensure S14 pressure switch is connected to the harness. Using a multimeter, check resistance between P1-15 and P1-20.	Continuity should be shorted between P1-15 and P1-20. If not, check for defective harness connections.
Step 6: If steps 1 thru 5 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.	

COMPRESSOR CODE 37

Low Aired Discharge Temperature

Explanation:

The Titan controller has detected a temperature from RTD1 temperature sensor that is more than -15°C (5°F) below the calculated airdischarge temperature setpoint for 20 minutes. If compressor code 60 or 74 is active then the Titan detects the temperature from RT2. Several compressor ALERT conditions can cause the temperature control to default to the full cool mode.

Effect:

Code 37 is a FAULT condition and will stop the compressor after 20 minutes. Code 37 and the FAULT name will be displayed on the ViewPort.

This compressor code does not apply to the HP915, XP1000, XHP750 T4F family of compressors. If this problem occurs, try the troubleshooting steps below.

Troubleshooting Steps

Action	Result
<p>Step 1: Use the ViewPort to verify the correct Compressor ID is loaded.</p>	<p>If the correct compressor ID is not loaded, refer to the section "Entering Compressor ID" in Operation and Maintenance Manual.</p>
<p>Step 2: If step 1 checks out OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.</p>	

COMPRESSOR CODE 38

Intake Air Filter Restricted

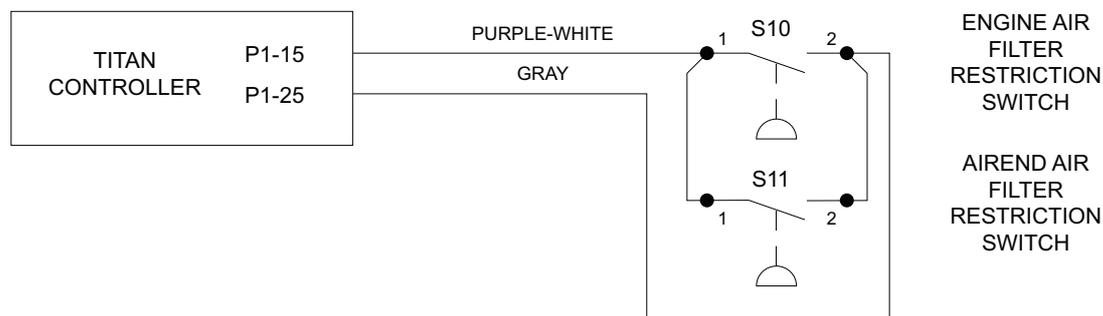
Explanation:

The Titan controller has detected a closed contact from S10 (Engine Air Filter) and/or S11 (Airend Air Filter) pressure switch indicating the filter is restricted.

Effect:

Code 38 is an ALERT condition and will not stop the compressor. Code 38 and the ALERT name will be displayed on the ViewPort.

S10 pressure switch circuit

**Circuit Description:**

The air filter restriction switches connect to the Titan controller as shown in the circuit diagram. S10 and S11 are normally open pressure switches that close when the air filter restriction reaches 51 cm (20 inches) of water. When S10 and S11 switch contacts close, a 12 VDC input is sent to the Titan. The white wire is the switch common supply (12 VDC). The pink wire is the input to the Titan.

Component Location:

S10 air filter restriction switch is located behind the engine air filter housing.
S11 air filter restriction switch is located behind the airend air filter housing.

COMPRESSOR CODE 38

Troubleshooting Steps

Action	Result
<p>Step 1: Check the engine and airend filters.</p>	<p>If the filters are dirty or clogged, replace filters as needed.</p>
<p>Step 2: Check all harness connections between Titan and S10 engine and S11 airend filter restriction switches.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 3: Disconnect the harness from S10 and S11 air filter restriction switches. Using a multimeter, check resistance across S10 and S11 switch terminals to verify the switches are open.</p>	<p>If there is continuity across S10 and/or S11 switch terminals, replace the bad pressure switch(es).</p>
<p>Step 4: Disconnect the harness from S10 air filter restriction switch. Turn the main control switch to the ON position. Using a multimeter, measure the voltage from the white wire at S10 to battery negative.</p>	<p>Voltage measures should be 12 VDC between the purple-white wire at S10 and S11 to battery negative. If voltage measured is not 12 VDC, check for defective harness connections.</p>
<p>Step 5: Disconnect P1 connector from the Titan. Ensure S10 and S11 filter restriction switches are connected to the harness. Using a multimeter, check resistance between P1-15 and P1-25.</p>	<p>Continuity should be open between P1-15 and P1-25. If not, check for defective harness connections.</p>
<p>Step 6: If steps 1 thru 5 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.</p>	

COMPRESSOR CODE 39

Low System Voltage

Explanation:

The Titan controller has detected the system voltage during compressor operation has reached a level below 25.5 VDC.

Effect:

Code 39 is an ALERT condition and will not stop the compressor, however if the system voltage reaches too low of a level the electronics will shutoff and the compressor will stop. Code 39 and the ALERT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
Step 1: Check alternator fuse F11.	If fuse is blown, replace F11 fuse.
Step 2: Check all harness connections between alternator and battery system.	If harness connections are loose or damaged, repair harness as needed.
Step 3: Start and run compressor at idle. Using a multimeter, measure the voltage between the alternator G1-POS and battery negative.	Voltage measured should be 27 VDC or above between alternator G1-POS and battery negative. If voltage measured is less than 27 VDC, replace G1 alternator.
Step 4: Start and run compressor at idle. Using a multimeter, measure the voltage between the Titan P1-1 and battery negative. Using a multimeter, measure the voltage between P1-13 and battery negative. Using a multimeter, measure the voltage between P1-24 and battery negative.	Voltage measured should be 27 VDC or above at all 3 measured points. If voltage measured is not 27 VDC or above at all 3 measured points, check for defective harness connections.
Step 5: Disconnect battery cables from the batteries. Using a battery load tester, test each battery.	If the one or both batteries test bad using the load tester, replace the defective battery(s).
Step 6: If steps 1 thru 5 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.	

COMPRESSOR CODE 41

Airend Oil Pressure Sensor

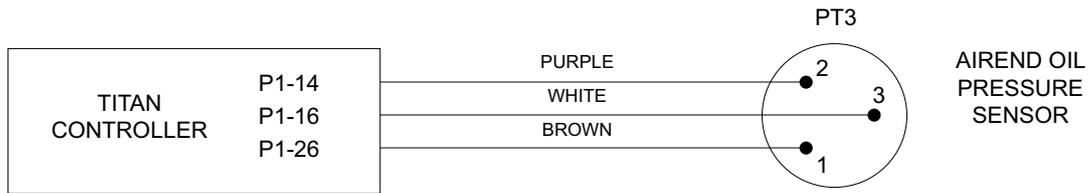
Explanation:

The Titan controller has detected an out of range reading from the PT3 pressure sensor.

Effect:

Code 41 is a FAULT condition and will stop the compressor. Code 41 and the FAULT name will be displayed on the ViewPort.

PT3 Pressure Sensor Circuit:



Circuit Description:

The pressure sensor connects to the Titan controller as shown in the circuit diagram. The purple wire is the 5 VDC excitation supply from the Titan. The white wire is the signal output to the Titan with a range of 0.5 to 4.5 VDC. The brown wire is the sensor ground. The pressure range of PT3 is 0 bar (0 psi) (0.5 VDC) to 15.5 bar (225 psig) (4.5 VDC).

Component Location:

PT3 pressure sensor is located on the airend, near the oil supply port.

COMPRESSOR CODE 41

Troubleshooting Steps

Action	Result
<p>Step 1: Check all harness connections between Titan and PT3 pressure sensor.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 2: Disconnect PT1 connector from the harness. Turn the main control switch to the ON position. Using a multimeter, measure the voltage between PT3-1 and PT3-2.</p>	<p>Voltage measured should be 5 VDC between PT3-1 and PT3-2. If voltage measured is not 5 VDC, check for defective harness connections.</p>
<p>Step 3: Disconnect PT3 connector from the harness and P1 connector from the Titan. Using a multimeter, measure resistance between PT3-1 and P1-26. Using a multimeter, measure resistance between PT3-2 and P1-14. Using a multimeter, measure resistance between PT3-3 and P1-16.</p>	<p>Continuity should be shorted between PT3-1 and P1-26. Continuity should be shorted between PT3-2 and P1-14. Continuity should be shorted between PT3-3 and P1-16. If not, check for defective harness connections.</p>
<p>Step 4: Disconnect PT3 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT3 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Airend Oil Pressure value is between 5.52 bar (80 psi) and 6.21 bar (90 psi).</p>	<p>If pressure value on ViewPort is not between 5.52 bar (80 psi) and 6.21 bar (90 psi), check for defective harness connections. If pressure value on ViewPort is between 5.52 bar (80 psi) and 6.21 bar (90 psi), replace PT3 pressure sensor.</p>
<p>Step 5: If steps 1 thru 4 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.</p>	

COMPRESSOR CODE 42

Fuel Level Sensor

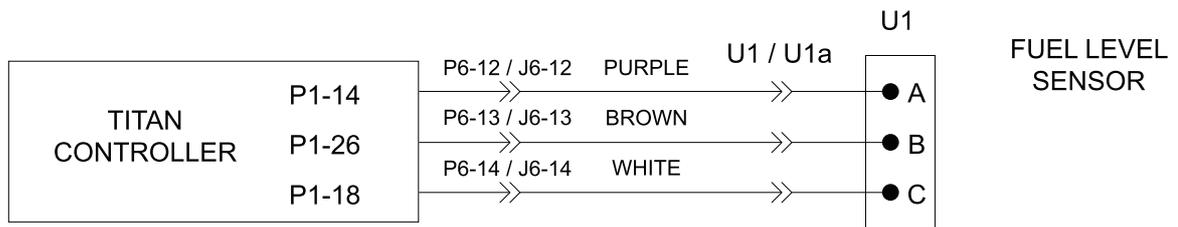
Explanation:

The Titan controller has detected an out of range reading from the U1 fuel level sensor.

Effect:

Code 42 is an ALERT condition and will not stop the compressor, however if the fuel level in the tank reaches a level below the pick-up tube the compressor will stop with no indication of reason. Code 42 and the FAULT name will be displayed on the ViewPort.

U1 Fuel Level Sensor Circuit:



Circuit Description:

The fuel level sensor connects to the Titan controller as shown in the circuit diagram. The purple wire is the 5 VDC excitation supply from the Titan. The white wire is the signal output to the Titan with a range of 0.5 to 4.5 VDC. The brown wire is the sensor ground. The level range of U1 is empty (0.5 VDC) to full (4.5 VDC).

Component Location:

U1 fuel level sensor is located in the fuel tank.

COMPRESSOR CODE 42

Troubleshooting Steps

Action	Result
<p>Step 1: Check all harness connections between Titan and U1 fuel level sensor.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 2: Disconnect U1 connector from the harness. Turn the main control switch to the ON position. Using a multimeter, measure the voltage between U1-A and U1-B.</p>	<p>Voltage measured should be 5 VDC between U1-A and U1-B. If voltage measured is not 5 VDC, check for defective harness connections.</p>
<p>Step 3: Disconnect U1 connector from the harness and P1 connector from the Titan. Using a multimeter, measure resistance between U1-B and P1-26. Using a multimeter, measure resistance between U1-A and P1-14. Using a multimeter, measure resistance between U1-C and P1-18.</p>	<p>Continuity should be shorted between U1-B and P1-26. Continuity should be shorted between U1-A and P1-14. Continuity should be shorted between U1-C and P1-18. If not, check for defective harness connections.</p>
<p>Step 4: Remove fuel level sensor from fuel tank. With the fuel level sensor connected to the harness, turn the sensor upside down so float will go to the top. Turn the main control switch to the ON position. Verify the fuel level on the gauge is full and code 42 clears from the ViewPort.</p>	<p>If code 42 clears and the fuel level gauge shows full, the fuel level sensor is operating properly. If code 42 does not clear and the fuel level gauge shows empty, replace U1 fuel level sensor.</p>
<p>Step 5: With the fuel level sensor still removed from the tank and the main control switch in the ON position, tilt the fuel sensor so the float will move down. Verify the fuel level gauge is moving down the scale.</p>	<p>If the float in the fuel level sensor appears to be sticking while moving, replace U1 fuel level sensor.</p>
<p>Step 6: If steps 1 thru 5 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.</p>	

COMPRESSOR CODE 43

Low Separator Tank Pressure

Explanation:

The Titan controller has detected a pressure from PT1 pressure sensor that is less than 2.56 bar (40 psi) after the compressor is loaded.

Effect:

Code 43 is a FAULT condition and will stop the compressor. Code 43 and the FAULT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
<p>Step 1: Check for leaking air hoses and pipes.</p>	<p>If air hoses or pipes are found to be leaking, tighten or replace as needed.</p>
<p>Step 2: Check all harness connections between Titan and PT1 pressure sensor.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 3: Disconnect PT1 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT1 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Air Pressure value is between 5.52 bar (80 psi) and 6.21 bar (90 psi).</p>	<p>If pressure value on ViewPort is not between 5.52 bar (80 psi) and 6.21 bar (90 psi), check for defective harness connections.</p> <p>If pressure value on ViewPort is between 5.52 bar (80 psi) and 6.21 bar (90 psi), replace PT1 pressure sensor.</p>
<p>Step 4: If steps 1 thru 3 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.</p>	

COMPRESSOR CODE 44

High IQ Filter Restriction

Explanation:

The Titan controller has received a message over the J1939 CAN network from the IQ TCU controller indicating the IQ filters are starting to restrict air flow.

Effect:

Code 44 is an ALERT condition and will not stop the compressor. Code 44 and the ALERT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
Step 1: Check for leaking air hoses and pipes.	If air hoses or pipes are found to be leaking, tighten or replace as needed.
Step 2: Replace IQ filters.	If replacing the IQ filters does not correct the problem, proceed to step 3.
Step 3: Check all harness connections between IQ TCU and PT100 and PT 101 pressure sensors.	If harness connections are loose or damaged, repair harness as needed.
Step 4: Disconnect PT100 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT100 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Primary Differential Pressure value is between 7.86 bar (114 psi) and 8.55 bar (124 psi).	If pressure value on ViewPort is not between 7.86 bar (114 psi) and 8.55 bar (124 psi), check for defective harness connections. If pressure value on ViewPort is between 7.86 bar (114 psi) and 8.55 bar (124 psi), replace PT100 pressure sensor.
Step 5: Disconnect PT101 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT101 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Primary and Secondary Differential Pressure value is between 7.86 bar (114 psi) and 8.55 bar (124 psi).	If pressure value on ViewPort is not between 7.86 bar (114 psi) and 8.55 bar (124 psi), check for defective harness connections. If pressure value on ViewPort is between 7.86 bar (114 psi) and 8.55 bar (124 psi), replace PT101 pressure sensor.
Step 6: If steps 1 thru 6 checkout OK, replace IQ TCU controller.	

COMPRESSOR CODE 50

High Separator Tank Temperature

Explanation:

The Titan controller has detected a temperature from RT1 temperature sensor that is greater than or equal to 120°C (248°F).

Effect:

Code 50 is a FAULT condition and will stop the compressor. Code 50 and the FAULT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
<p>Step 1: Check all harness connections between Titan and RT1 temperature sensor.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 2: Disconnect RT1 from harness and plug thermistor simulator (Part No. 22073878) into the RT1 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Separator Tank Temperature value is between -20°C (-3°F) and -25°C (-13°F).</p>	<p>If temperature value on ViewPort is not between -20°C (-3°F) and -25°C (-13°F), check for defective harness connections.</p> <p>If temperature value on ViewPort is between -20°C (-3°F) and -25°C (-13°F), replace RT1 temperature sensor.</p>
<p>Step 3: If steps 1 and 2 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.</p>	

COMPRESSOR CODE 51

Compressor ID Invalid

Explanation:

The Titan controller and the ViewPort display do not have a valid compressor ID. Code 51 will occur only when a new Titan and a new ViewPort are installed at the same time. The compressor ID defines the proper operational profile of the compressor. Absence of code 51 does not ensure the compressor ID is correct.

Effect:

Code 51 is a FAULT condition and will prevent any operation of the compressor. Code 51 and the FAULT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
Step 1: Use the ViewPort to verify the correct Compressor ID is loaded.	If the correct compressor ID is not loaded, refer to the section "Entering Compressor ID" in Operation and Maintenance Manual.

COMPRESSOR CODE 52

IQ Filters Restricted

Explanation:

The Titan controller has received a message over the J1939 CAN network from the IQ TCU controller indicating the IQ filters are restricting air flow past a usable level.

Effect:

Code 52 is a FAULT condition and will stop the compressor. Code 52 and the FAULT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
<p>Step 1: Replace IQ filters.</p>	<p>If replacing the IQ filters does not correct the problem, proceed to step 2.</p>
<p>Step 2: Check all harness connections between IQ TCU and PT100 and PT101 pressure sensors.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 3: Disconnect PT100 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT100 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Primary Differential Pressure value is between 7.86 bar (114 psi) and 8.55 bar (124 psi).</p>	<p>If pressure value on ViewPort is not between 7.86 bar (114 psi) and 8.55 bar (124 psi), check for defective harness connections. If pressure value on ViewPort is between 7.86 bar (114 psi) and 8.55 bar (124 psi), replace PT100 pressure sensor.</p>
<p>Step 4: Disconnect PT101 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT101 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Primary and Secondary Differential Pressure value is between 7.86 bar (114 psi) and 8.55 bar (124 psi).</p>	<p>If pressure value on ViewPort is not between 7.86 bar (114 psi) and 8.55 bar (124 psi), check for defective harness connections. If pressure value on ViewPort is between 7.86 bar (114 psi) and 8.55 bar (124 psi), replace PT101 pressure sensor.</p>
<p>Step 5: If steps 1 thru 5 checkout OK, replace IQ TCU controller.</p>	

COMPRESSOR CODE 53

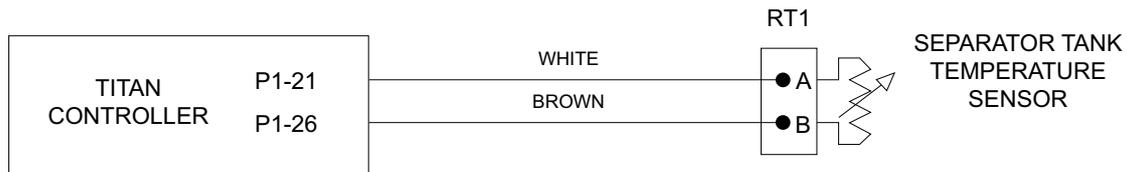
Separator Tank Temperature Sensor

Explanation:

The Titan controller has detected an out of range reading from the RT1 temperature sensor.

Effect:

Code 53 is a FAULT condition and will stop the compressor. Code 53 and the FAULT name will be displayed on the ViewPort.

RT1 Temperature Sensor Circuit:**Circuit Description:**

The temperature sensor connects to the Titan controller as shown in the circuit diagram. RT1 is a 10K ohm thermistor type temperature sensor. The white wire is the sense line to the Titan. The brown wire is the sensor ground.

Component Location:

RT1 temperature sensor is located on the side of the separator tank near the safety valve.

Troubleshooting Steps

Action	Result
Step 1: Check all harness connections between Titan and RT1 temperature sensor.	If harness connections are loose or damaged, repair harness as needed.
Step 2: Disconnect RT1 from harness and plug thermistor simulator (Part No. 22073878) into the RT1 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Separator Tank Temperature value is between -20°C (-3°F) and -25°C (-13°F).	If temperature value on ViewPort is not between -20°C (-3°F) and -25°C (-13°F), check defective harness connections. If temperature value on ViewPort is between -20°C (-3°F) and -25°C (-13°F), replace RT1 temperature sensor.
Step 3: If steps 1 and 2 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.	

COMPRESSOR CODE 54

Regulation System Pressure Sensor

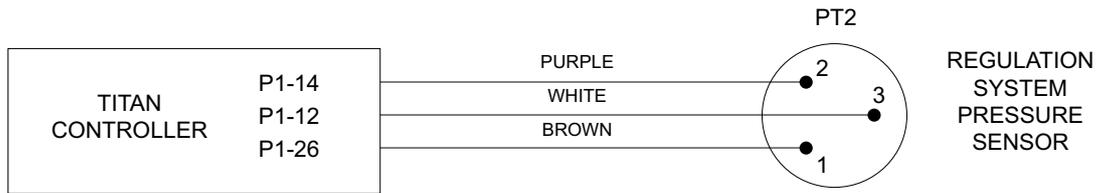
Explanation:

The Titan controller has detected an out of range reading from the PT2 pressure sensor.

Effect:

Code 54 is a FAULT condition and will stop the compressor. Code 54 and the FAULT name will be displayed on the ViewPort.

PT2 Pressure Sensor Circuit:



Circuit Description:

The pressure sensor connects to the Titan controller as shown in the circuit diagram. The purple wire is the 5 VDC excitation supply from the Titan. The white wire is the signal output to the Titan with a range of 0.5 to 4.5 VDC. The brown wire is the sensor ground. The pressure range of PT2 is 0 bar (0 psi) (0.5 VDC) to 6.90 bar (100 psi) (4.5 VDC).

Component Location:

PT2 pressure sensor is located in the regulation system on top of the airend.

COMPRESSOR CODE 54

Troubleshooting Steps

Action	Result
<p>Step 1: Check all harness connections between Titan and PT2 pressure sensor.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 2: Disconnect PT2 connector from the harness. Turn the main control switch to the ON position. Using a multimeter, measure the voltage between PT2-1 and PT2-2.</p>	<p>Voltage measured should be 5 VDC between PT2-1 and PT2-2. If voltage measured is not 5 VDC, check for defective harness connections.</p>
<p>Step 3: Disconnect PT2 connector from the harness and P1 connector from the Titan. Using a multimeter, measure resistance between PT2-1 and P1-26. Using a multimeter, measure resistance between PT2-2 and P1-14. Using a multimeter, measure resistance between PT2-3 and P1-12.</p>	<p>Continuity should be shorted between PT2-1 and P1-26. Continuity should be shorted between PT2-2 and P1-14. Continuity should be shorted between PT2-3 and P1-12. If not, check for defective harness connections.</p>
<p>Step 4: Disconnect PT2 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT2 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Regulation Pressure value is between 2.28 bar (33 psi) and 2.96 bar (43 psi).</p>	<p>If pressure value on ViewPort is not between 2.28 bar (33 psi) and 2.96 bar (43 psi), check for defective harness connections. If pressure value on ViewPort is between 2.28 bar (33 psi) and 2.96 bar (43 psi), replace PT2 pressure sensor.</p>
<p>Step 5: If steps 1 thru 4 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.</p>	

COMPRESSOR CODE 55

Emergency Stop Activated

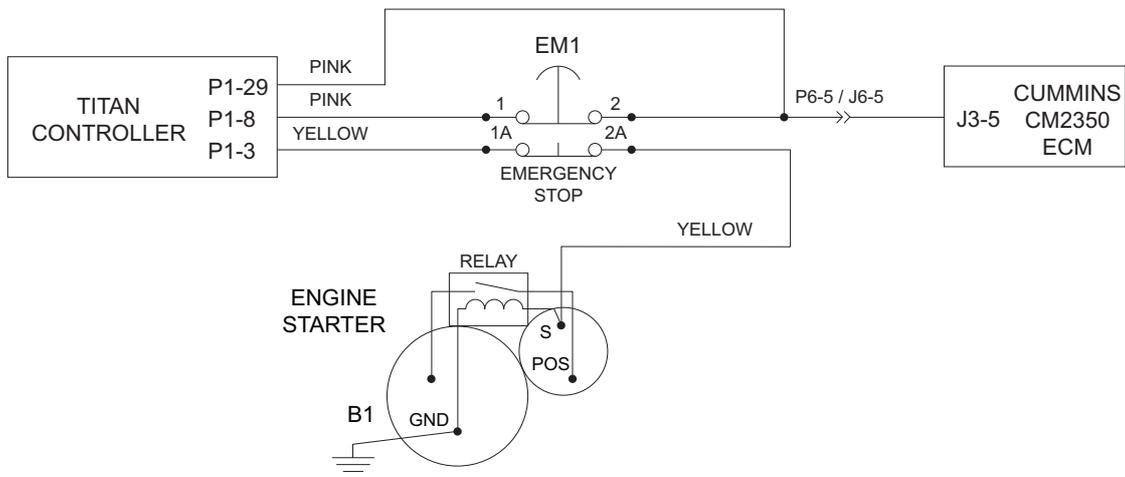
Explanation:

The Titan controller has detected an open contact from EM1 Emergency Stop indicating it has been activated.

Effect:

Code 55 is a FAULT condition and will stop the compressor. Code 55 and the FAULT name will be displayed on the ViewPort.

EM1 Emergency Stop Circuit:



Circuit Description:

The Emergency Stop connects to the Titan controller as shown in the circuit diagram. The Emergency Stop is in series with the Titan outputs that control engine keyswitch signal and B1-S starter relay coil. Pressing the Emergency Stop opens both circuits simultaneously. The Titan uses a 24 VDC input at P1-29 from the Emergency Stop to determine if it has been activated. When the 24 VDC input at P1-29 is lost that indicates the Titan that Emergency Stop has been activated.

Component Location:

EM1 Emergency Stop is located below the control panel.

COMPRESSOR CODE 55

Troubleshooting Steps

Action	Result
Step 1: Check Emergency Stop to ensure it has not been activated.	If the Emergency Stop has been activated, pull the red operator to de-activate the Emergency Stop.
Step 2: Check to ensure Emergency Stop is operating properly.	If the Emergency Stop is not operating properly, replace the EM1 Emergency Stop.
Step 3: Check all harness connections between Titan and EM1 Emergency Stop.	If harness connections are loose or damaged, repair harness as needed.
Step 4: Ensure Emergency Stop is not activated. Turn main control switch to the RUN position. Using a multimeter, measure the voltage between P1-29 and battery negative.	Voltage measured should be 24 VDC between P1-29 and battery negative. If voltage measured is not 24 VDC, check for defective harness connections.
Step 5: If steps 1 thru 4 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.	

COMPRESSOR CODE 56

Low Start Pressure

Explanation:

The minimum start pressure 3.45 bar (50 psi) has not been met within 20 seconds of compressor start.

Effect:

Code 56 is an ALERT condition and will not stop the compressor, however the compressor will not load. Code 56 and the ALERT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
<p>Step 1: Check for leaking air hoses and pipes.</p>	<p>If air hoses or pipes are found to be leaking, tighten or replace as needed.</p>
<p>Step 2: Check all harness connections between Titan and PT1 pressure sensor.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 3: Disconnect PT1 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT1 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Air Pressure value is between 5.52 bar (80 psi) and 6.21 bar (90 psi).</p>	<p>If pressure value on ViewPort is not between 5.52 bar (80 psi) and 6.21 bar (90 psi), check for defective harness connections. If pressure value on ViewPort is between 5.52 bar (80 psi) and 6.21 bar (90 psi), replace PT1 pressure sensor.</p>
<p>Step 4: If steps 1 thru 3 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.</p>	

COMPRESSOR CODE 58

Ambient Temperature Sensor

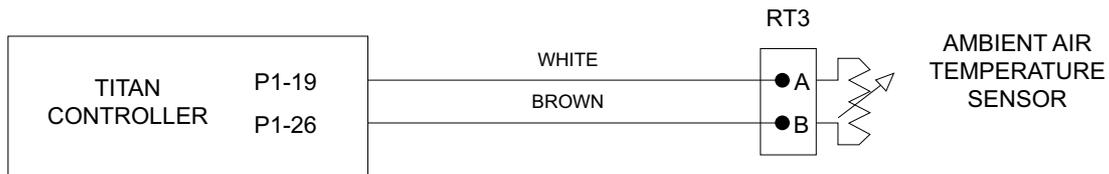
Explanation:

The Titan controller has detected an out of range reading from the RT3 temperature sensor.

Effect:

Code 58 is an ALERT condition and will not stop the compressor. Code 58 and the ALERT name will be displayed on the ViewPort.

RT3 Temperature Sensor Circuit:

**Circuit Description:**

The temperature sensor connects to the Titan controller as shown in the circuit diagram. RT3 is a 10K ohm thermistor type temperature sensor. The white wire is the sense line to the Titan. The brown wire is the sensor ground.

Component Location:

RT3 temperature sensor is located in the front behind the air intake louvers on the street side of the compressor.

Troubleshooting Steps

Action	Result
<p>Step 1: Check all harness connections between Titan and RT3 temperature sensor.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 2: Disconnect RT3 from harness and plug thermistor simulator (Part No. 22073878) into the RT3 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Ambient Temperature value is between -20°C (-3°F) and -25°C (-13°F).</p>	<p>If temperature value on ViewPort is not between -20°C (-3°F) and -25°C (-13°F), check for defective harness connections.</p> <p>If temperature value on ViewPort is between -20°C (-3°F) and -25°C (-13°F), replace RT3 temperature sensor.</p>
<p>Step 3: If steps 1 and 2 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.</p>	

COMPRESSOR CODE 61

IQ Filter Pressure Error

Explanation:

The Titan controller has received a message over the J1939 CAN network from the IQ TCU controller indicating the IQ filter outlet pressure reading is higher than the inlet pressure.

Effect:

Code 61 is an ALERT condition and will not stop the compressor. Code 61 and the ALERT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
<p>Step 1: Check for leaking air hoses and pipes.</p>	<p>If air hoses or pipes are found to be leaking, tighten or replace as needed.</p>
<p>Step 2: Verify that PT100 primary differential pressure sensor is installed properly. The air hose on the inlet of the primary filter connects to the H (high) side of the sensor. The air hose on the outlet of the primary filter connects to the L (low) side of the sensor.</p>	<p>If the PT100 differential pressure sensor is not installed properly, remove air hoses and re-install with the correct orientation.</p>
<p>Step 3: Verify that PT101 secondary differential pressure sensor is installed properly. The air hose on the inlet of the secondary filter connects to the H (high) side of the sensor. The air hose on the outlet of the secondary filter connects to the L (low) side of the sensor.</p>	<p>If the PT101 differential pressure sensor is not installed properly, remove air hoses and re-install with the correct orientation.</p>
<p>Step 4: Check all harness connections between IQ TCU and PT100 and PT101 differential pressure sensors.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 5: Disconnect PT100 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT100 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Primary Differential Pressure value is between 7.86 bar (114 psi) and 8.55 bar (124 psi).</p>	<p>If pressure value on ViewPort is not between 7.86 bar (114 psi) and 8.55 bar (124 psi), check for defective harness connections. If pressure value on ViewPort is between 7.86 bar (114 psi) and 8.55 bar (124 psi), replace PT100 differential pressure sensor.</p>
<p>Step 6: Disconnect PT101 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT101 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Secondary Differential Pressure value is between 7.86 bar (114 psi) and 8.55 bar (124 psi).</p>	<p>If pressure value on ViewPort is not between 7.86 bar (114 psi) and 8.55 bar (124 psi), check for defective harness connections. If pressure value on ViewPort is between 7.86 bar (114 psi) and 8.55 bar (124 psi), replace PT101 differential pressure sensor.</p>
<p>Step 7: If steps 1 thru 6 checkout OK, replace IQ TCU controller.</p>	

COMPRESSOR CODE 62

IQ System Louvers Malfunction

Explanation:

The Titan controller has received a message via the J1939 CAN network from the IQ TCU controller indicating the louvers or louver actuator is not operating properly.

Effect:

Code 62 is an ALERT condition and will not shut down the compressor; however, the IQ Discharge Air may not be maintained at the desired temperature. Code 62 and the ALERT name will be displayed on the ViewPort.

Troubleshooting Steps

Action	Result
Step 1: Disconnect the actuator from the louvers. Verify the IQ mechanical louvers operate properly when manually closing and opening.	If the IQ louvers are not operating properly, correct the issue.
Step 2: Move the Main Control Switch to the ON position. Observe the louvers during the power up test for closing and opening.	If louvers do not close and open during power up test, replace louver actuator.
Step 3: If Steps 1 and 2 checkout OK, replace IQ TCU controller.	

COMPRESSOR CODE 63

Primary IQ Differential Pressure Sensor

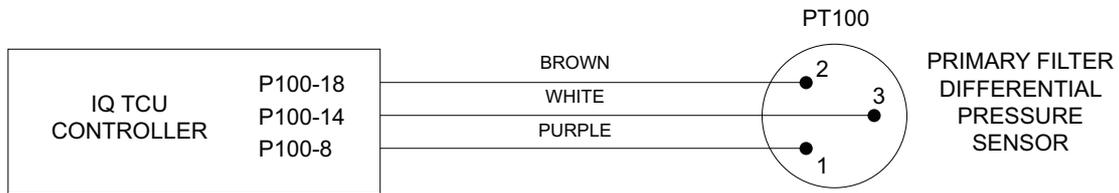
Explanation:

The Titan controller has received a message over the J1939 CAN network from the IQ TCU controller indicating an out of range reading from the PT100 primary IQ differential pressure sensor.

Effect:

Code 63 is an ALERT condition and will not stop the compressor, however if the filters clog up compressor oil could be released into the IQ air discharge. Code 63 and the ALERT name will be displayed on the ViewPort.

PT100 Primary Differential Pressure Sensor Circuit:



Circuit Description:

The differential pressure sensor connects to the IQ TCU controller as shown in the circuit diagram. The purple wire is the 5 VDC excitation supply from the IQ TCU. The orange wire is the signal output to the IQ TCU with a range of 0.5 to 4.5 VDC. The brown-white wire is the sensor ground. The pressure range of PT100 is 0 bar (0 psi) at 0.5 VDC to 20.68 bar (300 psi) at 4.5 VDC.

Component Location:

PT100 differential pressure sensor is located near the IQ filters. The H (high) side of the sensor connects to the inlet of the primary filter. The L (low) side of the sensor connects to the outlet of the primary filter.

COMPRESSOR CODE 63

Troubleshooting Steps

Action	Result
<p>Step 1: Check all harness connections between IQ TCU and PT100 differential pressure sensor.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 2: Disconnect PT100 connector from the harness. Turn the main control switch to the ON position. Using a multimeter, measure the voltage between PT100-1 and PT100-2.</p>	<p>Voltage measured should be 5 VDC between PT100-1 and PT100-2. If voltage measured is not 5 VDC, check for defective harness connections.</p>
<p>Step 3: Disconnect PT100 connector from the harness and P100 connector from the IQ TCU. Using a multimeter, measure resistance between PT100-1 and P100-8. Using a multimeter, measure resistance between PT100-2 and P100-18. Using a multimeter, measure resistance between PT100-3 and P100-14.</p>	<p>Continuity should be shorted between PT100-1 and P100-8. Continuity should be shorted between PT100-2 and P100-18. Continuity should be shorted between PT100-3 and P100-14. If not, check for defective harness connections.</p>
<p>Step 4: Disconnect PT100 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT100 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Primary Differential Pressure value is between 7.86 bar (114 psi) and 8.55 bar (124 psi).</p>	<p>If pressure value on ViewPort is not between 7.86 bar (114 psi) and 8.55 bar (124 psi), check for defective harness connections. If pressure value on ViewPort is between 7.86 bar (114 psi) and 8.55 bar (124 psi), replace PT100 differential pressure sensor.</p>
<p>Step 5: If steps 1 thru 4 checkout OK, replace IQ TCU controller.</p>	

COMPRESSOR CODE 64

Secondary IQ Differential Pressure Sensor

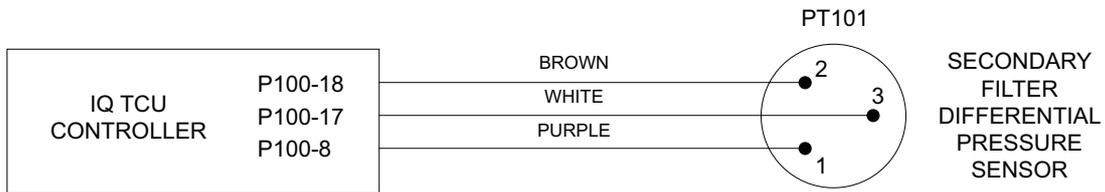
Explanation:

The Titan controller has received a message over the J1939 CAN network from the IQ TCU controller indicating an out of range reading from the PT101 secondary IQ differential pressure sensor.

Effect:

Code 64 is an ALERT condition and will not stop the compressor, however if the filters clog up compressor oil could be released into the IQ air discharge. Code 64 and the ALERT name will be displayed on the ViewPort.

PT101 Secondary Differential Pressure Sensor Circuit:



Circuit Description:

The differential pressure sensor connects to the IQ TCU controller as shown in the circuit diagram. The purple wire is the 5 VDC excitation supply from the IQ TCU. The orange wire is the signal output to the IQ TCU with a range of 0.5 to 4.5 VDC. The brown-white wire is the sensor ground. The pressure range of PT101 is 0 bar (0 psi) at 0.5 VDC to 20.68 bar (300 psi) at 4.5 VDC.

Component Location:

PT101 differential pressure sensor is located near the IQ filters. The H (high) side of the sensor connects to the inlet of the secondary filter. The L (low) side of the sensor connects to the outlet of the secondary filter.

COMPRESSOR CODE 64

Troubleshooting Steps

Action	Result
<p>Step 1: Check all harness connections between IQ TCU and PT101 differential pressure sensor.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 2: Disconnect PT101 connector from the harness. Turn the main control switch to the ON position. Using a multimeter, measure the voltage between PT101-1 and PT101-2.</p>	<p>Voltage measured should be 5 VDC between PT101-1 and PT101-2. If voltage measured is not 5 VDC, check for defective harness connections.</p>
<p>Step 3: Disconnect PT101 connector from the harness and P100 connector from the IQ TCU. Using a multimeter, measure resistance between PT101-1 and P100-8. Using a multimeter, measure resistance between PT101-2 and P100-18. Using a multimeter, measure resistance between PT101-3 and P100-17.</p>	<p>Continuity should be shorted between PT101-1 and P100-8. Continuity should be shorted between PT101-2 and P100-18. Continuity should be shorted between PT101-3 and P100-17. If not, check for defective harness connections.</p>
<p>Step 4: Disconnect PT101 from harness and plug pressure transducer simulator (Part No. 22168868) into the PT101 harness connector. Turn the main control switch to the ON position. Check ViewPort display to verify Secondary Differential Pressure value is between 7.86 bar (114 psi) and 8.55 bar (124 psi).</p>	<p>If pressure value on ViewPort is not between 7.86 bar (114 psi) and 8.55 bar (124 psi), check for defective harness connections. If pressure value on ViewPort is between 7.86 bar (114 psi) and 8.55 bar (124 psi), replace PT101 differential pressure sensor.</p>
<p>Step 5: If steps 1 thru 4 checkout OK, replace IQ TCU controller.</p>	

COMPRESSOR CODE 66

IQ Aftercooler Temperature Sensor

Explanation:

The Titan controller has received a message via the J1939 CAN network from the IQ TCU controller indicating an out of range reading from the RT100 IQ Aftercooler Temperature Sensor.

Effect:

Code 66 is an ALERT condition and will not shut down the compressor. Code 66 and the ALERT name will be displayed on the ViewPort

Circuit Description:

The RT100 IQ Aftercooler Temperature Sensor connects to the IQ TCU controller as illustrated in the circuit diagram. RT100 is a 10K ohm thermistor type temperature sensor. The yellow wire is the sense line to the IQ TCU. The brownwhite wire is the sensor ground.

Component Location:

RT100 IQ Aftercooler Temperature Sensor is located in the bottom of the IQ Aftercooler.

Troubleshooting Steps

Action	Result
<p>Step 1: Check all harness connections between IQ TCU and RT100 IQ Aftercooler Temperature Sensor.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 2: Disconnect RT100 from harness and plug Thermistor Simulator (Part No. 22073878) into the RT100 harness connector. Move the Main Control Switch to the ON position. Check ViewPort display to verify Aftercooler Temperature value is between -3°F and -13°F.</p>	<p>If temperature value on ViewPort is not between -3°F and -13°F, check for defective harness connections. If temperature value on ViewPort is between -3°F and -13°F, replace RT100 IQ Aftercooler Temperature Sensor.</p>
<p>Step 3: If Steps 1 and 2 checkout OK, replace IQ TCU controller.</p>	

COMPRESSOR CODE 67

IQ Actuator Position Sensor**Explanation:**

The Titan controller has received a message via the J1939 CAN network from the IQ TCU controller indicating an out of range reading from the ACT100 Actuator Position Sensor.

Effect:

Code 67 is an ALERT condition and will not shut down the compressor. Code 67 and the ALERT name will be displayed on the ViewPort.

Circuit Description:

The ACT100 Actuator Position Sensor connects to the IQ TCU controller as illustrated in the circuit diagram. ACT100 Actuator Position Sensor is a potentiometer. The purple wire is the 5 VDC excitation supply from the IQ TCU. The white wire is the position signal output to the IQ TCU. The brown-white wire is the sensor ground.

Component Location:

ACT100 Actuator Position Sensor is mounted on the IQ louvers.

Troubleshooting Steps

Action	Result
Step 1: Check all harness connections between IQ TCU and ACT100 Actuator Position Sensor.	If harness connections are loose or damaged, repair harness as needed.
Step 2: Ensure the ACT100 Actuator Position Sensor is connected to the harness. Move the Main Control Switch to the ON position. Using a multimeter, measure the voltage between ACT100-D and ACT100-E.	Voltage measured should be in the range of 0.2 VDC to 2.25 VDC between ACT100-D and ACT100-E. If voltage measured is not in the range of 0.2 VDC to 2.25 VDC, replace ACT100 Actuator Position Sensor.
Step 3: If Steps 1 and 2 checkout OK, replace IQ TCU controller.	

COMPRESSOR CODE 71

Engine ECM Communication

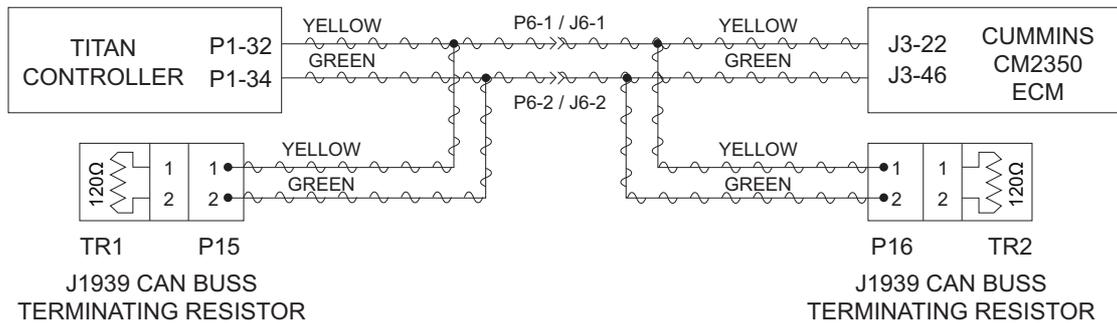
Explanation:

The Titan controller cannot communicate with the engine ECM via J1939 CAN BUSS network.

Effect:

Code 71 is a FAULT condition and will stop the compressor. Code 71 and the FAULT name will be displayed on the Viewport.

Titan to Engine ECM J1939 CAN BUSS circuit:



Circuit Description:

The twisted pair yellow and green wires are the communications link (J1939 CAN BUSS) that connects the Titan controller and the engine ECM together as shown in the circuit diagram. The yellow wire is referred to as J1939 CAN High (+). The green wire is referred to as J1939 CAN Low (-). The compressor harness and the engine harness are connected together at P6/J6 connection point.

The CAN network has two terminating resistors TR1 and TR2. The resistance value of each terminator is 120 ohms. The terminators are connected together in parallel across the High (+) and Low (-) wires. When connected the resistance value between the High (+) and Low (-) wires is 60 ohms.

Component Location:

P1 connector is connected to the Titan controller and the J3 connector is connected to the engine ECM. Terminating resistor TR1 is located on the compressor harness inside the control panel. Terminating resistor TR2 is located on the engine harness near the engine ECM.

COMPRESSOR CODE 71

Troubleshooting Steps

Action	Result
Step 1: Check engine ECM fuse FB1-F6.	If fuse is blown, replace FB1-F6 fuse.
Step 2: Check battery positive and negative connections to the engine ECM.	If harness connections are loose or damaged, repair harness as needed.
Step 3: Turn main control switch to the RUN position. Using a multimeter, measure the engine keyswitch signal voltage at J3-5.	Voltage measured should be 24 VDC at J3-5. If voltage measured is not 24 VDC, check for defective harness connections.
Step 4: Disconnect P1 connector from the Titan, J3 connector from the engine ECM, P2 connector from the ViewPort display, M2-B connector from the Engine Tachometer, and any other devices connected to the J1939 CAN BUSS. Using a multimeter, measure the resistance between P1-32 and P1-34. Using a multimeter, measure the resistance between J3-22 and J3-46.	Resistance value measured should be 60 ohms between P1-32 and P1-34. Resistance value measured should be 60 ohms between J3-22 and J3-46. If resistance value measured is not 60 ohms, measure resistance value of each terminator (120 ohms) and or check for defective harness connections.
Step 5: Disconnect P1 connector from the Titan, J3 connector from the engine ECM, P2 connector from the ViewPort display, M2-B connector from the Engine Tachometer, and any other devices connected to the J1939 CAN BUSS. Disconnect TR1 and TR2 from the harness. Using a multimeter, measure resistance between P1-32 and J3-22. Using a multimeter, measure resistance between P1-34 and J3-46. Using a multimeter, measure resistance between P1-32 and P1-34.	Continuity should be shorted between P1-32 and J3-22. Continuity should be shorted between P1-34 and J3-46. Continuity should be open between P1-32 and P1-34. If not, check for defective harness connections.
Step 6: If steps 1 thru 5 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.	
Step 7: If steps 1 thru 6 checkout OK, replace engine ECM.	

COMPRESSOR CODE 73

AutoStart Controller Communication

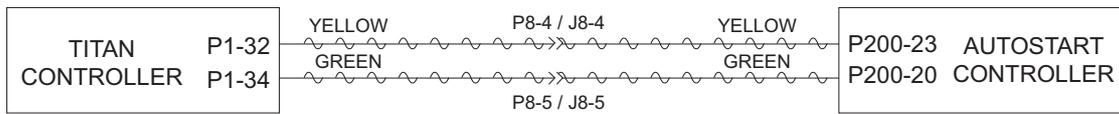
Explanation:

The Titan controller cannot communicate with the AutoStart controller via J1939 CAN BUSS network.

Effect:

Code 73 is an ALERT condition and will not stop the compressor. Code 73 and the ALERT name will be displayed on the ViewPort.

Titan to AutoStart controller J1939 CAN BUSS circuit:



Circuit Description:

The twisted pair yellow and green wires are the communications link (J1939 CAN BUSS) that connects the Titan controller and the AutoStart controller together as shown in the circuit diagram. The yellow wire is referred to as J1939 CAN High (+). The dark green wire is referred to as J1939 CAN Low (-). The compressor harness and the AutoStart harness are connected together at P8/J8 connection point.

Component Location:

P1 connector is connected to the Titan controller and the P200 connector is connected to the AutoStart controller. P8/J8 connectors are located behind the control panel.

COMPRESSOR CODE 73

Troubleshooting Steps

Action	Result
Step 1: Check AutoStart controller fuse FB1-F10.	If fuse is blown, replace FB1-F10 fuse.
Step 2: Check battery positive and negative connections to the AutoStart controller.	If harness connections are loose or damaged, repair harness as needed.
Step 3: Verify operation of FB1-K5 relay.	If relay is not operating properly, replace FB1-K5 relay.
Step 4: Disconnect P200 connector from the AutoStart controller. Turn the main control switch to the ON position. Using a multimeter, measure the voltage between P200-16 and battery negative.	Voltage measured should be 24 VDC between P200-16 and battery negative. If not, check for defective harness connections.
Step 5: Ensure the main control switch is in the OFF position. Disconnect P200 connector from the AutoStart controller. Using a multimeter, measure resistance between P200-22 and battery negative.	Continuity should be shorted between P200-22 and battery negative. If not, check for defective harness connections.
Step 6: Disconnect P1 connector from the Titan, J3 connector from the engine ECM, P2 connector from the ViewPort display, M2-B connector from the Engine Tachometer, P200 connector from the AutoStart controller, and any other devices connected to the J1939 CAN BUSS. Using a multimeter, measure the resistance between P200-20 and P200-23.	Resistance value measured should be 60 ohms between P200-20 and P200-23. If resistance value measured is not 60 ohms, measure resistance value of each terminator (120 ohms) and/or check for defective harness connections.
Step 7: If steps 1 thru 6 checkout OK, replace AutoStart controller.	

COMPRESSOR CODE 74

OTC Controller Communication

Explanation:

The Titan controller cannot communicate with the OTC controller via J1939 CAN BUSS network.

Effect:

Code 74 is an ALERT condition and will not stop the compressor. Code 74 and the ALERT name will be displayed on the ViewPort.

This compressor code does not apply to the HP915, XP1000, XHP750 T4F family of compressors. If this problem occurs, try the troubleshooting steps below.

Troubleshooting Steps

Action	Result
<p>Step 1: Use the ViewPort to verify the correct Compressor ID is loaded.</p>	<p>If the correct compressor ID is not loaded, refer to the section "Entering Compressor ID" in Operation and Maintenance Manual.</p>
<p>Step 2: If step 1 checks out OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.</p>	

COMPRESSOR CODE 75

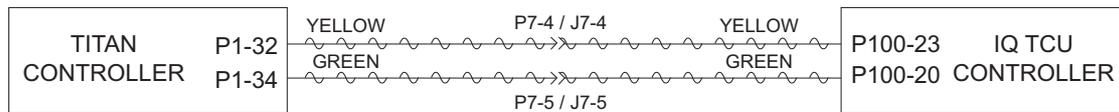
IQ TCU Controller Communication

Explanation:

The Titan controller cannot communicate with the IQ TCU controller via J1939 CAN BUSS network.

Effect:

Code 75 is an ALERT condition and will not stop the compressor. Code 75 and the ALERT name will be displayed on the ViewPort.

Titan to IQ TCU controller J1939 CAN BUSS circuit:**Circuit Description:**

The twisted pair yellow and green wires are the communications link (J1939 CAN BUSS) that connects the Titan controller and the IQ TCU controller together as shown in the circuit diagram. The yellow wire is referred to as J1939 CAN High (+). The green wire is referred to as J1939 CAN Low (-). The compressor harness and the IQ harness are connected together at P7/J7 connection point.

Component Location:

P1 connector is connected to the Titan controller and the P100 connector is connected to the IQ TCU controller. P7/J7 connectors are located behind the control panel.

COMPRESSOR CODE 75

Troubleshooting Steps

Action	Result
<p>Step 1: Check IQ TCU controller fuse FB1-F9.</p>	<p>If fuse is blown, replace FB1-F9 fuse.</p>
<p>Step 2: Check battery positive and negative connections to the IQ TCU controller.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 3: Verify operation of FB1-K5 relay.</p>	<p>If relay is not operating properly, replace FB1-K5 relay.</p>
<p>Step 4: Disconnect P100 connector from the IQ TCU controller. Turn the main control switch to the ON position. Using a multimeter, measure the voltage between P100-1 and battery negative. Using a multimeter, measure the voltage between P100-9 and battery negative. Using a multimeter, measure the voltage between P100-16 and battery negative.</p>	<p>Voltage measured should be 24 VDC between P100-1 and battery negative. Voltage measured should be 24 VDC between P100-9 and battery negative. Voltage measured should be 24 VDC between P100-16 and battery negative. If not, check for defective harness connections.</p>
<p>Step 5: Ensure the main control switch is in the OFF position. Disconnect P100 connector from the IQ TCU controller. Using a multimeter, measure resistance between P100-12 and battery negative. Using a multimeter, measure resistance between P100-21 and battery negative.</p>	<p>Continuity should be shorted between P100-12 and battery negative. Continuity should be shorted between P100-21 and battery negative. If not, check for defective harness connections.</p>
<p>Step 6: Disconnect P1 connector from the Titan, J3 connector from the engine ECM, P2 connector from the ViewPort display, M2-B connector from the Engine Tachometer, P100 connector from the IQ TCU controller, and any other devices connected to the J1939 CAN BUSS. Using a multimeter, measure the resistance between P100-22 and P100-23.</p>	<p>Resistance value measured should be 60 ohms between P100-22 and P100-23. If resistance value measured is not 60 ohms, measure resistance value of each terminator (120 ohms) and/or check for defective harness connections.</p>
<p>Step 7: If steps 1 thru 6 checkout OK, replace IQ TCU controller.</p>	

COMPRESSOR CODE 76

Titan Controller Communication

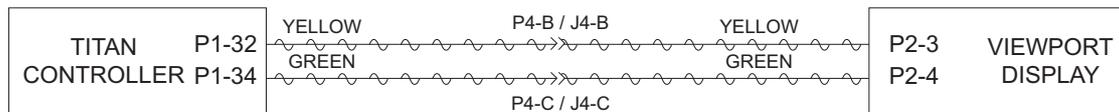
Explanation:

The ViewPort display cannot communicate with the Titan controller via J1939 CAN BUSS network.

Effect:

Code 76 is an ALERT condition and will not stop the compressor. Code 76 and the ALERT name will be displayed on the ViewPort.

ViewPort display to Titan controller J1939 CAN BUSS circuit:

**Circuit Description:**

The twisted pair yellow and green wires are the communications link (J1939 CAN BUSS) that connects the ViewPort display and the Titan controller together as shown in the circuit diagram. The yellow wire is referred to as J1939 CAN High (+). The green wire is referred to as J1939 CAN Low (-). The compressor harness and the control panel harness are connected together at P4/J4 connection point.

Component Location:

P1 connector is connected to the Titan controller and the P2 connector is connected to the ViewPort display. P4/J4 connectors are located inside the control panel.

COMPRESSOR CODE 76

Troubleshooting Steps

Action	Result
<p>Step 1: Check Titan controller fuse FB1-F1.</p>	<p>If fuse is blown, replace FB1-F1 fuse.</p>
<p>Step 2: Check battery positive and negative connections to the Titan controller.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 3: Disconnect the P1 connector from the Titan controller. Turn the main control switch to the ON position. Using a multimeter, measure voltage between P1-2 and battery negative.</p>	<p>Voltage measured should be 24 VDC between P1-2 and battery negative. If not, check for defective harness connections and/or verify operation of S1 main control switch.</p>
<p>Step 4: Disconnect P1 connector from the Titan controller. Turn the main control switch to the ON position. Using a multimeter measure the voltage between P1-1 and battery negative. Using a multimeter measure the voltage between P1-13 and battery negative. Using a multimeter measure the voltage between P1-24 and battery negative.</p>	<p>Voltage measured should be 24 VDC between P1-1 and battery negative. Voltage measured should be 24 VDC between P1-13 and battery negative. Voltage measured should be 24 VDC between P1-24 and battery negative. If not, check for defective harness connections.</p>
<p>Step 5: Ensure the main control switch is in the OFF position. Disconnect P1 connector from the Titan controller. Using a multimeter, measure resistance between P1-33 and battery negative. Using a multimeter, measure resistance between P1-35 and battery negative.</p>	<p>Continuity should be shorted between P1-33 and battery negative. Continuity should be shorted between P1-35 and battery negative. If not, check for defective harness connections.</p>
<p>Step 6: Disconnect P1 connector from the Titan, J3 connector from the engine ECM, P2 connector from the ViewPort display, M2-B connector from the Engine Tachometer, and any other devices connected to the J1939 CAN BUSS. Using a multimeter, measure the resistance between P1-32 and P1-34.</p>	<p>Resistance value measured should be 60 ohms across P1-32 and P1-34. If resistance value measure is not 60 ohms, measure resistance value of each terminator (120 ohms) and/or check for defective harness connections.</p>
<p>Step 7: If steps 1 thru 6 checkout OK, replace Titan controller or contact Doosan Technical Support at 800-633-5206.</p>	

ELECTRICAL CIRCUIT TROUBLESHOOTING

INTRODUCTION

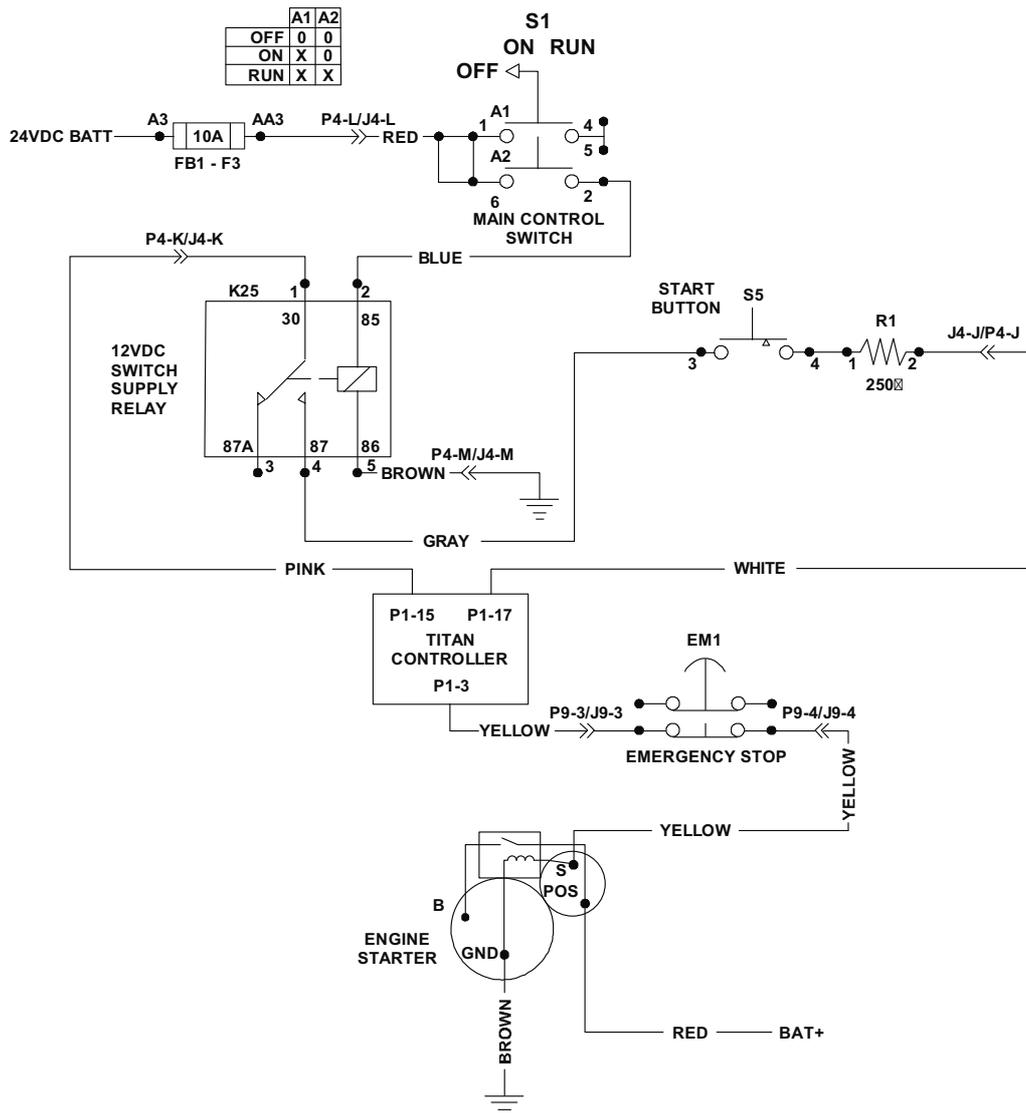
Not all electrical circuits throughout this compressor have a compressor diagnostic code when a problem arises. This section includes troubleshooting steps to help resolve some common electrical circuit problems. It is not possible to include all the solutions to problems that can occur or list all possible problems. A thorough analysis of the problem is the key to successful troubleshooting. The more information known about a problem, the faster and easier the problem can be solved. Start with simple troubleshooting first and then work up to the more complex troubleshooting methods.

ENGINE STARTER RELAY CIRCUIT

Operation Description:

The engine starter relay provides positive battery voltage to the engine starter for cranking the engine. When the main control switch is turned to the START position, a signal is sent to the Titan controller requesting the engine to start cranking. The Titan controls the engine cranking by energizing and de-energizing the engine starter relay. The main control switch must be held in the START position for the Titan to energize the engine starter relay. If the switch is released back to the RUN position at any point the Titan will de-energize the engine starter relay. The control signal from the Titan to the engine starter relay can be locked out by pressing the Emergency Stop. This will prevent cranking of the engine.

B1-S Engine Starter Relay Circuit:



ENGINE STARTER RELAY CIRCUIT

Circuit Description:

The engine starter relay connects to the Titan controller as shown in the circuit diagram. The pink wire is the switch supply (12 VDC) from the Titan. The blue wire connects to R1 and then the white wire is the start signal (12 VDC) to the Titan. The yellow wire is the output control (24 VDC) from the Titan to the B1-S relay coil. The yellow wire is the output from the relay to the engine starter solenoid.

Component Location:

B1-S relay is located on the starter. S1 main control switch is located on the control panel. The EM1 Emergency Stop is located below the control panel.

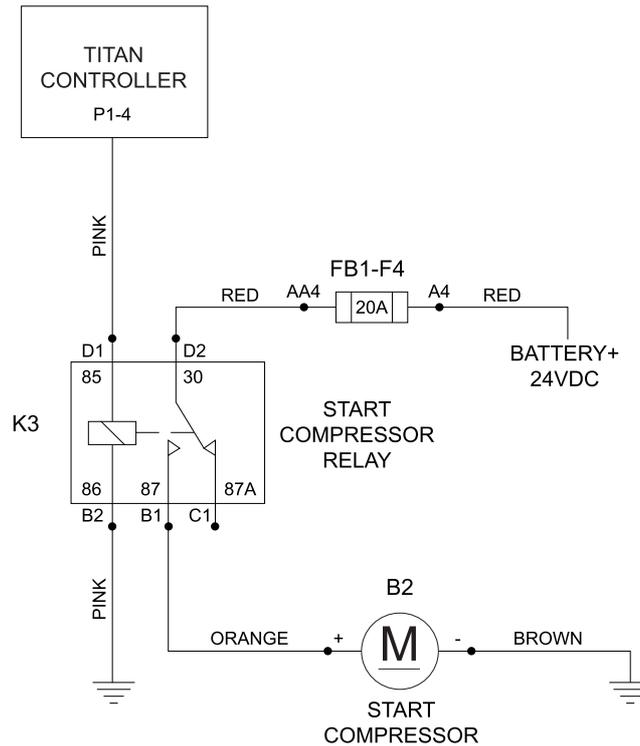
Troubleshooting Steps

Action	Result
Step 1: Check ViewPort display for active diagnostic codes.	If active diagnostic codes are present, resolve the issues.
Step 2: Check Emergency Stop to ensure it has not been activated.	If the Emergency Stop has been activated, pull the red operator to de-activate the Emergency Stop.
Step 3: Check all harness connections throughout engine start circuit.	If harness connections are loose or damaged, repair harness as needed.
Step 4: Check the condition of the compressor batteries.	If the batteries are discharged or not able to be charged, replace batteries.
Step 5: Move the Main Control Switch to the ON position. Using a multimeter, measure the voltage between P1-15 and battery Negative.	Voltage measured should be 12 VDC between P1-15 and battery negative. If voltage measured is not 12 VDC, replace Titan controller or contact Doosan Technical Support at 800-633-5206.
Step 6: Hold the main control switch in the START position. Using a multimeter, complete the following measurements: <ol style="list-style-type: none"> 1. Voltage between S1-5 and battery negative. 2. Voltage between S1-6 and battery negative. 3. Voltage between P1-17 and battery negative. 4. Voltage between P1-3 and battery negative. 5. Voltage between EM1-1A and battery negative. 6. Voltage between EM1-2A and battery negative. 7. Voltage between B1-S and battery Negative. 	<ol style="list-style-type: none"> 1. Voltage measured should be 12 VDC. If not, check for defective harness connections. 2. Voltage measured should be 12 VDC. If not, replace S1 main control switch. 3. Voltage measured should be 12 VDC. If not, check for defective harness connections. 4. Voltage measured should be 24 VDC. If not, replace Titan controller or contact Doosan Technical Support at 800-633-5206. 5. Voltage measured should be 24 VDC. If not, check for defective harness connections. 6. Voltage measured should be 24 VDC. If not, replace EM1 Emergency Stop. 7. Voltage measured should be 24 VDC. If not, check for defective harness connections. If 24 VDC is measured, replace B1 Engine Starter.

START COMPRESSOR CIRCUIT

Operation Description:

The start compressor provides air to close the air end unloader valve for ease of engine starting. The Titan controls the start compressor by energizing and de-energizing the start compressor relay. When the main control switch is turned to the RUN position, the start compressor will be turned on for 10 seconds. The start compressor will turn off after 10 seconds if no engine start is initiated. When the main control switch is turned to the START position, the start compressor will be turned on and remain on until the engine speed reaches 1450 RPM. If the engine start is not successful, the start compressor will turn off after 10 seconds or when the main control switch is turned to the OFF position.

B2 Start Compressor Circuit:**Circuit Description:**

The start compressor connects to the Titan controller as shown in the circuit diagram. The pink wire is the output control (24 VDC) from the Titan to the FB1-K3 relay coil. The orange wire is the output from the relay to the B2 start compressor. The start compressor and relay contacts are protected by FB1-F4 (20 amp) fuse.

START COMPRESSOR CIRCUIT

Component Location:

B2 start compressor is located on top of the fuel tank beside the airend. K3 relay and F4 fuse are located in the FB1 Fuse/Relay center mounted on the lifting bail on left side.

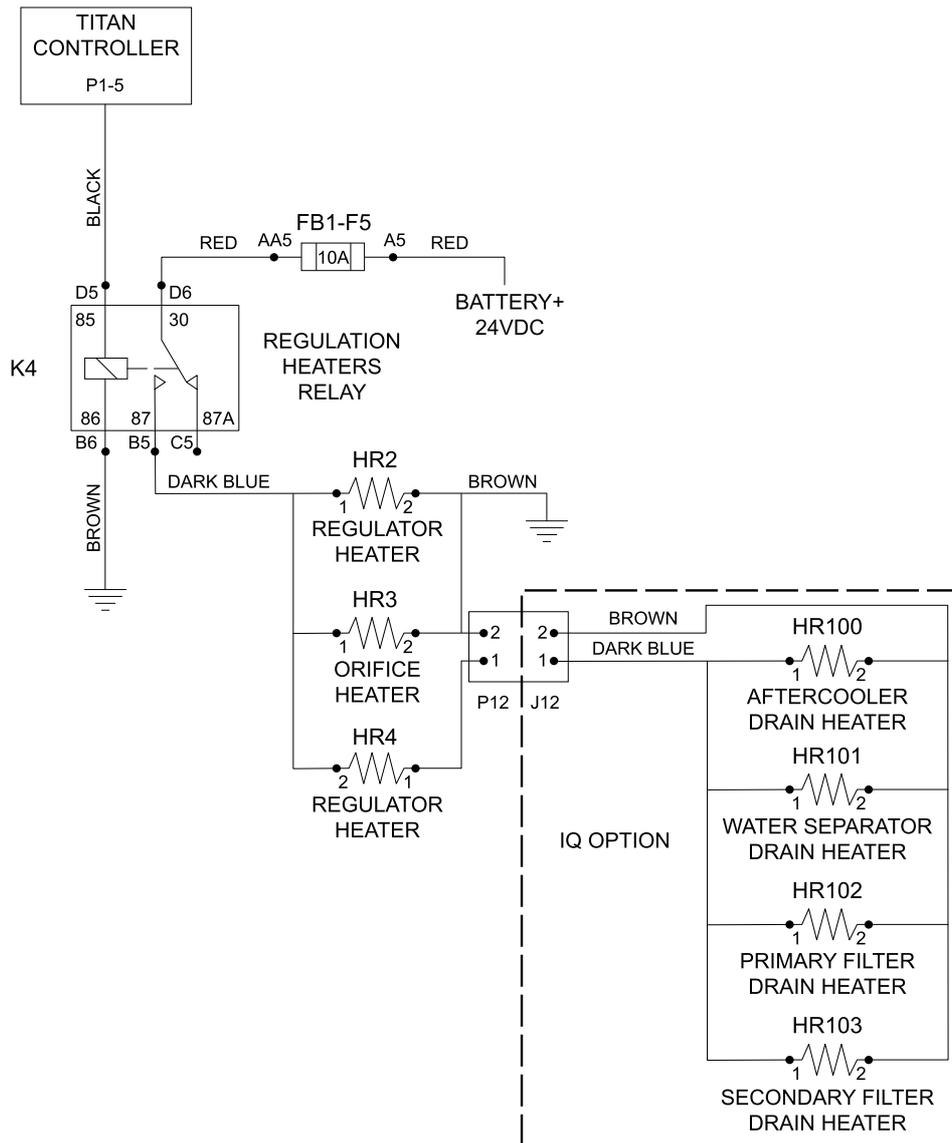
Troubleshooting Steps

Action	Result
Step 1: Check start compressor fuse FB1-F4.	If fuse is blown, replace FB1-F4 fuse.
Step 2: Check all harness connections throughout start compressor circuit.	If harness connections are loose or damaged, repair harness as needed.
Step 3: Turn the main control switch to the RUN position. Start compressor output will only be on for 10 seconds. Using a multimeter, complete the following measurements: Voltage between P1-4 and battery negative. Voltage between K3-D2 and battery negative. Resistance between K3-B2 and battery negative. Voltage between K3-D1 and battery negative. Voltage between K3-B1 and battery negative. Resistance between B2- and battery negative. Voltage between B2+ and battery negative.	Voltage measured should be 24 VDC. If not, replace Titan controller or contact Doosan Technical Support at 800-633-5206. Voltage measured should be 24 VDC. If not, check fuse and or defective harness connections. Continuity should be shorted. If not, check for defective harness connections. Voltage measured should be 24 VDC. If not, check for defective harness connections. Voltage measured should be 24 VDC. If not, replace K3 relay. Continuity should be shorted. If not, check for defective harness connections. Voltage measured should be 24 VDC. If not, check for defective harness connections. If 24 VDC is measured, replace B2 start compressor.

REGULATION HEATER CIRCUIT

Operation Description:

The regulation heaters provide heat to orifices and regulators that may freeze during cold weather. The Titan controls the regulation heaters by energizing and de-energizing the regulation heaters relay. When the main control switch is turned to the ON position and the ambient temperature is below 7°C (45°F), the regulation heaters will be turned on. The heaters stay on, even if the compressor is running, as long as the ambient temperature is below 7°C (45°F). When the ambient temperature is above 8°C (46°F), the heaters are turned off.

HR2, HR3, HR4 and HR100-HR103 Regulation Heaters Circuit:

REGULATION HEATER CIRCUIT

Circuit Description:

The regulation heaters connect to the Titan controller as shown in the circuit diagram. The brown wire is the output control (24 VDC) from the Titan to the FB1-K4 relay coil. The orange wire is the output from the relay to the regulation heaters. The regulation heaters are wired in parallel with each other. The regulation heater and relay contacts are protected by FB1-F5 (10 amp) fuse.

Component Location:

HR2 is located on the pressure regulator mounted on top of the separator tank. HR3 is located on the regulation orifice on the airend unloader. HR4 is located on the regulation orifice on the dual pressure. HR100-HR103 orifice heaters are located on the bottom of the IQ filters.

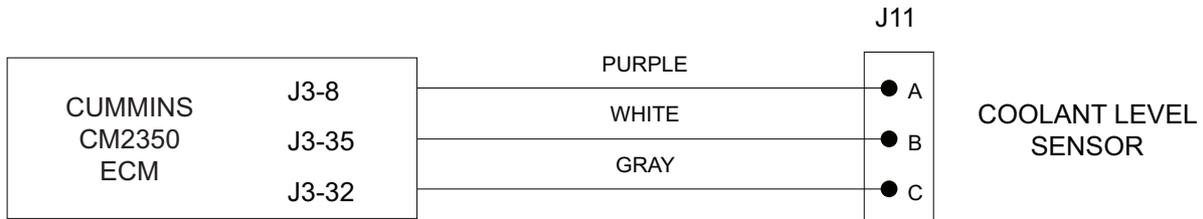
Troubleshooting Steps

Action	Result
Step 1: Check regulation heater fuse FB1-F5.	If fuse is blown, replace FB1-F5 fuse.
Step 2: Check all harness connections throughout heater circuit.	If harness connections are loose or damaged, repair harness as needed.
Step 3: Check ViewPort display to verify ambient temperature. If the ambient temperature is below 7°C (45°F) the heaters will come on. If the ambient temperature appears abnormal given the outside temperature is below 7°C (45°F), the RT3 ambient temperature sensor or circuit could be bad.	If temperature value on ViewPort display is 7°C (45°F) or below, then proceed to step 4. Follow troubleshooting steps for code 58 to determine if RT3 ambient temperature sensor or circuit is bad.
Step 4: Turn the main control switch to the ON position. Ensure the ambient temperature on the ViewPort display is 7°C (45°F) or below with or without the use of simulator plug 22073878. Using a multimeter, complete the following measurements: <ol style="list-style-type: none"> 1. Voltage between P1-5 and battery negative. 2. Voltage between K4-D6 and battery negative. 3. Resistance between K4-B6 and battery negative. 4. Voltage between K4-D5 and battery negative. 5. Voltage between K4-B5 and battery negative. 6. Resistance between HR2, HR3, HR4 and HR100-HR103 pin 2 and battery negative. 7. Voltage between HR2, HR3, HR4 and HR100-HR103 pin 1 and battery negative. 	<ol style="list-style-type: none"> 1. Voltage measured should be 24 VDC. If not, replace Titan controller or contact Doosan Technical Support at 800-633-5206. 2. Voltage measured should be 24 VDC. If not, check fuse and or defective harness connections. 3. Continuity should be shorted. If not, check for defective harness connections. 4. Voltage measured should be 24 VDC. If not, check for defective harness connections. 5. Voltage measured should be 24 VDC. If not, replace K4 relay. 6. Continuity should be shorted. If not, check for defective harness connections. 7. Voltage measured should be 24 VDC. If not, check for defective harness connections. If 24 VDC is measured at HR2, HR3, HR4 and HR100-HR103 pin 1, replace bad heater(s).

COOLANT LEVEL SENSOR CIRCUIT

Operation Description:

The coolant level sensor monitors the engine coolant level in the radiator and reports to the engine ECM. When the coolant level reaches too low of a level, the engine will de-rate and after a period of time the engine will stop. The de-rate time and shutdown time is determined by the engine ECM.

J11 Coolant Level Sensor Circuit:**Circuit Description:**

The coolant level sensor connects to the engine ECM as shown in the circuit diagram. The purple wire W243 (J11-A) is the 5 VDC excitation supply from the engine ECM. The white wire E245 (J11-B) is the signal output to the engine ECM with a range of 0.5 VDC (In Water) to 4.75 VDC (Out Of Water). The gray wire W244 (J11-C) is the sensor return.

Component Location:

J11 coolant level sensor is located in the top of the radiator near the coolant fill cap.

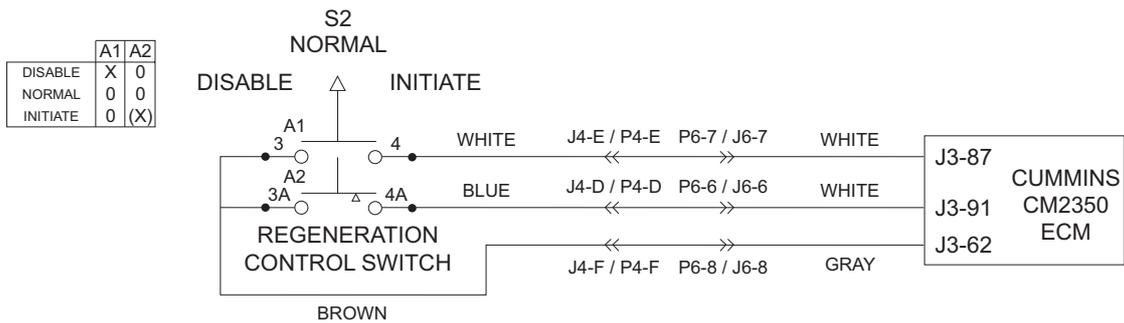
Troubleshooting Steps

Action	Result
Step 1: Check coolant level in radiator.	If the coolant level is low, add coolant.
Step 2: Check all harness connections between engine ECM and J11 coolant level sensor.	If harness connections are loose or damaged, repair harness as needed.
Step 3: Remove coolant level sensor from radiator. Fill a cup full of engine coolant and submerge coolant level sensor probe in coolant. Ensure engine coolant is completely covering the sensor probe. Turn the main control switch to the RUN position. Using a multimeter, complete the following measurements: <ol style="list-style-type: none"> 1. Voltage between J3-8 and battery negative. 2. Voltage between J11-A and battery negative. 3. Resistance between J3-32 and J11-C. 4. Voltage between J3-35 and battery negative. 5. Voltage between J11-B and battery negative. 	<ol style="list-style-type: none"> 1. Voltage measured should be 5 VDC. If not, refer to the engine manufacturer's service manual for instructions. 2. Voltage measured should be 5 VDC. If not, check for defective harness connections. 3. Continuity should be shorted. If not, check for defective harness connections. 4. Voltage measured should be 4.75 VDC. If not, check for defective harness connections. 5. Voltage measured should be 4.75 VDC. If not, replace J11 coolant level sensor.

REGENERATION CONTROL SWITCH CIRCUIT

Operation Description:

The regeneration control switch controls the regeneration of the diesel particulate filter. When the switch is turned to the NORMAL position (maintained), the engine ECM will automatically perform the regeneration of the diesel particulate filter when the soot reaches a high level. When the switch is turned to the INITIATE position (momentary), a request is sent to the engine ECM for a manual (non-mission) regeneration of the diesel particulate filter. This manual regeneration will only happen when the machine is in a non-mission condition and DPF soot levels are high enough to allow regeneration. When the switch is turned to the DISABLE position (maintained), the engine ECM disallows any automatic or manual (non-mission) regeneration of the diesel particulate filter. Refer to the Engine Owner's Manual for further operational information.

S2 Regeneration Control Switch Circuit:**Circuit Description:**

The regeneration control switch connects to the engine ECM as shown in the circuit above. The white wire is the disable signal to the engine ECM. The blue wire is the initiate signal to the engine ECM. The brown wire is the switch return. When the switch is in the NORMAL position, there is no signal input to the engine ECM.

Component Location:

S2 regeneration control switch is located left side on the control panel inside machine with a lockable cover.

REGENERATION CONTROL SWITCH CIRCUIT

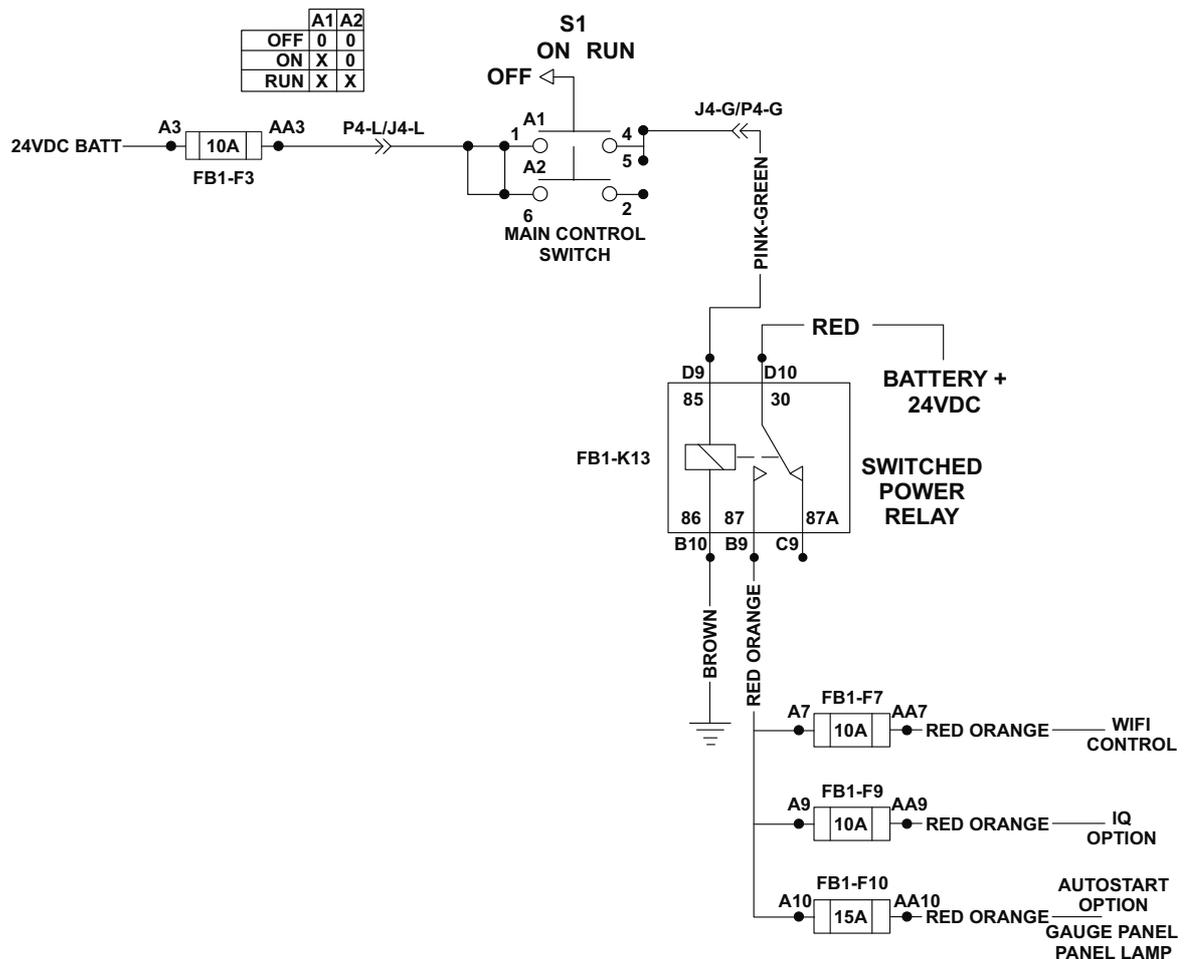
Troubleshooting Steps

Action	Result
<p>Step 1:</p> <p>Check all harness connections between regeneration control switch and engine ECM.</p>	<p>If harness connections are loose or damaged, repair harness as needed.</p>
<p>Step 2:</p> <p>Disconnect the J3 engine ECM connector. Using a multimeter, complete the following measurements:</p> <ol style="list-style-type: none"> 1. With the switch in the NORMAL position, measure resistance between J3-62 and J3-87. 2. With the switch in the NORMAL position, measure resistance between J3-62 and J3-91. 3. With the switch in the NORMAL position, measure resistance between J3-87 and J3-91. 4. With the switch in the DISABLE position, measure resistance between J3-62 to J3-87. 5. With the switch in the INITIATE position, measure resistance between J3-62 and J3-91. 	<ol style="list-style-type: none"> 1. Continuity should be open. If not, check for defective harness connections. 2. Continuity should be open. If not, check for defective harness connections. 3. Continuity should be open. If not, check for defective harness connections. 4. Continuity should be shorted. If not, check for defective harness connections and or verify S2 switch operation. 5. Continuity should be shorted. If not, check for defective harness connections and or verify S2 switch operation. <p>If wiring checks out OK in steps 4 & 5, replace S2 regeneration control switch.</p>

SWITCHED POWER RELAY CIRCUIT

Operation Description:

The switched power relay provides positive battery voltage to the gauge panel, panel lamp, IQ option, and AutoStart option. The main control switch controls positive battery voltage to these devices by energizing and de-energizing the switched power relay. When the main control switch is turned to the ON position, the switched power relay will be turned on. The switched power relay will remain on until the main control switch is turned to the OFF position.

FB1-K5 Switched Power Relay Circuit:**Circuit Description:**

The switch power relay connects to the main control switch as shown in the circuit diagram. The orange wire is the output control (24 VDC) from the main control switch to the K5 relay coil. The orange wire is the output from the relay to FB1-F9 and FB1-F10 fuse. The main control switch and the relay coil are protected by FB1-F3 (10 amp) fuse. The switched power relay common contact terminal 30 is connected directly to battery+ (24 VDC).

SWITCHED BATTERY POWER RELAY CIRCUIT

Component Location:

The S1 main control switch is located on the control panel. K5 relay, F3 fuse, F9 fuse, and F10 fuse are located in the FB1 Fuse/Relay center mounted on the lifting bail on left side.

Troubleshooting Steps

Action	Result
Step 1: Check main control switch fuse FB1-F3.	If fuse is blown, replace FB1-F3 fuse.
Step 2: Check all harness connections throughout switch power relay circuit.	If harness connections are loose or damaged, repair harness as needed.
Step 3: Turn the main control switch to the ON position. Using a multimeter, complete the following measurements: <ol style="list-style-type: none"> 1. Voltage between S1-1 and battery negative. 2. Voltage between S1-2 and battery negative. 3. Voltage between K5-D9 and battery negative. 4. Resistance between K5-B10 and battery negative. 5. Voltage between K5-D10 and battery negative. 6. Voltage between K5-B9 and battery negative. 	<ol style="list-style-type: none"> 1. Voltage measured should be 24 VDC. If not, check FB1-F3 fuse and or check for defective harness connections. 2. Voltage measured should be 24 VDC. If not, replace S1 main control switch. 3. Voltage measured should be 24 VDC. If not, check for defective harness connections. 4. Continuity should be shorted. If not, check for defective harness connections. 5. Voltage measured should be 24 VDC. If not, check for defective harness connections. 6. Voltage measured should be 24 VDC. If not, replace K5 switched power relay.

J1939 SPN	J1939 FMI	Cummins Code	J1939 SPN Description	J1939 FMI Description	Cummins Description
27	2	1228	Engine Exhaust Gas Recirculation 1 Valve Position	Data Erratic, Intermittent or Incorrect	EGR Valve Position - Data erratic, intermittent or incorrect
27	4	2272	Engine Exhaust Gas Recirculation 1 Valve Position	Voltage Below Normal or Shorted to Low Source	EGR Valve Position Circuit - Voltage below normal, or shorted to low source
81	16	2754	Engine Diesel Particulate Filter Intake Pressure	Data Valid but Above Normal Operating Range - Moderately Severe Level	Engine Diesel Particulate Filter Intake Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level
84	2	241	Wheel-Based Vehicle Speed	Data Erratic, Intermittent or Incorrect	Wheel-Based Vehicle Speed - Data erratic, intermittent or incorrect
84	9	3526	Wheel-Based Vehicle Speed	Abnormal Update Rate	Wheel-Based Vehicle Speed - Abnormal update rate
84	10	242	Wheel-Based Vehicle Speed	Abnormal Rate of Change	Wheel-Based Vehicle Speed Sensor Circuit tampering has been detected - Abnormal rate of change
84	19	3525	Wheel-Based Vehicle Speed	Received Network Data in Error	Wheel-Based Vehicle Speed - Received Network Data In Error
91	0	148	Accelerator Pedal Position 1	Data Valid but Above Normal Operational Range - Most Severe Level	Accelerator Pedal or Lever Position Sensor 1 - Data valid but above normal operational range - Most Severe Level
91	1	147	Accelerator Pedal Position 1	Data Valid but Below Normal Operational Range - Most Severe Level	Accelerator Pedal or Lever Position 1 Sensor Circuit Frequency - Data valid but below normal operating range
91	2	1242	Accelerator Pedal Position 1	Data Erratic, Intermittent or Incorrect	Accelerator Pedal or Lever Position Sensor 1 - Data erratic, intermittent or incorrect
91	3	131	Accelerator Pedal Position 1	Voltage Above Normal or Shorted to High Source	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage above normal, or shorted to high source
91	4	132	Accelerator Pedal Position 1	Voltage Below Normal or Shorted to Low Source	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage below normal, or shorted to low source
91	9	3326	Accelerator Pedal Position 1	Abnormal Update Rate	SAE J1939 Multiplexed Accelerator Pedal or Lever Sensor System - Abnormal update rate
91	19	1515	Accelerator Pedal Position 1	Received Network Data in Error	SAE J1939 Multiplexed Accelerator Pedal or Lever Sensor System - Received Network Data In Error
93	2	528	Engine Net Brake Torque	Data Erratic, Intermittent or Incorrect	Auxiliary Alternate Torque Validation Switch - Data erratic, intermittent or incorrect
94	0	4615	Engine Fuel Delivery Pressure	Data Valid but Above Normal Operational Range - Most Severe Level	Engine Fuel Delivery Pressure - Data Valid but Above Normal Operational Range - Most Severe Level
94	3	546	Engine Fuel Delivery Pressure	Voltage Above Normal or Shorted to High Source	Fuel Delivery Pressure Sensor Circuit - Voltage above normal, or shorted to high source
94	4	547	Engine Fuel Delivery Pressure	Voltage Below Normal or Shorted to Low Source	Fuel Delivery Pressure Sensor Circuit - Voltage below normal, or shorted to low source
94	15	2261	Engine Fuel Delivery Pressure	Data Valid but Above Normal Operational Range - Least Severe Level	Fuel Pump Delivery Pressure - Data Valid But Above Normal Operating Range - Least Severe Level
94	17	2262	Engine Fuel Delivery Pressure	Data Valid but Below Normal Operational Range - Least Severe Level	Fuel Pump Delivery Pressure - Data Valid But Below Normal Operating Range - Least Severe Level
94	18	2215	Engine Fuel Delivery Pressure	Data Valid but Below Normal Operational Range - Moderately Severe Level	Fuel Pump Delivery Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level
95	16	2372	Engine Fuel Filter Differential Pressure	Data Valid but Above Normal Operational Range - Moderately Severe Level	Fuel Filter Differential Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level
97	3	428	Water In Fuel Indicator	Voltage Above Normal or Shorted to High Source	Water in Fuel Indicator Sensor Circuit - Voltage above normal, or shorted to high source
97	4	429	Water In Fuel Indicator	Voltage Below Normal or Shorted to Low Source	Water in Fuel Indicator Sensor Circuit - Voltage below normal, or shorted to low source
97	15	418	Water In Fuel Indicator	Data Valid but Above Normal Operational Range - Least Severe Level	Water in Fuel Indicator - Data Valid But Above Normal Operating Range - Least Severe Level

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97	16	1852	Water In Fuel Indicator	Data Valid but Above Normal Operating Range - Moderately Severe Level	Water in Fuel Indicator - Data Valid But Above Normal Operating Range - Moderately Severe Level
98	0	688	Engine Oil Level	Data Valid but Above Normal Operating Range - Most Severe Level	Engine Oil Level - Data Valid but Above Normal Operating Range - Most Severe Level
98	1	253	Engine Oil Level	Data Valid but Below Normal Operating Range - Most Severe Level	Engine Oil Level - Data Valid but Below Normal Operating Range - Most Severe Level
98	17	471	Engine Oil Level	Data Valid but Below Normal Operating Range - Least Severe Level	Engine Oil Level - Data Valid but Below Normal Operating Range - Least Severe Level
100	1	415	Engine Oil Pressure	Data Valid but Below Normal Operating Range - Most Severe Level	Engine Oil Pressure - Data Valid but Below Normal Operating Range - Most Severe Level
100	2	435	Engine Oil Pressure	Data Erratic, Intermittent or Incorrect	Engine Oil Pressure - Data Erratic, Intermittent or Incorrect
100	3	135	Engine Oil Pressure	Voltage Above Normal or Shorted to High Source	Engine Oil Pressure Sensor Circuit - Voltage above normal, or shorted to high source
100	4	141	Engine Oil Pressure	Voltage Below Normal or Shorted to Low Source	Engine Oil Pressure Sensor Circuit - Voltage below normal, or shorted to low source
100	18	143	Engine Oil Pressure	Data Valid but Below Normal Operating Range - Moderately Severe Level	Engine Oil Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level
101	0	556	Engine Crankcase Pressure	Data Valid but Above Normal Operating Range - Most Severe Level	Crankcase Pressure - Data Valid but Above Normal Operating Range - Most Severe Level
101	2	1942	Engine Crankcase Pressure	Data Erratic, Intermittent or Incorrect	Crankcase Pressure - Data Erratic, Intermittent or Incorrect
101	3	1843	Engine Crankcase Pressure	Voltage Above Normal or Shorted to High Source	Crankcase Pressure Circuit - Voltage above normal, or shorted to high source
101	4	1844	Engine Crankcase Pressure	Voltage Below Normal or Shorted to Low Source	Crankcase Pressure Circuit - Voltage below normal, or shorted to low source
101	15	1974	Engine Crankcase Pressure	Data Valid but Above Normal Operating Range - Least Severe Level	Crankcase Pressure - Data Valid But Above Normal Operating Range - Least Severe Level
101	16	555	Engine Crankcase Pressure	Data Valid but Above Normal Operating Range - Moderately Severe Level	Crankcase Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level
102	2	2973	Engine Intake Manifold #1 Pressure	Data Erratic, Intermittent or Incorrect	Intake Manifold 1 Pressure - Data Erratic, Intermittent or Incorrect
102	3	122	Engine Intake Manifold #1 Pressure	Voltage Above Normal or Shorted to High Source	Intake Manifold 1 Pressure Sensor Circuit - Voltage above normal, or shorted to high source
102	4	123	Engine Intake Manifold #1 Pressure	Voltage Below Normal or Shorted to Low Source	Intake Manifold 1 Pressure Sensor Circuit - Voltage below normal, or shorted to low source
102	10	3361	Engine Intake Manifold #1 Pressure	Abnormal Rate of Change	Intake Manifold 1 Pressure - Abnormal rate of change
102	16	124	Engine Intake Manifold #1 Pressure	Data Valid but Above Normal Operating Range - Moderately Severe Level	Intake Manifold 1 Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level
102	18	125	Engine Intake Manifold #1 Pressure	Data Valid but Below Normal Operating Range - Moderately Severe Level	Intake Manifold 1 Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level
103	2	686	Engine Turbocharger 1 Speed	Data Erratic, Intermittent or Incorrect	Turbocharger 1 Speed - Data Erratic, Intermittent or Incorrect
103	15	2288	Engine Turbocharger 1 Speed	Data Valid but Above Normal Operating Range - Least Severe Level	Turbocharger 1 Speed - Data Valid But Above Normal Operating Range - Least Severe Level
103	16	595	Engine Turbocharger 1 Speed	Data Valid but Above Normal Operating Range - Moderately Severe Level	Turbocharger 1 Speed - Data Valid But Above Normal Operating Range - Moderately Severe Level
103	18	687	Engine Turbocharger 1 Speed	Data Valid but Below Normal Operating Range - Moderately Severe Level	Turbocharger 1 Speed - Data Valid But Below Normal Operating Range - Moderately Severe Level

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104	18	3917	Engine Turbocharger Lube Oil Pressure 1	Data Valid but Below Normal Operating Range - Moderately Severe Level	Engine Turbocharger Lube Oil Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level
105	0	155	Engine Intake Manifold 1 Temperature	Data Valid but Above Normal Operational Range - Most Severe Level	Intake Manifold 1 Temperature - Data Valid but above normal operational range - Most Severe Level
105	2	436	Engine Intake Manifold 1 Temperature	Data Erratic, Intermittent or Incorrect	Intake Manifold 1 Temperature - Data erratic, intermittent or incorrect
105	3	153	Engine Intake Manifold 1 Temperature	Voltage Above Normal or Shorted to High Source	Intake Manifold 1 Temperature Sensor Circuit - Voltage above normal, or shorted to high source
105	4	154	Engine Intake Manifold 1 Temperature	Voltage Below Normal or Shorted to Low Source	Intake Manifold 1 Temperature Sensor Circuit - Voltage below normal, or shorted to low source
105	15	2964	Engine Intake Manifold #1 Temperature	Data Valid but Above Normal Operating Range - Least Severe Level	Intake Manifold 1 Temperature - Data Valid But Above Normal Operating Range - Least Severe Level
105	16	488	Engine Intake Manifold Temperature	Data Valid but Above Normal Operating Range - Moderately Severe Level	Intake Manifold 1 Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level
105	18	3385	Engine Intake Manifold 1 Temperature	Data Valid but Below Normal Operating Range - Moderately Severe Level	Intake Manifold 1 Temperature - Data Valid But Below Normal Operating Range - Moderately Severe Level
107	15	5576	Engine Air Filter 1 Differential Pressure	Data Valid but Above Normal Operating Range - Least Severe Level	Engine Air Filter Differential Pressure - Data Valid But Above Normal Operating Range - Least Severe Level
107	16	3341	Engine Air Filter 1 Differential Pressure	Data Valid but Above Normal Operating Range - Moderately Severe Level	Engine Air Filter Differential Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level
108	2	295	Barometric Pressure	Data Erratic, Intermittent or Incorrect	Barometric Pressure - Data erratic, intermittent or incorrect
108	3	221	Barometric Pressure	Voltage Above Normal or Shorted to High Source	Barometric Pressure Sensor Circuit - Voltage above normal, or shorted to high source
108	4	222	Barometric Pressure	Voltage Below Normal or Shorted to Low Source	Barometric Pressure Sensor Circuit - Voltage above normal, or shorted to low source
109	3	231	Engine Coolant Pressure	Voltage Above Normal or Shorted to High Source	Coolant Pressure Sensor Circuit - Voltage above normal, or shorted to high source
109	4	232	Engine Coolant Pressure	Voltage Below Normal or Shorted to Low Source	Coolant Pressure Sensor Circuit - Voltage below normal, or shorted to low source
109	18	233	Engine Coolant Pressure	Data Valid but Below Normal Operating Range - Moderately Severe Level	Coolant Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level
110	0	151	Engine Coolant Temperature	Data Valid but Above Normal Operational Range - Most Severe Level	Engine Coolant Temperature - Data valid but above normal operational range - Most Severe Level
110	2	334	Engine Coolant Temperature	Data Erratic, Intermittent or Incorrect	Engine Coolant Temperature - Data erratic, intermittent or incorrect
110	3	144	Engine Coolant Temperature	Voltage Above Normal or Shorted to High Source	Engine Coolant Temperature 1 Sensor Circuit - Voltage above normal, or shorted to high source
110	4	145	Engine Coolant Temperature	Voltage Below Normal or Shorted to Low Source	Engine Coolant Temperature 1 Sensor Circuit - Voltage below normal, or shorted to low source
110	14	1847	Engine Coolant Temperature	Special Instructions	Engine Coolant Temperature - Special Instructions
110	15	2963	Engine Coolant Temperature	Data Valid but Above Normal Operating Range - Least Severe Level	Engine Coolant Temperature - Data Valid But Above Normal Operating Range - Least Severe Level
110	16	146	Engine Coolant Temperature	Data Valid but Above Normal Operating Range - Moderately Severe Level	Engine Coolant Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level
110	18	2789	Engine Coolant Temperature	Data Valid but Below Normal Operating Range - Moderately Severe Level	Engine Coolant Temperature - Data Valid But Below Normal Operating Range - Moderately Severe Level

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110	31	2646	Engine Coolant Temperature	Not Available or Condition Exists	Engine Coolant Temperature - Condition Exists
110	31	2659	Engine Coolant Temperature	Not Available or Condition Exists	Engine Coolant Temperature - Condition Exists
111	1	235	Engine Coolant Level	Data Valid but Below Normal Operational Range - Most Severe Level	Coolant Level - Data valid but below normal operational range - Most Severe Level
111	2	422	Engine Coolant Level	Data Erratic, Intermittent or Incorrect	Coolant Level - Data erratic, intermittent or incorrect
111	3	195	Engine Coolant Level	Voltage Above Normal or Shorted to High Source	Coolant Level Sensor 1 Circuit - Voltage above normal, or shorted to high source
111	4	196	Engine Coolant Level	Voltage Below Normal or Shorted to Low Source	Coolant Level Sensor 1 Circuit - Voltage below normal, or shorted to low source
111	9	3613	SAE J1939 Multiplexing PGN Timeout	Abnormal Update Rate	SAE J1939 Multiplexing PGN Timeout Error - Abnormal update rate
111	17	2448	Engine Coolant Level	Data Valid but Below Normal Operational Range - Least Severe Level	Coolant Level - Data Valid But Below Normal Operating Range - Least Severe Level
111	17	5167	Engine Coolant Level	Data Valid but Below Normal Operational Range - Least Severe Level	Coolant Level - Data Valid But Below Normal Operating Range - Least Severe Level
111	18	197	Engine Coolant Level	Data Valid but Below Normal Operational Range - Moderately Severe Level	Coolant Level - Data Valid But Below Normal Operating Range - Moderately Severe Level
111	18	3366	Engine Coolant Level	Data Valid but Below Normal Operational Range - Moderately Severe Level	Coolant Level - Data Valid But Below Normal Operating Range - Moderately Severe Level
111	19	3614	SAE J1939 Multiplexing PGN Timeout	Received Network Data in Error	Coolant Level Sensor - Received Network Data in Error
157	1	2249	Engine Injector Metering Rail 1 Pressure	Data Valid but Below Normal Operational Range - Most Severe Level	Injector Metering Rail 1 Pressure - Data valid but below normal operational range - Most Severe Level
157	2	554	Engine Injector Metering Rail 1 Pressure	Data Erratic, Intermittent or Incorrect	Injector Metering Rail 1 Pressure - Data erratic, intermittent or incorrect
157	3	451	Engine Injector Metering Rail 1 Pressure	Voltage Above Normal or Shorted to High Source	Injector Metering Rail 1 Pressure Sensor Circuit - Voltage above normal, or shorted to high source
157	4	452	Engine Injector Metering Rail 1 Pressure	Voltage Below Normal or Shorted to Low Source	Injector Metering Rail 1 Pressure Sensor Circuit - Voltage below normal, or shorted to low source
157	7	755	Engine Injector Metering Rail 1 Pressure	Mechanical System not Responding or Out of Adjustment	Injector Metering Rail 1 Pressure - Mechanical system not responding or out of adjustment
157	15	4727	Engine Injector Metering Rail 1 Pressure	Data Valid but Above Normal Operational Range - Least Severe Level	Injector Metering Rail 1 Pressure - Data Valid But Above Normal Operating Range - Least Severe Level
157	16	553	Engine Injector Metering Rail 1 Pressure	Data Valid but Above Normal Operational Range - Moderately Severe Level	Injector Metering Rail 1 Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level
157	18	559	Engine Injector Metering Rail 1 Pressure	Data Valid but Below Normal Operational Range - Moderately Severe Level	Injector Metering Rail 1 Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level
168	16	442	Battery Potential /Power Input 1	Data Valid but Above Normal Operational Range - Moderately Severe Level	Battery 1 Voltage - Data Valid But Above Normal Operating Range - Moderately Severe Level
168	17	3724	Battery Potential /Power Input 1	Data Valid but Below Normal Operational Range - Least Severe Level	Battery 1 Voltage - Data Valid But Below Normal Operating Range - Least Severe Level
168	18	441	Battery Potential /Power Input 1	Data Valid but Below Normal Operational Range - Moderately Severe Level	Battery 1 Voltage - Data Valid But Below Normal Operating Range - Moderately Severe Level
171	2	2398	Ambient Air Temperature	Data Erratic, Intermittent or Incorrect	Ambient Air Temperature - Data erratic, intermittent or incorrect
171	3	249	Ambient Air Temperature	Voltage Above Normal or Shorted to High Source	Ambient Air Temperature Sensor 1 Circuit - Voltage above normal, or shorted to high source
171	4	256	Ambient Air Temperature	Voltage Below Normal or Shorted to Low Source	Ambient Air Temperature Sensor 1 Circuit - Voltage below normal, or shorted to low source

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171	9	3531	Ambient Air Temperature	Abnormal Update Rate	Ambient Air Temperature - Abnormal update rate
171	19	3532	Ambient Air Temperature	Received Network Data in Error	Ambient Air Temperature - Received Network Data In Error
174	0	266	Engine Fuel Temperature 1	Data Valid but Above Normal Operational Range - Most Severe Level	Engine Fuel Temperature - Data valid but above normal operational range - Most Severe Level
174	2	535	Engine Fuel Temperature 1	Data Erratic, Intermittent or Incorrect	Engine Fuel Temperature - Data erratic, intermittent or incorrect
174	3	263	Engine Fuel Temperature 1	Voltage Above Normal or Shorted to High Source	Engine Fuel Temperature Sensor 1 Circuit - Voltage above normal, or shorted to high source
174	4	265	Engine Fuel Temperature 1	Voltage Below Normal or Shorted to Low Source	Engine Fuel Temperature Sensor 1 Circuit - Voltage below normal, or shorted to low source
174	16	261	Engine Fuel Temperature 1	Data Valid but Above Normal Operational Range - Moderately Severe Level	Engine Fuel Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level
175	0	214	Engine Oil Temperature 1	Data Valid but Above Normal Operational Range - Most Severe Level	Engine Oil Temperature - Data valid but above normal operational range - Most Severe Level
175	2	425	Engine Oil Temperature 1	Data Erratic, Intermittent or Incorrect	Engine Oil Temperature - Data erratic, intermittent or incorrect
175	3	212	Engine Oil Temperature 1	Voltage Above Normal or Shorted to High Source	Engine Oil Temperature Sensor 1 Circuit - Voltage above normal, or shorted to high source
175	4	213	Engine Oil Temperature 1	Voltage Below Normal or Shorted to Low Source	Engine Oil Temperature Sensor 1 Circuit - Voltage below normal, or shorted to low source
175	16	421	Engine Oil Temperature 1	Data Valid but Above Normal Operational Range - Moderately Severe Level	Engine Oil Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level
188	16	3715	Engine Speed At Idle, Point 1 (Engine Configuration)	Data Valid but Above Normal Operational Range - Moderately Severe Level	Engine Speed At Idle - Data Valid But Above Normal Operating Range - Moderately Severe Level
188	18	3716	Engine Speed At Idle, Point 1 (Engine Configuration)	Data Valid but Below Normal Operational Range - Moderately Severe Level	Engine Speed At Idle - Data Valid But Below Normal Operating Range - Moderately Severe Level
190	0	234	Engine Speed	Data Valid but Above Normal Operational Range - Most Severe Level	Engine Crankshaft Speed/Position - Data valid but above normal operational range - Most Severe Level
190	2	689	Engine Speed	Data Erratic, Intermittent or Incorrect	Engine Crankshaft Speed/Position - Data erratic, intermittent or incorrect
190	2	2321	Engine Speed	Data Erratic, Intermittent or Incorrect	Engine Crankshaft Speed/Position - Data erratic, intermittent or incorrect
190	16	1992	Engine Speed	Data Valid but Above Normal Operational Range - Moderately Severe Level	Engine Crankshaft Speed/Position - Data Valid But Above Normal Operating Range - Moderately Severe Level
190	16	2468	Engine Speed	Data Valid but Above Normal Operational Range - Moderately Severe Level	Engine Crankshaft Speed/Position - Data Valid But Above Normal Operating Range - Moderately Severe Level
191	9	3328	Transmission Output Shaft Speed	Abnormal Update Rate	Transmission Output Shaft Speed - Abnormal update rate
191	16	349	Transmission Output Shaft Speed	Data Valid but Above Normal Operational Range - Moderately Severe Level	Transmission Output Shaft Speed - Data Valid But Above Normal Operating Range - Moderately Severe Level
191	18	489	Transmission Output Shaft Speed	Data Valid but Below Normal Operational Range - Moderately Severe Level	Transmission Output Shaft Speed - Data Valid But Below Normal Operating Range - Moderately Severe Level
191	19	3418	Transmission Output Shaft Speed	Received Network Data in Error	Transmission Output Shaft Speed - Received Network Data In Error
237	2	4722	Vehicle Identification Number	Data Erratic, Intermittent or Incorrect	Vehicle Identification Number - Data erratic, intermittent or incorrect
237	13	4517	Vehicle Identification Number	Out of Calibration	Vehicle Identification Number - Out of Calibration
237	31	4721	Vehicle Identification Number	Not Available or Condition Exists	Vehicle Identification Number - Condition Exists

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251	2	319	Real Time Clock	Data Erratic, Intermittent or Incorrect	Real Time Clock - Data erratic, intermittent or incorrect
411	2	1866	Engine Exhaust Gas Recirculation Differential Pressure	Data Erratic, Intermittent or Incorrect	Exhaust Gas Recirculation Differential Pressure - Data erratic, intermittent or incorrect
411	3	2273	Engine Exhaust Gas Recirculation Differential Pressure	Voltage Above Normal or Shorted to High Source	Exhaust Gas Recirculation Differential Pressure Sensor Circuit - Voltage above normal, or shorted to high source
411	4	2274	Engine Exhaust Gas Recirculation Differential Pressure	Voltage Below Normal or Shorted to Low Source	Exhaust Gas Recirculation Differential Pressure Sensor Circuit - Voltage below normal, or shorted to low source
412	2	1867	Engine Exhaust Gas Recirculation Temperature	Data Erratic, Intermittent or Incorrect	Exhaust Gas Recirculation Temperature - Data erratic, intermittent or incorrect
412	3	2375	Engine Exhaust Gas Recirculation Temperature	Voltage Above Normal or Shorted to High Source	Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage above normal, or shorted to high source
412	4	2376	Engine Exhaust Gas Recirculation Temperature	Voltage Below Normal or Shorted to Low Source	Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage below normal, or shorted to low source
412	15	2961	Engine Exhaust Gas Recirculation Temperature	Data Valid but Above Normal Operating Range - Least Severe Level	Exhaust Gas Recirculation Temperature - Data Valid But Above Normal Operating Range - Least Severe Level
412	16	2962	Engine Exhaust Gas Recirculation Temperature	Data Valid but Above Normal Operating Range - Moderately Severe Level	Exhaust Gas Recirculation Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level
441	3	293	Auxiliary Temperature 1	Voltage Above Normal or Shorted to High Source	Auxiliary Temperature Sensor Input 1 Circuit - Voltage above normal, or shorted to high source
441	4	294	Auxiliary Temperature 1	Voltage Below Normal or Shorted to Low Source	Auxiliary Temperature Sensor Input 1 Circuit - Voltage below normal, or shorted to low source
441	14	292	Auxiliary Temperature 1	Special Instructions	Auxiliary Temperature Sensor Input 1 - Special Instructions
442	3	3765	Auxiliary Temperature 2	Voltage Above Normal or Shorted to High Source	Auxiliary Temperature Sensor Input 2 Circuit - Voltage above normal, or shorted to high source
442	4	3766	Auxiliary Temperature 2	Voltage Below Normal or Shorted to Low Source	Auxiliary Temperature Sensor Input 2 Circuit - Voltage below normal, or shorted to low source
521	2	4526	Brake Pedal Position	Data Erratic, Intermittent or Incorrect	Brake Pedal Position - Data erratic, intermittent or incorrect
558	2	431	Accelerator Pedal 1 Low/Idle Switch	Data Erratic, Intermittent or Incorrect	Accelerator Pedal or Lever Idle Validation Switch - Data erratic, intermittent or incorrect
558	9	3528	Accelerator Pedal 1 Low/Idle Switch	Abnormal Update Rate	Accelerator Pedal or Lever Idle Validation Switch - Abnormal update rate
558	13	432	Accelerator Pedal 1 Low/Idle Switch	Out of Calibration	Accelerator Pedal or Lever Idle Validation Switch Circuit - Out of Calibration
558	19	3527	Accelerator Pedal 1 Low/Idle Switch	Received Network Data in Error	Accelerator Pedal or Lever Idle Validation Switch - Received Network Data in Error
563	9	3488	Anti-Lock Braking (ABS) Active	Abnormal Update Rate	Anti-Lock Braking (ABS) Controller - Abnormal update rate
563	31	4215	Anti-Lock Braking (ABS) Active	Not Available or Condition Exists	Anti-Lock Braking (ABS) Active - Condition Exists
596	2	3841	Cruise Control Enable Switch	Data Erratic, Intermittent or Incorrect	Cruise Control Enable Switch - Data erratic, intermittent or incorrect
596	7	3839	Cruise Control Enable Switch	Mechanical System not Responding or Out of Adjustment	Cruise Control Enable Switch - Mechanical system not responding or out of adjustment
596	13	3842	Cruise Control Enable Switch	Out of Calibration	Cruise Control Enable Switch - Out of Calibration
597	3	769	Brake Switch	Voltage Above Normal or Shorted to High Source	Brake Switch Circuit - Voltage above normal, or shorted to high source

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597	4	771	Brake Switch	Voltage Below Normal or Shorted to Low Source	Brake Switch Circuit - Voltage below normal, or shorted to low source
599	2	2721	Cruise Control Set Switch	Data Erratic, Intermittent or Incorrect	Cruise Control Set Switch - Data erratic, intermittent or incorrect
611	2	523	System Diagnostic Code #1	Data Erratic, Intermittent or Incorrect	Auxiliary Intermediate (PIO) Speed Switch Validation - Data erratic, intermittent or incorrect
612	2	115	System Diagnostic Code #2	Data Erratic, Intermittent or Incorrect	Engine Magnetic Speed/Position Lost Both of Two Signals - Data erratic, intermittent or incorrect
625	9	291	Proprietary Datalink	Abnormal Update Rate	Proprietary Datalink Error (OEM/Vehicle Datalink) - Abnormal update rate
626	3	2738	Engine Start Enable Device 1	Voltage Above Normal or Shorted to High Source	Start Enable Device 1 Circuit (Either Injection) - Voltage above normal, or shorted to high source
626	4	2739	Engine Start Enable Device 1	Voltage Below Normal or Shorted to Low Source	Start Enable Device 1 Circuit (Either Injection) - Voltage below normal, or shorted to low source
626	18	487	Engine Start Enable Device 1	Data Valid but Below Normal Operating Range - Moderately Severe Level	Start Enable Device 1 Canister Empty (Either Injection) - Data Valid But Below Normal Operating Range
629	12	111	Controller #1	Bad Intelligent Device or Component	Engine Control Module Critical Internal Failure - Bad intelligent device or component
629	12	343	Controller #1	Bad Intelligent Device or Component	Engine Control Module Warning Internal Hardware Failure - Bad intelligent device or component
629	31	2661	Controller #1	Not Available or Condition Exists	At Least One Unacknowledged Most Severe Fault - Condition Exists
629	31	2662	Controller #1	Not Available or Condition Exists	At Least One Unacknowledged Moderately Severe Fault - Condition Exists
630	12	3697	Engine Control Module Calibration Memory	Bad Intelligent Device or Component	Engine Control Module Calibration Memory - Bad intelligent device or component
633	31	2311	Engine Fuel Actuator 1 Control Command	Not Available or Condition Exists	Electronic Fuel Injection Control Valve Circuit - Condition Exists
639	2	426	J1939 Network #1, Primary Vehicle Network (previously SAE J1939 Data Link)	Data Erratic, Intermittent or Incorrect	J1939 Network #1 - Data erratic, intermittent or incorrect
639	9	285	J1939 Network #1, Primary Vehicle Network (previously SAE J1939 Data Link)	Abnormal Update Rate	SAE J1939 Multiplexing PGN Timeout Error - Abnormal update rate
639	9	427	J1939 Network #1, Primary Vehicle Network (previously SAE J1939 Data Link)	Abnormal Update Rate	SAE J1939 Datalink - Abnormal update rate
639	13	286	J1939 Network #1, Primary Vehicle Network (previously SAE J1939 Data Link)	Out of Calibration	SAE J1939 Multiplexing Configuration Error - Out of Calibration
640	14	599	Engine External Protection Input	Special Instructions	Auxiliary Commanded Dual Output Shutdown - Special Instructions
641	7	2387	Engine Variable Geometry Turbocharger Actuator #1	Mechanical System not Responding or Out of Adjustment	VGT Actuator Driver Circuit (Motor) - Mechanical system not responding or out of adjustment
641	9	2636	Engine Variable Geometry Turbocharger Actuator #1	Abnormal Update Rate	VGT Actuator Driver Circuit - Abnormal update rate
641	11	2198	Engine Variable Geometry Turbocharger Actuator #1	Root Cause Not Known	VGT Actuator Driver Circuit - Root Cause Not Known
641	12	2634	Engine Variable Geometry Turbocharger Actuator #1	Bad Intelligent Device or Component	VGT Actuator Controller - Bad intelligent device or component
641	13	1898	Engine Variable Geometry Turbocharger Actuator #1	Out of Calibration	VGT Actuator Controller - Out of Calibration

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641	13	2449	Engine Variable Geometry Turbocharger Actuator #1	Out of Calibration	VG T Actuator Controller - Out of Calibration
641	15	1962	Engine Variable Geometry Turbocharger Actuator #1	Data Valid but Above Normal Operating Range - Least Severe Level	VG T Actuator Driver Over Temperature (Calculated) - Data Valid but Above Normal Operating Range - Least Severe Level
641	31	2635	Engine Variable Geometry Turbocharger Actuator #1	Not Available or Condition Exists	VG T Actuator Driver Circuit - Condition Exists
644	2	237	Engine External Speed Command Input	Data Erratic, Intermittent or Incorrect	External Speed Command Input (Multiple Unit Synchronization) - Data Erratic, Intermittent or Incorrect
647	3	2377	Engine Fan Clutch 1 Output Device Driver	Voltage Above Normal or Shorted to High Source	Fan Control Circuit - Voltage above normal, or shorted to high source
647	4	245	Engine Fan Clutch 1 Output Device Driver	Voltage Below Normal or Shorted to Low Source	Fan Control Circuit - Voltage below normal, or shorted to low source
649	3	5271	Engine Exhaust Back Pressure Regulator Control Circuit	Voltage Above Normal or Shorted to High Source	Engine Exhaust Back Pressure Regulator Control Circuit - Voltage Above Normal, or Shorted to High Source
649	4	5272	Engine Exhaust Back Pressure Regulator Control Circuit	Voltage Below Normal or Shorted to Low Source	Engine Exhaust Back Pressure Regulator Control Circuit - Voltage Below Normal, or Shorted to Low Source
649	5	5273	Engine Exhaust Back Pressure Regulator Control Circuit	Current Below Normal or Open Circuit	Engine Exhaust Back Pressure Regulator Control Circuit - Current Below Normal or Open Circuit
651	5	322	Engine Injector Cylinder #01	Current Below Normal or Open Circuit	Injector Solenoid Driver Cylinder 1 Circuit - Current below normal or open circuit
651	7	1139	Engine Injector Cylinder #01	Mechanical System not Responding or Out of Adjustment	Injector Solenoid Driver Cylinder 1 - Mechanical system not responding or out of adjustment
652	5	331	Engine Injector Cylinder #02	Current Below Normal or Open Circuit	Injector Solenoid Driver Cylinder 2 Circuit - Current below normal or open circuit
652	7	1141	Engine Injector Cylinder #02	Mechanical System not Responding or Out of Adjustment	Injector Solenoid Driver Cylinder 2 - Mechanical system not responding or out of adjustment
653	5	324	Engine Injector Cylinder #03	Current Below Normal or Open Circuit	Injector Solenoid Driver Cylinder 3 Circuit - Current below normal or open circuit
653	7	1142	Engine Injector Cylinder #03	Mechanical System not Responding or Out of Adjustment	Injector Solenoid Driver Cylinder 3 - Mechanical system not responding or out of adjustment
654	5	332	Engine Injector Cylinder #04	Current Below Normal or Open Circuit	Injector Solenoid Driver Cylinder 4 Circuit - Current below normal or open circuit
654	7	1143	Engine Injector Cylinder #04	Mechanical System not Responding or Out of Adjustment	Injector Solenoid Driver Cylinder 4 - Mechanical system not responding or out of adjustment
655	5	323	Engine Injector Cylinder #05	Current Below Normal or Open Circuit	Injector Solenoid Driver Cylinder 5 Circuit - Current below normal or open circuit
655	7	1144	Engine Injector Cylinder #05	Mechanical System not Responding or Out of Adjustment	Injector Solenoid Driver Cylinder 5 - Mechanical system not responding or out of adjustment
656	5	325	Engine Injector Cylinder #06	Current Below Normal or Open Circuit	Injector Solenoid Driver Cylinder 6 Circuit - Current below normal or open circuit
656	7	1145	Engine Injector Cylinder #06	Mechanical System not Responding or Out of Adjustment	Injector Solenoid Driver Cylinder 6 - Mechanical system not responding or out of adjustment
657	5	1548	Engine Injector Cylinder #7	Current Below Normal or Open Circuit	Injector Solenoid Driver Cylinder 7 Circuit - Current below normal or open circuit
658	5	1549	Engine Injector Cylinder #8	Current Below Normal or Open Circuit	Injector Solenoid Driver Cylinder 8 Circuit - Current below normal or open circuit
659	5	1622	Engine Injector Cylinder #9	Current Below Normal or Open Circuit	Injector Solenoid Driver Cylinder 9 Circuit - Current below normal or open circuit

J1939 SPN	J1939 FM	Cummins Code	J 1939SPN Description	J 1939FM Description	Cummins Description
660	5	1551	Engine Injector Cylinder #10	Current Below Normal or Open Circuit	Injector Solenoid Driver Cylinder 10 Circuit - Current below normal or open circuit
661	5	1552	Engine Injector Cylinder #11	Current Below Normal or Open Circuit	Injector Solenoid Driver Cylinder 11 Circuit - Current below normal or open circuit
662	5	1553	Engine Injector Cylinder #12	Current Below Normal or Open Circuit	Injector Solenoid Driver Cylinder 12 Circuit - Current below normal or open circuit
663	5	1554	Engine Injector Cylinder #13	Current Below Normal or Open Circuit	Injector Solenoid Driver Cylinder 13 Circuit - Current below normal or open circuit
664	5	1555	Engine Injector Cylinder #14	Current Below Normal or Open Circuit	Injector Solenoid Driver Cylinder 14 Circuit - Current below normal or open circuit
665	5	1556	Engine Injector Cylinder #15	Current Below Normal or Open Circuit	Injector Solenoid Driver Cylinder 15 Circuit - Current below normal or open circuit
666	5	1557	Engine Injector Cylinder #16	Current Below Normal or Open Circuit	Injector Solenoid Driver Cylinder 16 Circuit - Current below normal or open circuit
677	3	584	Engine Starter Motor Relay	Voltage Above Normal or Shorted to High Source	Starter Relay Driver Circuit - Voltage above normal, or shorted to high source
677	4	585	Engine Starter Motor Relay	Voltage Below Normal or Shorted to Low Source	Starter Relay Driver Circuit - Voltage below normal, or shorted to low source
697	3	2557	Auxiliary PWM Driver #1	Voltage Above Normal or Shorted to High Source	Auxiliary PWM Driver 1 Circuit - Voltage above normal, or shorted to high source
697	4	2558	Auxiliary PWM Driver #1	Voltage Below Normal or Shorted to Low Source	Auxiliary PWM Driver 1 Circuit - Voltage below normal, or shorted to low source
701	14	4734	Auxiliary I/O #01	Special Instructions	Auxiliary Input Output 1 - Special Instructions
702	3	527	Auxiliary I/O #02	Voltage Above Normal or Shorted to High Source	Auxiliary Input Output 2 Circuit - Voltage above normal, or shorted to high source
702	5	4724	Auxiliary I/O #02	Current Below Normal or Open Circuit	Auxiliary Input Output 2 Circuit - Current below normal or open circuit
702	6	4725	Auxiliary I/O #02	Current Above Normal or Grounded Circuit	Auxiliary Input Output 2 Circuit - Current above normal or grounded circuit
703	3	529	Auxiliary I/O #03	Voltage Above Normal or Shorted to High Source	Auxiliary Input Output 3 Circuit - Voltage above normal, or shorted to high source
723	2	778	Engine Speed 2	Data Erratic, Intermittent or Incorrect	Engine Camshaft Speed / Position Sensor - Data erratic, intermittent or incorrect
723	2	2322	Engine Speed 2	Data Erratic, Intermittent or Incorrect	Engine Camshaft Speed / Position Sensor - Data erratic, intermittent or incorrect
723	7	731	Engine Speed 2	Mechanical System not Responding or Out of Adjustment	Engine Speed / Position Camshaft and Crankshaft Misalignment - Mechanical system not responding or out of adjustment
729	3	2555	Engine Intake Air Heater Driver #1	Voltage Above Normal or Shorted to High Source	Engine Intake Air Heater 1 Circuit - Voltage above normal, or shorted to high source
729	4	2556	Engine Intake Air Heater Driver #1	Voltage Below Normal or Shorted to Low Source	Engine Intake Air Heater 1 Circuit - Voltage below normal, or shorted to low source
748	9	3641	Transmission Output Retarder	Abnormal Update Rate	Transmission Output Retarder - Abnormal update rate
862	3	3733	Crankcase Breather Heater Circuit	Voltage Above Normal or Shorted to High Source	Crankcase Breather Filter Heater Circuit - Voltage above normal, or shorted to high source
862	4	3734	Crankcase Breather Heater Circuit	Voltage Below Normal or Shorted to Low Source	Crankcase Breather Filter Heater Circuit - Voltage below normal, or shorted to low source
974	3	133	Remote Accelerator Pedal Position	Voltage Above Normal or Shorted to High Source	Remote Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage above normal, or shorted to high source

J1939 SPN	J 1939 FM	Cummins Code	J 1939SPN Description	J 1939FM Description	Cummins Description
974	4	134	Remote Accelerator Pedal Position	Voltage Below Normal or Shorted to Low Source	Remote Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage below normal, or shorted to low source
974	19	288	Remote Accelerator Pedal Position	Received Network Data in Error	SAE J1939 Multiplexing Remote Accelerator Pedal or Lever Position Sensor System - Received Network Data in Error
1072	3	2182	Engine (Compression) Brake Output #1	Voltage Above Normal or Shorted to High Source	Engine Brake Actuator Driver 1 Circuit - Voltage above normal, or shorted to high source
1072	4	2183	Engine (Compression) Brake Output #1	Voltage Below Normal or Shorted to Low Source	Engine Brake Actuator Driver 1 Circuit - Voltage below normal, or shorted to low source
1073	3	2367	Engine (Compression) Brake Output #2	Voltage Above Normal or Shorted to High Source	Engine Brake Actuator Driver 2 Circuit - Voltage above normal, or shorted to high source
1073	4	2363	Engine (Compression) Brake Output #2	Voltage Below Normal or Shorted to Low Source	Engine Brake Actuator Driver 2 Circuit - Voltage below normal, or shorted to low source
1075	3	2265	Engine Electric Lift Pump for Engine Fuel Supply	Voltage Above Normal or Shorted to High Source	Electric Lift Pump for Engine Fuel Supply Circuit - Voltage above normal, or shorted to high source
1075	4	2266	Engine Electric Lift Pump for Engine Fuel Supply	Voltage Below Normal or Shorted to Low Source	Electric Lift Pump for Engine Fuel Supply Circuit - Voltage below normal, or shorted to low source
1081	7	3494	Engine Wait to Start Lamp	Mechanical System not Responding or Out of Adjustment	Engine Wait to Start Lamp - Mechanical system not responding or out of adjustment
1081	9	3555	Engine Wait to Start Lamp	Abnormal Update Rate	Engine Wait to Start Lamp - Abnormal update rate
1081	19	3556	Engine Wait to Start Lamp	Received Network Data in Error	Engine Wait to Start Lamp - Received Network Data in Error
1081	31	4252	Engine Wait to Start Lamp	Not Available or Condition Exists	Engine Wait to Start Lamp - Condition exists
1109	0	3931	Engine Protection System Approaching Shutdown	Data Valid but Above Normal Operational Range - Most Severe Level	Engine Protection System Approaching Shutdown - Data valid but above normal operational range - Most Severe Level
1112	3	2368	Engine (Compression) Brake Output #3	Voltage Above Normal or Shorted to High Source	Engine Brake Actuator Driver 3 Circuit - Voltage above normal, or shorted to high source
1112	4	2365	Engine (Compression) Brake Output #3	Voltage Below Normal or Shorted to Low Source	Engine Brake Actuator Driver 3 Circuit - Voltage below normal, or shorted to low source
1127	7	3683	Engine Turbocharger Boost Pressure	Mechanical System not Responding or Out of Adjustment	Engine Turbocharger Boost Pressure - Mechanical system not responding or out of adjustment
1136	2	699	Engine ECU Temperature	Data Erratic, Intermittent or Incorrect	Engine ECU Temperature - Data erratic, intermittent or incorrect
1136	3	697	Engine ECU Temperature	Voltage Above Normal or Shorted to High Source	Engine ECU Temperature Sensor Circuit - Voltage above normal, or shorted to high source
1136	4	698	Engine ECU Temperature	Voltage Below Normal or Shorted to Low Source	Engine ECU Temperature Sensor Circuit - Voltage below normal, or shorted to low source
1172	2	693	Engine Turbocharger 1 Compressor Intake Temperature	Data Erratic, Intermittent or Incorrect	Turbocharger 1 Compressor Intake Temperature - Data erratic, intermittent or incorrect
1172	3	691	Engine Turbocharger 1 Compressor Intake Temperature	Voltage Above Normal or Shorted to High Source	Turbocharger 1 Compressor Intake Temperature Circuit - Voltage above normal, or shorted to high source
1172	4	692	Engine Turbocharger 1 Compressor Intake Temperature	Voltage Below Normal or Shorted to Low Source	Turbocharger 1 Compressor Intake Temperature Circuit - Voltage below normal, or shorted to low source
1172	9	3369	Engine Turbocharger 1 Compressor Intake Temperature	Abnormal Update Rate	Turbocharger 1 Compressor Intake Temperature Sensor - Abnormal update rate
1172	19	3371	Engine Turbocharger 1 Compressor Intake Temperature	Received Network Data in Error	Turbocharger 1 Compressor Intake Temperature Sensor - Received Network Data in Error
1176	1	3348	Engine Turbocharger 1 Compressor Intake Pressure	Data Valid but Below Normal Operational Range - Most Severe Level	Turbocharger 1 Compressor Intake Pressure - Data valid but below normal operational range - Most Severe Level

J1939 SPN	J1939 FM	Cummins Code	J 1939SPN Description	J 1939FM Description	Cummins Description
1176	2	743	Engine Turbocharger 1 Compressor Intake Pressure	Data Erratic, Intermittent or Incorrect	Turbocharger 1 Compressor Intake Pressure - Data erratic, intermittent or incorrect
1176	3	741	Engine Turbocharger 1 Compressor Intake Pressure	Voltage Above Normal or Shorted to High Source	Turbocharger 1 Compressor Intake Pressure Circuit - Voltage above normal, or shorted to high source
1176	4	742	Engine Turbocharger 1 Compressor Intake Pressure	Voltage Below Normal or Shorted to Low Source	Turbocharger 1 Compressor Intake Pressure Circuit - Voltage below normal, or shorted to low source
1176	9	3372	Engine Turbocharger 1 Compressor Intake Pressure	Abnormal Update Rate	Turbocharger 1 Compressor Intake Pressure - Abnormal update rate
1176	18	629	Engine Turbocharger 1 Compressor Intake Pressure	Data Valid but Below Normal Operating Range - Moderately Severe Level	Turbocharger 1 Compressor Intake Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level
1176	19	3373	Engine Turbocharger 1 Compressor Intake Pressure	Received Network Data in Error	Turbocharger 1 Compressor Intake Pressure - Received Network Data in Error
1194	13	3298	Anti-theft Encryption Seed Present Indicator	Out of Calibration	Anti-theft Encryption Seed - Out of Calibration
1195	2	269	Anti-theft Password Valid Indicator	Data Erratic, Intermittent or Incorrect	Anti-theft Password Valid Indicator - Data erratic, intermittent or incorrect
1209	2	2554	Engine Exhaust Gas Pressure 1	Data Erratic, Intermittent or Incorrect	Exhaust Gas Pressure 1 - Data erratic, intermittent or incorrect
1209	3	2373	Engine Exhaust Gas Pressure 1	Voltage Above Normal or Shorted to High Source	Exhaust Gas Pressure Sensor 1 Circuit - Voltage above normal, or shorted to high source
1209	4	2374	Engine Exhaust Gas Pressure 1	Voltage Below Normal or Shorted to Low Source	Exhaust Gas Pressure Sensor 1 Circuit - Voltage below normal, or shorted to low source
1209	16	2764	Engine Exhaust Gas Pressure 1	Data Valid but Above Normal Operating Range - Moderately Severe Level	Exhaust Gas Pressure 1 - Data Valid But Above Normal Operating Range - Moderately Severe Level
1213	9	3535	Malfunction Indicator Lamp	Abnormal Update Rate	Malfunction Indicator Lamp - Abnormal update rate
1231	2	3329	J1939 Network #2	Data Erratic, Intermittent or Incorrect	J1939 Network #2 - Data erratic, intermittent or incorrect
1235	2	3331	J1939 Network #3	Data Erratic, Intermittent or Incorrect	J1939 Network #3 - Data erratic, intermittent or incorrect
1239	16	4726	Engine Fuel Leakage 1	Data Valid but Above Normal Operating Range - Moderately Severe Level	Engine Fuel Leakage - Data Valid But Above Normal Operating Range - Moderately Severe Level
1267	3	338	Idle Shutdown Vehicle Accessories Relay Driver Circuit	Voltage Above Normal or Shorted to High Source	Idle Shutdown Vehicle Accessories Relay Driver Circuit - Voltage above normal, or shorted to high source
1267	4	339	Idle Shutdown Vehicle Accessories Relay Driver Circuit	Voltage Below Normal or Shorted to Low Source	Idle Shutdown Vehicle Accessories Relay Driver Circuit - Voltage below normal, or shorted to low source
1322	31	1718	Engine Misfire for Multiple Cylinders	Not Available or Condition Exists	Engine Misfire for Multiple Cylinders - Condition Exists
1323	31	1654	Engine Misfire Cylinder #1	Not Available or Condition Exists	Engine Misfire Cylinder 1 - Condition Exists
1324	31	1655	Engine Misfire Cylinder #2	Not Available or Condition Exists	Engine Misfire Cylinder 2 - Condition Exists
1325	31	1656	Engine Misfire Cylinder #3	Not Available or Condition Exists	Engine Misfire Cylinder 3 - Condition Exists
1326	31	1657	Engine Misfire Cylinder #4	Not Available or Condition Exists	Engine Misfire Cylinder 4 - Condition Exists
1327	31	1658	Engine Misfire Cylinder #5	Not Available or Condition Exists	Engine Misfire Cylinder 5 - Condition Exists
1328	31	1659	Engine Misfire Cylinder #6	Not Available or Condition Exists	Engine Misfire Cylinder 6 - Condition Exists
1347	3	272	Engine Fuel Pump Pressurizing Assembly #2	Voltage Above Normal or Shorted to High Source	Engine Fuel Pump Pressurizing Assembly 1 Circuit - Voltage above normal, or shorted to high source
1347	4	271	Engine Fuel Pump Pressurizing Assembly #1	Voltage Below Normal or Shorted to Low Source	Engine Fuel Pump Pressurizing Assembly 1 Circuit - Voltage below normal, or shorted to low source
1347	7	281	Engine Fuel Pump Pressurizing Assembly #3	Mechanical System not Responding or Out of Adjustment	Engine Fuel Pump Pressurizing Assembly 1 - Mechanical system not responding or out of adjustment

J1939 SPN	J1939 FM	Cummins Code	J 1939SPN Description	J 1939FM Description	Cummins Description
1349	3	483	Engine Injector Metering Rail 2 Pressure	Voltage Above Normal or Shorted to High Source	Injector Metering Rail 2 Pressure Sensor Circuit - Voltage above normal, or shorted to high source
1349	4	484	Engine Injector Metering Rail 2 Pressure	Voltage Below Normal or Shorted to Low Source	Injector Metering Rail 2 Pressure Sensor Circuit - Voltage below normal, or shorted to low source
1377	2	497	Engine Synchronization Switch	Data Erratic, Intermittent or Incorrect	Multiple Unit Synchronization Switch - Data erratic, intermittent or incorrect
1378	31	649	Engine Oil Change Interval	Not Available or Condition Exists	Engine Oil Change Interval - Condition Exists
1383	31	611	Engine was Shut Down Hot	Not Available or Condition Exists	Engine Shut Down Hot - Condition Exists
1387	3	1539	Auxiliary Pressure #1	Voltage Above Normal or Shorted to High Source	Auxiliary Pressure Sensor Input 1 Circuit - Voltage above normal, or shorted to high source
1387	4	1621	Auxiliary Pressure #1	Voltage Below Normal or Shorted to Low Source	Auxiliary Pressure Sensor Input 1 Circuit - Voltage below normal, or shorted to low source
1388	3	297	Auxiliary Pressure #2	Voltage Above Normal or Shorted to High Source	Auxiliary Pressure Sensor Input 2 Circuit - Voltage above normal, or shorted to high source
1388	4	298	Auxiliary Pressure #2	Voltage Below Normal or Shorted to Low Source	Auxiliary Pressure Sensor Input 2 Circuit - Voltage below normal, or shorted to low source
1388	14	296	Auxiliary Pressure #2	Special Instructions	Auxiliary Pressure Sensor Input 2 - Special Instructions
1563	2	1256	Incompatible Monitor/Controller	Data Erratic, Intermittent or Incorrect	Control Module Identification Input State Error - Data erratic, intermittent or incorrect
1563	2	1257	Incompatible Monitor/Controller	Data Erratic, Intermittent or Incorrect	Control Module Identification Input State Error - Data erratic, intermittent or incorrect
1569	31	3714	Engine Protection Torque Derate	Not Available or Condition Exists	Engine Protection Torque Derate - Condition Exists
1590	2	784	Adaptive Cruise Control Mode	Data Erratic, Intermittent or Incorrect	Adaptive Cruise Control Mode - Data erratic, intermittent or incorrect
1623	9	3186	Tachograph output-shaft-speed	Abnormal Update Rate	Tachograph Output-Shaft-Speed - Abnormal update rate
1623	13	5248	Tachograph Output Shaft-Speed	Out of Calibration	Tachograph Output-Shaft-Speed - Out of Calibration
1623	19	3213	Tachograph output-shaft-speed	Received Network Data in Error	Tachograph Output-Shaft-Speed - Received Network Data in Error
1632	14	2998	Engine Torque Limit Feature	Special Instructions	Engine Torque Limit Feature - Special Instructions
1632	31	5193	Engine Torque Limit Feature	Not Available or Condition Exists	Engine Torque Limit Feature - Condition Exists
1639	0	4789	Fan Speed	Data Valid but Above Normal Operational Range - Most Severe Level	Fan Speed - Data Valid but Above Normal Operational Range - Most Severe Level
1639	1	4791	Fan Speed	Data Valid but Below Normal Operational Range - Most Severe Level	Fan Speed - Data Valid but Below Normal Operational Range - Most Severe Level
1668	2	4437	J1939 Network #4 - Data erratic	Data Erratic, Intermittent or Incorrect	J1939 Network #4 - Data erratic, intermittent or incorrect
1675	31	3737	Engine Starter Mode	Not Available or Condition Exists	Engine Starter Mode Overcrank Protection - Condition Exists
1761	1	1673	Aftreatment 1 Diesel Exhaust Fluid Tank Level	Data Valid but Below Normal Operational Range - Most Severe Level	Aftreatment 1 Diesel Exhaust Fluid Tank Level - Data valid but below normal operational range -Most Severe Level
1761	2	1699	Aftreatment 1 Diesel Exhaust Fluid Tank Level	Data Erratic, Intermittent or Incorrect	Aftreatment 1 Diesel Exhaust Fluid Tank Level Sensor - Data erratic, intermittent or incorrect
1761	3	1669	Aftreatment 1 Diesel Exhaust Fluid Tank Level	Voltage Above Normal or Shorted to High Source	Aftreatment 1 Diesel Exhaust Fluid Tank Level Sensor Circuit - Voltage above normal, or shorted to high source
1761	4	1668	Aftreatment 1 Diesel Exhaust Fluid Tank Level	Voltage Below Normal or Shorted to Low Source	Aftreatment 1 Diesel Exhaust Fluid Tank Level Sensor Circuit - Voltage below normal, or shorted to low source

J1939 SPN	J 1939 FM	Cummins Code	J 1939SPN Description	J 1939FM Description	Cummins Description
1761	5	4679	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Current Below Normal or Open Circuit	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor Circuit - Current below normal or open circuit
1761	6	4738	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Current Above Normal or Grounded Circuit	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor Circuit - Current above normal or grounded circuit
1761	10	4769	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Abnormal Rate of Change	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor - Abnormal Rate of Change
1761	11	4739	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Root Cause Not Known	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor - Root Cause Not Known
1761	13	4732	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature	Out of Calibration	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor - Out of Calibration
1761	17	3497	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Data Valid but Below Normal Operating Range - Least Severe Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level - Data Valid But Below Normal Operating Range - Least Severe Level
1761	18	3498	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Data Valid but Below Normal Operating Range - Moderately Severe Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level - Data Valid But Below Normal Operating Range - Moderately Severe Level
1800	16	2263	Battery 1 Temperature	Data Valid but Above Normal Operating Range - Moderately Severe Level	Battery Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level
1800	18	2264	Battery 1 Temperature	Data Valid but Below Normal Operating Range - Moderately Severe Level	Battery Temperature - Data Valid But Below Normal Operating Range - Moderately Severe Level
1818	31	3374	ROP Brake Control active	Not Available or Condition Exists	Roll Over Protection Brake Control Active - Condition Exists
2006	9	5133	Source Address 6	Abnormal Update Rate	Source Address 6 - Abnormal Update Rate
2623	3	1239	Accelerator Pedal #1 Channel 2	Voltage Above Normal or Shorted to High Source	Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage above normal, or shorted to high source
2623	4	1241	Accelerator Pedal #1 Channel 2	Voltage Below Normal or Shorted to Low Source	Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage below normal, or shorted to low source
2629	15	2347	Engine Turbocharger 1 Compressor Outlet Temperature	Data Valid but Above Normal Operating Range - Least Severe Level	Turbocharger Compressor Outlet Temperature (Calculated) - Data Valid But Above Normal Operating Range
2630	2	3478	Engine Charge Air Cooler 1 Outlet Temperature	Data Erratic, Intermittent or Incorrect	Engine Charge Air Cooler Outlet Temperature - Data erratic, intermittent or incorrect
2630	3	2571	Engine Charge Air Cooler 1 Outlet Temperature	Voltage Above Normal or Shorted to High Source	Engine Charge Air Cooler Outlet Temperature - Voltage above normal, or shorted to high source
2630	4	2572	Engine Charge Air Cooler 1 Outlet Temperature	Voltage Below Normal or Shorted to Low Source	Engine Charge Air Cooler Outlet Temperature - Voltage below normal, or shorted to low source
2633	7	3616	Engine Variable Geometry Turbocharger (VGT) 1 Nozzle Position	Mechanical System not Responding or Out of Adjustment	Engine VGT Nozzle Position - Mechanical system not responding or out of adjustment
2634	3	1776	Power Relay	Voltage Above Normal or Shorted to High Source	Power Relay Driver Circuit - Voltage above normal, or shorted to high source
2634	4	1777	Power Relay	Voltage Below Normal or Shorted to Low Source	Power Relay Driver Circuit - Voltage below normal, or shorted to low source
2789	15	2346	Engine Turbocharger 1 Calculated Turbine Intake Temperature	Data Valid but Above Normal Operating Range - Least Severe Level	Turbocharger Turbine Intake Temperature - Data Valid But Above Normal Operating Range - Least Severe
2789	16	2451	Engine Turbocharger 1 Calculated Turbine Intake Temperature	Data Valid but Above Normal Operating Range - Moderately Severe Level	Turbocharger Turbine Intake Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level
2791	5	2349	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	Current Below Normal or Open Circuit	EGR Valve Control Circuit - Current below normal or open circuit

J1939 SPN	J1939 FM	Cummins Code	J 1939SPN Description	J 1939FM Description	Cummins Description
2791	6	2353	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	Current Above Normal or Grounded Circuit	EGR Valve Control Circuit - Current above normal or grounded circuit
2791	7	2357	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	Mechanical System not Responding or Out of Adjustment	EGR Valve Control Circuit - Mechanical system not responding or out of adjustment
2791	9	1893	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	Abnormal Update Rate	EGR Valve Control Circuit - Abnormal update rate
2791	13	1896	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	Out of Calibration	EGR Valve Controller - Out of Calibration
2791	15	1961	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	Data Valid but Above Normal Operating Range - Least Severe Level	EGR Valve Control Over Temperature - Data Valid but Above Normal Operating Range - Least Severe Level
2797	13	2765	Engine Injector Group 1	Out of Calibration	Engine Injector Bank 1 Barcodes - Out of Calibration
2884	9	3735	Engine Auxiliary Governor Switch	Abnormal Update Rate	Engine Auxiliary Governor Switch - Abnormal update rate
2978	9	3838	Estimated Engine Parasitic Losses - Percent Torque	Abnormal Update Rate	Estimated Engine Parasitic Losses - Percent Torque - Abnormal update rate
3031	2	1679	Aftreatment1 Diesel Exhaust Fluid Tank Temperature	Data Erratic, Intermittent or Incorrect	Aftreatment1 Diesel Exhaust Fluid Tank Temperature - Data erratic, intermittent or incorrect
3031	3	1678	Aftreatment1 Diesel Exhaust Fluid Tank Temperature	Voltage Above Normal or Shorted to High Source	Aftreatment1 Diesel Exhaust Fluid Tank Temperature Sensor - Voltage above normal, or shorted to high source
3031	4	1677	Aftreatment1 Diesel Exhaust Fluid Tank Temperature	Voltage Below Normal or Shorted to Low Source	Aftreatment1 Diesel Exhaust Fluid Tank Temperature Sensor - Voltage below normal, or shorted to low source
3031	5	4682	Aftreatment1 Diesel Exhaust Fluid Tank Temperature	Current Below Normal or Open Circuit	Aftreatment1 Diesel Exhaust Fluid Tank Temperature Sensor Circuit - Current below normal or open circuit
3031	6	4736	Aftreatment1 Diesel Exhaust Fluid Tank Temperature	Current Above Normal or Grounded Circuit	Aftreatment1 Diesel Exhaust Fluid Tank Temperature Sensor Circuit - Current above normal or grounded circuit
3031	9	4572	Aftreatment1 Diesel Exhaust Fluid Tank Temperature	Abnormal Update Rate	Aftreatment1 Diesel Exhaust Fluid Tank Temperature - Abnormal update rate
3031	11	4737	Aftreatment1 Diesel Exhaust Fluid Tank Temperature	Root Cause Not Known	Aftreatment1 Diesel Exhaust Fluid Tank Temperature - Root Cause Not Known
3031	13	4731	Aftreatment1 Diesel Exhaust Fluid Tank Temperature	Out of Calibration	Aftreatment1 Diesel Exhaust Fluid Tank Temperature Sensor - Out of Calibration
3060	18	3243	Engine Cooling System Monitor	Data Valid but Below Normal Operating Range - Moderately Severe Level	Engine Cooling System Monitor - Data Valid But Below Normal Operating Range - Moderately Severe Level
3216	2	3228	Aftreatment1 Intake NOx	Data Erratic, Intermittent or Incorrect	Aftreatment1 Intake NOx Sensor - Data erratic, intermittent or incorrect
3216	4	1885	Aftreatment1 Intake NOx	Voltage Below Normal or Shorted to Low Source	Aftreatment1 Intake NOx Sensor Circuit - Voltage below normal, or shorted to low source
3216	9	3232	Aftreatment1 Intake NOx	Abnormal Update Rate	Aftreatment1 Intake NOx Sensor - Abnormal update rate
3216	10	3725	Aftreatment1 Intake NOx	Abnormal Rate of Change	Aftreatment1 Intake NOx Sensor - Abnormal rate of change
3216	13	3718	Aftreatment1 Intake NOx	Out of Calibration	Aftreatment1 Intake NOx - Out of Calibration
3216	16	3726	Aftreatment1 Intake NOx	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftreatment1 Intake NOx - Data Valid But Above Normal Operating Range - Moderately Severe Level
3216	20	3748	Aftreatment1 Intake NOx	Data not Rational - Drifted High	Aftreatment1 Intake NOx Sensor - Data not rational - Drifted High
3217	2	1861	Aftreatment1 Intake O2	Data Erratic, Intermittent or Incorrect	Aftreatment1 Intake Oxygen Sensor - Data erratic, intermittent or incorrect

J1939 SPN	J1939 FM	Cummins Code	J1939SPN Description	J1939FM Description	Cummins Description
3218	2	3682	Aftertreatment 1 Intake Gas Sensor Power Status	Data Erratic, Intermittent or Incorrect	Aftertreatment 1 Intake NOx Sensor Power Supply - Data erratic, intermittent or incorrect
3226	2	1694	Aftertreatment 1 Outlet NOx	Data Erratic, Intermittent or Incorrect	Aftertreatment 1 Outlet NOx Sensor - Data erratic, intermittent or incorrect
3226	4	1887	Aftertreatment 1 Outlet NOx	Voltage Below Normal or Shorted to Low Source	Aftertreatment 1 Outlet NOx Sensor Circuit - Voltage below normal, or shorted to low source
3226	9	2771	Aftertreatment 1 Outlet NOx	Abnormal Update Rate	Aftertreatment 1 Outlet NOx Sensor - Abnormal update rate
3226	10	3545	Aftertreatment 1 Outlet NOx	Abnormal Rate of Change	Aftertreatment 1 Outlet NOx Sensor - Abnormal rate of change
3226	13	3717	Aftertreatment 1 Outlet NOx	Out of Calibration	Aftertreatment 1 Outlet NOx Sensor - Out of Calibration
3226	20	3749	Aftertreatment 1 Outlet NOx	Data not Rational - Drifted High	Aftertreatment 1 Outlet NOx Sensor - Data not Rational - Drifted High
3227	9	2683	Aftertreatment 1 Outlet O2	Abnormal Update Rate	Aftertreatment Outlet Oxygen Sensor Circuit - Abnormal update rate
3228	2	3681	Aftertreatment 1 Outlet Gas Sensor Power Status	Data Erratic, Intermittent or Incorrect	Aftertreatment 1 Outlet NOx Sensor Power Supply - Data erratic, intermittent or incorrect
3242	0	3311	Aftertreatment 1 Diesel Particulate Filter Intake Gas Temperature	Data Valid but Above Normal Operating Range - Most Severe Level	Aftertreatment 1 Diesel Particulate Filter Intake Temperature - Data valid but above normal operation
3242	2	3318	Aftertreatment 1 Diesel Particulate Filter Intake Gas Temperature	Data Erratic, Intermittent or Incorrect	Aftertreatment 1 Diesel Particulate Filter Intake Temperature - Data erratic, intermittent or incorrect
3242	3	3317	Aftertreatment 1 Diesel Particulate Filter Intake Gas Temperature	Voltage Above Normal or Shorted to High Source	Aftertreatment 1 Diesel Particulate Filter Intake Temperature Sensor Circuit - Voltage above normal, or shorted to high source
3242	4	3316	Aftertreatment 1 Diesel Particulate Filter Intake Gas Temperature	Voltage Below Normal or Shorted to Low Source	Aftertreatment 1 Diesel Particulate Filter Intake Temperature Sensor Circuit - Voltage below normal, or shorted to low source
3242	15	3254	Aftertreatment 1 Diesel Particulate Filter Intake Gas Temperature	Data Valid but Above Normal Operating Range - Least Severe Level	Aftertreatment 1 Diesel Particulate Filter Intake Temperature - Data Valid But Above Normal Operating Range
3242	16	3253	Aftertreatment 1 Diesel Particulate Filter Intake Gas Temperature	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftertreatment 1 Diesel Particulate Filter Intake Temperature - Data Valid But Above Normal Operating Range
3246	0	3312	Aftertreatment 1 Diesel Particulate Filter Outlet Gas Temperature	Data Valid but Above Normal Operating Range - Most Severe Level	Aftertreatment 1 Diesel Particulate Filter Outlet Temperature - Data valid but above normal operation
3246	2	3322	Aftertreatment 1 Diesel Particulate Filter Outlet Gas Temperature	Data Erratic, Intermittent or Incorrect	Aftertreatment 1 Diesel Particulate Filter Outlet Temperature - Data erratic, intermittent or incorrect
3246	3	3319	Aftertreatment 1 Diesel Particulate Filter Outlet Gas Temperature	Voltage Above Normal or Shorted to High Source	Aftertreatment 1 Diesel Particulate Filter Outlet Temperature Sensor Circuit - Voltage above normal, or shorted to high source
3246	4	3321	Aftertreatment 1 Diesel Particulate Filter Outlet Gas Temperature	Voltage Below Normal or Shorted to Low Source	Aftertreatment 1 Diesel Particulate Filter Outlet Temperature Sensor Circuit - Voltage below normal, or shorted to low source
3246	15	3256	Aftertreatment 1 Diesel Particulate Filter Outlet Gas Temperature	Data Valid but Above Normal Operating Range - Least Severe Level	Aftertreatment 1 Diesel Particulate Filter Outlet Temperature - Data Valid But Above Normal Operating Range
3246	16	3255	Aftertreatment 1 Diesel Particulate Filter Outlet Gas Temperature	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftertreatment 1 Diesel Particulate Filter Outlet Temperature - Data Valid But Above Normal Operating Range

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3249	17	2742	Aftreatment1 Exhaust Gas Temperature 2	Data Valid but Below Normal Operating Range - Least Severe Level	Aftreatment Exhaust Gas Temperature 2 - Data Valid But Below Normal Operating Range - Least Severe Level
3249	18	2743	Aftreatment1 Exhaust Gas Temperature 2	Data Valid but Below Normal Operating Range - Moderately Severe Level	Aftreatment Exhaust Gas Temperature 2 - Data Valid But Below Normal Operating Range - Moderately Severe Level
3251	0	1922	Aftreatment1 Diesel Particulate Filter Differential Pressure	Data Valid but Above Normal Operating Range - Most Severe Level	Aftreatment Diesel Particulate Filter Differential Pressure - Data valid but above normal Operating Range
3251	2	1883	Aftreatment1 Diesel Particulate Filter Differential Pressure	Data Erratic, Intermittent or Incorrect	Aftreatment Diesel Particulate Filter Differential Pressure Sensor - Data erratic, intermittent or incorrect
3251	3	1879	Aftreatment1 Diesel Particulate Filter Differential Pressure	Voltage Above Normal or Shorted to High Source	Aftreatment Diesel Particulate Filter Differential Pressure Sensor Circuit - Voltage above normal
3251	4	1881	Aftreatment1 Diesel Particulate Filter Differential Pressure	Voltage Below Normal or Shorted to Low Source	Aftreatment Diesel Particulate Filter Differential Pressure Sensor Circuit - Voltage below normal
3251	15	2639	Aftreatment1 Diesel Particulate Filter Differential Pressure	Data Valid but Above Normal Operating Range - Least Severe Level	Aftreatment Diesel Particulate Filter Differential Pressure - Data valid but above normal Operating Range
3251	16	1921	Aftreatment1 Diesel Particulate Filter Differential Pressure	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftreatment Diesel Particulate Filter Differential Pressure - Data Valid But Above Normal Operating Range
3255	9	4145	Aftreatment2 Intake NOx	Abnormal Update Rate	Aftreatment2 Intake NOx Sensor - Abnormal update rate
3265	9	3988	Aftreatment2 Outlet NOx	Abnormal Update Rate	Aftreatment2 Outlet NOx - Abnormal Update Rate
3353	3	4953	Aftreatment1 Status	Voltage Above Normal or Shorted to High Source	Aftreatment1 Status - Voltage Above Normal, or Shorted to High Source
3353	4	4954	Aftreatment1 Status	Voltage Below Normal or Shorted to Low Source	Aftreatment1 Status - Voltage Below Normal, or Shorted to Low Source
3361	2	2976	Aftreatment1 Diesel Exhaust Fluid Dosing Unit	Data Erratic, Intermittent or Incorrect	Aftreatment1 Diesel Exhaust Fluid Dosing Unit Temperature - Data erratic, intermittent or incorrect
3361	3	3558	Aftreatment1 Diesel Exhaust Fluid Dosing Unit	Voltage Above Normal or Shorted to High Source	Aftreatment1 Diesel Exhaust Fluid Dosing Unit - Voltage above normal, or shorted to high source
3361	4	3559	Aftreatment1 Diesel Exhaust Fluid Dosing Unit	Voltage Below Normal or Shorted to Low Source	Aftreatment1 Diesel Exhaust Fluid Dosing Unit - Voltage below normal, or shorted to low source
3362	31	1682	Aftreatment1 Diesel Exhaust Fluid Dosing Unit Input Lines	Not Available or Condition Exists	Aftreatment1 Diesel Exhaust Fluid Dosing Unit Input Lines - Condition Exists
3363	3	1683	Aftreatment1 Diesel Exhaust Fluid Tank 1 Heater	Voltage Above Normal or Shorted to High Source	Aftreatment1 Diesel Exhaust Fluid Tank Heater - Voltage above normal, or shorted to high source
3363	4	1684	Aftreatment1 Diesel Exhaust Fluid Tank 1 Heater	Voltage Below Normal or Shorted to Low Source	Aftreatment1 Diesel Exhaust Fluid Tank Heater - Voltage below normal, or shorted to low source
3363	7	3242	Aftreatment1 Diesel Exhaust Fluid Tank 1 Heater	Mechanical System not Responding or Out of Adjustment	Aftreatment1 Diesel Exhaust Fluid Tank Heater - Mechanical system not responding or out of adjustment
3363	16	1713	Aftreatment1 Diesel Exhaust Fluid Tank 1 Heater	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftreatment1 Diesel Exhaust Fluid Tank Heater - Data Valid But Above Normal Operating Range - Moderately Severe Level
3363	18	1712	Aftreatment1 Diesel Exhaust Fluid Tank 1 Heater	Data Valid but Below Normal Operating Range - Moderately Severe Level	Aftreatment1 Diesel Exhaust Fluid Tank Heater - Data Valid But Below Normal Operating Range - Moderately Severe Level
3364	1	3866	Aftreatment1 Diesel Exhaust Fluid Tank 1 Quality	Data Valid but Below Normal Operating Range - Most Severe Level	Aftreatment Diesel Exhaust Fluid Quality - Data valid but below normal operational range - Most Severe Level
3364	2	3878	Aftreatment1 Diesel Exhaust Fluid Tank 1 Quality	Data Erratic, Intermittent or Incorrect	Aftreatment Diesel Exhaust Fluid Quality - Data erratic, intermittent or incorrect

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3364	3	1686	Aftertreatment1 Diesel Exhaust Fluid Tank 1 Quality	Voltage Above Normal or Shorted to High Source	Aftertreatment Diesel Exhaust Fluid Quality Sensor Circuit - Voltage above normal, or shorted to high source
3364	4	1685	Aftertreatment1 Diesel Exhaust Fluid Tank 1 Quality	Voltage Below Normal or Shorted to Low Source	Aftertreatment Diesel Exhaust Fluid Quality Sensor Circuit - Voltage below normal, or shorted to low source
3364	5	4741	Aftertreatment1 Diesel Exhaust Fluid Tank 1 Quality	Current Below Normal or Open Circuit	Aftertreatment Diesel Exhaust Fluid Quality Sensor Circuit - Current below normal or open circuit
3364	6	4742	Aftertreatment1 Diesel Exhaust Fluid Tank 1 Quality	Current Above Normal or Grounded Circuit	Aftertreatment Diesel Exhaust Fluid Quality Sensor Circuit - Current above normal or grounded circuit
3364	7	3876	Aftertreatment1 Diesel Exhaust Fluid Tank 1 Quality	Mechanical System not Responding or Out of Adjustment	Aftertreatment Diesel Exhaust Fluid Quality Sensor - Mechanical system not responding or out of adjustment
3364	9	3868	Aftertreatment1 Diesel Exhaust Fluid Tank 1 Quality	Abnormal Update Rate	Aftertreatment Diesel Exhaust Fluid Quality - Abnormal update rate
3364	10	4277	Aftertreatment1 Diesel Exhaust Fluid Tank 1 Quality	Abnormal Rate of Change	Aftertreatment Diesel Exhaust Fluid Quality - Abnormal Rate of Change
3364	11	1715	Aftertreatment1 Diesel Exhaust Fluid Tank 1 Quality	Root Cause Not Known	Aftertreatment Diesel Exhaust Fluid Quality - Root Cause Not Known
3364	12	3877	Aftertreatment1 Diesel Exhaust Fluid Tank 1 Quality	Bad Intelligent Device or Component	Aftertreatment Diesel Exhaust Fluid Quality Sensor - Bad intelligent device or component
3364	13	1714	Aftertreatment1 Diesel Exhaust Fluid Tank 1 Quality	Out of Calibration	Aftertreatment Diesel Exhaust Fluid Quality - Out of Calibration
3364	15	4842	Aftertreatment Diesel Exhaust Fluid Quality	Data Valid but Above Normal Operating Range - Least Severe Level	Aftertreatment Diesel Exhaust Fluid Quality - Data Valid But Above Normal Operating Range - Least Severe Level
3364	18	3867	Aftertreatment1 Diesel Exhaust Fluid Tank 1 Quality	Data Valid but Below Normal Operating Range - Moderately Severe Level	Aftertreatment Diesel Exhaust Fluid Quality - Data Valid But Below Normal Operating Range - Moderately Severe Level
3364	19	4241	Aftertreatment1 Diesel Exhaust Fluid Tank 1 Quality	Received Network Data in Error	Aftertreatment Diesel Exhaust Fluid Quality - Received Network Data in Error
3480	2	1926	Aftertreatment Fuel Pressure	Data Erratic, Intermittent or Incorrect	Aftertreatment Fuel Pressure Sensor - Data erratic, intermittent or incorrect
3480	3	1927	Aftertreatment Fuel Pressure	Voltage Above Normal or Shorted to High Source	Aftertreatment Fuel Pressure Sensor Circuit - Voltage above normal, or shorted to high source
3480	4	1928	Aftertreatment Fuel Pressure	Voltage Below Normal or Shorted to Low Source	Aftertreatment Fuel Pressure Sensor Circuit - Voltage below normal, or shorted to low source
3480	17	2881	Aftertreatment Fuel Pressure	Data Valid but Below Normal Operating Range - Least Severe Level	Aftertreatment Fuel Pressure Sensor - Data Valid But Below Normal Operating Range - Least Severe Level
3481	16	2778	Aftertreatment Fuel Rate	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftertreatment Fuel Rate - Data Valid But Above Normal Operating Range - Moderately Severe Level
3482	2	1925	Aftertreatment Fuel Enable Actuator	Data Erratic, Intermittent or Incorrect	Aftertreatment Fuel Shutoff Valve - Data erratic, intermittent or incorrect
3482	3	1923	Aftertreatment Fuel Enable Actuator	Voltage Above Normal or Shorted to High Source	Aftertreatment Fuel Shutoff Valve Circuit - Voltage above normal, or shorted to high source
3482	4	1924	Aftertreatment Fuel Enable Actuator	Voltage Below Normal or Shorted to Low Source	Aftertreatment Fuel Shutoff Valve Circuit - Voltage below normal, or shorted to low source
3482	7	1963	Aftertreatment Fuel Enable Actuator	Mechanical System not Responding or Out of Adjustment	Aftertreatment Fuel Shutoff Valve - Mechanical system not responding or out of adjustment
3482	13	2741	Aftertreatment Fuel Enable Actuator	Out of Calibration	Aftertreatment Fuel Shutoff Valve Swapped - Out of Calibration
3482	16	4568	Aftertreatment Fuel Enable Actuator	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftertreatment Fuel Shutoff Valve - Data Valid But Above Normal Operating Range - Moderately Severe

J1939 SPN	J 1939 FM	Cummins Code	J 1939SPN Description	J 1939FM Description	Cummins Description
3490	3	3224	Aftreatment 1 Purge Air Actuator	Voltage Above Normal or Shorted to High Source	Aftreatment 1 Purge Air Actuator Circuit - Voltage above normal, or shorted to high source
3490	4	3223	Aftreatment 1 Purge Air Actuator	Voltage Below Normal or Shorted to Low Source	Aftreatment 1 Purge Air Actuator Circuit - Voltage below normal, or shorted to low source
3490	7	3225	Aftreatment 1 Purge Air Actuator	Mechanical System not Responding or Out of Adjustment	Aftreatment 1 Purge Air Actuator - Mechanical system not responding or out of adjustment
3509	3	386	Sensor supply voltage 1	Voltage Above Normal or Shorted to High Source	Sensor Supply 1 Circuit - Voltage above normal, or shorted to high source
3509	4	352	Sensor supply voltage 1	Voltage Below Normal or Shorted to Low Source	Sensor Supply 1 Circuit - Voltage below normal, or shorted to low source
3510	3	227	Sensor supply voltage 2	Voltage Above Normal or Shorted to High Source	Sensor Supply 2 Circuit - Voltage above normal, or shorted to high source
3510	4	187	Sensor supply voltage 2	Voltage Below Normal or Shorted to Low Source	Sensor Supply 2 Circuit - Voltage below normal, or shorted to low source
3511	3	239	Sensor supply voltage 3	Voltage Above Normal or Shorted to High Source	Sensor Supply 3 Circuit - Voltage above normal, or shorted to high source
3511	4	238	Sensor supply voltage 3	Voltage Below Normal or Shorted to Low Source	Sensor Supply 3 Circuit - Voltage below normal, or shorted to low source
3512	3	2185	Sensor supply voltage 4	Voltage Above Normal or Shorted to High Source	Sensor Supply 4 Circuit - Voltage above normal, or shorted to high source
3512	4	2186	Sensor supply voltage 4	Voltage Below Normal or Shorted to Low Source	Sensor Supply 4 Circuit - Voltage below normal, or shorted to low source
3513	3	1695	Sensor supply voltage 5	Voltage Above Normal or Shorted to High Source	Sensor Supply 5 - Voltage above normal, or shorted to high source
3513	4	1696	Sensor supply voltage 5	Voltage Below Normal or Shorted to Low Source	Sensor Supply 5 - Voltage below normal, or shorted to low source
3514	3	515	Sensor supply voltage 6	Voltage Above Normal or Shorted to High Source	Sensor Supply 6 Circuit - Voltage above normal, or shorted to high source
3514	4	516	Sensor supply voltage 6	Voltage Below Normal or Shorted to Low Source	Sensor Supply 6 Circuit - Voltage below normal, or shorted to low source
3515	2	4242	Aftreatment 1 Diesel Exhaust Fluid Temperature 2	Data Erratic, Intermittent or Incorrect	Aftreatment 1 Diesel Exhaust Fluid Temperature 2 - Data erratic, intermittent or incorrect
3515	3	4233	Aftreatment 1 Diesel Exhaust Fluid Temperature 2	Voltage Above Normal or Shorted to High Source	Aftreatment 1 Diesel Exhaust Fluid Temperature 2 Sensor Circuit - Voltage above normal, or shorted to high source
3515	4	4234	Aftreatment 1 Diesel Exhaust Fluid Temperature 2	Voltage Below Normal or Shorted to Low Source	Aftreatment 1 Diesel Exhaust Fluid Temperature 2 Sensor Circuit - Voltage below normal, or shorted to low source
3515	5	4743	Aftreatment 1 Diesel Exhaust Fluid Temperature 2	Current Below Normal or Open Circuit	Aftreatment 1 Diesel Exhaust Fluid Temperature 2 Sensor Circuit - Current below normal or open circuit
3515	6	4744	Aftreatment 1 Diesel Exhaust Fluid Temperature 2	Current Above Normal or Grounded Circuit	Aftreatment 1 Diesel Exhaust Fluid Temperature 2 Sensor Circuit - Current above normal or grounded
3515	10	4243	Aftreatment 1 Diesel Exhaust Fluid Temperature 2	Abnormal Rate of Change	Abnormal Rate of Change
3515	11	4745	Aftreatment 1 Diesel Exhaust Fluid Temperature 2	Root Cause Not Known	Aftreatment 1 Diesel Exhaust Fluid Temperature 2 - Root Cause Not Known
3521	11	4768	Aftreatment 1 Diesel Exhaust Fluid Property	Root Cause Not Known	Aftreatment 1 Diesel Exhaust Fluid Property - Root Cause Not Known

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3521	31	4235	Aftertreatment 1 Diesel Exhaust Fluid Property	Not Available or Condition Exists	Aftertreatment 1 Diesel Exhaust Fluid Property - Condition Exists
3555	17	1943	Ambient Air Density	Data Valid but Below Normal Operating Range - Least Severe Level	Ambient Air Density - Data Valid But Below Normal Operating Range - Least Severe Level
3556	2	1932	Aftertreatment Hydrocarbon Doser	Data Erratic, Intermittent or Incorrect	Aftertreatment Doser - Data Erratic, Intermittent or incorrect
3556	5	1977	Aftertreatment Hydrocarbon Doser	Current Below Normal or Open Circuit	Aftertreatment Doser Circuit - Current below normal or open circuit
3556	7	1964	Aftertreatment Hydrocarbon Doser	Mechanical System not Responding or Out of Adjustment	Aftertreatment Doser - Mechanical system not responding or out of adjustment
3556	18	3167	Aftertreatment Hydrocarbon Doser	Data Valid but Below Normal Operating Range - Moderately Severe Level	Aftertreatment Doser - Data Valid But Below Normal Operating Range - Moderately Severe Level
3597	2	1117	ECU Power Output Supply Voltage #1	Data Erratic, Intermittent or Incorrect	Power Supply Lost With Ignition On - Data erratic, intermittent or incorrect
3597	3	1939	ECU Power Output Supply Voltage #1	Voltage Above Normal or Shorted to High Source	ECU Power Output Supply Voltage 1 - Voltage above normal, or shorted to high source
3597	4	1941	ECU Power Output Supply Voltage #1	Voltage Below Normal or Shorted to Low Source	ECU Power Output Supply Voltage 1 - Voltage below normal, or shorted to low source
3597	12	351	ECU Power Output Supply Voltage #1	Bad Intelligent Device or Component	Injector Power Supply - Bad intelligent device or component
3597	18	1938	ECU Power Output Supply Voltage #1	Data Valid but Below Normal Operating Range - Moderately Severe Level	ECU Power Output Supply Voltage 1 - Data Valid But Below Normal Operating Range - Moderately Severe Level
3610	2	3135	Aftertreatment Diesel Particulate Filter Outlet Pressure	Data Erratic, Intermittent or Incorrect	Aftertreatment 1 Diesel Particulate Filter Outlet Pressure - Data erratic, intermittent or incorrect
3610	3	3133	Aftertreatment Diesel Particulate Filter Outlet Pressure	Voltage Above Normal or Shorted to High Source	Aftertreatment 1 Diesel Particulate Filter Outlet Pressure Sensor Circuit - Voltage above normal, or shorted to high source
3610	4	3134	Aftertreatment Diesel Particulate Filter Outlet Pressure	Voltage Below Normal or Shorted to Low Source	Aftertreatment 1 Diesel Particulate Filter Outlet Pressure Sensor Circuit - Voltage below normal, or shorted to low source
3667	2	5221	Engine Air Shutoff Status	Data Erratic, Intermittent or Incorrect	Engine Air Shutoff Status - Data erratic, intermittent or incorrect
3667	3	3139	Engine Air Shutoff Status	Voltage Above Normal or Shorted to High Source	Engine Air Shutoff Circuit - Voltage above normal, or shorted to high source
3667	4	3141	Engine Air Shutoff Status	Voltage Below Normal or Shorted to Low Source	Engine Air Shutoff Circuit - Voltage below normal, or shorted to low source
3667	7	4484	Engine Air Shutoff	Mechanical System not Responding or Out of Adjustment	Engine Air Shutoff - Mechanical System Not Responding or Out of Adjustment
3695	2	4213	Diesel Particulate Filter Regeneration Inhibit Switch	Data Erratic, Intermittent or Incorrect	Aftertreatment Diesel Particulate Filter Regeneration Inhibit Switch - Data erratic, intermittent or incorrect
3703	31	2777	Diesel Particulate Filter Active Regeneration Inhibited Due to Inhibit Switch	Not Available or Condition Exists	Particulate Trap Active Regeneration Inhibited Due to Inhibit Switch - Condition Exists
3713	31	3753	Diesel Particulate Filter Active Regeneration Inhibited Due to System Timeout	Not Available or Condition Exists	Diesel Particulate Filter Active Regeneration Inhibited Due to System Timeout - Condition Exists
3750	31	3396	Diesel Particulate Filter 1 Conditions Not Met for Active Regeneration	Not Available or Condition Exists	Diesel Particulate Filter 1 Conditions Not Met for Active Regeneration - Condition Exists

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3826	18	4573	Aftertreatment 1 Diesel Exhaust Fluid Average Consumption	Data Valid but Below Normal Operating Range - Moderately Severe Level	Aftertreatment 1 Diesel Exhaust Fluid Average Consumption - Data Valid But Below Normal Operating Range
3936	7	3245	Aftertreatment 1 Diesel Particulate Filter System	Mechanical System not Responding or Out of Adjustment	Aftertreatment 1 Diesel Particulate Filter System - Mechanical system not responding or out of adjustment
3936	14	4584	Aftertreatment Diesel Particulate Filter System	Special Instructions	Aftertreatment Diesel Particulate Filter System - Special Instructions
3936	15	1981	Aftertreatment Diesel Particulate Filter System	Data Valid but Above Normal Operating Range - Least Severe Level	Aftertreatment 1 Diesel Particulate Filter System - Data Valid But Above Normal Operating Range - Level
4094	31	3543	NOx limits exceeded due to Insufficient Diesel Exhaust Fluid Quality	Not Available or Condition Exists	NOx limits exceeded due to Insufficient Reagent Quality - Condition Exists
4096	31	3547	NOx limits exceeded due to Empty Diesel Exhaust Fluid Tank	Not Available or Condition Exists	Aftertreatment Diesel Exhaust Fluid Tank Empty - Condition Exists
4097	3	2732	Aftertreatment 1 Fuel Drain Actuator	Voltage Above Normal or Shorted to High Source	Aftertreatment Fuel Drain Valve Circuit - Voltage above normal, or shorted to high source
4097	4	2733	Aftertreatment 1 Fuel Drain Actuator	Voltage Below Normal or Shorted to Low Source	Aftertreatment Fuel Drain Valve Circuit - Voltage below normal, or shorted to low source
4097	7	2878	Aftertreatment 1 Fuel Drain Actuator	Mechanical System not Responding or Out of Adjustment	Aftertreatment Fuel Drain Valve - Mechanical system not responding or out of adjustment
4182	4	3695	Generator Output Frequency Adjust Potentiometer Circuit	Voltage Below Normal or Shorted to Low Source	Generator Output Frequency Adjust Potentiometer Circuit - Voltage below normal, or shorted to low source
4183	4	3696	Droop Adjust Potentiometer Circuit	Voltage Below Normal or Shorted to Low Source	Droop Adjust Potentiometer Circuit - Voltage below normal, or shorted to low source
4184	4	3694	Gain Adjust Potentiometer Circuit	Voltage Below Normal or Shorted to Low Source	Gain Adjust Potentiometer Circuit - Voltage below normal, or shorted to low source
4185	31	1427	Overspeed Shutdown Relay Driver	Not Available or Condition Exists	Overspeed Shutdown Relay Driver Diagnostic has detected an error - Condition Exists
4186	31	1428	Low Oil Pressure Shutdown Relay Driver	Not Available or Condition Exists	Low Oil Pressure (LOP) Shutdown Relay Driver Diagnostic has detected an error - Condition Exists
4187	31	1429	High Engine Temperature Shutdown Relay Driver	Not Available or Condition Exists	High Engine Temperature (HE T) Shutdown Relay Driver Diagnostic has detected an error - Condition Exists
4188	31	1431	Pre-Low Oil Pressure Indicator Relay Driver	Not Available or Condition Exists	Pre-Low Oil Pressure Warning Relay Driver Diagnostic has detected an error - Condition Exists
4223	31	1432	Pre-High Engine Temperature Warning Relay Driver	Not Available or Condition Exists	Pre-High Engine Temperature Warning Relay Driver Diagnostic has detected an error - Condition Exists
4331	18	4658	Aftertreatment 1 Diesel Exhaust Fluid Actual Dosing Quantity	Data Valid but Below Normal Operating Range - Moderately Severe Level	Aftertreatment SCR Actual Dosing Reagent Quantity - Data Valid But Below Normal Operating Range - Mo
4334	2	3596	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	Data Erratic, Intermittent or Incorrect	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Data erratic, intermittent or incorrect
4334	3	3571	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	Voltage Above Normal or Shorted to High Source	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Voltage above normal, or shorted to high source
4334	4	3572	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	Voltage Below Normal or Shorted to Low Source	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Voltage below normal, or shorted to low source
4334	16	3575	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Data Valid But Above Normal Operating Range
4334	18	3574	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	Data Valid but Below Normal Operating Range - Moderately Severe Level	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Data Valid But Below Normal Operating Range
4337	2	4244	Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature	Data Erratic, Intermittent or Incorrect	Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature - Data erratic, intermittent or incorrect

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4337	3	4174	Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature Sensor	Voltage Above Normal or Shorted to High Source	Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature Sensor - Voltage Above Normal, or Shorted to High Source
4337	4	4175	Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature Sensor	Voltage Below Normal or Shorted to Low Source	Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature Sensor - Voltage below normal, or shorted to low source
4337	10	4249	Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature	Abnormal Rate of Change	Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature - Abnormal Rate of Change
4339	31	4586	Aftertreatment 1 SCR Feedback Control Status	Not Available or Condition Exists	Aftertreatment 1 SCR Feedback Control Status - Condition Exists
4340	3	3237	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State	Voltage Above Normal or Shorted to High Source	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Circuit - Voltage above normal, or shorted to high source
4340	4	3238	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State	Voltage Below Normal or Shorted to Low Source	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Circuit - Voltage below normal, or shorted to low source
4340	5	3258	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State	Current Below Normal or Open Circuit	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Circuit - Current below normal or open circuit
4342	3	3239	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State	Voltage Above Normal or Shorted to High Source	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Circuit - Voltage above normal, or shorted to high source
4342	4	3241	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State	Voltage Below Normal or Shorted to Low Source	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Circuit - Voltage below normal, or shorted to low source
4342	5	3261	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State	Current Below Normal or Open Circuit	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Circuit - Current below normal or open circuit
4344	3	3422	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State	Voltage Above Normal or Shorted to High Source	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Voltage above normal, or shorted to high source
4344	4	3423	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State	Voltage Below Normal or Shorted to Low Source	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Voltage below normal, or shorted to low source
4344	5	3425	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State	Current Below Normal or Open Circuit	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Current below normal or open circuit
4360	0	3229	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Data Valid but Above Normal Operational Range - Most Severe Level	Aftertreatment 1 SCR Intake Temperature - Data valid but above normal operational range - Most Severe Level
4360	2	3144	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Data Erratic, Intermittent or Incorrect	Aftertreatment 1 SCR Intake Temperature Sensor - Data erratic, intermittent or incorrect
4360	3	3142	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Voltage Above Normal or Shorted to High Source	Aftertreatment 1 SCR Intake Temperature Sensor Circuit - Voltage above normal, or shorted to high source
4360	4	3143	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Voltage Below Normal or Shorted to Low Source	Aftertreatment 1 SCR Intake Temperature Sensor Circuit - Voltage below normal, or shorted to low source
4360	15	3164	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Data Valid but Above Normal Operational Range - Least Severe Level	Aftertreatment 1 SCR Intake Temperature - Data Valid But Above Normal Operating Range - Least Severe
4360	16	3231	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Data Valid but Above Normal Operational Range - Moderately Severe Level	Aftertreatment 1 SCR Intake Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level
4360	16	5247	Aftertreatment 1 SCR Intake Temperature	Data Valid but Above Normal Operational Range - Moderately Severe Level	Aftertreatment 1 SCR Intake Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level
4363	0	3165	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature	Data Valid but Above Normal Operational Range - Most Severe Level	Aftertreatment 1 SCR Outlet Temperature - Data valid but above normal operational range - Most Severe
4363	2	3148	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature	Data Erratic, Intermittent or Incorrect	Aftertreatment 1 SCR Outlet Temperature Sensor - Data erratic, intermittent or incorrect

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4363	3	3146	Aftreatment1 SCR Catalyst Outlet Gas Temperature	Voltage Above Normal or Shorted to High Source	Aftreatment1 SCR Outlet Temperature Sensor Circuit - Voltage above normal, or shorted to high source
4363	4	3147	Aftreatment1 SCR Catalyst Outlet Gas Temperature	Voltage Below Normal or Shorted to Low Source	Aftreatment1 SCR Outlet Temperature Sensor Circuit - Voltage below normal, or shorted to low source
4363	16	3235	Aftreatment1 SCR Catalyst Outlet Gas Temperature	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftreatment1 SCR Outlet Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level
4364	18	3582	Aftreatment1 SCR Conversion Efficiency	Data Valid but Below Normal Operating Range - Moderately Severe Level	Aftreatment SCR Catalyst Conversion Efficiency - Data Valid But Below Normal Operating Range - Moderately Severe Level
4376	3	3577	Aftreatment1 Diesel Exhaust Fluid Return Valve	Voltage Above Normal or Shorted to High Source	Aftreatment Diesel Exhaust Fluid Return Valve - Voltage above normal, or shorted to high source
4376	4	3578	Aftreatment1 Diesel Exhaust Fluid Return Valve	Voltage Below Normal or Shorted to Low Source	Aftreatment Diesel Exhaust Fluid Return Valve - Voltage below normal, or shorted to low source
4376	7	4157	Aftreatment1 Diesel Exhaust Fluid Return Valve	Mechanical System not Responding or Out of Adjustment	Aftreatment Diesel Exhaust Fluid Return Valve - Mechanical system not responding or out of adjustment
4490	9	3367	Specific Humidity	Abnormal Update Rate	Specific Humidity Sensor - Abnormal update rate
4490	19	3368	Specific Humidity	Received Network Data in Error	Specific Humidity Sensor - Received Network Data in Error
4765	2	3315	Aftreatment Diesel Oxidation Catalyst Intake Temperature	Data Erratic, Intermittent or Incorrect	Aftreatment Diesel Oxidation Catalyst Intake Temperature - Data erratic, intermittent or incorrect
4765	3	3314	Aftreatment Diesel Oxidation Catalyst Intake Temperature	Voltage Above Normal or Shorted to High Source	Aftreatment Diesel Oxidation Catalyst Intake Temperature Sensor Circuit - Voltage above normal, or shorted to high source
4765	4	3313	Aftreatment Diesel Oxidation Catalyst Intake Temperature	Voltage Below Normal or Shorted to Low Source	Aftreatment Diesel Oxidation Catalyst Intake Temperature Sensor Circuit - Voltage below normal, or shorted to low source
4765	13	3325	Aftreatment Diesel Oxidation Catalyst Intake Temperature	Out of Calibration	Aftreatment Diesel Oxidation Catalyst Intake Temperature Swapped - Out of Calibration
4765	16	3251	Aftreatment Diesel Oxidation Catalyst Intake Temperature	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftreatment Diesel Oxidation Catalyst Intake Temperature - Data Valid But Above Normal Operating Range
4766	0	5387	Aftreatment1 Diesel Oxidation Catalyst Outlet Gas Temperature	Data Valid but Above Normal Operating Range - Most Severe Level	Aftreatment1 Diesel Oxidation Catalyst Outlet Gas Temperature - Data Valid But Above Normal Operating Range - Most Severe Level
4766	2	5386	Aftreatment1 Diesel Oxidation Catalyst Outlet Gas Temperature	Data Erratic, Intermittent or Incorrect	Aftreatment1 Diesel Oxidation Catalyst Outlet Gas Temperature - Data Erratic, intermittent, or incorrect
4766	3	4533	Aftreatment1 Diesel Particulate Filter Intake Temperature Sensor Circuit	Voltage Above Normal or Shorted to High Source	Aftreatment1 Diesel Particulate Filter Intake Temperature Sensor Circuit - Voltage above normal, or shorted to high source
4766	3	4534	Aftreatment1 Diesel Particulate Filter Intake Temperature Sensor Circuit	Voltage Above Normal or Shorted to High Source	Aftreatment1 Diesel Particulate Filter Intake Temperature Sensor Circuit - Voltage below normal, or shorted to low source
4766	15	5389	Aftreatment1 Diesel Oxidation Catalyst Outlet Gas Temperature	Data Valid but Above Normal Operating Range - Least Severe Level	Aftreatment1 Diesel Oxidation Catalyst Outlet Gas Temperature - Data Valid But Above Normal Operating Range - Least Severe Level
4766	16	5388	Aftreatment1 Diesel Oxidation Catalyst Outlet Gas Temperature	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftreatment1 Diesel Oxidation Catalyst Outlet Gas Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level

J1939 SPN	J 1939 FM	Cummins Code	J 1939SPN Description	J 1939FM Description	Cummins Description
4792	7	3751	Aftertreatment SCR Catalyst System	Mechanical System not Responding or Out of Adjustment	Aftertreatment SCR Catalyst System - Mechanical system not responding or out of adjustment
4792	14	4585	Aftertreatment 1 SCR Catalyst System	Special Instructions	Aftertreatment 1 SCR Catalyst System - Special Instructions
4793	31	3158	Aftertreatment Warm Up Diesel Oxidation Catalyst	Not Available or Condition Exists	Aftertreatment Warm Up Diesel Oxidation Catalyst Missing - Condition Exists
4794	31	3151	Aftertreatment 1 SCR Catalyst System	Not Available or Condition Exists	Aftertreatment 1 SCR Catalyst System Missing - Condition Exists
4795	31	1993	Aftertreatment 1 Diesel Particulate Filter Missing	Not Available or Condition Exists	Aftertreatment 1 Diesel Particulate Filter Missing - Condition Exists
4796	31	1664	Aftertreatment 1 Diesel Oxidation Catalyst Missing	Not Available or Condition Exists	Aftertreatment 1 Diesel Oxidation Catalyst Missing - Condition Exists
4809	2	3154	Aftertreatment Warm Up Diesel Oxidation Catalyst Intake Temperature	Data Erratic, Intermittent or Incorrect	Aftertreatment Warm Up Diesel Oxidation Catalyst Intake Temperature - Data erratic, intermittent or incorrect
4809	3	3152	Aftertreatment Warm Up Diesel Oxidation Catalyst Intake Temperature	Voltage Above Normal or Shorted to High Source	Aftertreatment Warm Up Diesel Oxidation Catalyst Intake Temperature Sensor Circuit - Voltage above normal
4809	4	3153	Aftertreatment Warm Up Diesel Oxidation Catalyst Intake Temperature	Voltage Below Normal or Shorted to Low Source	Aftertreatment Warm Up Diesel Oxidation Catalyst Intake Temperature Sensor Circuit - Voltage below normal
4809	13	3166	Aftertreatment Warm Up Diesel Oxidation Catalyst Intake Temperature	Out of Calibration	Aftertreatment Warm Up Diesel Oxidation Catalyst Intake Temperature Sensor - Swapped - Out of Calibration
4809	16	3247	Aftertreatment Warm Up Diesel Oxidation Catalyst Intake Temperature	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftertreatment Warm Up Diesel Oxidation Catalyst Intake Temperature - Data Valid But Above Normal Operating Range
4810	0	3162	Aftertreatment Warm Up Diesel Oxidation Catalyst Outlet Temperature	Data Valid but Above Normal Operating Range - Most Severe Level	Aftertreatment Warm Up Diesel Oxidation Catalyst Outlet Temperature - Data valid but above normal operating Range - Most Severe level
4810	2	3157	Aftertreatment Warm Up Diesel Oxidation Catalyst Outlet Temperature	Data Erratic, Intermittent or Incorrect	Aftertreatment Warm Up Diesel Oxidation Catalyst Outlet Temperature - Data erratic, intermittent or incorrect
4810	3	3155	Aftertreatment Warm Up Diesel Oxidation Catalyst Outlet Temperature	Voltage Above Normal or Shorted to High Source	Aftertreatment Warm Up Diesel Oxidation Catalyst Outlet Temperature Sensor Circuit - Voltage above normal
4810	4	3156	Aftertreatment Warm Up Diesel Oxidation Catalyst Outlet Temperature	Voltage Below Normal or Shorted to Low Source	Aftertreatment Warm Up Diesel Oxidation Catalyst Outlet Temperature Sensor Circuit - Voltage below normal
4810	15	3249	Aftertreatment Warm Up Diesel Oxidation Catalyst Outlet Temperature	Data Valid but Above Normal Operating Range - Least Severe Level	Aftertreatment Warm Up Diesel Oxidation Catalyst Outlet Temperature - Data Valid But Above Normal Operating Range
4810	16	3169	Aftertreatment Warm Up Diesel Oxidation Catalyst Outlet Temperature	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftertreatment Warm Up Diesel Oxidation Catalyst Outlet Temperature - Data Valid But Above Normal Operating Range
5018	11	2637	Aftertreatment Diesel Oxidation Catalyst	Root Cause Not Known	Aftertreatment 1 Diesel Oxidation Catalyst Face Plugged - Root Cause Not Known
5019	2	3138	Engine Exhaust Gas Recirculation 1 Outlet Pressure	Data Erratic, Intermittent or Incorrect	Engine Exhaust Gas Recirculation Outlet Pressure - Data erratic, intermittent or incorrect
5019	3	3136	Engine Exhaust Gas Recirculation 1 Outlet Pressure	Voltage Above Normal or Shorted to High Source	Engine Exhaust Gas Recirculation Outlet Pressure Sensor Circuit - Voltage above normal, or shorted to high source
5019	4	3137	Engine Exhaust Gas Recirculation 1 Outlet Pressure	Voltage Below Normal or Shorted to Low Source	Engine Exhaust Gas Recirculation Outlet Pressure Sensor Circuit - Voltage below normal, or shorted to low source

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5024	10	3649	Aftertreatment 1 Intake Gas NOx Sensor Heater Ratio	Abnormal Rate of Change	Aftertreatment 1 Intake NOx Sensor Heater - Abnormal rate of change
5031	10	3583	Aftertreatment 1 Outlet Gas NOx Sensor Heater Ratio	Abnormal Rate of Change	Aftertreatment 1 Outlet NOx Sensor Heater - Abnormal rate of change
5097	3	4293	Engine Brake Active Lamp Data	Voltage Above Normal or Shorted to High Source	Engine Brake Active Lamp - Voltage Above Normal, or Shorted to High Source
5097	4	4294	Engine Brake Active Lamp Data	Voltage Below Normal or Shorted to Low Source	Engine Brake Active Lamp - Voltage below normal, or shorted to low source
5125	3	3419	Sensor supply voltage 7	Voltage Above Normal or Shorted to High Source	Sensor Supply 7 Circuit - Voltage above normal, or shorted to high source
5125	4	3421	Sensor supply voltage 7	Voltage Below Normal or Shorted to Low Source	Sensor Supply 7 Circuit - Voltage below normal, or shorted to low source
5245	31	4863	Aftertreatment Selective Catalytic Reduction Operator Inducement Active	Not Available or Condition Exists	Aftertreatment SCR Operator Inducement Active - Condition Exists
5246	0	3712	Aftertreatment SCR Operator Inducement Severity	Data Valid but Above Normal Operating Range - Most Severe Level	Aftertreatment SCR Operator Inducement - Data valid but above normal operational range - Most Severe level
5298	18	1691	Aftertreatment 1 Diesel Oxidation Catalyst Conversion Efficiency	Data Valid but Below Normal Operating Range - Moderately Severe Level	Aftertreatment 1 Diesel Oxidation Catalyst Conversion Efficiency - Data Valid But Below Normal Operating Range - Moderately Severe Level
5319	31	3376	Aftertreatment 1 Diesel Particulate Filter Incomplete Regeneration	Not Available or Condition Exists	Aftertreatment Diesel Particulate Filter - Incomplete Regeneration - Condition Exists
5357	31	4713	Engine Fuel Injection Quantity Error for Multiple Cylinders	Not Available or Condition Exists	Engine Fuel Injection Quantity Error for Multiple Cylinders - Condition Exists
5380	11	4936	Engine Fuel Valve 1	Root Cause Not Known	Engine Fuel Valve 1 - Root Cause Not Known
5380	13	4937	Engine Fuel Valve 1	Out of Calibration	Engine Fuel Valve 1 - Out of Calibration
5394	2	3755	Aftertreatment Diesel Exhaust Fluid Dosing Valve	Data Erratic, Intermittent or Incorrect	Aftertreatment Diesel Exhaust Fluid Dosing Valve - Data erratic, intermittent or incorrect
5394	5	3567	Aftertreatment Diesel Exhaust Fluid Dosing Valve	Current Below Normal or Open Circuit	Aftertreatment Diesel Exhaust Fluid Dosing Valve - Current below normal or open circuit
5394	7	3568	Aftertreatment Diesel Exhaust Fluid Dosing Valve	Mechanical System not Responding or Out of Adjustment	Aftertreatment Diesel Exhaust Fluid Dosing Valve - Mechanical system not responding or out of adjustment
5395	16	3337	Engine Idle Fuel Quantity	Data Valid but Above Normal Operating Range - Moderately Severe Level	Engine Idle Fuel Quantity - Data Valid But Above Normal Operating Range - Moderately Severe Level
5395	18	3338	Engine Idle Fuel Quantity	Data Valid but Below Normal Operating Range - Moderately Severe Level	Engine Idle Fuel Quantity - Data Valid But Below Normal Operating Range - Moderately Severe Level
5396	31	3377	Engine Crankcase Ventilation Hose Disconnected	Not Available or Condition Exists	Engine Crankcase Ventilation Hose Disconnected - Condition Exists
5397	31	3375	Aftertreatment 1 Diesel Particulate Filter Regeneration too Frequent	Not Available or Condition Exists	Aftertreatment Diesel Particulate Filter Regeneration too Frequent - Condition Exists
5484	3	3633	Engine Fan Clutch 2 Output Device Driver	Voltage Above Normal or Shorted to High Source	Engine Fan Clutch 2 Control Circuit - Voltage above normal, or shorted to high source
5484	4	3634	Engine Fan Clutch 2 Output Device Driver	Voltage Below Normal or Shorted to Low Source	Engine Fan Clutch 2 Control Circuit - Voltage below normal, or shorted to low source
5491	3	3562	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay	Voltage Above Normal or Shorted to High Source	Aftertreatment Diesel Exhaust Fluid Line Heater Relay - Voltage above normal, or shorted to high source
5491	4	3563	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay	Voltage Below Normal or Shorted to Low Source	Aftertreatment Diesel Exhaust Fluid Line Heater Relay - Voltage below normal, or shorted to low source
5491	7	3713	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay	Mechanical System not Responding or Out of Adjustment	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay - Mechanical system not responding or out of adjustment

J1939 SPN	J1939 FM	Cummins Code	J 1939SPN Description	J 1939FM Description	Cummins Description
5571	0	3741	High Pressure Common Rail Fuel Pressure Relief Valve	Data Valid but Above Normal Operating Range - Most Severe Level	High Pressure Common Rail Fuel Pressure Relief Valve - Data valid but above normal operational range
5571	3	4262	High Pressure Common Rail Fuel Pressure Relief Valve	Voltage Above Normal or Shorted to High Source	High Pressure Common Rail Fuel Pressure Relief Valve - Voltage Above Normal, or Shorted to High Source
5571	4	4263	High Pressure Common Rail Fuel Pressure Relief Valve	Voltage Below Normal or Shorted to Low Source	High Pressure Common Rail Fuel Pressure Relief Valve - Voltage below normal, or shorted to low source
5571	7	3727	High Pressure Common Rail Fuel Pressure Relief Valve	Mechanical System not Responding or Out of Adjustment	High Pressure Common Rail Fuel Pressure Relief Valve - Mechanical system not responding or out of adjustment
5571	11	4265	High Pressure Common Rail Fuel Pressure Relief Valve	Root Cause Not Known	High Pressure Common Rail Fuel Pressure Relief Valve - Root Cause Not Known
5571	15	5585	High Pressure Common Rail Fuel Pressure Relief Valve	Data Valid but Above Normal Operating Range - Least Severe Level	High Pressure Common Rail Fuel Pressure Relief Valve - Data Valid But Above Normal Operating Range - Least Severe Level
5571	31	4867	High Pressure Common Rail Fuel Pressure Relief Valve	Not Available or Condition Exists	High Pressure Common Rail Fuel Pressure Relief Valve - Condition Exists
5585	18	4691	Engine Injector Metering Rail 1 Cranking Pressure	Data Valid but Below Normal Operating Range - Moderately Severe Level	Engine Injector Metering Rail 1 Cranking Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level
5603	9	3843	Cruise Control Disable Command	Abnormal Update Rate	Cruise Control Disable Command - Abnormal update rate
5603	31	3845	Cruise Control Disable Command	Not Available or Condition Exists	Cruise Control Disable Command - Condition Exists
5605	31	3844	Cruise Control Pause Command	Not Available or Condition Exists	Cruise Control Pause Command - Condition Exists
5625	2	5274	Engine Exhaust Back Pressure Regulator Position	Data Erratic, Intermittent or Incorrect	Engine Exhaust Back Pressure Regulator Position - Data Erratic, Intermittent or Incorrect
5625	3	5275	Engine Exhaust Back Pressure Regulator Position Sensor Circuit	Voltage Above Normal or Shorted to High Source	Engine Exhaust Back Pressure Regulator Position Sensor Circuit - Voltage Above Normal, or Shorted to High Source
5625	4	5276	Engine Exhaust Back Pressure Regulator Position Sensor Circuit	Voltage Below Normal or Shorted to Low Source	Engine Exhaust Back Pressure Regulator Position Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
5626	13	5277	Engine Exhaust Back Pressure Regulator	Out of Calibration	Engine Exhaust Back Pressure Regulator - Out of Calibration
5741	2	4451	Aftreatment 1 Outlet Soot	Data Erratic, Intermittent or Incorrect	Aftreatment 1 Outlet Soot - Data erratic, intermittent or incorrect
5741	3	4143	Aftreatment 1 Outlet Soot Sensor	Voltage Above Normal or Shorted to High Source	Aftreatment 1 Outlet Soot Sensor - Voltage Above Normal, or Shorted to High Source
5741	4	4144	Aftreatment 1 Outlet Soot Sensor	Voltage Below Normal or Shorted to Low Source	Aftreatment 1 Outlet Soot Sensor - Voltage below normal, or shorted to low source
5742	3	4161	Aftreatment Diesel Particulate Filter Temperature Sensor Module	Voltage Above Normal or Shorted to High Source	Aftreatment Diesel Particulate Filter Temperature Sensor Module - Voltage Above Normal, or Shorted to high source
5742	4	4162	Aftreatment Diesel Particulate Filter Temperature Sensor Module	Voltage Below Normal or Shorted to Low Source	Aftreatment Diesel Particulate Filter Temperature Sensor Module - Voltage below normal, or shorted to low source
5742	9	4151	Aftreatment Diesel Particulate Filter Temperature Sensor Module	Abnormal Update Rate	Aftreatment Diesel Particulate Filter Temperature Sensor Module - Abnormal update rate
5742	11	4259	Aftreatment Diesel Particulate Filter Temperature Sensor Module	Root Cause Not Known	Aftreatment Diesel Particulate Filter Temperature Sensor Module - Root Cause Not Known
5742	12	4158	Aftreatment Diesel Particulate Filter Temperature Sensor Module	Bad Intelligent Device or Component	Aftreatment Diesel Particulate Filter Temperature Sensor Module - Bad intelligent device or component

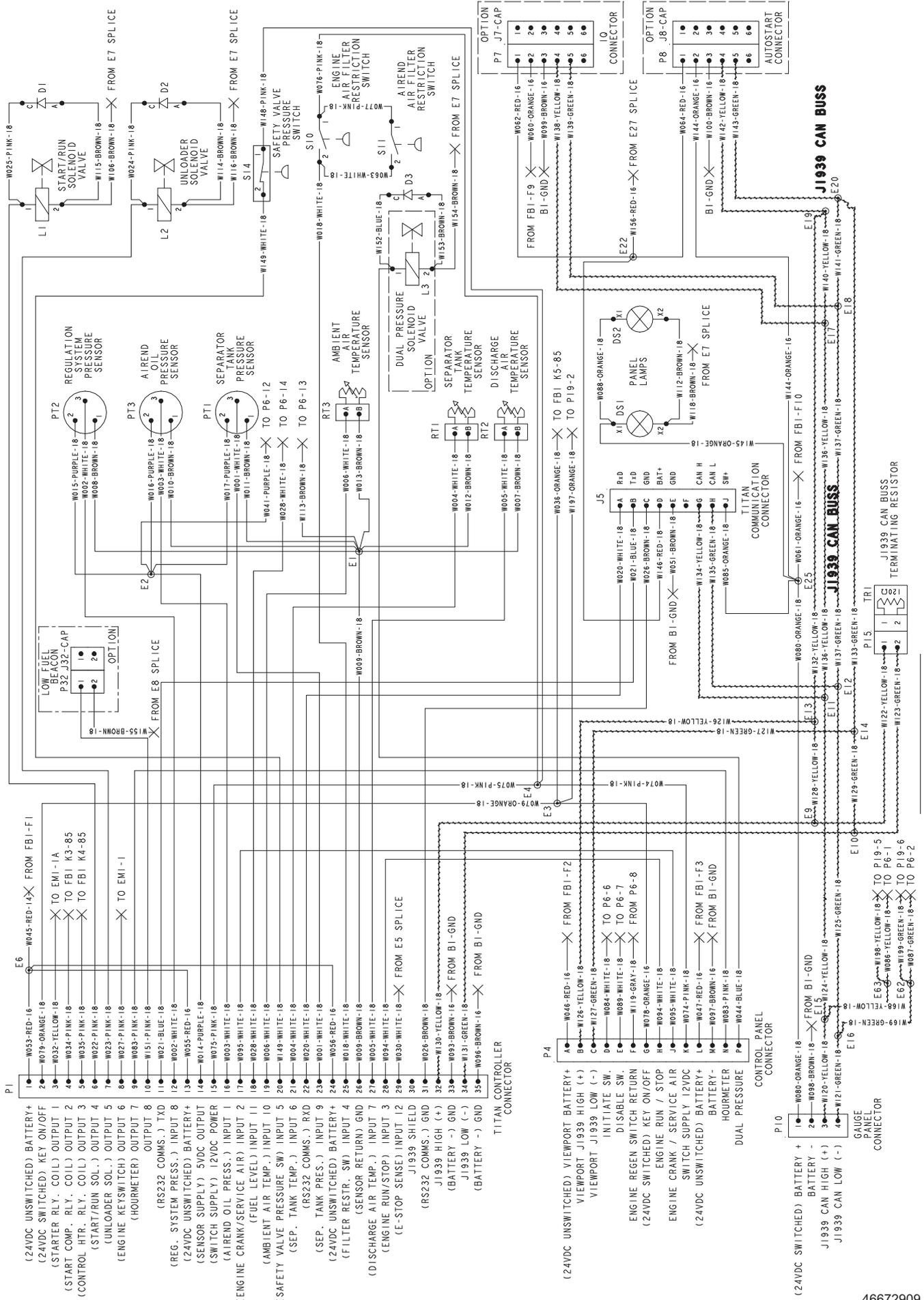
J1939 SPN	J 1939 FM	Cummins Code	J 1939SPN Description	J 1939FM Description	Cummins Description
5742	16	4163	Aftertreatment Diesel Particulate Filter Temperature Sensor Module	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftertreatment Diesel Particulate Filter Temperature Sensor Module - Data Valid But Above Normal Operating Range
5743	3	4164	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Voltage Above Normal or Shorted to High Source	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Voltage Above Normal, or Shorted to high source
5743	4	4165	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Voltage Below Normal or Shorted to Low Source	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Voltage below normal, or Shorted to low source
5743	9	4152	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Abnormal Update Rate	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Abnormal update rate
5743	11	4261	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Root Cause Not Known	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Root Cause Not Known
5743	12	4159	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Bad Intelligent Device or Component	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Bad intelligent device or component
5743	16	4166	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Data Valid But Above Normal
5745	3	4168	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater	Voltage Above Normal or Shorted to High Source	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater - Voltage Above Normal, or Shorted to High
5745	4	4169	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater	Voltage Below Normal or Shorted to Low Source	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater - Voltage below normal, or shorted to low source
5745	18	4171	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater	Data Valid but Below Normal Operating Range - Moderately Severe Level	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater - Data Valid But Below Normal Operating Range
5746	3	4155	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Relay	Voltage Above Normal or Shorted to High Source	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Relay - Voltage Above Normal, or Shorted to high source
5746	4	4156	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Relay	Voltage Below Normal or Shorted to Low Source	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Relay - Voltage below normal, or shorted to low source
5747	3	4153	Aftertreatment 1 Outlet Soot Sensor Heater	Voltage Above Normal or Shorted to High Source	Aftertreatment 1 Outlet Soot Sensor Heater - Voltage Above Normal, or Shorted to High Source
5747	4	4154	Aftertreatment 1 Outlet Soot Sensor Heater	Voltage Below Normal or Shorted to Low Source	Aftertreatment 1 Outlet Soot Sensor Heater - Voltage below normal, or shorted to low source
5747	10	4449	Aftertreatment 1 Outlet Soot Sensor Heater	Abnormal Rate of Change	Aftertreatment 1 Outlet Soot Sensor Heater - Abnormal rate of change
5793	9	4284	Desired Engine Fueling State	Abnormal Update Rate	Desired Engine Fueling State - Abnormal Update Rate
5797	3	4254	Aftertreatment Warm Up Diesel Oxidation Catalyst Temperature Sensor Module	Voltage Above Normal or Shorted to High Source	Aftertreatment Warm Up Diesel Oxidation Catalyst Temperature Sensor Module - Voltage Above Normal, or shorted to high source
5797	4	4255	Aftertreatment Warm Up Diesel Oxidation Catalyst Temperature Sensor Module	Voltage Below Normal or Shorted to Low Source	Aftertreatment Warm Up Diesel Oxidation Catalyst Temperature Sensor Module - Voltage below normal, or shorted to low source
5797	11	4258	Aftertreatment Warm Up Diesel Oxidation Catalyst Temperature Sensor Module	Root Cause Not Known	Aftertreatment Warm Up Diesel Oxidation Catalyst Temperature Sensor Module - Root Cause Not Known
5797	12	4253	Aftertreatment Warm Up Diesel Oxidation Catalyst Temperature Sensor Module	Bad Intelligent Device or Component	Aftertreatment Warm Up Diesel Oxidation Catalyst Temperature Sensor Module - Bad intelligent device
5797	16	4256	Aftertreatment Warm Up Diesel Oxidation Catalyst Temperature Sensor Module	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftertreatment Warm Up Diesel Oxidation Catalyst Temperature Sensor Module - Data Valid But Above Normal Operating Range - Moderately Severe Level
5798	2	4245	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Temperature	Data Erratic, Intermittent or Incorrect	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Temperature - Data erratic, intermittent or incorrect

J1939 SPN	J1939 FM	Cummins Code	J 1939SPN Description	J 1939FM Description	Cummins Description
5798	10	4251	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Temperature	Abnormal Rate of Change	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Temperature - Abnormal Rate of Change
5838	31	4485	EGR Valve Malfunction	Not Available or Condition Exists	EGR Valve Malfunction - Condition Exists
5839	31	4486	Diesel Exhaust Fluid Consumption Malfunction	Not Available or Condition Exists	Diesel Exhaust Fluid Consumption Malfunction - Condition Exists
5840	31	4487	Diesel Exhaust Fluid Dosing Malfunction	Not Available or Condition Exists	Diesel Exhaust Fluid Dosing Malfunction - Condition Exists
5841	31	4488	Diesel Exhaust Fluid Quality Malfunction	Not Available or Condition Exists	Diesel Exhaust Fluid Quality Malfunction - Condition Exists
5842	31	4489	SCR Monitoring System Malfunction	Not Available or Condition Exists	SCR Monitoring System Malfunction - Condition Exists
6301	3	4688	Water in Fuel Indicator 2 Sensor Circuit	Voltage Above Normal or Shorted to High Source	Water in Fuel Indicator 2 Sensor Circuit - Voltage above normal, or shorted to high source
6301	4	4689	Water in Fuel Indicator 2 Sensor Circuit	Voltage Below Normal or Shorted to Low Source	Water in Fuel Indicator 2 Sensor Circuit - Voltage below normal, or shorted to low source
6653	16	4841	Cold Start Injector Metering Rail 1 Pressure	Data Valid but Above Normal Operating Range - Moderately Severe Level	Cold Start Injector Metering Rail 1 Pressure - Data Valid But Above Normal Operating Range - Moderate Severe Level
6655	3	4951	ECU Power Lamp	Voltage Above Normal or Shorted to High Source	Maintain ECU Power Lamp - Voltage Above Normal, or Shorted to High Source
6655	4	4952	ECU Power Lamp	Voltage Below Normal or Shorted to Low Source	Maintain ECU Power Lamp - Voltage Below Normal, or Shorted to Low Source
6713	9	5177	VGT Actuator Driver Circuit	Abnormal Update Rate	VGT Actuator Driver Circuit - Abnormal Update rate
6713	13	4956	Variable Geometry Turbocharger Actuator	Out of Calibration	Variable Geometry Turbocharger Actuator Software - Out of Calibration
6713	31	4957	Variable Geometry Turbocharger Actuator	Not Available or Condition Exists	Variable Geometry Turbocharger Actuator Software - Condition Exists
6881	9	5653	SCR Operator Inducement Override Switch	Abnormal Update Rate	SCR Operator Inducement Override Switch - Abnormal Update Rate
6881	13	5654	SCR Operator Inducement Override Switch	Out of Calibration	SCR Operator Inducement Override Switch - Out of Calibration
520199	3	193	Cruise Control	Voltage Above Normal or Shorted to High Source	Cruise Control (Resistive) Signal Circuit - Voltage above normal, or shorted to high source
520199	4	194	Cruise Control	Voltage Below Normal or Shorted to Low Source	Cruise Control (Resistive) Signal Circuit - Voltage below normal, or shorted to low source
520286	4	5394	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module	Voltage Below Normal or Shorted to Low Source	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Voltage Below Normal or Shorted to Low Source
520286	11	5395	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module	Root Cause Not Known	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Root Cause Not Known
520320	7	2699	Crankcase Depression Valve	Mechanical System not Responding or Out of Adjustment	Crankcase Depression Valve - Mechanical system not responding or out of adjustment
520332	3	2755	Cruise Control	Voltage Above Normal or Shorted to High Source	Cruise Control (Resistive) #2 Signal Circuit - Voltage above normal, or shorted to high source
520332	4	2756	Cruise Control	Voltage Below Normal or Shorted to Low Source	Cruise Control (Resistive) #2 Signal Circuit - Voltage below normal, or shorted to low source
520435	12	3222	Glow Plug Module	Bad Intelligent Device or Component	Glow Plug Module - Bad intelligent device or component
520595	2	4288	Closed Crankcase Ventilation System Pressure	Data Erratic, Intermittent or Incorrect	Closed Crankcase Ventilation System Pressure - Data erratic, intermittent or incorrect

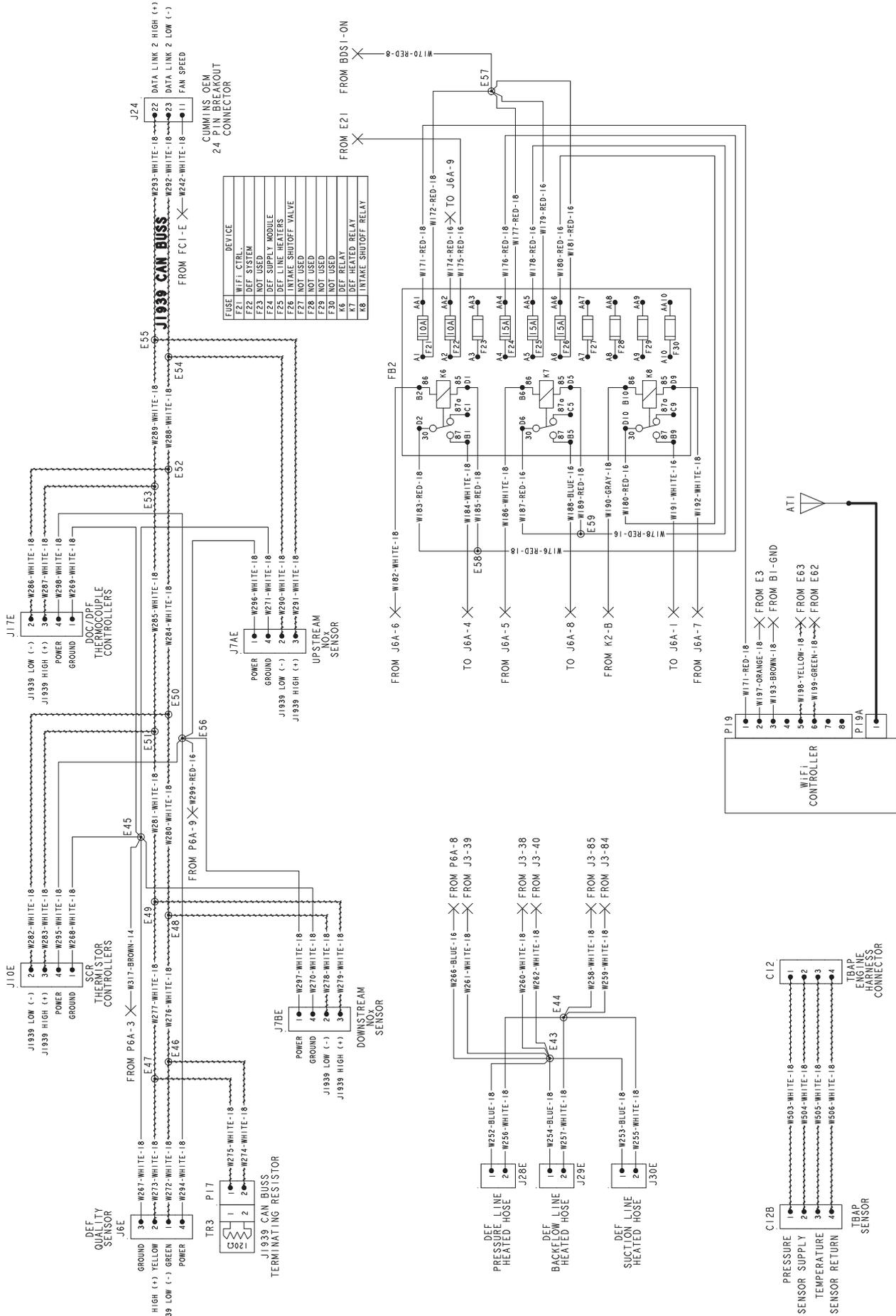
J1939 SPN	J1939 FM	Cummins Code	J 1939SPN Description	J 1939FM Description	Cummins Description
520595	3	4286	Closed Crankcase Ventilation System Pressure Sensor	Voltage Above Normal or Shorted to High Source	Closed Crankcase Ventilation System Pressure Sensor - Voltage Above Normal, or Shorted to High Source
520595	4	4287	Closed Crankcase Ventilation System Pressure Sensor	Voltage Below Normal or Shorted to Low Source	Closed Crankcase Ventilation System Pressure Sensor - Voltage below normal, or shorted to low source
520668	31	4452	Aftreatment1 OutletNOx Sensor Closed Loop Operation	Not Available or Condition Exists	Aftreatment1 OutletNOx Sensor Closed Loop Operation - Condition Exists
520716	3	4752	Aftreatment1 Diesel Exhaust Fluid Dosing Valve 1 Heater	Voltage Above Normal or Shorted to High Source	Aftreatment1 Diesel Exhaust Fluid Dosing Valve 1 Heater - Voltage Above Normal, or Shorted to High Source
520716	4	4753	Aftreatment1 Diesel Exhaust Fluid Dosing Valve 1 Heater	Voltage Below Normal or Shorted to Low Source	Aftreatment1 Diesel Exhaust Fluid Dosing Valve 1 Heater - Voltage Below Normal, or Shorted to Low Source
520784	3	5183	Fan Blade Pitch Position Sensor Circuit	Voltage Above Normal or Shorted to High Source	Fan Blade Pitch Position Sensor Circuit - Voltage Above Normal, or Shorted to High Source
520784	4	5184	Fan Blade Pitch Position Sensor Circuit	Voltage Below Normal or Shorted to Low Source	Fan Blade Pitch Position Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
520784	5	5185	Fan Blade Pitch	Current Below Normal or Open Circuit	Fan Blade Pitch - Mechanical system not responding or out of adjustment
520791	2	5215	Engine Boost Curve Selection	Data Erratic, Intermittent or Incorrect	Engine Boost Curve Selection - Data erratic, intermittent or incorrect
520808	31	5291	Engine Emergency Shutdown Switch Activated	Not Available or Condition Exists	Engine Emergency Shutdown Switch Activated - Condition Exists
520809	31	5292	Excessive Time Since Last Engine Air Shutoff Maintenance Test	Not Available or Condition Exists	Excessive Time Since Last Engine Air Shutoff Maintenance Test - Condition Exists
520826	3	5393	Aftreatment Diesel Oxidation Catalyst Temperature Sensor Module	Voltage Above Normal or Shorted to High Source	Aftreatment Diesel Oxidation Catalyst Temperature Sensor Module - Voltage Above Normal or Shorted to High Source
520826	9	5391	Aftreatment Diesel Oxidation Catalyst Temperature Sensor Module	Abnormal Update Rate	Aftreatment Diesel Oxidation Catalyst Temperature Sensor Module - Abnormal Update Rate
520826	12	5392	Aftreatment Diesel Oxidation Catalyst Temperature Sensor Module	Bad Intelligent Device or Component	Aftreatment Diesel Oxidation Catalyst Temperature Sensor Module - Bad Intelligent Device or Component
520826	16	5396	Aftreatment Diesel Oxidation Catalyst Temperature Sensor Module	Data Valid but Above Normal Operating Range - Moderately Severe Level	Aftreatment Diesel Oxidation Catalyst Temperature Sensor Module - Data Valid but Above Normal Operating Range - Moderately Severe Level
524286	31	5617	Aftreatment1 Diesel Oxidation Catalyst System	Not Available or Condition Exists	Aftreatment1 Diesel Oxidation Catalyst System - Special Instruction
524286	31	9491		Not Available or Condition Exists	Reserved for temporary use - Condition Exists
524286	31	9999		Not Available or Condition Exists	Reserved for temporary use - Condition Exists

SYSTEM SCHEMATICS AND WIRING DIAGRAMS

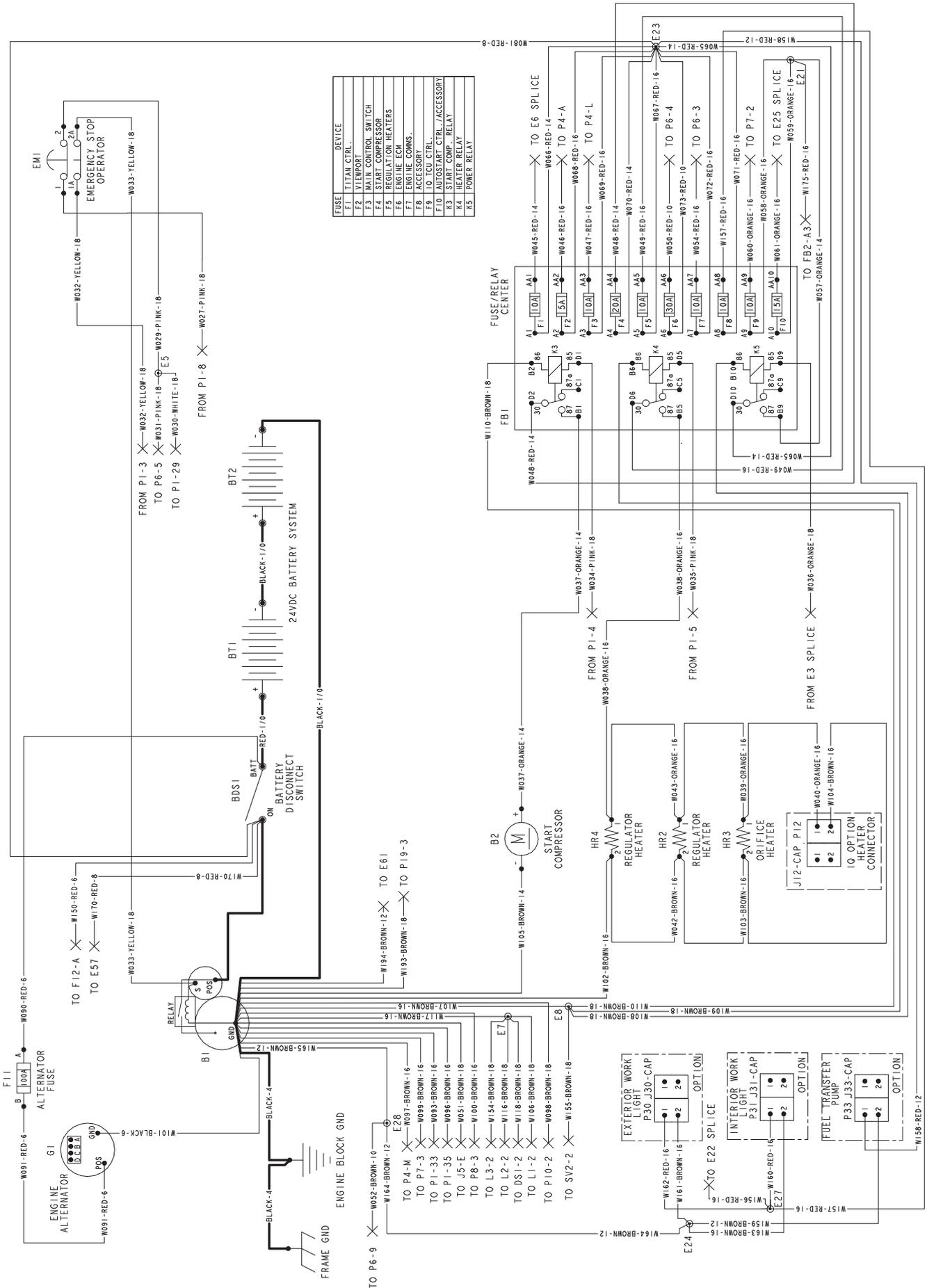
COMPRESSOR AND ENGINE HARNESS



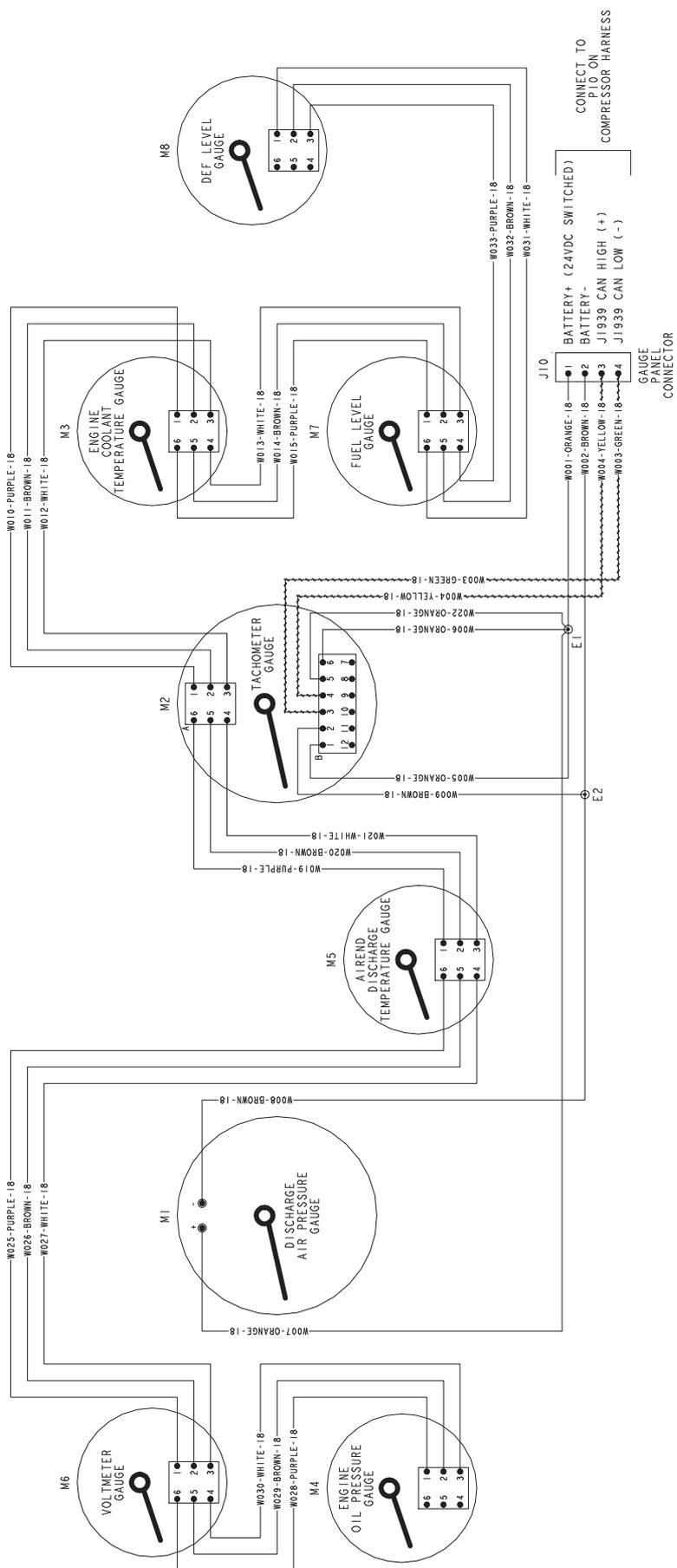
COMPRESSOR AND ENGINE HARNESS



COMPRESSOR AND ENGINE HARNESS

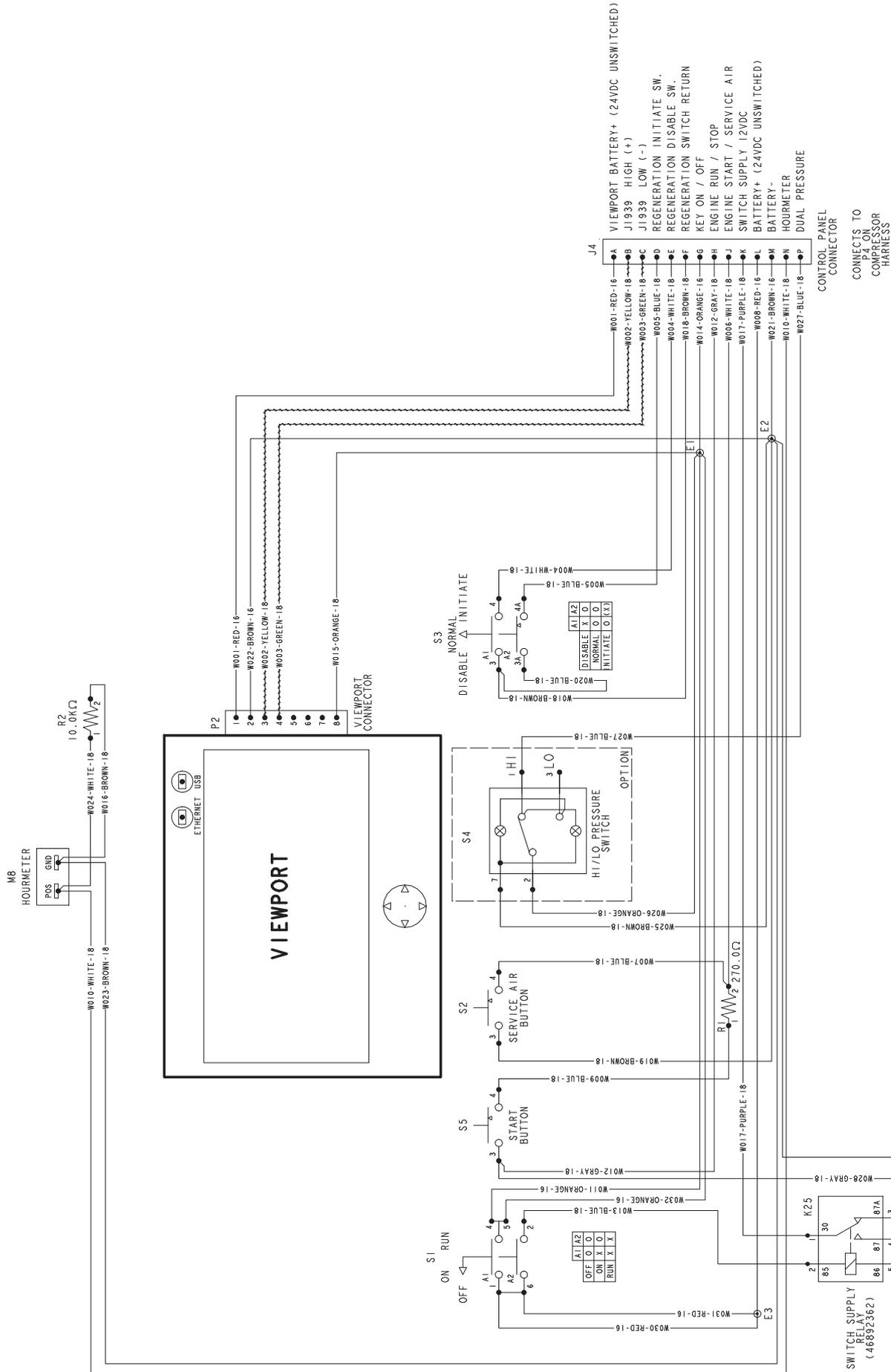


GUAGE PANEL HARNESS

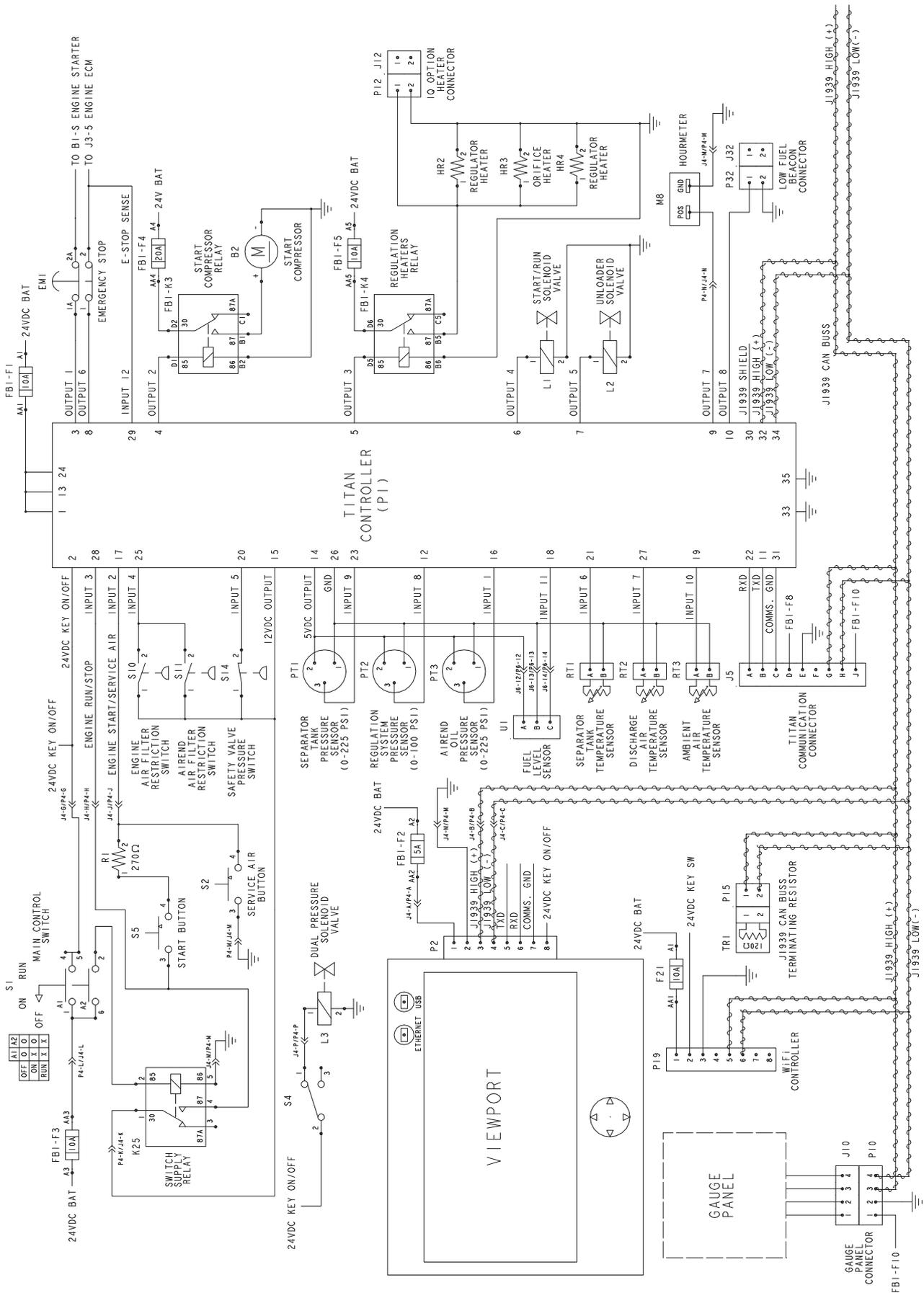


CONNECT TO
P10 ON
COMPRESSOR HARNESS

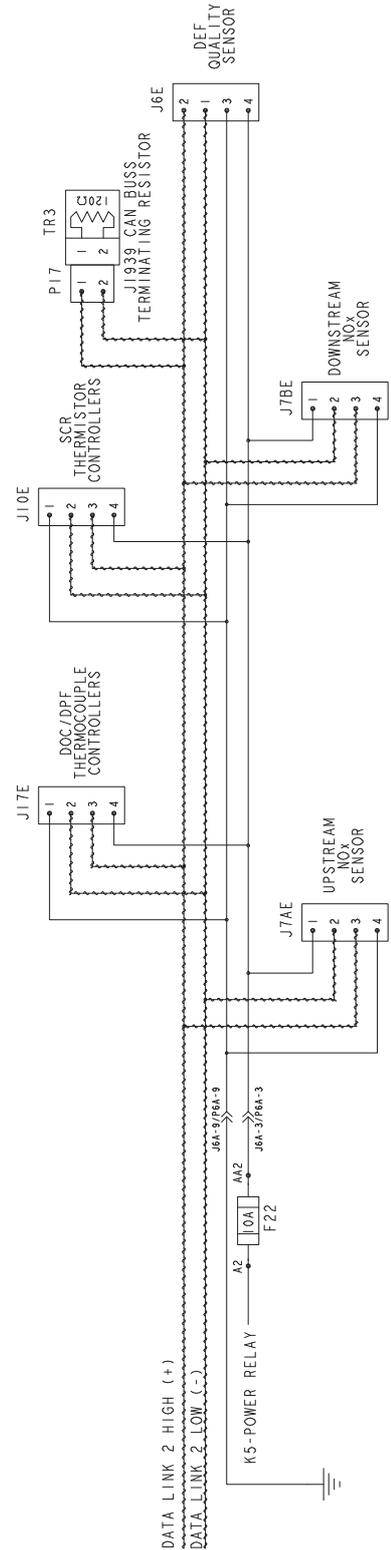
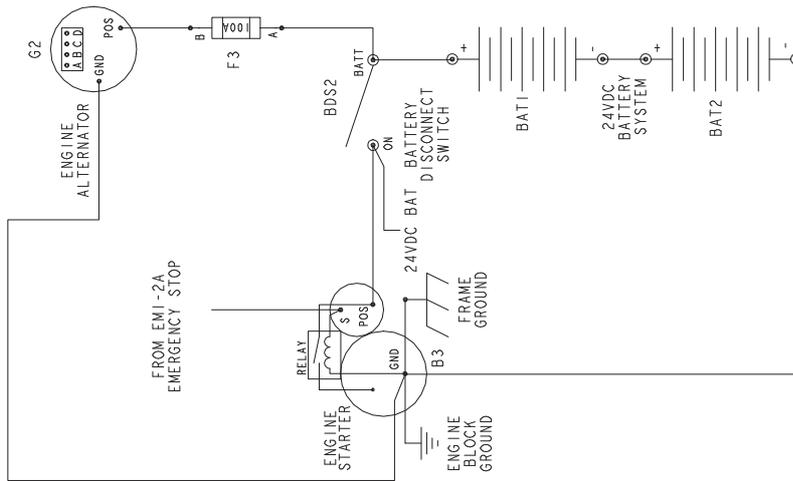
CONTROL PANEL HARNESS



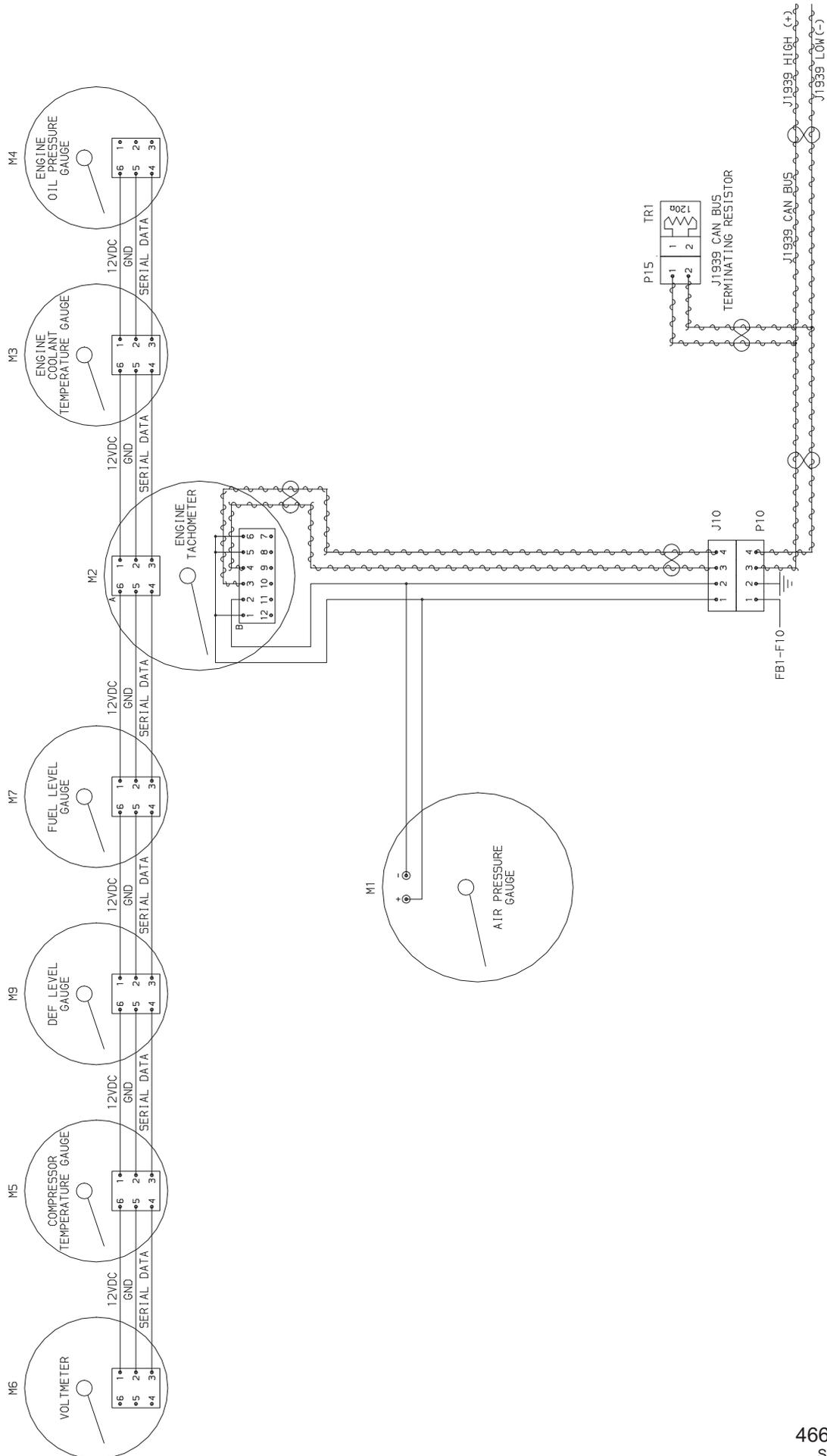
CONTROL SYSTEM SCHEMATIC



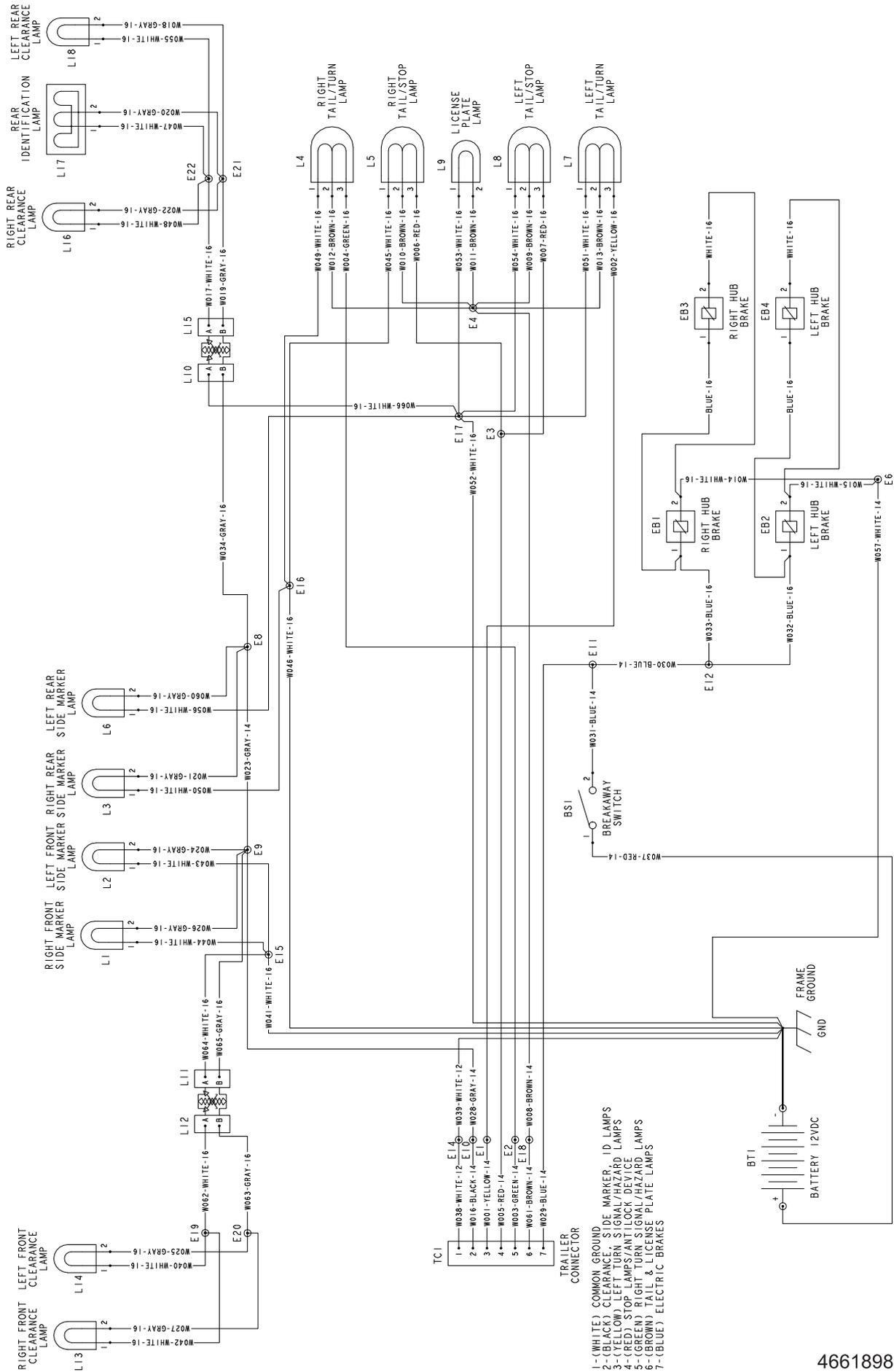
CONTROL SYSTEM SCHEMATIC



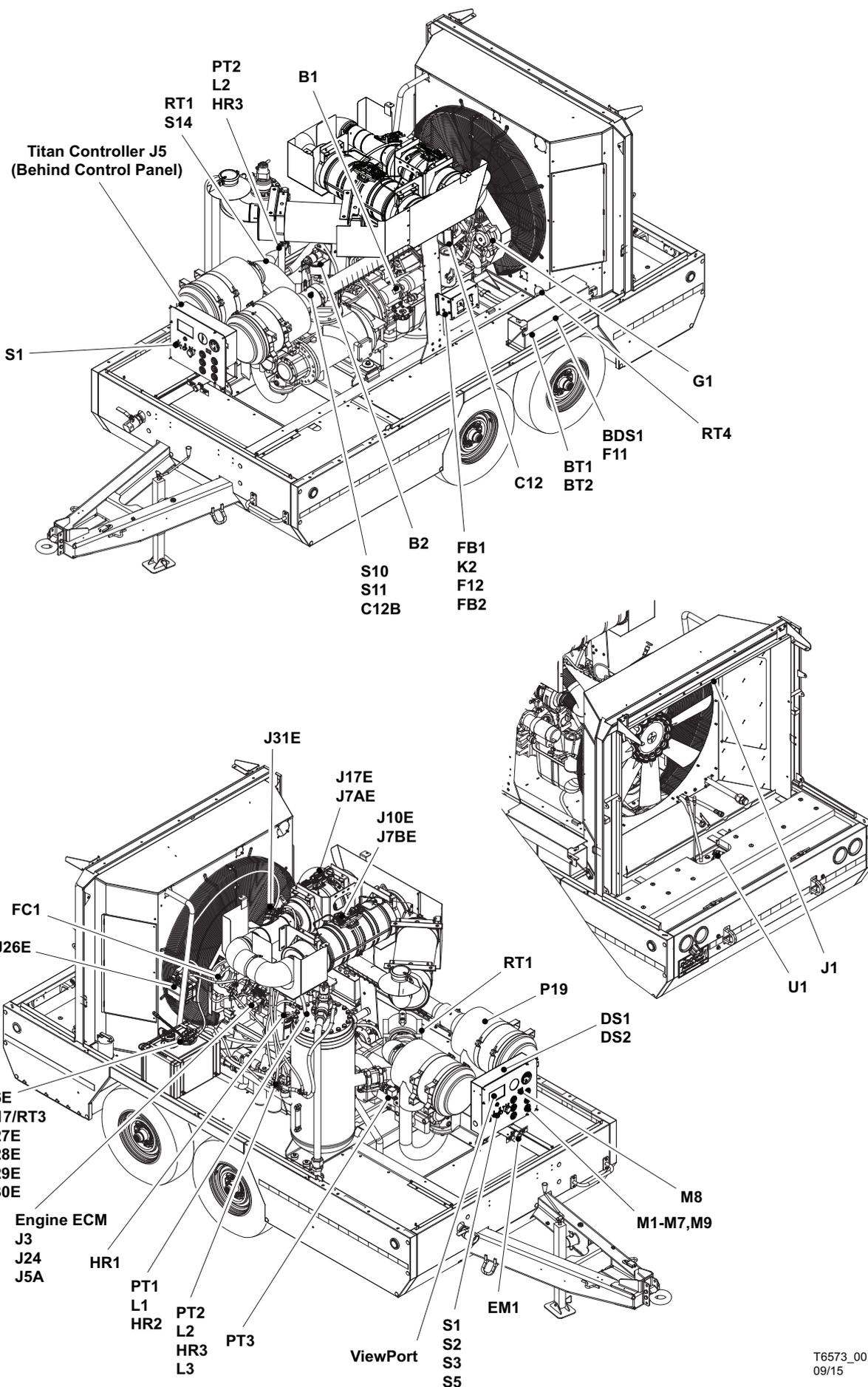
CONTROL SYSTEM SCHEMATIC



TRAILER HARNESS SCHEMATIC



ELECTRICAL CONTROL LOCATIONS



T6573_00
09/15

Harness Connector Locations

- C5B:** 2 pin connector that connects to the fuel filter sensor.
- C12:** 4 pin connector located near the engine starter and connects to the engine harness.
- J3:** 96 pin connector that connects to the engine ECM.
- J5:** 9 pin connector located behind the control panel and is used for Titan controller communications.
- J5A:** 9 pin connector located near engine ECM and is used for engine ECM service tool.
- J24:** 24 pin connector located near engine ECM and connects to the engine harness.
- P1:** 35 pin connector that connects to the Titan controller.
- P2:** 8 pin connector that connects to the ViewPort display.
- P4 / J4:** 14 pin connector system located behind control panel. Connector system connects the control panel harness to the compressor harness.
- P6/J6, J6A/P6A:** 14 pin connector system located in wire harness tray near lift bail on curb side of machine. Connector system connects the compressor harness to the engine harness.
- P7 / J7-CAP:** 6 pin connector system located under control panel. Connector system connects the IQ option harness to the compressor harness.
- P8 / J8-CAP:** 6 pin connector system located under control panel. Connector system connects the AutoStart option harness to the compressor harness.
- P10 / J10:** 4 pin connector system located behind control panel. Connector system connects the gauge panel harness to the compressor harness.
- P12 / J12-CAP:** 2 pin connector system located under control panel. Connector system connects the IQ option heater harness to the compressor harness.
- P15:** 2 pin connector located behind control panel for termination resistor TR1 on J1939 CAN BUSS.
- P16:** 2 pin connector located near engine ECM for termination resistor TR2 on J1939 CAN BUSS.
- P17:** 2 pin connector located near engine ECM for termination resistor TR3 on J1939 CAN BUSS.

ELECTRICAL PARTS LIST

Compressor and Engine		
Reference Designator	Description	Part Number
P1	Titan Controller	46651420
	Compressor Harness	46624448
	Engine Harness	46642388
	Engine Intake Heater Harness	46571979
	Battery Positive Stud to Stud Cable	46562019
	Battery Positive Cable	46562039
	Battery Negative Cable	46562040
	Battery Cable Jumper	46561979
	Frame Ground Strap	46569681
	Engine Ground Strap	46569684
B1	Engine Starter	46551038
B2	Start Compressor	36850691
BDS1	Battery Disconnect Switch	36896975
BT1	Battery, 12 VDC	22413876
BT2	Battery, 12 VDC	22413876
C12B	TBAP Sensor	46566779
D1	Diode	35376169
D2	Diode	35376169
D3	Diode	35376169
DS1	Panel Lamp	46556345
DS2	Panel Lamp	46556345
EM1	Emergency Stop	89303127
FB1	Fuse/Relay Center Replacement	46611559
FB1	Fuse/Relay Center Replacement Cover	23366172
FB1	Fuse/Relay Center Decal Outside Cover	46574381
FB1	Fuse/Relay Center Decal Inside Cover	46587539
FB1	Titan Controller Fuse 10 Amp	23091812
FB1	ViewPort Display Fuse 5 Amp	23326069
FB1	Main Control Switch Fuse 10 Amp	23091812
FB1	Start Compressor Fuse 20 Amp	23091838
FB1	Regulation Heaters Fuse 10 Amp	23091812
FB1	Engine ECM Fuse 30 Amp	23091853
FB1	Engine Communication Fuse 10 Amp	23091812
FB1	Accessory Fuse 10 Amp	23091812
FB1	IQ TCU Controller Fuse 10 Amp	23091812
FB1	AutoStart Controller Fuse 15 Amp	23091820
FB2	Fuse/Relay Center Replacement	46611559
FB2	Fuse/Relay Center Replacement Cover	23366172
FB2	Fuse/Relay Center Decal Outside Cover	46575499
FB2	Fuse/Relay Center Decal Inside Cover	46656815
FB2-F21	WiFi controller Fuse 10 Amp	23091812

Compressor and Engine		
Reference Designator	Description	Part Number
FB2-F22	DEF System Fuse 10 Amp	23091812
FB2-F24	DEF Supply Module Fuse 15 Amp	23091820
FB2-F25	DEF Line Heaters 15 Amp	23091820
FB2-F26	Intake Shutoff Valve Fuse 15 Amp	23091820
FB2-K6	DEF Supply Module Relay	23316250
FB2-K7	DEF Line Heaters Relay	23316250
FB2-K8	Intake Shutoff Relay	23316250
F11	Engine Alternator Fuse 100 Amp	46630412
F12	Engine Intake Air Heater Fuse 150 Amp	46561563
F12	Replacement Fuse Holder	46561862
G1	Engine Alternator	46551114
HR1	Engine Intake Air Heater	Cummins Part
HR2	Regulator Heater	36854677
HR3	Orifice Heater	36841526
HR4	Regulator Heater	36854677
J11	Coolant Level Sensor	22769186
J3	Replacement Backshell	TBD
J5	Replacement Cap with Lanyard	23366768
J5A	Replacement Cap with Lanyard	23366768
J6E	DEF Tank Sensor	46651459
J7BE	Downstream Nox Sensor (SCR)	Cummins Part
J10E	SCR Temperature Module	Cummins Part
J17E	DOC Temperature Module	Cummins Part
J26E	DEF Supply Module	46605124
J27E	DEF Tank Heating Valve	46642638
J27AE	Upstream Nos Sensor (DOC)	Cummins Part
J28E	DEF Pressure Line Heated Hose	46651119
J29E	DEF Backflow Line Heated Hose	46651065
J30E	DEF Suction Line Heated Hose	46651065
J31E	DEF Dosing Module	Cummins Part
K2	Engine Intake Air Heater Relay	46562041
FB1-K3	Start Compressor Relay	23316250
FB1-K4	Regulation Heaters Relay	23316250
FB1-K5	Switched Power Relay	23316250
L1 (HP915, XP1000)	Start/Run Solenoid Valve	36840841
L1 (XHP750)	Start/Run Solenoid Valve	36842300
L2 (HP915, XP1000)	Unloader Solenoid Valve	36840841
L2 (XHP750)	Unloader Solenoid Valve	36842318

Compressor and Engine		
Reference Designator	Description	Part Number
L3 (HP915, XP1000-OPT.)	Dual Pressure Solenoid Valve - Dual Pres. Switch Option	36840841
L3 (XHP750-OPT.)	Dual Pressure Solenoid Valve - Dual Pres. Switch Option	36842300
PT1 (HP915, XP1000)	Separator Tank Pressure Sensor	54496773
PT1 (XHP750)	Separator Tank Pressure Sensor	54765946
PT2	Regulation System Pressure Sensor	36920825
PT3 (HP915, XP1000)	Airend Oil Pressure Sensor	54496773
PT3 (XHP750)	Airend Oil Pressure Sensor	54765946
RT1	Separator Tank Temperature Sensor	23294820
RT2	Discharge Air Temperature Sensor	23294820
RT3	Ambient Air Temperature Sensor	23294820
RT4	CAC Temperature Sensor	23294820
S10	Airend Air Filter Restriction Switch	36847838
S11	Engine Air Filter Restriction Switch	36847838
S12 (OPT.)	Engine Over Speed Valve Switch	46663638
S13 (OPT.)	Aftercooler Switch	46669371
S14	Safety Valve Pressure Switch	46568519
TR1	J1939 CAN BUSS Terminating Resistor	23091804
TR2	J1939 CAN BUSS Terminating Resistor	23091804
TR3	J1939 CAN BUSS Terminating Resistor	23091804
U1	Fuel Level Sensor	46578039
U1 (OPT.)	Fuel Level Sensor – Fuel Transfer Pump Option	46598700

Control Panel		
Reference Designator	Description	Part Number
	ViewPort Display	46594821
	Control Panel Harness	46672898
K25	12VDC Switch Supply Relay	36892362
M8	Hourmeter	46557109
S1	Main Control Switch	46641633
S2	Service Air Button	46559026
S3	Regeneration Control Switch	46556142
S3	Replacement Switch Cover	46556145
S4 (OPT.)	Hi/Lo Pressure Switch - Dual Pres. Switch Option	22054084
S5	Start Button	46663130

Gauge Panel		
Reference Designator	Description	Part Number
	Gauge Panel Harness	46672899
M1 (HP915, XP1000)	Air Pressure Gauge 0-250 psi (0-17.24 bar)	46558799
M1 (XHP750)	Air Pressure Gauge 0-600 psi (0-41.37 bar)	46558801
M2	Engine Tachometer	46558802
M3	Engine Coolant Temperature Gauge	46558804
M4	Engine Oil Pressure	46558803
M5	Compressor Temperature Gauge	46558806
M6	Voltmeter	46558805
M7	Fuel Level Gauge	46565479
M9	DEF Level Gauge	46636464

Trailer		
Reference Designator	Description	Part Number
	Trailer Harness	46651563
BS1	Breakaway Switch	46554147
L1	Right Front Side Marker Lamp	35367051
L2	Right Front Clearance Lamp	35367051
L3	Left Front Side Marker Lamp	35367051
L4	Left Front Clearance Lamp	35367051
L5	Right Rear Clearance Lamp	35367044
L6	Right Rear Side Marker Lamp	35367044
L7	Left Rear Clearance Lamp	35367044
L8	Left Rear Side Marker Lamp	35367044
L9	Rear Identification Lamp	36922144
L10	Right Tail/Turn Lamp	36788081
L11	Right Tail/Stop Lamp	36788081
L12	Left Tail/Turn Lamp	36788081
L13	Left Tail/Stop Lamp	36788081
L14	License Plate Lamp	36881910

HARNESS CONNECTOR INFORMATION

The following is a complete list of the connectors and connector parts that are used on the machine harnesses. The most common replacement connectors and connector parts will be found in the Deutsch terminal repair kit, Packard terminal repair kit, and Wire terminal repair kit. A repair kit is available for the Titan connector and Engine ECM connector. Check the Electrical Parts List section for individual replacement harness parts for certain items. If the connectors and connector parts are not in the kits, the manufacturer part numbers and contact information will be provided.

Compressor Harness			
Connector and Parts	Manufacturer	Manufacturer's Part No.	Included in Doosan Service Kit Part No.
P10 Gauge Panel Connector			
Plug, 4 way	Deutsch	DT06-4S-EP06	46490983
Wedglock	Deutsch	W4S-P012	46490983
Socket size 16 Gold	Deutsch	0462-201-1631	46490983
P15 J1939 CAN Terminator Connector			
Plug, 2 way	Deutsch	DTM06-2S-E005	46490983
Wedglock	Deutsch	WM-2SB	46490983
Socket size 20 Gold	Deutsch	0462-201-2031	46490983
TR1 J1939 CAN Terminator			
Receptacle, 2 way terminator	Deutsch	DTM04-2P-EP10	46490983
J5 TITAN Controller Communication Connector			
Receptacle, 9 way	Deutsch	HD10-9-96P	46490983
Connector Cap	Deutsch	HDC9-JDL082397	46490983
Pin size 16 Gold	Deutsch	0460-202-1631	46490983
Sealing plug size 16-12	Deutsch	114017	46490983
P4 Control Panel Connector			
Plug, 14 way	Deutsch	HDP26-18-14SE	
Socket size 16 Gold	Deutsch	0462-201-1631	46490983
Sealing plug size 16-12	Deutsch	114017	46490983
P1 Titan Controller Connector			
Plug, 35 way	Amp	776164-1	46491502
Terminal, female 20-16 AWG gold	Amp	770854-3	46491502
Cavity plug	Amp	770678-1	46491502
P7 IQ Option Connector			
Plug, 6 way	Deutsch	DT06-6S-EP06	46490983
Wedglock	Deutsch	W6S-P012	46490983
Socket size 16 Gold	Deutsch	0462-201-1631	46490983
P8 AutoStart Option Connector			
Plug, 6 way	Deutsch	DT06-6S-EP06	46490983
Wedglock	Deutsch	W6S-P012	46490983
Socket size 16 Gold	Deutsch	0462-201-1631	46490983

Compressor Harness			
Connector and Parts	Manufacturer	Manufacturer's Part No.	Included in Doosan Service Kit Part No.
J7-Cap IQ Option Connector Cap			
Receptacle, 6 way	Deutsch	DT04-6P-E005	46490983
Sealing plug size 16-12	Deutsch	114017	46490983
J8-Cap AutoStart Option Connector Cap			
Receptacle, 6 way	Deutsch	DT04-6P-E005	46490983
Sealing plug size 16-12	Deutsch	114017	46490983
RT2 Temperature Sensor Connector			
Plug, 2 way	Packard	15300027	46491296
TPA	Packard	15300014	46491296
Terminal	Packard	12077411	46491296
Cable Seal	Packard	12089679	46491296
P12 IQ Option Heater Connector			
Plug, 2 way	Deutsch	DT06-2S-EP06	46490983
Wedgelock	Deutsch	W2S-P012	46490983
Socket size 16 Gold	Deutsch	0462-201-1631	46490983
J12-Cap IQ Option Heater Connector Cap			
Receptacle, 2 way	Deutsch	DT04-2P-E005	46490983
Sealing plug size 16-12	Deutsch	114017	46490983
PT3 Pressure Sensor Connector			
Plug, 3 way	Packard	13532244	46491296
TPA	Packard	15452678	46491296
Terminal	Packard	15326267	46491296
Cable Seal	Packard	15305351	46491296
PT2 Pressure Sensor Connector			
Plug, 3 way	Packard	13532244	46491296
TPA	Packard	15452678	46491296
Terminal	Packard	15326267	46491296
Cable Seal	Packard	15305351	46491296
RT3 Temperature Sensor Connector			
Plug, 2 way	Packard	15300027	46491296
TPA	Packard	15300014	46491296
Terminal	Packard	12077411	46491296
Cable Seal	Packard	12089679	46491296
RT1 Temperature Sensor Connector			
Plug, 2 way	Packard	15300027	46491296
TPA	Packard	15300014	46491296
Terminal	Packard	12077411	46491296
Cable Seal	Packard	12089679	46491296

Compressor Harness			
Connector and Parts	Manufacturer	Manufacturer's Part No.	Included in Doosan Service Kit Part No.
S14 Safety Valve Pressure Switch Connector			
Plug, 2 way	Deutsch	DT06-2S-EP06	46490983
Wedglock	Deutsch	W2S-P012	46490983
Socket size 16 Gold	Deutsch	0462-201-1631	46490983
PT1 Pressure Sensor Connector			
Plug, 3 way	Packard	13532244	46491296
TPA	Packard	15452678	46491296
Terminal	Packard	15326267	46491296
Cable Seal	Packard	15305351	46491296
P6 Engine Harness Interface Connector			
Plug, 10 way	FCI	54201009	
Terminal, 20-18 AWG Gold	FCI	54001803	46603079
Terminal, 12-10 AWG Tin	FCI	54001000	
Cavity Plug	FCI	54200005	
FB1,FB2 Fuse/Relay Center			
Fuse/Relay Block	Cooper Bussman	15304-4-0-4	
Terminal, 18-16 AWG	Packard	12110847	46491296
Terminal, 16-14 AWG	Packard	12129409	46491296
Terminal, 12-10 AWG	Packard	12110853	
Cable Seal 20-18 AWG	Packard	12089679	46491296
Cable Seal 16-14 AWG	Packard	12015323	46491296
Cable Seal 12-10 AWG	Packard	12015193	
Cavity Plug	Packard	12010300	46491296
P30 Option Exterior Work Light Connector			
Plug, 2 way	Deutsch	DT06-2S-EP06	46490983
Wedglock	Deutsch	W2S-P012	46490983
Socket size 16 Gold	Deutsch	0462-201-1631	46490983
P31 Option Interior Work Light Connector			
Plug, 2 way	Deutsch	DT06-2S-EP06	46490983
Wedglock	Deutsch	W2S-P012	46490983
Socket size 16 Gold	Deutsch	0462-201-1631	46490983

Compressor Harness			
Connector and Parts	Manufacturer	Manufacturer's Part No.	Included in Doosan Service Kit Part No.
P32 Option Low Fuel Beacon Connector			
Plug, 2 way	Deutsch	DTM06-2S	46490983
Wedglock	Deutsch	WM-2S	46490983
Socket size 20 Gold	Deutsch	0462-201-2031	46490983
J30-Cap Option Exterior Work Light Connector Cap			
Receptacle, 2 way	Deutsch	DT04-2P-E005	46490983
Sealing plug size 16-12	Deutsch	114017	46490983
J31-Cap Option Interior Work Light Connector Cap			
Receptacle, 2 way	Deutsch	DT04-2P-E005	46490983
Sealing plug size 16-12	Deutsch	114017	46490983
J32-Cap Option Low Fuel Beacon Connector Cap			
Receptacle, 2 way	Deutsch	DTM04-2P	46490983
Sealing plug size 16-12	Deutsch	114017	46490983
D1, D2, D3 Diode Terminals			
Plug, Bullet	AMP	60660-1	22252969
Receptacle, Bullet	AMP	60798-1	22252969
P33 Option Fuel Transfer Pump Connector			
Plug, 2 way	Deutsch	DTP06-2S-E003	46490983
Wedglock	Deutsch	WP-2S	46490983
Socket size 12 Gold	Deutsch	0462-210-1231	46490983
J33-Cap Option Fuel Transfer Pump Connector Cap			
Receptacle, 2 way	Deutsch	DTP04-2P-E003	46490983
Sealing plug size 16-12	Deutsch	114017	46490983

Engine Harness			
Connector and Parts	Manufacturer	Manufacturer's Part No.	Included in Doosan Service Kit Part No.
J6 Engine Harness Interface Connector			
Receptacle, 10 way	FCI	54201016	
Terminal, 20-18 AWG Gold	FCI	54001819	
Terminal, 12-10 AWG Tin	FCI	54001001	
Cavity Plug	FCI	54200005	
J5A Cummins Engine ECM Service Connector			
Receptacle, 9 way	Deutsch	HD10-9-1939P	46490983
Connector Cap	Deutsch	HDC9-JDL082397	46490983
Pin size 16 Gold	Deutsch	0460-202-1631	46490983
Sealing plug size 16-12	Deutsch	114017	46490983
J24 Cummins OEM 24 Pin Breakout Connector			
Plug, 24 way	FCI	F934000	46603079
Terminal, 18-16 AWG Gold	FCI	54001627	46603079
Cavity Plug	FCI	54241629	46603079
Cavity Plug	FCI	54240002	46603079
P16 J1939 CAN Terminator Connector			
Plug, 2 way	Deutsch	DTM06-2S-E005	46490983
Wedglock	Deutsch	WM-2SB	46490983
Socket size 20 Gold	Deutsch	0462-201-2031	46490983
TR2 J1939 CAN Terminator			
Receptacle, 2 way terminator	Deutsch	DTM04-2P-EP10	46490983
J3 Cummins CM2350 ECM OEM 96 PIN Connector			
Connector, Plug 96 Way	Packard	13964572	46652061
Cover, 96 Way Connector With Lever	Packard	13964580	46652061
Rubber Boot, 96 Way Connector	Packard	13957208	46652061
Terminal Lock, 96 Way Connector	Packard	15494608	46652061
Strain Relief, 96 Way Connector	Packard	13856709	46652061
Terminal, Female HVT 1.2 AG 18 AWG Silver	Packard	13627886	46652061
Terminal, Female HVT 1.2 AG 16 AWG Silver	Packard	13627887	46652061
Cavity Seal	Packard	15318164	46652061
J11 Coolant Level Sensor			
Plug, 3 way	Packard	12110293	
TPA	Packard	12052845	
Terminal, 18-16 AWG	Packard	12048074	46491296
Cable Seal 18-16 AWG	Packard	12048086	46491296

Engine Harness			
Connector and Parts	Manufacturer	Manufacturer's Part No.	Included in Doosan Service Kit Part No.
RT4 Temperature Sensor Connector			
Plug, 2 way	Packard	15300027	46491296
TPA	Packard	15300014	46491296
Terminal	Packard	12077411	46491296
Cable Seal	Packard	12089679	46491296
U1 Fuel Level Sensor Connector			
Plug, 3 way	Deutsch	DT06-3S-EP06	46490983
Wedglock	Deutsch	W3S-P012	46490983
Socket size 16 Gold	Deutsch	0462-201-1631	46490983

Control Panel Harness			
Connector and Parts	Manufacturer	Manufacturer's Part No.	Included in Doosan Service Kit Part No.
J4 Control Panel Connector			
Receptacle, 14 way	Deutsch	HDP24-18-14PE	
Pin size 16 Gold	Deutsch	0460-202-1631	46490983
Sealing plug size 16-12	Deutsch	114017	46490983
P2 View Port Connector			
Plug, 8 way	Deutsch	DT06-08SA-EP07	46599303
Wedglock	Deutsch	W8S-P012	46599303
Backshell	Deutsch	1011-244-0805	46599303
Socket size 16 Gold	Deutsch	0462-201-1631	46599303
S1 Main Control Switch			
Plug, 6 way	Deutsch	DT06-6S-EP06	46490983
Wedglock	Deutsch	W6S-P012	46490983
Socket size 16 Gold	Deutsch	0462-201-1631	46490983
Sealing plug size 16-12	Deutsch	114017	46490983

Gauge Panel Harness			
Connector and Parts	Manufacturer	Manufacturer's Part No.	Included in Doosan Service Kit Part No.
J10 Control Panel Connector			
Receptacle, 4 way	Deutsch	DT04-4P-E005	46490983
Pin size 16 Gold	Deutsch	0460-202-1631	46490983
M2-A, M3, M4, M5, M6, M7, M9 Gauge Connector			
Plug, 6 way	Deutsch	DT06-6S-EP06	46490983
Wedgelock	Deutsch	W6S-P012	46490983
Socket size 16 Gold	Deutsch	0462-201-1631	46490983
Sealing plug size 16-12	Deutsch	114017	46490983
M2-B Tachometer Gauge Connector			
Plug, 12 way	Deutsch	DT06-12SA-EP08	46599319
Wedgelock	Deutsch	W12S-P012	46599319
Socket size 16 Gold	Deutsch	0462-201-1631	46599319
Socket Size 16 Tin	Deutsch	0462-201-16141	46599319
Sealing plug size 16-12	Deutsch	114017	46599319

Quick Connects & Ring Terminals on all Harnesses	
Quick Disconnects, Ring Terminals, and Butt Splices	
Most Common used Quick Disconnects, Ring Terminals, and Butt Splices can be found in the Doosan Wire Terminal Service Kit.	22252969

Harness Connector Manufacturer Information

Contact For Packard Connector and Connector Parts:

Power and Signal Group
6675 Parkland Blvd.
Solon, OH 44139
1-800-722-5273

Contact For Deutsch Connector and Connector Parts:

Ladd Industries, Inc.
4849 Hempstead Station Dr.
Kettering, OH 45429
1-800-223-1236

Contact For AMP Connector and Connector Parts:

AMP Incorporated
Harrisburg, PA 17105
1-800-522-6752

Contact For FCI Connector and Connector Parts:

Mouser Electronics
1000 North Main Street
Mansfield, TX 76063
1-800-346-6873

Contact For Sumitomo Connector and Connector Parts:

Ballenger Motorsports, Inc.
8972 Quioccasin Rd
Suite 188
Richmond, VA 23229
804-915-7201

Contact For Yazaki Connector and Connector Parts:

Yazaki
6801 Haggerty Road
Canton, MI 48187
1-888-942-9152

Electrical Torque Specifications

Electronic Controller Connector Screw Torque Specifications			
Description	Connector Manufacturer	Manufacturer Part Number	Torque
TITAN Controller	Amp	776164-1	25 in.lbs (2.82Nm)
Caterpillar C9,C15, & C18 Tier 3 Engine ECM	Amp	776241-1	53 in.lbs (5.99Nm)
Cummins QSL9 & QSC8.3 Tier 3 Engine ECM	Deutsch	DRC26-50S-04	25 in.lbs (2.82Nm)
Cummins QSX15 Tier 3 Engine ECM	Deutsch	DRC26-50S-01	25 in.lbs (2.82Nm)
Cummins CM2250 T4F Engine ECM	Packard	15472534	25 in.lbs (2.82Nm)
Cummins CM2350 T4F Engine ECM	Delphi	(13964572) 13856709	25 in.lbs (2.82Nm)

SERVICE TOOLS AND REPAIR KITS

SERVICE TOOLS

The following list of special service tools are recommended to perform service and troubleshooting procedures in this manual. These tools can be purchased through Doosan Infracore Portable Power.

Service Tools	
Part Number	Description
22216691	Digital Multimeter (Fluke 87) Used to measure electrical circuits: Volts, Amps, Ohms
22216733	Fluke Meter Case Storage Case for Fluke meter and test leads
22216709	Fluke Test Lead Set Contains needle probes, alligator clips, and test leads
22216725	Fluke Wire Insulation Piercing Probe Used to pierce wire insulation when making electrical measurements
22147540	Kit, Test Adapters Used to interconnect between devices and harness for electrical measurements
22281588	T-Handle Hex Wrench 5/32" Used to remove Titan, Caterpillar ECM, and Cummins ECM connectors
22282107	Screw Driver Hex 5/32" Used to remove Titan, Caterpillar ECM, and Cummins ECM connectors
22282172	Flex Driver 1/4" Used to remove John Deere ECM connector
54740675	RS232 Heavy Duty Serial Cable Used for communication connection to Doosan controllers
54699640	Deutsch Terminal Removal Tool Size 20 Used to remove Deutsch size 20 terminals from connectors
54699632	Deutsch Terminal Removal Tool Size 16 Used to remove Deutsch size 16 terminals from connectors
46490942	Deutsch Terminal Removal Tool Size 14 Used to remove Deutsch size 14 terminals from connectors
54699624	Deutsch Terminal Removal Tool Size 12 Used to remove Deutsch size 12 terminals from connectors
54699616	Deutsch Terminal Removal Tool Size 8 Used to remove Deutsch size 8 terminals from connectors
54699657	Deutsch Wedgelock and Terminal Removal Tool Used to remove Deutsch DT style connector Wedgelock and terminals
22146393	Kit, Deutsch Terminal Removal Tool Size 20 Through 8 Used to remove Deutsch size 20 through 8 terminals from connectors
22216667	Deutsch Terminal Crimp Tool Used to crimp Deutsch connector terminals

Service Tools	
Part Number	Description
54729660	Packard Weather-Pack Terminal Removal Tool Used to remove Packard Weather-Pack connector terminals
54749643	Packard Metri-Pack Terminal Removal Tool Used to remove Packard Metri-Pack connector terminals
46490959	Packard Metri-Pack Terminal Removal Tool Used to remove Packard Metri-Pack connector terminals
22254734	Packard Weather-Pack Terminal Crimp Tool Used to crimp Packard Weather-Pack connector terminals
22216683	Packard Metri-Pack Terminal Crimp Tool Used to crimp Packard 150 and 280 series connector terminals
22255947	Packard Metri-Pack Terminal Crimp Tool Used to crimp Packard 150 series pull-to-seat connector terminals
46490967	Packard Metri-Pack Terminal Crimp Tool Used to crimp Packard 150-GT series connector terminals
46490975	Packard Metri-Pack Terminal Crimp Tool Used to crimp Packard 630 series connector terminals
54749544	RTD Simulator Used to troubleshoot RTD type temperature sensor problems
54749551	Thermistor Simulator Used to troubleshoot Thermistor type temperature sensor problems
22073878	Thermistor Simulator Used to troubleshoot Thermistor type temperature sensor problems
22168868	Pressure Transducer Simulator Used to troubleshoot pressure sensor problems
54729710	Electrical Contact Cleaner Used to clean electrical terminals and connectors
22409114	Electrical Grease Used to prevent corrosion in connector terminals
46491338	Molex 1.5 Terminal Crimp Tool Used to crimp Molex CMC 1.5 series connector terminals
46491346	Molex 0.6 Terminal Crimp Tool Used to crimp Molex CMC 0.6 series connector terminals
46491653	Molex 1.5 Terminal Removal Tool Used to remove Molex CMC connector terminals
46491361	Molex 0.6 Terminal Removal Tool Used to remove Molex CMC connector terminals
46491320	AMP Ampseal Terminal Crimp Tool Used to crimp Ampseal series connector terminals

HARNESS CONNECTOR REPAIR KITS

The following is a list of harness connector repair kits that can be purchased through Doosan Portable Power to service or repair the most common used connectors.

Harness Connector Repair Kits	
Part Number	Description
46490983	Kit, Deutsch Connector Repair Assortment of Deutsch connectors and terminals.
22252969	Kit, Wire Terminal Repair Assortment of ring and quick disconnect terminals.
22254775	Kit, Fuses Assortment of ATC and ATM style fuses.
22253017	Kit, Adhesive Lined Heat Shrink Assortment of adhesive lined heat shrink sizes.
22252993	Kit, Wedge Connector Repair Used to repair 40 way Wedge connector and terminals.
46491296	Kit, Packard Connector Repair Assortment of Packard connectors and terminals.
46491304	Kit, Caterpillar C9, C15, and C18 Engine ECM Connector Repair Used to repair 70 way engine ECM connector and terminals.
46491312	Kit, IQ, TC4, OTC, and Auto Start Controller Connector Repair Used to repair 23 way controller connector and terminals.
46491411	Kit, John Deere and Yanmar Tier 3 Engine ECM Connector Repair Used to repair 48 way engine ECM connector and terminals.
46491429	Kit, Cummins QSX15 Engine ECM Connector Repair Used to repair 50 way engine ECM connector and terminals.
46491502	Kit, SECU, Mote and Titan Controller Connector Repair Used to repair 35 way controller connector and terminals.
46491569	Kit, Cummins OSL9 and QSC 8.3 Engine ECM Connector Used to repair 50 way engine ECM connector and terminals.
46599302	Kit, Cummins T4i CM2350 Engine ECM Connector Repair Used to repair 60 way engine ECM connector and terminals.
46599303	Kit, ViewPort Connector Repair Used to repair 8 way ViewPort connector and terminals.
46599319	Kit, Engine Tachometer Connector Repair Used to repair 12 way and 6 way Engine Tachometer connector and terminals.
46603079	Kit, Cummins T4i OEM 24 Pin Breakout Connector Repair Used to repair 24 way OEM Breakout Connector connected to Engine Harness.
46652061	Kit, Cummins T4F CM2350 Engine ECM Connector Repair Used to repair 96 way engine ECM connector and terminals.

TERMINAL CRIMP TOOL USAGE

The following chart shows which manufacturer's crimp tool to use with each terminal when making repairs. Most of the common crimp tools are available through Doosan Portable Power. If the tools needed are not available through Doosan Portable Power, the manufacturer part numbers and contact information will be provided.

Terminal	Manufacturer	Manufacturer's Part No.	Manufacturer's Crimp Tool Part No.	Doosan Crimp Tool Part No.
Socket size 20 Tin	Deutsch	0462-201-20141	HDT-48-00	2221667
Socket size 20 Gold	Deutsch	0462-201-2031	HDT-48-00	2221667
Pin size 20 Tin	Deutsch	0460-202-20141	HDT-48-00	2221667
Pin size 20 Gold	Deutsch	0460-202-2031	HDT-48-00	2221667
Socket size 16 Tin	Deutsch	0462-201-16141	HDT-48-00	2221667
Socket size 16 Gold	Deutsch	0462-201-1631	HDT-48-00	2221667
Pin size 16 Tin	Deutsch	0460-202-16141	HDT-48-00	2221667
Pin size 16 Gold	Deutsch	0460-202-1631	HDT-48-00	2221667
Socket size 14 Tin	Deutsch	0462-209-16141	HDT-48-00	2221667
Socket size 14 Gold	Deutsch	0462-209-1631	HDT-48-00	2221667
Pin size 14 Tin	Deutsch	0460-215-16141	HDT-48-00	2221667
Pin size 14 Gold	Deutsch	0460-215-1631	HDT-48-00	2221667
Socket size 12 Tin	Deutsch	0462-203-12141	HDT-48-00	2221667
Socket size 12 Gold	Deutsch	0462-210-1231	HDT-48-00	2221667
Pin size 12 Tin	Deutsch	0460-204-12141	HDT-48-00	2221667
Pin size 12 Gold	Deutsch	0460-220-1231	HDT-48-00	2221667
Terminal	Packard	15326267	15359996	46490967
Terminal	Packard	12077411	12155975	22216683
Terminal	Packard	12048074	12155975	22216683
Terminal 16-18 Awg	Packard	12110847	12155975	22216683
Terminal 16-14 Awg	Packard	12129409	12155975	22216683
Pin Grip Terminal	Packard	08911072	12155975	22216683
Terminal 18-16 Awg	Packard	12034046	12155975	22216683
Terminal 20-16 Awg Gold	AMP	770854-3	58440-1	46491320

Crimp Tool Manufacturer Information

Contact for Packard ConnectorTools:

Power and Signal Group
6675 Parkland Blvd.
Solon, OH 44139
1-800-722-5273

Contact for Deutsch Connector Tools:

Ladd Industries. Inc.
4849 Hempstead Station Dr.
Kettering, OH 45429
1-800-223-1236

Contact For AMP Tools:

Amp Inc.
Harrisburg, PA 17105
1-800-522-6752

Contact for FCI Connector Tools:

Mouser Electronics
1000 North Main Street
Mansfield, TX 76063
1-800-346-6873

Contact for Sumitomo Connector Tools:

Ballenger Motorsports, Inc.
8972 Quioccasin Rd
Suite 188
Richmond, VA 23229
1-804-915-7201

Contact for Yazaki Connector Tools:

Yazaki
6801 Haggerty Road
Canton, MI 48187
1-888-942-9152

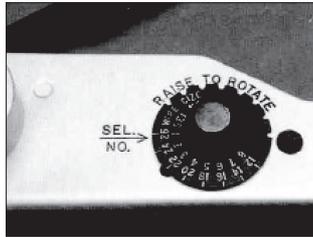
DEUTSCH CRIMP TOOL HDT-48-00 INSTRUCTIONS

**Crimping Procedure
(HDT-48-00)**

**Wire Termination
DOs and DON'Ts**



- 1) Strip (see recommended Strip lengths) insulation from wire.
- 2) Raise selector knob and rotate until arrow is aligned with wire size to be crimped.
- 3) Loosen lock nut, turn adjusting screw in until it stops.

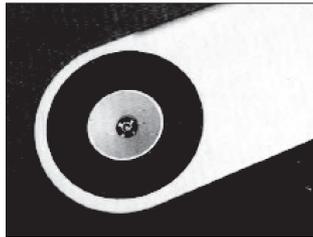


1), 2) & 3)

DO

- Check strip lengths.
- Protect wire strands.
- Gauge the crimp indenters.
- Check crimp selector for correct wire size settings.

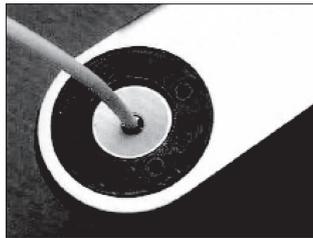
- 4) Insert contact, turn adjusting screw counter clockwise out until contact is flush with indenter cover. Tighten lock nut.



4)

- Check air pressure on semi and automatic crimp equipment.
- Tensile pull test.
- Specify Deutsch manufactured terminals.
- Check crimp locations.

- 5) Insert wire in contact, contact must be centered between indicators. Close handles until handle contacts the stop.
- 6) Release handles and remove crimped contact.



5) & 6)



DON'T

- Add solder.
- Apply heat.
- Leave exposed conductor wire strands.
- Overcrimp.
- Rely on T-Dim measurements only.

- 7) Inspect terminal to ensure that all strands are in crimp barrel.



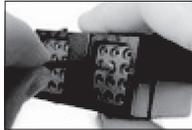
7)

- Use "Field-Maintenance" crimp tools for volume production.
- Buy bogus terminals.

NOTE: Tool must be readjusted for each type/size of contact.

DEUTSCH DRC SERIES CONNECTOR SERVICE PROCEDURES**Contact Insertion**

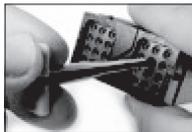
1. Grasp contact approximately 1.00" (25.4 mm) behind the contact crimp barrel.



2. Hold connector with rear grommet facing you.



3. Push contact straight into connector grommet until a positive stop is felt. A slight tug will confirm that it is properly locked in place.

Contact Removal

1. With rear insert toward you, snap appropriate size extractor tool over the wire of contact to be removed.



2. Slide tool along wire into the insert cavity until it engages contact and resistance is felt.

NOTE: Do not twist or insert tool at an angle.



3. Pull contact-wire assembly out of connector.

DEUTSCH DT SERIES CONNECTOR SERVICE PROCEDURES

Contact Insertion



1. Grasp crimped contact approximately (25.2 mm) one inch behind the contact barrel.



2. Hold connector with rear grommet facing you.



3. Push contact straight into connector grommet until a click is felt. A slight tug will confirm that it is properly locked in place.



Once all contacts are in place, insert orange wedge will arrow pointing toward exterior locking mechanism. The orange wedge will snap into place. Rectangular wedges are not oriented. They may go in either way.

NOTE: The receptacle is shown - use the same procedure for plug.

Contact Removal



1. Remove orange wedge using needle nose pliers or a hook shaped wire to pull wedge straight out.



2. To remove the contacts, gently pull wire backwards, while at the same time releasing the locking finger by moving it away from the contact with a screwdriver.



3. Hold the rear seal in place, as removing the contact will displace the seal.

DEUTSCH DTM SERIES CONNECTOR SERVICE PROCEDURES

Contact Insertion



1. Grasp crimped contact approximately (25.2 mm) one inch behind the contact barrel.



2. Hold connector with rear grommet facing you.



3. Push contact straight into connector grommet until a click is felt. A slight tug will confirm that it is properly locked in place.



Once all contacts are in place, insert orange wedge: receptacles - with half holes aligning with contacts. Plugs - with contacts aligning behind full holes. The orange wedge will snap into place.

NOTE: The receptacle is shown - use the same procedure for plug.

Contact Removal



1. Remove orange wedge using needle nose pliers to pull wedge straight out.



2. To remove the contacts, gently pull wire backwards, while at the same time releasing the locking finger by moving it away from the contact with a screwdriver.



3. Hold the rear seal in place, as removing the contact will displace the seal.

DEUTSCH HD10 SERIES CONNECTOR SERVICE PROCEDURES**Contact Insertion**

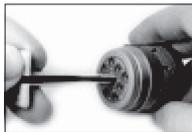
1. Grasp the contact-wire assembly between the thumb and forefinger on the wire approximately one inch behind the contact crimp barrel.



2. Hold connector with rear grommet facing you.



3. Push the contact straight into the connector grommet until a positive stop is felt. The retaining fingers in the connector will snap behind the shoulder of the contact and lock it in place. A slight tug will confirm that it is properly sealed.

Contact Removal

1. With rear insert toward you, snap the appropriate size plastic tool over the wire of the contact to be removed.



2. Slide the tool along the wire into the insert cavity until it engages the contact and resistance is felt. The contact retaining clip will be in the unlocked position.



3. Pull contact-wire assembly out of connector.

DEUTSCH HD30 AND HDP20 SERIES CONNECTOR SERVICE PROCEDURES

Contact Insertion

1. Grasp contact approximately (25.4 mm) one inch behind the contact crimp barrel.



2. Hold connector with rear grommet facing you.



3. Push contact straight into connector grommet until a positive stop is felt. A slight tug will confirm that it is properly locked in place.

NOTE: For unused wire cavities, insert sealing plugs for full environmental sealing.

Contact Removal

1. With rear insert toward you, snap appropriate size extractor tool over the wire of contact to be removed.



2. Slide tool along into the insert cavity until it engages contact and resistance is felt.



3. Pull contact-wire assembly out of connector.

NOTE: Do not twist or insert tool at an angle

AMP CRIMP TOOL 58440-1 INSTRUCTIONS

PROPER USE GUIDELINES

Cumulative Trauma Disorders can result from prolonged use of manually powered hand tools. AMP handtools are intended for occasional use and low volume applications. AMP offers a wide selection of powered application equipment for extended use, production operations.

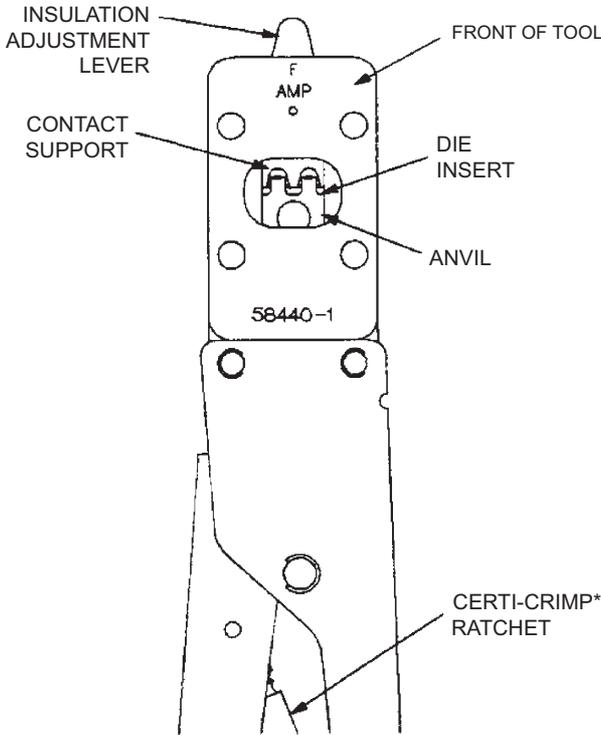


Figure 1

1. INTRODUCTION

AMP Hand Crimping Tool 58440-1, shown in Figure 1, is designed for crimping AMPSEAL* Loose Piece contacts listed in Figure 2. Read these instructions thoroughly before crimping any contact.

2. DESCRIPTION

The FRONT of the tool, into which the contact is inserted, has the tool number marked on it. The BACK of the tool (wire side), into which the wire is inserted, has the wire size marked above the crimp section.

The tool features two fixed upper die inserts, two bottom movable dies (anvils), an insulation crimp adjustment lever, a contact support, a locator, an ejector, and a CERTI-CRIMP ratchet. The insulation adjustment lever is used to regulate the crimp height of the contact insulation barrel. Refer to Paragraph 4, INSULATION CRIMP ADJUSTMENT. The contact support prevents the contact from bending during the crimping operation.

The locator has two functions: first, it positions the contact between the upper insert and the anvil before crimping; and, second, it limits the insertion distance of the stripped wire into the contact. In use, it rests in the locator slot of the contact (see Figures 2 and 3).

The ejector pulls the locator down, and ejects the crimped contact when the tool handles are fully opened.

The CERTI-CRIMP ratchet assures full crimping of the contact. Once engaged, the ratchet will not release until the handles have been fully closed.

CAUTION The crimping jaws bottom before the CERTI-CRIMP ratchet releases. This is a design feature that ensures maximum electrical and tensile performance of the crimp. Do NOT re-adjust the ratchet.

3. CRIMPING PROCEDURE

Refer to the chart in Figure 2 and ensure that the wire is of the specified size and insulation diameter, and is compatible with the contact and the wire size marking on the BACK of the tool. Strip the wire to the length indicated - do NOT cut or nick the wire strands.

WIRE		TOOL CRIMP SECTION (Wire Size Marking)	CONTACT PART NUMBER	
SIZE (AWG)	INSULATION DIAMETER RANGE		LOOSE PIECE	STRIP FORM*
16	1,7-2,7 mm (.067-.106")	16	770854-1	770520-1
20-18		20-18		

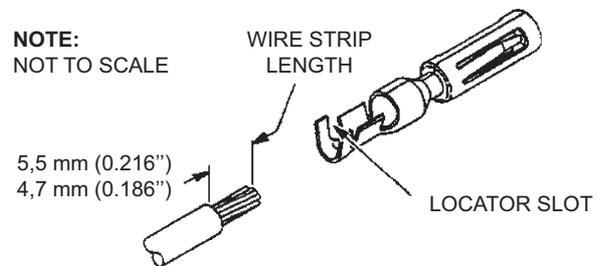


Figure 2

* SEE CAUTION BELOW

CAUTION

Do NOT cut strip form (reeled) contacts into loose piece form. This will produce burrs on the cut-off tab which will damage the wire seal in the plug assembly.

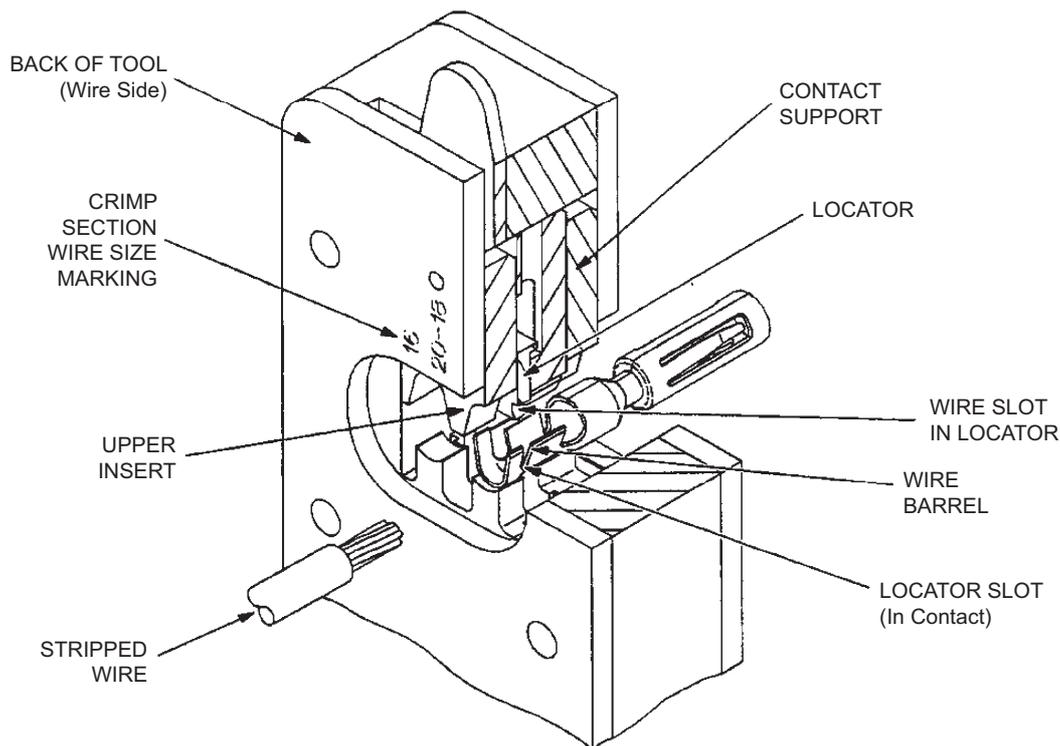


Figure 3

For dimensional information on the product, refer to AMP Application Specification 114-16016. Then proceed as follows:

1. Hold tool so BACK side (wire side) faces you. See Figure 3.
2. Ensure that tool ratchet is released by squeezing tool handles and allowing them to open.
3. Holding contact by its mating portion and looking straight into crimp section, insert contact from the FRONT of tool into BACK of crimp section. Position contact between the crimping dies so the locator-insulation stop enters the locator slot in contact. The wire barrel should butt against the locator / insulation stop.
4. Holding contact in this position, squeeze tool handles together until insulation barrel anvil starts entry into the upper insert (insulation). Do NOT deform insulation barrel or wire barrel.
5. Insert properly stripped wire through the wire slot in locator and into wire barrel of contact until insulation butts against the locator / insulation stop.
6. Holding wire in place, crimp contact to wire by squeezing tool handles together until ratchet releases.
7. Allow tool handles to open FULLY and remove crimped contact from tool.

4. INSULATION CRIMP ADJUSTMENT

The insulation barrel crimp height is regulated by the insulation adjustment lever. To determine the proper setting, test crimp a contact using the setting which approximates the insulation size: (1) small, (2) medium, or (3) large. If the crimped insulation barrel is too tight or too loose, change the setting accordingly. The crimp should hold the insulation firmly without cutting into it.

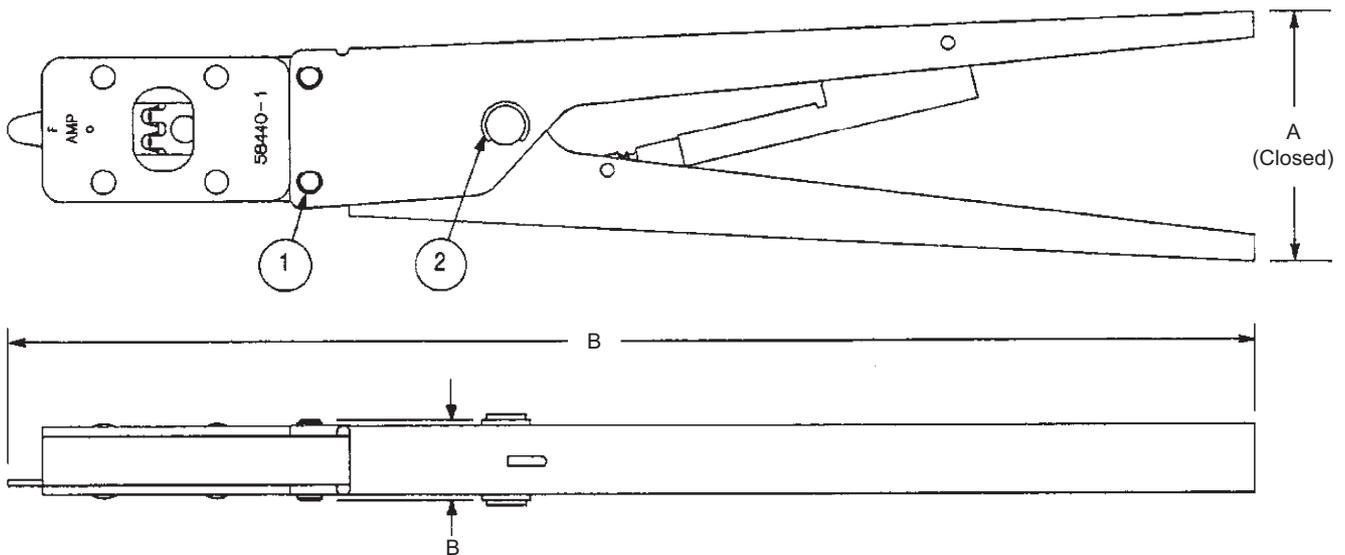
5. MAINTENANCE / INSPECTION

These instructions have been approved by AMP Design, Production, and Quality Control Engineers to provide documented maintenance and inspection procedures. Through AMP test laboratories and the inspection of production assembly, the procedures described herein have been established to ensure quality and reliability of AMP hand crimping tools.

Customer-replaceable parts are listed in Figure 4. A complete inventory should be stocked and controlled to prevent lost time when replacement of parts is necessary. When parts are needed, order by part number and description.

5.1. Daily Maintenance

Remove all foreign particles with a clean, soft brush, or a clean, soft lint-free cloth. Make sure the proper retaining pins are in place, and secured with the proper retaining rings. If foreign matter / substances cannot be removed easily, or if the proper replacement parts are not available, return the tool to your supervisor.



DIMENSIONS		CUSTOMER-REPLACABLE PARTS			
DIMENSION	WEIGHT	ITEM	PART NUMBER	DESCRIPTION	QTY
A	567 g (1 lb.4 oz.)	1	21045-3	RING, Retaining	4
B		2	21045-9	RING, Retaining	2
C					

CAUTION DO NOT REMOVE THE RETAINING PINS AS PERMANENT DAMAGE TO THE TOOL MAY RESULT.

Figure 4

Make certain all pivot points and bearing surfaces are protected with a THIN coat of any good SAE No. 20 motor oil. Do NOT oil excessively. When tool is not in use, keep the handles closed to prevent objects from becoming lodged between the crimping dies, and store the tool in a clean, dry area.

5.2. Periodic Inspection

Regular inspections should be performed by quality control personnel. A record of scheduled inspection should remain with the tool and/or be supplied to supervisory personnel responsible for the tool. Though recommendations call for at least one inspection a month, the inspection frequency should be based on the amount of use, ambient working conditions, operator training and skill, and established company standards. These inspections should be performed in the following sequence:

A. Visual Inspection

1. Remove all lubrication and accumulated film by immersing the tool (handles partially closed) in a suitable commercial degreaser that will not affect paint or plastic material.
2. Make certain all retaining pins are in place and secured with retaining rings. If replacements are necessary, refer to parts listed in Figure 4.
3. Close the tool handles until the ratchet releases, then allow the tool handles to open freely. If they do not open quickly and fully, the spring is defective and must be replaced (see Paragraph 6, REPAIR).

4. Inspect the head assembly, with special emphasis on checking for worn, cracked, or broken dies. If damage to any part of the head assembly is evident, return the tool to AMP for evaluation and repair (see Paragraph 6, REPLACEMENT AND REPAIR).

B. Crimp Height Inspection

This inspection requires the use of a micrometer with a modified anvil as shown in Figure 5. AMP recommends the modified micrometer (Crimp Height Comparator RS-1019-5LP) which can be purchased from:

York Machinery & Supply Co.

20 North Penn Street

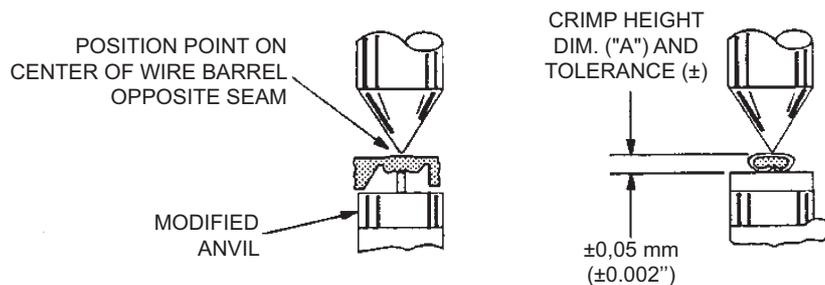
York, PA 17401-1014

or

VAICO

1410 Stonewood Drive

Bethlehem, PA 18017-3527



CONTACT NUMBER STRIP FORM	CONTACT NUMBER LOOSE PIECE	WIRE SIZE AWG (MAX)	CRIMP SECTION (WIRE SIZE MARKING)	CRIMP HEIGHT DIMENSION "A"	HAND TOOL NUMBER
770520-1	770854-1	20	20 - 18	1,22 mm (0.048")	58440-1
		18	20 - 18		
		16	16	1,40 mm (0.055")	

Figure 5

Proceed as follows:

1. Refer to chart in Figure 5 and select a contact and a wire (maximum size) for each crimp section listed in the chart.
2. Refer to Paragraph 3, CRIMPING PROCEDURE, and crimp the contact(s) accordingly.
3. Using a crimp height comparator, measure wire barrel crimp height as shown in Figure 5. If the crimp height conforms to that shown in the chart, the tool is considered dimensionally correct. If not, return the tool to AMP for evaluation and repair (see Paragraph 6, REPLACEMENT AND REPAIR).

For additional information concerning the use of the crimp height comparator, refer to AMP instruction sheet 408-7424.

C. CERTI-CRIMP Ratchet Inspection

Obtain a 0.025mm [0.001 in] shim that is suitable for checking the clearance between the bottoming surfaces of the crimping dies.

Proceed as follows:

1. Select a contact, wire (maximum size) and the designated crimp section for the wire you are using (see Figure 5).
2. Position the contact and wire between the crimping dies, according to Paragraph 3, CRIMPING PROCEDURE (STEPS 1 THROUGH 5). Holding the wire in place, squeeze the handles together until the CERTI-CRIMP ratchet releases.

Hold the tool handles in this position, maintaining just enough pressure to keep the dies closed.

3. Check the clearance between the bottoming surfaces of the crimping dies. If the clearance is 0.025mm [0.001 in], or less, the ratchet is satisfactory. If clearance is greater, the ratchet is out of adjustment and must be repaired (see Paragraph 6, REPLACEMENT AND REPAIR).

If the tool conforms to these inspection procedures, lubricate it with a THIN coat of any good SAE No.20 motor oil and return it to service.

6. REPLACEMENT AND REPAIR

The parts listed in Figure 4 are customer replaceable. A complete inventory can be stocked and controlled to prevent lost time when replacement of parts is necessary. Order replacement parts through your AMP representative, or call 1-800-526-5142, or send a facsimile of your purchase order to 1-717-986-7605, or write to:

CUSTOMER SERVICE (38-35)
AMP INCORPORATED
P.O. BOX 3608
HARRISBURG PA 17105-3608

Tools may also be returned to AMP for evaluation and repair. For repairs, send tool, with a written description of the problem, to:

CUSTOMER REPAIR (01-12)
AMP INCORPORATED
1523 NORTH 4TH STREET
HARRISBURG, PA 17102-1604

AMP AMPSEAL SERIES CONNECTOR SERVICE PROCEDURES

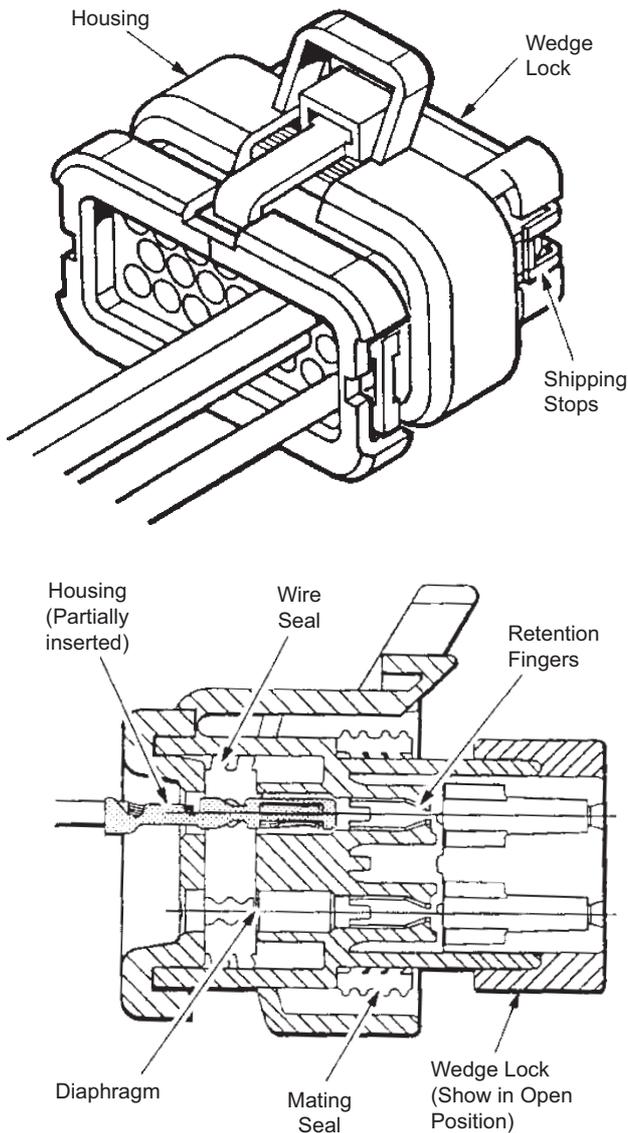


Figure 1

1. INTRODUCTION

This instruction sheet provides assembly and disassembly procedures for the AMP* AMPSEAL Automotive Plug Connector Assembly shown in Figure 1.

NOTE All dimensions are in millimetres.

Reasons for reissue of this sheet are provided in Section 9, REVISION SUMMARY.

2. DESCRIPTION

The plug assembly is shipped in one piece, with the wedge lock in the open position. The assembly consists of a housing, a cover, a wedge lock, a wire seal, and a mating seal.

Contacts are available in strip-form or in loose piece. Strip-form contacts are designed to be crimped with AMP Mini- Applicator 567333- 2. Loose piece contacts are designed to be crimped with AMP Hand Tool 58440 or AMP PRO-CRIMPER* Tool 58529-1.

3. ASSEMBLY PROCEDURES

Check to be sure the wedge lock is in the **open**, or as-shipped, position (see Figure 1). If the wedge lock is closed, see Section 7. Then, proceed as follows:

- To insert a contact, push it straight into the appropriate circuit cavity as far as it will go (see Figure 2).

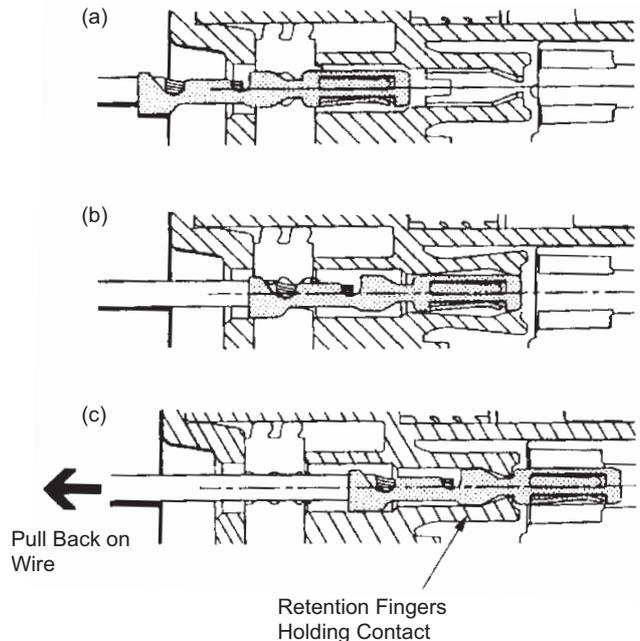


Figure 2

- Pull back on the contact wire with a force of about 4 to 9 Newtons (1 or 2 pounds) to be sure the retention fingers are holding the contact (see Figure 2).
- After all required contacts have been inserted, the wedge lock must be closed to its **locked** position. Release the locking latches by squeezing them inward (see Figure 3).

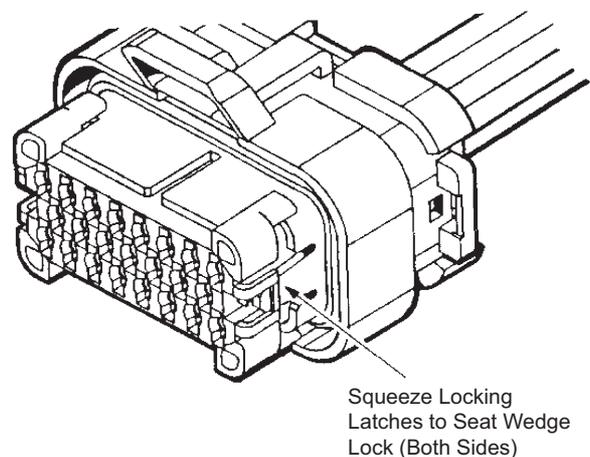


Figure 3

- Slide the wedge lock into the housing until it is flush with the housing (see Figure 4).

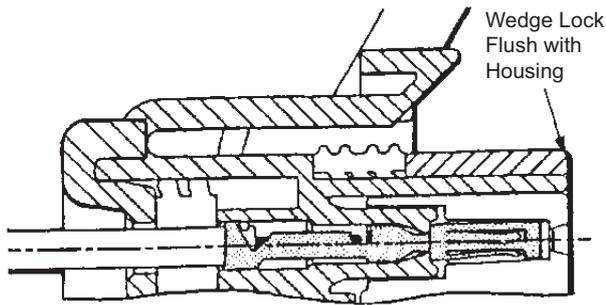


Figure 4

4. SEAL PLUG (Figure 5)

All circuits are sealed by a diaphragm in the rubber wire seal. When assembling the connector, the diaphragm is pierced as the contact passes through it. Unused circuit cavities will remain sealed, unless perforated by accidentally inserting and removing a contact in the wrong cavity. AMP Seal Plug 770678-1 is designed to keep out contaminants if the diaphragm is pierced. Insert seal plug, **large end first**, into the circuit cavity as far as it will go. An insertion tool is generally **not** required for this procedure.

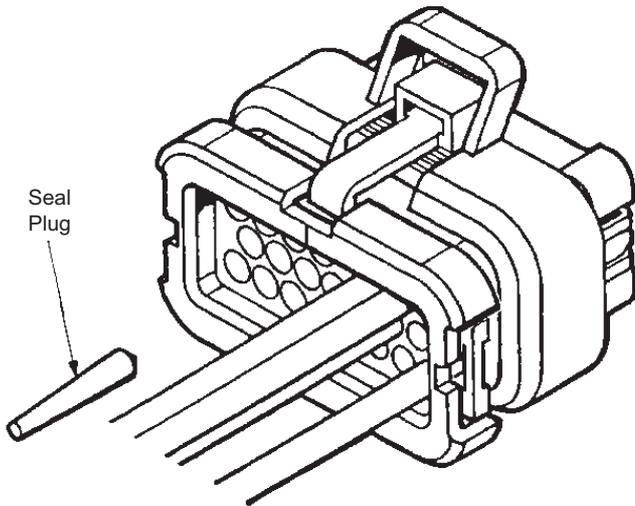


Figure 5

5. DISASSEMBLY PROCEDURES (Contact Removal)

Refer to Figure 6 and proceed as follows:

- Insert a screwdriver blade between the mating seal and one of the red wedge lock tabs.
- Pry open the wedge lock to the open (as-shipped) position.
- While rotating the wire back and forth over a half turn (1/4 turn in each direction), gently pull the wire until the contact is removed.

NOTE The wedge lock should never be removed from the housing for insertion or removal of the contacts.

6. ADDITIONAL INFORMATION

For information on contact crimping, refer to the instructions packaged with the tooling. For inspection information on crimped contacts, refer to instruction sheet 408-3284. For panel cut-out dimensions, printed circuit board layout, etc. for the header assembly, refer to 408-3285. For application information on the AMPSEAL product line, refer to Application Specification 114-16016.

7. OPENING WEDGE LOCK

It is possible during adverse shipping conditions that some wedge locks may get bumped into the closed position (see Figure 4). If so, refer to Section 5, DISASSEMBLY PROCEDURES, Steps 1 and 2.

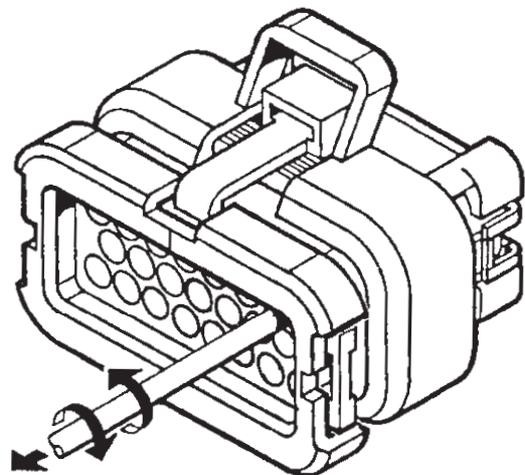
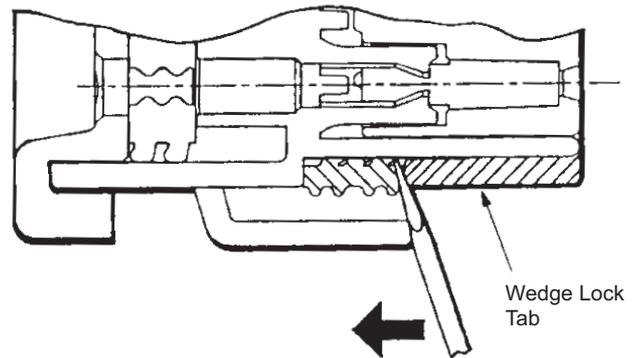


Figure 6

8. CURRENT RATING

Refer to Figure 7 for current ratings of special use connectors, AMPSEAL Series 770669 (headers) and 770680 (plugs).

SINGLE-CIRCUIT PLATING	WIRE SIZE (AWG)	CURRENT RATING (MAX)
Tin	16, 18 and 20	8A
	16	14,5A
Gold	18	13A
	20	11,5A

Figure 7

IQ OPTION

IQ TCU Controller

The IQ TCU controller monitors and controls the IQ system. It is a microprocessor based unit with analog and digital inputs and outputs.

The IQ TCU controller is mounted inside the control panel enclosure.

The first function of the IQ TCU controller is to scan all inputs at a fixed interval. The analog values are compared to minimum and maximum values and an ALERT or FAULT is sent to the Titan controller if a value is out of range. The ALERTS and FAULTS for the IQ system are listed in the Compressor Diagnostic Code Troubleshooting section.

The second function of the IQ TCU controller is IQ discharge air temperature control. The IQ TCU monitors the aftercooler output temperature and adjusts the louvers to maintain that output temperature above 7°C (45°F).

The third function of the IQ TCU controller is to monitor the restriction of the primary and secondary IQ filters. When air flow is starting to be restricted across one or both filters, an ALERT is sent to the Titan controller. When air flow is restricted past a usable level across one or both filters, a FAULT is sent to the Titan controller.

Temperature Sensors and Differential Pressure Transducers

The IQ TCU controller uses temperature sensors and differential pressure transducers to monitor the IQ operation. The temperature sensor used to measure the aftercooler temperature is a thermistor type device. The resistance output of the temperature sensor changes with a temperature change of the parameter being monitored. The IQ TCU controller receives the resistance value of the sensor and converts it to a temperature value. The IQ TCU controller ensures the parameter being monitored is within its operating limits and sends the temperature value to the Titan controller. The Titan controller sends the temperature value to the ViewPort for operator viewing.

The differential pressure sensors used to measure the IQ primary and secondary filter delta P pressures are transducer type devices. These devices have an output signal range of 0.5 VDC to 4.5 VDC where 0.5 VDC corresponds to 0 BAR (0 psi) and 4.5 VDC corresponds to 20.68 BAR (300 psi) (Differential). Differential pressure sensors are provided with 5 VDC from the IQ TCU controller for excitation voltage. Also the sensor return or ground connects to the IQ TCU controller. The output voltage of the pressure sensor changes with a pressure change of the parameter being monitored. The IQ TCU controller receives the voltage of the sensor and converts it to a pressure value. The IQ TCU controller ensures the parameter being monitored is within its operating limits and sends the pressure value to the Titan controller. The Titan controller sends the pressure value to the ViewPort for operator viewing.

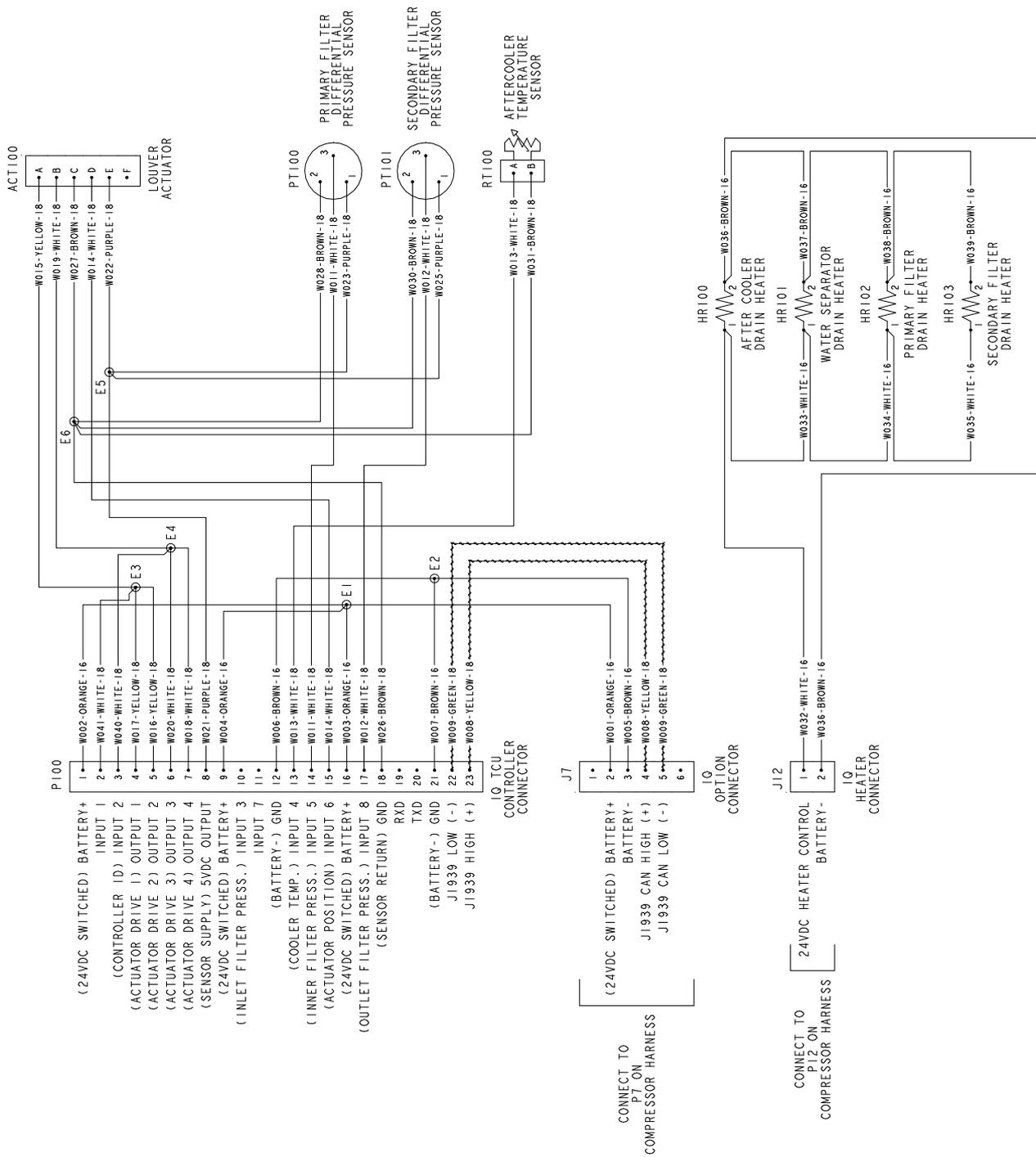
IQ Option Harness Connector Locations

P100: 23 pin connector that connects to the IQ TCU controller.

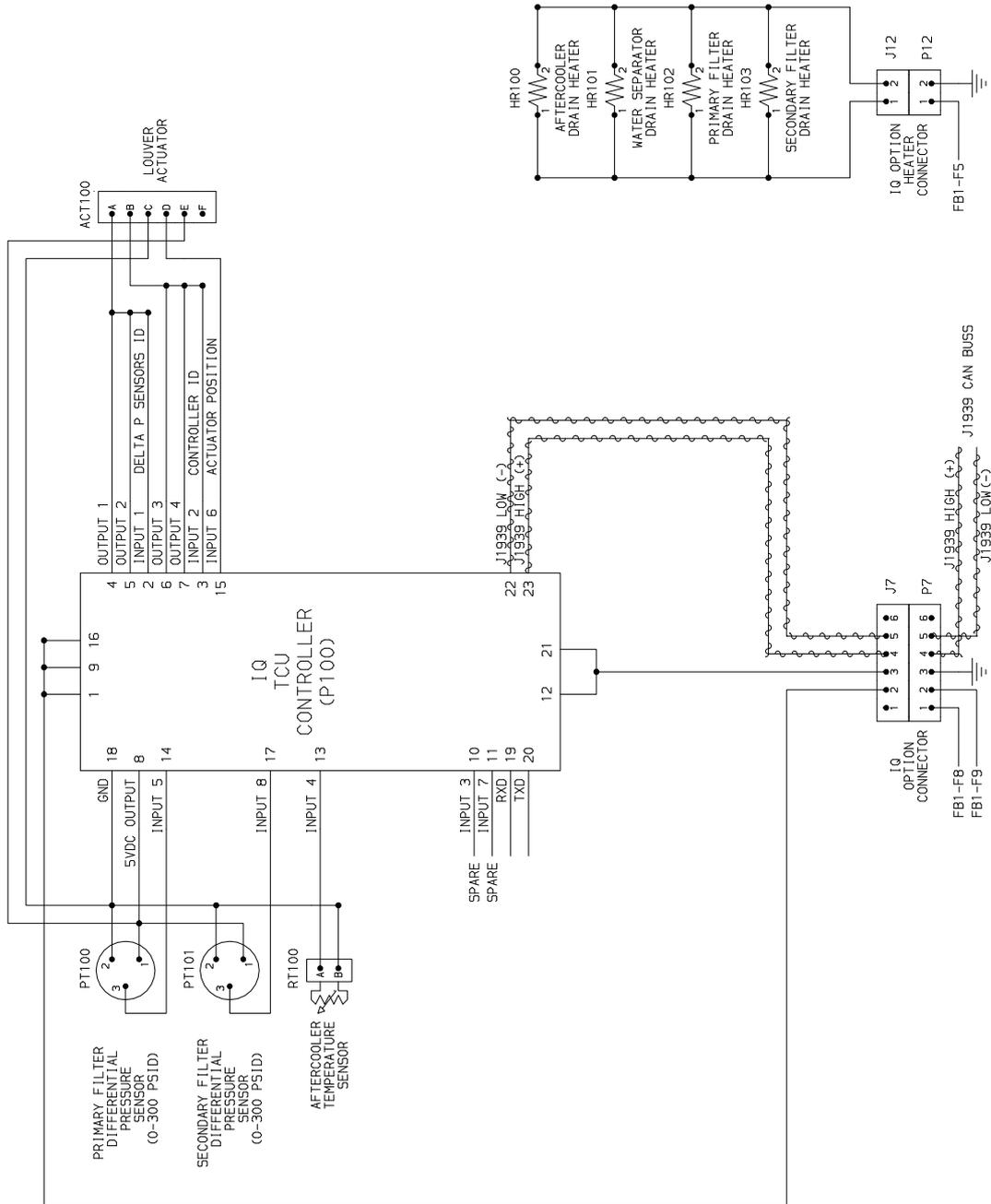
P7 / J7-CAP: 6 pin connector system located under control panel. Connector system connects the IQ option harness to the compressor harness.

P12 / J12-CAP: 2 pin connector system located under control panel. Connector system connects the IQ option heater harness to the compressor harness.

IQ OPTION HARNESS



IQ OPTION CONTROL SYSTEM SCHEMATIC



Electrical Parts List

IQ Option		
Reference Designator	Description	Part Number
	IQ TCU Controller	46569499
	Low Ambient IQ Harness	46647764
ACT100	Louver Actuator	36898310
HR100	Aftercooler Drain Heater	36841526
HR101	Water Separator Drain Heater	36841526
HR102	Primary Filter Drain Heater	36841526
HR103	Secondary Filter Drain Heater	36841526
PT100	Primary Filter Pressure Sensor	54496773
PT101	Secondary Filter Pressure Sensor	54496773
RT101	Aftercooler Temperature Sensor	23294820

IQ Option Harness Connector Information

The following is a complete list of the connectors and connector parts that are used on the IQ option harness. The most common replacement connectors and connector parts will be found in the Deutsch terminal repair kit, Packard terminal repair kit, and Wire terminal repair kit. A repair kit is available for the IQ TCU controller connector. Check the Electrical Parts List section for individual replacement harness parts for certain items. If the connectors and connector parts are not in the kits, the manufacturer part numbers and contact information will be provided.

Connector and Parts	Manufacturer	Manufacturer's Part No.	Included in Doosan Service Kit Part No.
P100 IQ TCU Controller Connector			
Plug, 23 way	Amp	770680-1	46491312
Terminal, female 20-16 AWG gold	Amp	770854-3	46491312
Cavity plug	Amp	770678-1	46491312
J7 IQ Option Connector			
Receptacle, 6 way	Deutsch	DT04-6P-E005	46490983
Wedglock	Deutsch	W6P	
Pin size 16 Gold	Deutsch	0460-202-1631	46490983
Sealing plug size 16-12	Deutsch	114017	46490983
J12 IQ Option Heater Connector			
Receptacle, 2 way	Deutsch	DT04-2P-E005	46490983
Wedglock	Deutsch	W2P	46490983
Pin size 16 Gold	Deutsch	0460-202-1631	46490983
RT100 Temperature Sensor Connector			
Plug, 2 way	Packard	15300027	46491296
TPA	Packard	15300027	46491296
Terminal	Packard	12077411	46491296
Cable Seal	Packard	12089679	46491296
PT100 Pressure Sensor Connector			
Plug, 3 way	Packard	13532244	46491296
TPA	Packard	15452678	46491296
Terminal	Packard	15326267	46491296
Cable Seal	Packard	15305351	46491296
Cable Seal	Packard	15305351	46491296
PT101 Pressure Sensor Connector			
Plug, 3 way	Packard	13532244	46491296
TPA	Packard	15452678	46491296
Terminal	Packard	15326267	46491296
Cable Seal	Packard	15305351	46491296

Connector and Parts	Manufacturer	Manufacturer's Part No.	Included in Doosan Service Kit Part No.
ACT100 Louver Actuator Connector			
Plug, 6 way	Packard	12052848	
TPA	Packard	12052850	
Terminal	Packard	12048074	46491296
Cable Seal	Packard	12048086	46491296
Cavity Plug	Packard	12059168	46491296

Quick Disconnects, Ring Terminals, and Butt Splices	
Most Common used Quick Disconnects, Ring Terminals, and Butt Splices can be found in the Doosan Wire Terminal Service Kit.	22252969

Harness Connector Information**Contact For Packard Connector and Connector Parts:**

Power and Signal Group

6675 Parkland Blvd.

Solon, OH 44139

1-800-722-5273

Contact For Deutsch Connector and Connector Parts:

Ladd Industries. Inc.

4849 Hempstead Station Dr.

Kettering, OH 45429

1-800-223-1236

Contact For AMP Connector and Connector Parts:

AMP Incorporated

Harrisburg, PA 17105

1-800-522-6752



Portable Power



Portable Power