Doosan Infracore
Portable Power

ELECTRONIC SERVICE MANUAL

COMPRESSOR MODELS

XHP1170WCAT-FX-T3 (F22)
XHP1170FCATS-FX-T3 (E11)
XHP1170FCATS-FX-T3 (E92)
XHP1070WCAT-T3 (B41)
XHP1170WCAT-T3 (B40)
XHP1170WCAT-EU-FX-T3 (E61)
XHP1170WCAT-EX-T3 (E37)
XHP1170WCAT-FX-T3 (E21)
XHP1170FCATS-EX-T3 (E42)
XHP1170CATF-EX-T3 (F52)
XHP1170CAT-EX-T3 (F53)

Doosan Infracore Portable Power
1293 Glenway Drive
Statesville, N.C. 28625
DoosanPortablePower.com

Book: 22742969 (04-2015) Rev D

TABLE OF CONTENTS

SECTION 1
MANUAL DESCRIPTION

This XHP manual contains all of the information concerning the electrical and electronic systems for the compressor. It provides all information necessary to service, troubleshoot and order parts for this machine.

It is organized into 12 sections.

Sections 2 – 4 cover systems operation and troubleshooting procedures.

Sections 5 – 7 have location diagrams, drawings of specific circuits and systems schematics.

Section 8 has information concerning the electrical connectors used, including removal and replacement.

Section 9 contains the parts list with ordering information.

Section 10 contains the list of Alerts and Shutdowns.

Section 11 contains a list of recommended spare parts for servicing.

Section 12 contains software information.

SECTION 2

GENERAL INFORMATION
and
OPERATIONAL THEORY

GENERAL INFORMATION AND OPERATIONAL THEORY

General

The XHP1070/1170 machine has an electronic monitor and control system to provide discharge air pressure control and engine and package monitor functions. The system uses the WEDGE controller to perform these functions. The electrical system connects all the necessary switches, sensors and transducers to the WEDGE controller in order for it to perform the monitor and control functions.

WEDGE Controller

The WEDGE controller is the heart of the machine monitor and control system. It provides data collection, alarming and control functions for compressor operations. It is a microcontroller based unit with analog and digital inputs and outputs.

The WEDGE controller is attached to the back of the control panel. The LED annunciators are part of the front panel of the WEDGE. They can be seen through the laminate on the front of the control panel.

The WEDGE is attached to the control panel with four #10 size nuts.

The first function of the WEDGE controller is to scan all analog and digital inputs at a fixed interval. These inputs are scanned every 50 milliseconds. The analog values are then compared against minimum and maximum values and an ALERT or SHUTDOWN is issued, if a value is out of range. The various ALERTS and SHUTDOWNS are listed in Section 10 of this manual.

The second function of the WEDGE controller is machine discharge pressure control. The WEDGE monitors the regulation system air pressure and varies the engine throttle to maintain the setpoint discharge air pressure. The setpoint pressure is set using the regulator on the separator tank.

The third function of the WEDGE controller is to communicate with the diesel engine via the J1939 CAN network. The WEDGE controller retrieves diagnostic information via the J1939 CAN Network.

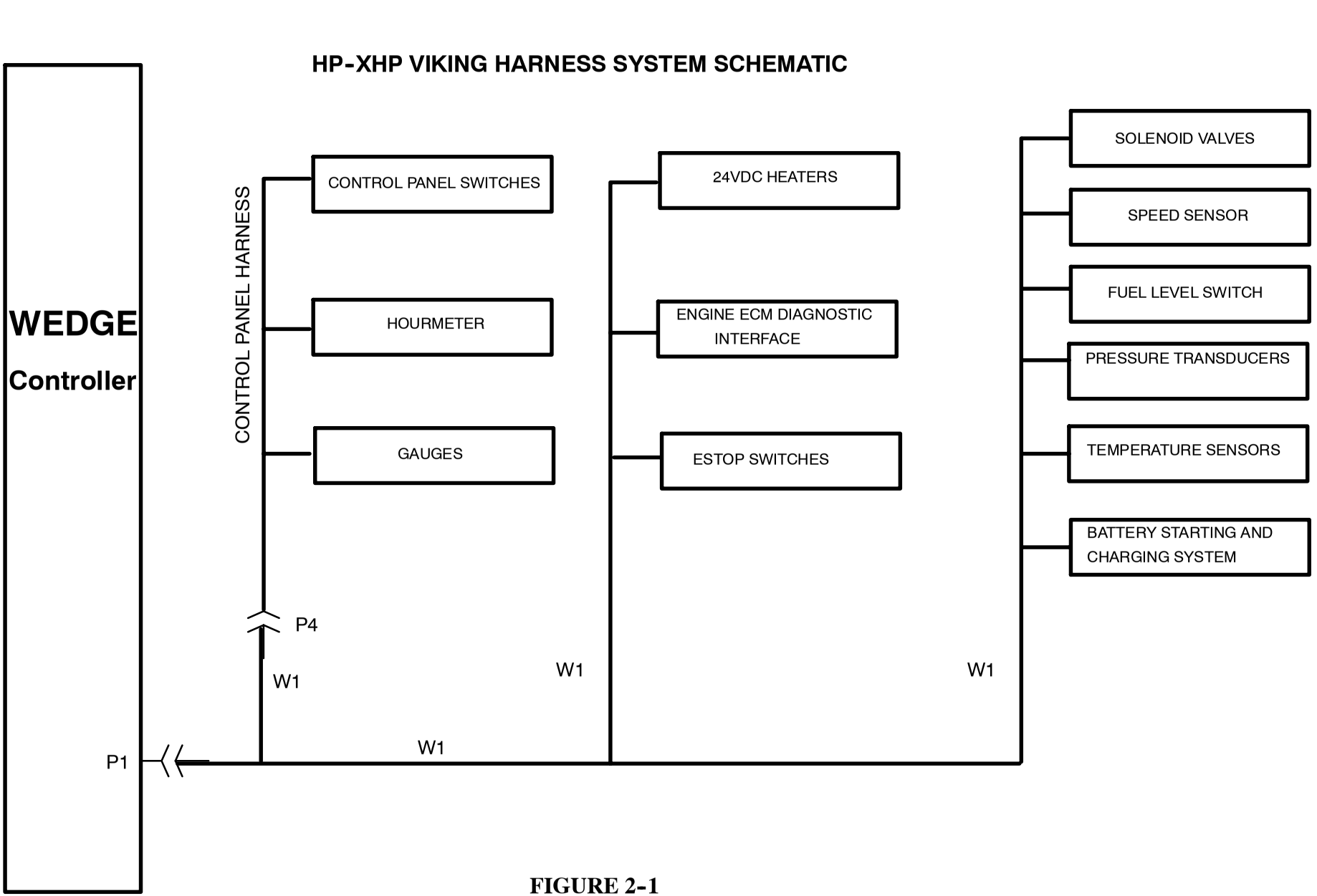

HP-XHP VIKING HARNESS SYSTEM SCHEMATIC
WEDGE
Controller
CONTROL PANEL HARNESS
CONTROL PANEL SWITCHES
HOURMETER
GAUGES
24VDC HEATERS
ENGINE ECM DIAGNOSTIC INTERFACE
ESTOP SWITCHES
SOLENOID VALVES
SPEED SENSOR
FUEL LEVEL SWITCH
PRESSURE TRANSDUCERS
TEMPERATURE SENSORS
BATTERY STARTING AND CHARGING SYSTEM
P1
P4
W1
W1
W1
W1

FIGURE 2-1

WEDGE TO ENGINE INTERFACE
CAT C15 ENGINE

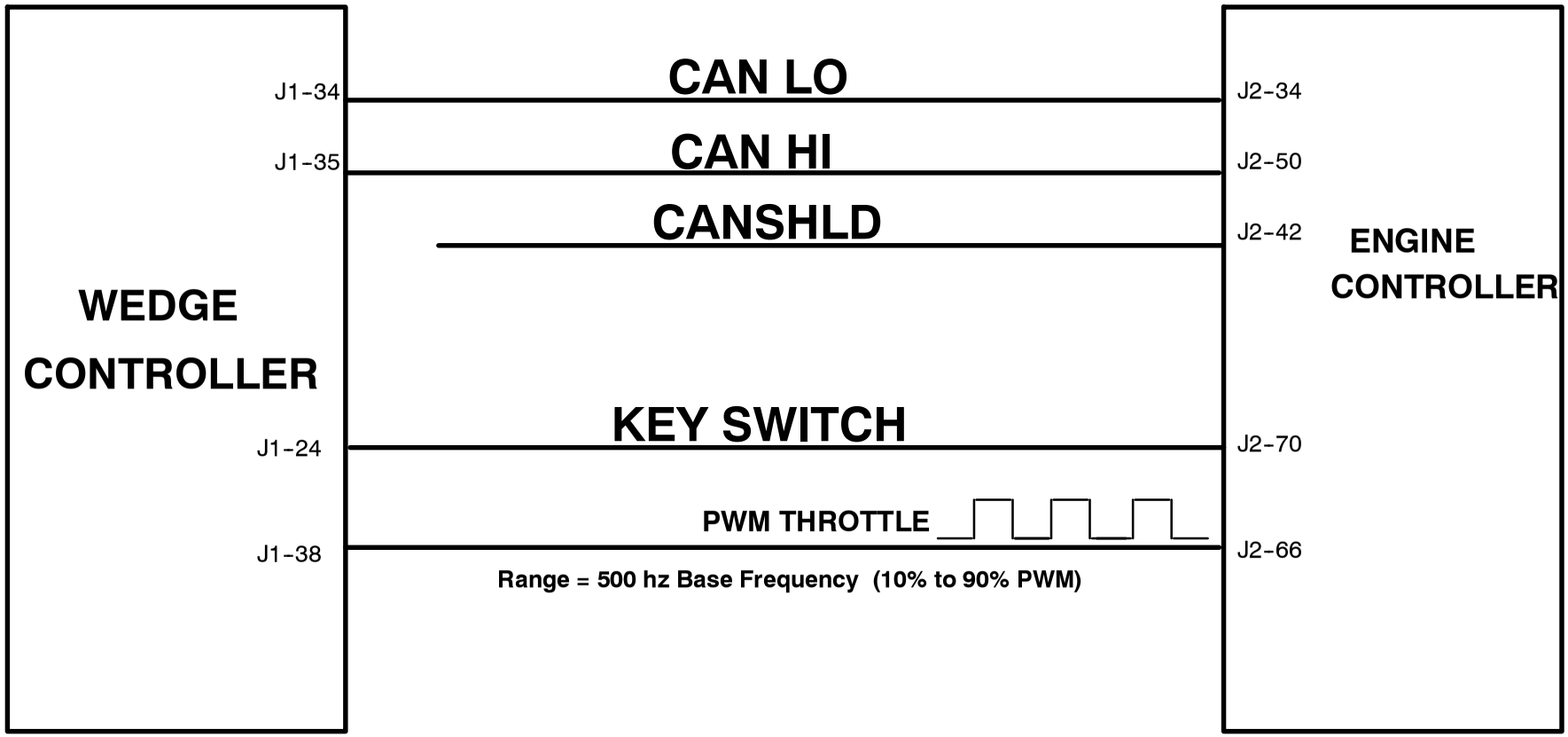


FIGURE 2-2

HP-XHP VIKING J1939 CAN COMMUNICATIONS SCHEMATIC

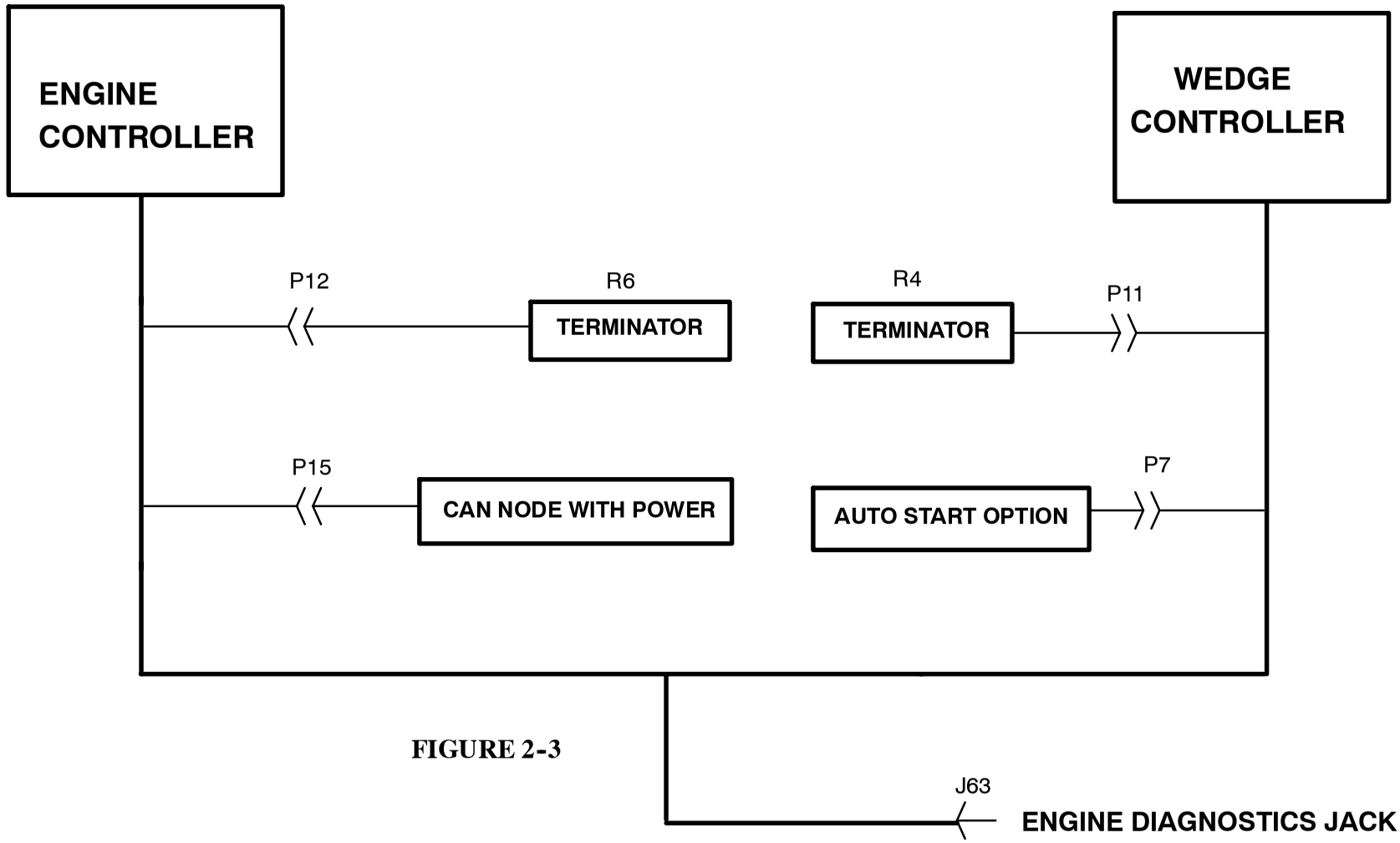


FIGURE 2-3

A PWM (Pulse Width Modulated) throttle is used to communicate with the CAT engine. The WEDGE controller receives diagnostic and run time data from the engine over the J1939 CAN network. A PWM throttle interface is used with the engine. Figure 2-2 shows the connections between the WEDGE controller and the engine controller.

It has a base frequency of 500 Hz and the duty cycle varies from 10% to 90%.

Figure 2-2 shows the signals between the engine controller and the WEDGE controller.

Sensors and Transducers

The electronics system contains sensors and transducers that are used to collect data from the compressor. The temperature is measured by a thermistor. This device exhibits a change in resistance as the temperature changes. The resistance causes an input voltage change to the WEDGE controller input and is interpreted as a temperature change.

The electronics system also uses pressure transducers to measure compressor pressure changes. These devices have an output signal of .45 VDC to 4.5 VDC, corresponding to 0 psi and the maximum measured psi for a particular device. The maximum pressure transducer ranges are 100, 225 or 500 psi. The 100, 225 and 500 psi devices are gauge pressure devices. These transducers are provided with 5 VDC excitation to power the device. These are three wire devices: excitation, signal and ground.

Digital Inputs and Outputs

The WEDGE controller scans digital inputs such as switch contacts. These are either “ON” (24VDC) or “OFF” (0 VDC). These digital inputs are connected to switches within the package such as the key start switch, air filter switches and IQ filter switches.

The WEDGE controller provides 24 VDC digital outputs to control solenoids, start compressor and DC heaters. These are 24 VDC “ON” and 0 VDC “OFF”. They are current limited and short circuit protected.

Controller Outputs

The WEDGE controller has three types of outputs: frequency, pulse width modulated (PWM) and 24 VDC digital (ON /OFF). The frequency output is used as a throttle signal for the engine.

The PWM signal is used as a throttle signal for the Caterpillar engine. It has a base frequency of 500 Hz and the duty cycle varies from 10% to 90%.

Pressure Control

The discharge pressure is controlled by manipulating the engine speed and compressor inlet valve position. The inlet valve position is controlled pneumatically and the engine speed is determined by the WEDGE controller. The WEDGE measures the pneumatic system regulation pressure and computes an engine throttle setting. This throttle setting is sent to the engine via the frequency throttle, PWM or J1939 throttle, depending on which technique is used. The engine controller will control engine speed to this throttle setting.

Electronic Engine

The XHP1070/1170 machine contains an emissions certified diesel engine. In order to meet the emissions requirements, the engine has an electronic control system.

The control system handles all monitor, alarm and control functions for the engine. The WEDGE controller communicates with the engine controller over the J1939 CAN network.

J1939 Data Link

The CAN network is a single pair shielded cable located with the W1 main harness. Figure 2–3 shows a layout of the CAN harness or “backbone” as it is referred to. The termination resistors (Terminator) are important to prevent reflections on the transmission line and must be in place for the network to function properly. The shield from the cable is floating at the WEDGE controller end.

The engine diagnostics connector is located on the left side of the engine. This is used to connect the engine manufacturer’s service tools to the CAN network. This connector also provides 24 VDC to power these service tools.

Electrical System

The electrical system consists of the wiring harnesses and associated electrical devices such as relays, switches, lights, solenoids and alarm horn. There are two wiring harnesses in the XHP machines. They are as follows:

22661854 W1 Chassis Main Harness
22108690 Control Panel Wiring Harness

The schematic diagrams show the connections for these harnesses. Figure 2–1 is a system schematic showing harness connection with devices and controllers. Section 8 includes information on connectors used in the harnesses.

The electrical circuits are protected using ATC style fuses. A fuse should only be replaced with one of the same rating. Replacing a fuse with one of a large rating could lead to harness damage. If a fault occurs and the circuit does not have the appropriate size fuse, wires could be burned in the harness and damage other circuits.

KEY ELECTRICAL COMPONENTS FUNCTION

PT1:

PT1 is a 0–500 psi gauge pressure transducer that measures discharge air pressure.

PT2:

PT2 is a 0–100 psi gauge pressure transducer that measures regulation system pressure.

U1:

U1 is resistive level detector that measures the fuel level in the fuel tank.
It provides a continuous reading of fuel level. It also has a switch for low fuel level and low fuel shutdown.
These switches connect to WEDGE.

RT1:

RT1 is a 10K ohm Thermistor temperature sensor that measures separator tank temperature.
Its range is –30 to 255° F.

RT2:

RT2 is a 10K ohm Thermistor temperature sensor that measures airend discharge temperature.
Its range is –30 to 255°F.

K1:

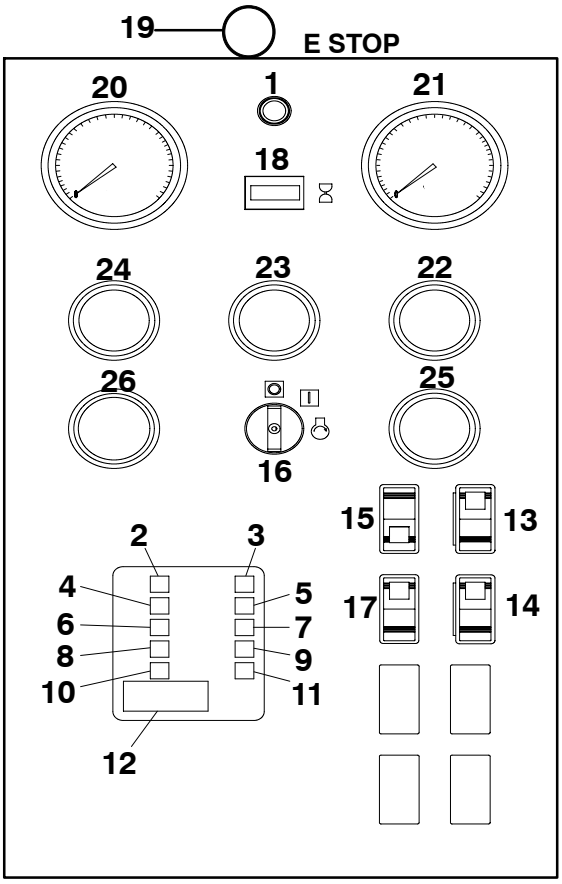
K1 is SPST, 24VDC relay used to activate the engine starter.

K2:

K2 is a SPDT, 24VDC relay used to activate the start compressor.

K3:

K3 is a SPDT, 24VDC relay used to power the IQ system. (If equipped)



OPERATING CONTROLS AND INSTRUMENTS

The operating controls and instruments are arranged on the control panel as shown above. A description of each panel device is as follows:

1. **Panel Light:** Illuminates instrument and control panel. Controlled by Switch 14.
2. **High Compressor Temp**: Fault indicator lamp. Indicates shutdown due to high compressor temperature.
3. **Low Radiator Coolant Level:** Alarm indicator lamp. Indicates engine coolant needs service.
4. **Low Engine Oil Pressure**: Fault indicator lamp. Indicates shutdown due to low engine oil pressure.
5. **Restricted Air Filter**: Alarm indicator lamp. Indicates engine/compressor air inlet filters need service.
6. **High Engine Coolant Temp:** Fault indicator lamp. Indicates shutdown due to high engine water temperature.
7. **Restricted IQ Air Filters:** Fault indicator lamp. Indicates shutdown due to dirty IQ air filters (if equipped).
8. **Low Fuel Level:** Fault indicator lamp. Indicates shutdown due to low fuel level. Lamp blinks at low fuel warning.
9. **Compressor Malfunction:** Fault indicator lamp. Indicates shutdown due to compressor system fault. Refer to Fault Code List.
10. **Low Battery Voltage**: Alarm indicator lamp. Indicates battery or charging system requires service.
11. **Engine Malfunction:** Engine Fault code. Refer to service card, engine manual or this manual for codes and service requirements.
12. **Malfunction Code (4 Digit)**: Compressor or engine fault. Refer to manual for list of codes and service requirements.
13. **Ether Inject**: Injects a measured shot of ether for aid in cold weather starting of engine. Caution: Use Sparingly.
14. **Panel Light Switch**: Controls panel lamp # 1.
15. **Service Airl:** Momentary contact switch. Allows engine to warm up at low compressor pressure.
16. **Main Power Control Switch:** ON/OFF Start Switch.
17. **Heaters:** ON/OFF Power Switch for regulation and IQ heaters. Prevents freeze up in cold weather.
18. **Hourmeter:** Indicates machine operating hours.
19. **E-STOP**: Emergency Stop Push Button (ESA units only). Push to stop, turn to release.
20. **Discharge Air Pressure Gage:** Indicates pressure in receiver tank, normally from 0 psi(kPa) to the rated pressure of the machine.
21. **Engine Tachometer:** Indicates engine speed in RPM from 0 when stopped to full speed.
22. **Engine Water Temp**
23. **Fuel Level Gauge**: Not used on “S” Models.
24. **Compressor Oil Temp**
25. **Engine Oil Pressure**
26. **Battery Voltage**

OPERATIONAL INFORMATION

Power "ON" at Control Panel:

1. Key switch signal (24VDC) supplied to engine controller by WEDGE controller
2. Frequency throttle signal OFF (ON for Software V1.5 and later)
3. Unloader solenoid valve (L2) is closed (energized) for 10 seconds
4. Start-up compressor is turned on for 10 seconds

Engine Start-up:

When the key is switched to the engine crank position:

1. Unloader solenoid valve (L2) is closed (energized).
2. Start compressor is turned on.
3. Key switch signal (24VDC) is supplied to engine controller.
4. K1 auxiliary start relay is energized.
5. Run/Start solenoid valve (L1) is opened (energized).

Note: Start compressor remains on, run/start solenoid stays open and unloader solenoid valve stays closed for 10 seconds after the key is released if the engine does not start.

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

1. Frequency throttle signal is turned on.
2. Engine speed goes to 1200 RPM for a short period and then advances to 1500 RPM.

When the engine speed reaches 1450 RPM:

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

When the separator tank pressure reaches 50 psi:

1. Run/Start solenoid valve is opened (energized), L1.

After 5 seconds:

1. Engine speed is set to idle 1350 RPM if air end discharge temperature is approximately 150 degrees F or (if J1939 CAN is functioning). The engine coolant is 100 degrees F. Otherwise, the engine idle stays at 1500 RPM.

Loading:

When the "Service Air" switch is pushed:

1. Engine speed is set to 1800 RPM

When engine speed reaches 1700 RPM:

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

After 2 seconds and if the regulation system pressure is 4 psi or greater:

1. Engine speed control/pressure control is engaged.

READING AND SETTING THE DISPLAY UNITS

This feature is available in V1.40 and greater.

The WEDGE has four choices for display units:

- °F, PSI
- °C, Bars
- °C, kPa
- °C, Kg/cm2

To determine which units the WEDGE has been configured for:

1. With the machine power off (Key turned OFF)
2. Press and hold the “Service Air” Switch
3. Turn the key switch directly to the crank position.
4. Hold these switch positions until the 4 digit LED display on the WEDGE goes blank.
5. Release “Service Air” switch, release key switch to “ON”.

Units will be displayed for 2 seconds after which the current selection will be displayed as:

- °F, PSI will be displayed as “PSI”
- °C, Bars will be displayed as “bAr”
- °C, kPa will be displayed as “HPA”
- °C, Kg/cm2 will be displayed as “H9C”

To change the units setting:

1. With the WEDGE showing the current setting, press and release the “Service Air” switch until the desired setting appears on the display.

2. Once it appears, do not release the “Service Air” switch. Hold it in the ON position until the WEDGE restarts. This will select units selection that was displayed.

3. Release the “Service Air” switch. The compressor is ready to start.

WEDGE SERVICE DIAGNOSTICS

The WEDGE controller provides a diagnostic capability that allows various internal parameters to be viewed on the 4-digit LED display. These can be accessed with the machine stopped or while it is operating. If the machine is stopped, the “Service Air” switch on the control panel is used to toggle through the list of parameters. If the machine is operating, the “Start” position of the key switch is used. To view the parameters, toggle the switch or key and a number (2-20) will appear on the LED display. After 3 seconds, it will extinguish and the parameter will be displayed. The toggle only works in the ascending order direction, but it will wrap around and start over.

Display	**Parameter**	**Remarks**
2	RPM	From Engine Flywheel Sensor
3	Engine RPM	Filtered RPM Value
4	Reg. Sys. Pressure	PSI
5	Sep. Tank Pressure	PSI
6	Discharge Temperature	Deg F
7		
8	Engine Target RPM	Wedge Signal to Engine
9	Machine Type	
10	Engine Coolant Temp.	From CAN, Deg F
11	Engine Oil Temp.	From CAN, Deg F
12	Engine Oil Pressure	From CAN, PSI
13	Intake Manifold Temp.	From CAN, Deg F
14	RPM	From CAN
15	Fault Code List	Codes
16	Throttle Position	
17	Boost Pressure	
18	Engine Hours	
19	Load at Speed	Percent
20	Set Machine ID	

ENTERING MACHINE ID FOR WEDGE CONTROL SYSTEMS with V1.60 or Greater Software

For machines with the WEDGE controller mounted inside the control panel/instrument panel box, the “Service Air” switch is used to enter the machine ID. Disconnect the fuel level gauge (located in the fuel tank) before starting the process and reconnect once the process is completed.

For machines with the WEDGE controller mounted in the engine compartment, the rocker switch beside the WEDGE is used to enter the machine ID.

For the instructions below, the “Service Air” or rocker switch will be referred to as the “data input switch”.

1. Examine the machine data plate to confirm the machine model.
   Using the machine model and the machine models list on page 2 of this document, locate the proper machine ID.

2. Turn power to the “ON” position. Machine must not be operating.

3. Toggle the data input switch twice and the number “2” will appear on the WEDGE 4-digit LED display.
   Continue to toggle the switch until the number “9” is reached. Read the machine ID on the display, if it matches the proper machine ID in Step 1, stop. If not, proceed to step 4.

4. Continue to toggle the switch until number “19” is reached. Push
   And hold the data input switch and the number “20” will appear.
   Continue to hold the switch. After 1 second, the current machine ID will appear in the display.
   Continue to hold for 9 more seconds and a blinking ”-” will appear. Release the switch.

5. Toggle the data input switch, the display will show “0”. Toggle the data input switch until the proper machine ID appears on the display, then stop the toggle sequence.

6. Wait until the controller performs a reset function (or power up) (approximately 10 seconds). At reset, the controller display first goes blank, then all 10 annunciator LED’s light, the 4-digit LED display shows all 8’s, the display then shows the installed software version and finally the display goes blank and the engine oil pressure and alternator LED begin flashing. At this point the controller has stored the machine ID selected in step 5.

7. Using the data input switch, toggle to service diagnostic number “9”.
   The number “9” will appear for 1 second and then the machine ID will appear. The ID should be the same as the one entered in steps 4-6. If not, go back to step 4 and enter the ID again.

ESA Models / WEDGE Machine ID

Models	Machine ID
7/120, 9/110, 10/105, 14/85	7
7/170, 10/125, 14/115	8
9/230, 9/270, 9/300, 12/235	5
17/235, 21/215	6

MSA Models / WEDGE Machine ID

Models	Machine ID
P425WJD, XP375WJD, HP375AWJD VHP300AWJD	7
P600WJD, HP450WJD, VHP400WJD	8
XP1060WCU, HP935WCU, MHP825WCU VHP750WCU	5
XHP750WCU	6
MHP825WCAT, VHP750WCAT XP1060HACAT, XP950HACAT	2
SHP825WCAT, XHP750WCAT, XHP650WCAT	3
HP1300WCU, HP1600WCU	0
XHP1170WCU	1
1070AWCAT, XHP1170WCAT, XHP1170SCAT	4
HP1600WCAT	9

SIRC Models/Wedge Machine ID

Models	Machine ID
P1060WCAT, XP950WCAT, HP935WCAT MHP825WCAT, VHP750WCAT	2
XHP750WCAT	3

SECTION 3

SERVICE TOOLS

SERVICE TOOLS

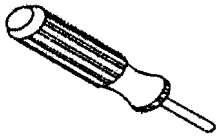
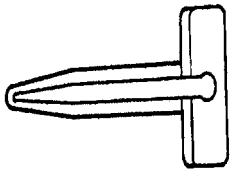
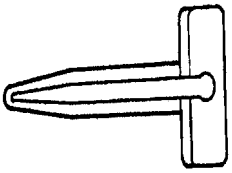
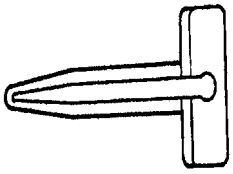
Service Tools

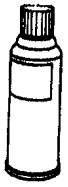
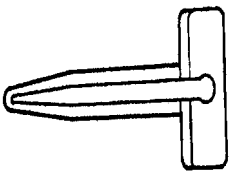
The following special tools are recommended to perform service procedures in this manual. The tools can be purchased from Portable Power or other sources listed.

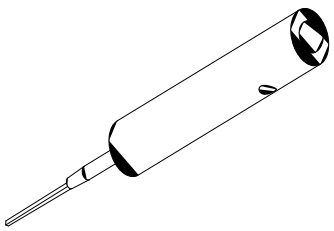
Tool	Tool Description
22216691	Digital Multimeter (Fluke 87) Used to measure electrical circuits; Volts, amps, ohms
54729660	Packard Weather-Pack Terminal Removal Tool Used to repair Packard Electric Weather-Pack Connectors
54699632	Deutsch Terminal Removal Tool (Blue) Used to repair Deutsch connectors
54699640	Deutsch Terminal Removal Tool (Red) Used to repair Deutsch connectors
54699624	Deutsch Terminal Removal Tool (Yellow)\ Used to repair Deutsch connectors
22216667	Deutsch Terminal Crimp Tool (HDT-48-00) Used to crimp Deutsch connector terminals
54729710	Electrical Contact Cleaner Used to clean electrical contacts and connectors
54729728	PDA Service Tool Used to load software & extract service and fault logs
54699616	Deutsch Terminal Removal Tool Used to repair Deutsch connectors
54749544	RTD Simulator Plug Used to test RTD circuits
54749551	Thermistor Simulator Plug Used to test thermistor circuits for INTELLISYS controller systems
22073878	Thermistor Simulator Plug Used to test thermistor circuits for WEDGE controller systems
54749635	Connector Repair Kit Used to make connector repairs for Deutsch and Packard Electric Connectors
54699657	Deutsch Terminal removal Tool Used to repair Deutsch connectors
54749643	Packard Metri-Pack Terminal Removal Tool Used to repair Packard Electric connectors

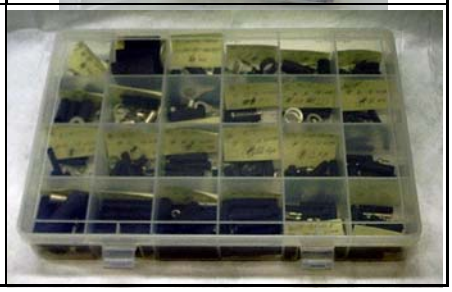
22168868	Pressure Transducer Simulator Used to test pressure transducer circuits
22147540	Test Adapter Kit Test adapters for various connectors to be Used when making electrical measurements
22146393	Removal Tool Kit Assortment of most used Deutsch removal tools
22216675	Deutsch Crimp Tool (DTT -20-00) Used to crimp Deutsch connector terminals
22216683	Packard Electric Crimp Tool (12155975) Crimps 150 and 280 series pins
22255947	Packard Electric Crimp Tool (12039500) Crimps 150 series pull to seat pins
22216709	Fluke Test Lead Set (TL20) Contains needle probes, alligator clips, test leads heat shrink tubing that are used on harnesses
22216725	Fluke Insulation Piercing Probe (AC-89) Used to connect to a wire for measurements
22216733	Fluke Meter Case (C25) Case for Fluke 87 meter including storage for test leads and probes
54740675	RS232 Heavy Duty Serial Cable Connects lap top computer or PDA Service Tool to WEDGE or Intellisys controller
22252969	Wire Terminal Kit Contains a selection of terminals with corresponding heat shrink tubing that are used on harnesses
22281588 22282107	Connector Wrench 5/32 “T” style hex wrenches
22282172	1/4” Flex Shaft Nutdriver Used to remove ECM connector on John Deere engines
22252993	WEDGE Connector Kit Includes the 40-pin connector housing and pins for the harness connector
22253009	CAN Communications Adapter Converts RS232 to J1939 CAN, used with lap top computer or PDA Service Tool
22253017	Adhesive Heat Shrink Assortment Selection of most used heat shrink sizes

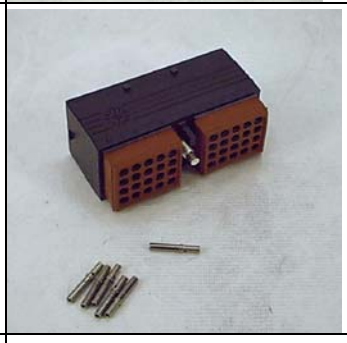
22221303	Service Tool Kit Kit consists of the following P/N's: 22216691 22216667 22216675 22216683 54729660 54749643 54699657 22146393 22147540 22073878 54749635 22168868 22216709 22216725 22216733 54740675
22254775	ATC Fuse Assorlment Kit Kit contains 5, 7–1/2, 10, 15,20,25, and 30 Amp fuses
22254734	Packard Crimp Tool (12014254) Crimps Sealed Weather Pack Connector pins

Tool No.	Tool Description	Tool Illustration
22216691	**Digital Multimeter**	
54729660	**Weather-Pack Terminal Removal Tool**	
54699632	**Deutsch Terminal Removal Tool (Blue)**	
54699640	**Deutsch Terminal Removal Tool (Red)**	
54699624	**Deutsch Terminal Removal Tool (Yellow)**	
22216667	**Deutsch Crimp Tool**	

54729710	**Electrical Contact Cleaner**	
54729728	**Virtual Technicial Service Tool Kit**	
54699616	**Deutsch Terminal Removal Tool**	
54749544	**RTD Simulator Plug**	
22073878	**Thermistor Plug**	
54749635	**Connector Repair kit**	
54699657	**Deutsch Terminal Removal Tool**	

54749643	**Packard Metri-Pack Removal Tool**	
22168868	**Pressure Transducer Simulator**	
22147540	**Test Adapter Kit**	
22146393	**Removal Tool Kit**	
22216675	**Deutsch Crimp Tool**	
22216683	**Packard Electric Crimp Tool**	

22216709	**Fluke Test Lead Set**	
22216725	**Fluke Insulation Piercing Probe (single probe)**	
22216733	**Fluke Meter Case**	
54740675	**RS232 Serial Cable**	
22253969	**Wire Terminal Kit**	

22252977	**Connector Wrenches**	
22252985	**1/4” Flex Shaft Nutdriver**	
22252993	**WEDGE Connector Kit**	
22253009	**CAN Communications Adapter**	
22253017	**Adhesive Heat Shrink Assortment**	

22255947	**Packard Electric Crimp Tool**	
22254734	**Packard Electric Crimp Tool**	

SECTION 4

ELECTRONIC SYSTEMS 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

- 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
- Double check before replacing components
- Review the controller fault log for clues as to the problem
- Determine the cause of the problem and make a thorough repair

MEASURING VOLTAGE, RESISTANCE, FREQUENCY AND DUTY CYCLE

General Measuring Guidlines:
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. Use circuit common for the Black lead, not chassis ground or other metal connection. Circuit common will be any of the BROWN wires or battery negative can be used.

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 system power is turned 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. As of the date of this writing, Fluke is the only known digital voltmeter that has the duty cycle feature. The Fluke Model 87 Digital Meter has the duty cycle function.

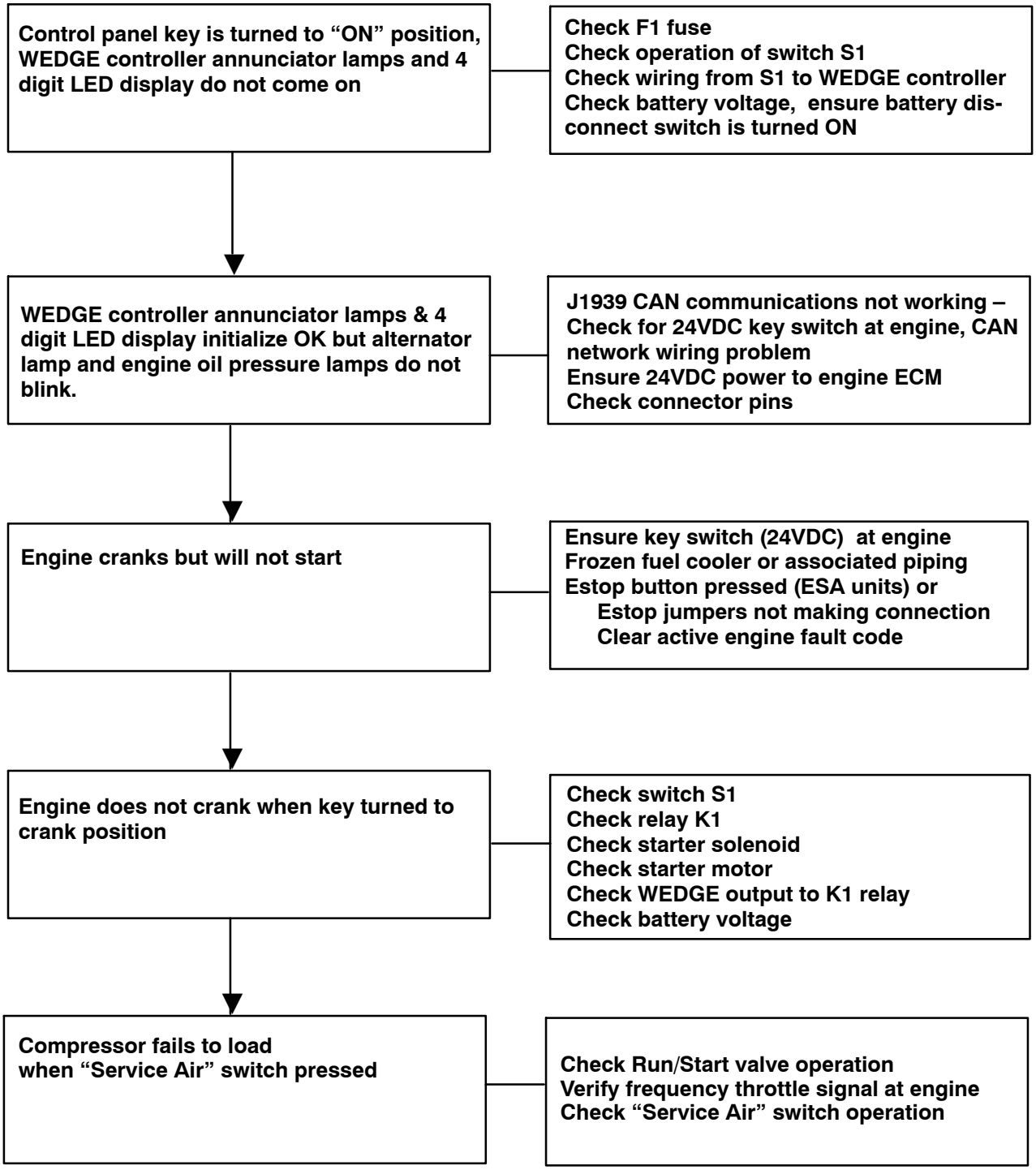
COMPRESSOR FAULT CODES DESCRIPTION & TROUBLESHOOTING

Following are the descriptions of the COMPRESSOR fault codes. These are indicated when the “COMPRESSOR MALFUNCTION” lamp is illuminated. The compressor malfunction lamp is shown on the control panel picture in Section 2 of this manual. It is indicated by Item number 9.

The engine fault codes are indicated by the “ENGINE MALFUNCTION” lamp, that is located under the “COMPRESSOR MALFUNCTION” lamp. The engine fault codes are listed in Section 10 of this manual.

Be sure to determine which malfunction lamp is illuminated before beginning the troubleshooting process.

TROUBLE SHOOTING FLOW CHART



COMPRESSOR CODE 1

Engine Speed Less Than 800 RPM

Explanation:
The WEDGE has received an engine speed less than 800 RPM for 30 seconds.

Effect:
Code 1 is a shutdown condition and will shutdown the machine.

TROUBLESHOOTING STEPS

Code 1

Action	Result
Check engine fault codes for an engine shutdown. Check for engine fuel system restriction (filter).	

COMPRESSOR CODE 2

Engine Speed Greater Than 1900 RPM

Explanation:
The WEDGE has received an engine speed greater than 1900 RPM for 30 seconds.

Effect:
Code 2 is a shutdown condition and will shutdown the machine.

TROUBLESHOOTING STEPS

Code 2

Action	Result
Check engine fault codes for an engine shutdown.	

COMPRESSOR CODE 3

Engine Crank Time Exceeded

Explanation: The engine crank time has exceeded 15 seconds.

Effect: Code 3 is a shutdown condition and will shutdown the machine.

TROUBLESHOOTING STEPS

Code 3

Action	Result
Crank engine for less than 15 seconds.	

COMPRESSOR CODE 5

Engine Oil Temperature

Explanation:
The WEDGE has received an engine oil temperature greater than 252 Deg F

Effect:
Code 5 is an ALERT condition and will not halt machine operation.

TROUBLESHOOTING STEPS

Code 5

Action	Result
Step1: Refer to the engine manufacturer's service manual for instructions.	

COMPRESSOR CODE 6

Engine Intake Manifold Temperature

Explanation:
The WEDGE has received an engine intake manifold temperature greater than 180 deg F.

Effect:
Code 6 is an ALERT condition and will not halt machine operation.

TROUBLESHOOTING STEPS

Code 6

Action	Result
Step1: Refer to the engine manufacturer's service manual for instructions.	

COMPRESSOR CODE 8

Water in Fuel

Explanation:
The WEDGE has received a water in fuel indication from the engine.

Effect:
Code 8 is an ALERT condition and will not halt machine operation.

TROUBLESHOOTING STEPS

Code 8

Action	Result
Step1: Check the machine fuel system and engine fuel filters.	
Step 2: Refer to the engine manufacturer's service manual for instructions.	

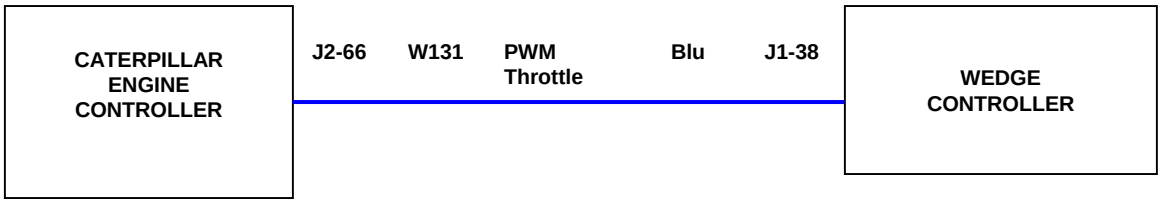
COMPRESSOR CODE 10

Engine Not Responding To Throttle Command

Explanation:
The engine has not responded to a request from the WEDGE for engine speed change during engine start. This ALERT will only occur during the idle speed time, right after engine start.

Effect:
Code 10 is an ALERT condition and will not shutdown the machine. The machine will not perform properly due to the low speed condition.

Throttle Circuits:



TROUBLESHOOTING STEPS

Code 10

Action	Result
Step1: Measure the throttle signal at the engine connector.	If signal not present, check wiring and verify throttle output at WEDGE.
Step 2: Engine may not be able to fuel properly due to restricted fuel filters	Replace fuel filter (s)
Step 3: Verify correct machine ID plug is installed. If so, verify resistance value of ID plug and its connection to WEDGE controller.	

COMPRESSOR CODE 11

Too Many Start Attempts During Auto Start

Explanation:
The WEDGE has made three attempts to start the machine as commanded by the Auto Start Stop controller. The machine failed to start.

Effect:
Code 11 is a SHUTDOWN condition and will shutdown the machine.

TROUBLESHOOTING STEPS

Code 11

Action	Result
Step 1: Check the machine fuel system and engine fuel filters.	
Step 2: Check the condition of the machine batteries.	
Step 3: Cycle machine power, activate the Auto Start input so the machine will make another start attempt. Machine will go through 3 crank cycles to attempt start before a Code 11 is issued.	

COMPRESSOR CODE 29

Engine Shuts Itself Down: Reason Unknown

Explanation:
The engine has shut down. The WEDGE did not shut down the engine.

Effect:
Code 29 is a SHUTDOWN condition and will shut down the machine.

TROUBLESHOOTING STEPS

Code 29

Action	Result
Step 1: Check the machine fuel system and engine fuel filters. Check for loose fittings in the fuel piping that could allow air to be drawn into the fuel system.	
Step 2: Verify the throttle signal from the WEDGE is continuously supplied to the engine.	A quick drop in the throttle signal could cause the engine to stop.
Step 3: Verify battery + and – connections to the engine controller. Inspect harness connections and measure voltage drop at engine ECM.	
Step 4: In the case of the I-R (John Deere) engine, check the connections for the crank sensor which is mounted at the front of the engine. Loose pin connections in the connector will cause Code 29.	

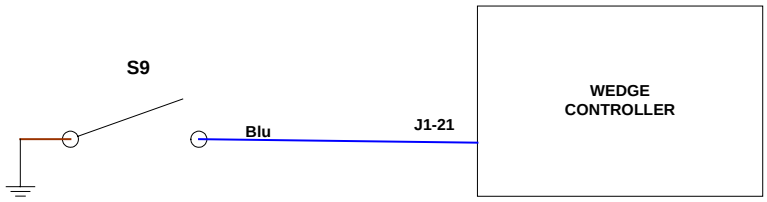
COMPRESSOR CODE 31

Low Air End Oil Pressure

Explanation:
The WEDGE has received a contact closure from pressure switch S9, located in the airend. This indicates a low oil pressure in the airend.

Effect:
Code 31 is a shutdown condition and will shutdown the machine. The cause of the low air end oil pressure must be repaired to continue machine operation.

S9 Pressure Switch Circuit:



Circuit Description:

Switch S9 is a 12 psi, normally open pressure switch. If the pressure falls below 12 psi, the switch will close, indicating to the WEDGE controller a low air end oil pressure.

Component Location:

S9 is located in the back of the air end.

TROUBLESHOOTING STEPS

Code 31

Action	Result
Step1: Check the air end oil pressure with a mechanical gauge.	If > 12 psi, replace S9 If not, there is a harness or WEDGE problem.

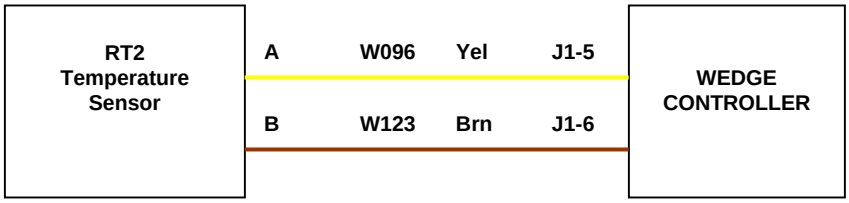
COMPRESSOR CODE 32

RT2, Discharge Temperature Sensor Fault

Explanation:
The WEDGE has received an out of limits reading from the RT2 temperature sensor. This reading could be on the high or low end of the range. It is out of the normal range for temperature measurement.

Effect:
Code 32 is a shutdown condition and will shutdown the machine.

RT2 Temperature Sensor Circuit:



Circuit Description:

The thermistor temperature sensor connects to the WEDGE controller as shown in the schematic above. The temperature range of RT2 is –30 to 255 degress F. The thermistor is a 10K ohm device.

Component Location:

RT2 thermistor is located in the side of the separator tank.

TROUBLESHOOTING STEPS

Code 32

Action	Result
Step1: Substitute the thermistor simulator (I-R # 22073878) for RT2 Use the WEDGE service diagnostics to read the value for RT2 It should be approximately 32 degrees F.	Should read approx. 32 Deg F If not, there is a harness or WEDGE problem.

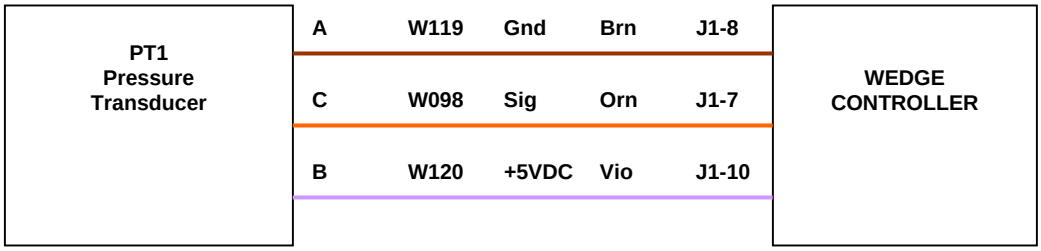
COMPRESSOR CODE 33

PT1 Pressure Transducer Sensor Fault

Explanation:
The WEDGE has received an out of limits reading from the PT1 pressure transducer. This reading could be on the high or low end of the range. It is out of the normal range for pressure.

Effect:
Code 33 is an ALERT condition and will not shutdown the machine. If the transducer is defective, the machine could shutdown due to an out of range pressure

PT1Pressure Transducer Circuit:



Circuit Description:

The pressure transducer is a 3-wire device that connects to the WEDGE controller as shown in the schematic above. The violet wire (W120) is the 5 VDC excitation supply. This is spliced in the harness near the breakout for the harness branch that goes to the separator tank. The “sig” wire is the output signal that has a range o .45 to 4.5 volts DC. The pressure range of this transducer is 0 – 100 psig.

Component Location:

Pressure transducer is located in the pneumatic circuit near the compressor inlet valve.

TROUBLESHOOTING STEPS

Code 33

Action	Result
Step1: Substitute the pressure transducer simulator (I-R # 22168868) for PT1. Use the WEDGE service diagnostics to read the value for PT1. It should be approximately 30 – 50 psi.	Should read 30 – 50 psi. If not, there is a harness or WEDGE problem.

COMPRESSOR CODE 34

Separator Tank Pressure Greater Than 20 psi at Crank

Explanation:
The WEDGE has received a pressure from PT1 that is greater than 20 psi at the time of engine crank.

Effect:
Code 34 is a shutdown condition and will not allow the engine to crank. Once the separator tank bleeds down below 20 psi, engine crank will be allowed.

COMPRESSOR CODE 35

Machine Over Pressure Condition

Explanation:
The WEDGE has received a pressure from PT1 that is greater than 175 psi.

Effect:
Code 35 is a shutdown condition and will shutdown the machine. The separator tank high pressure has been exceeded.

TROUBLESHOOTING STEPS

Code 35

Action	Result
Verify PT1 pressure transducer is reading correctly.	

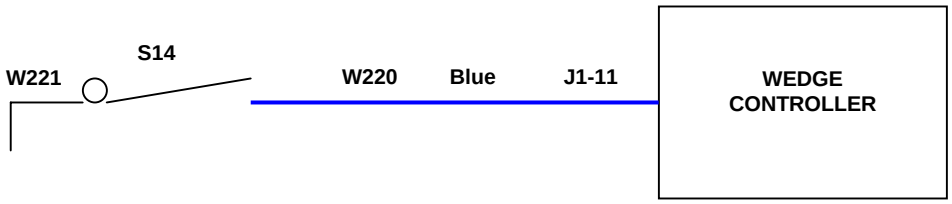
COMPRESSOR CODE 36

Safety Valve Open

Explanation:
The WEDGE has received a switch closure from S14. This indicates the separator tank safety valve has opened.

Effect:
Code 36 is a shutdown condition and will shutdown the machine.

S14 Pressure Switch Circuit:



Circuit Description:

S14 is a normally open, 12 psi pressure switch. When the safety valve opens, S14's pressure is raised above 12 psi and the switch closes. This grounds the WEDGE input, indicating the safety valve has opened.

Component Location:

S14 is screwed into the outlet of the safety valve.

TROUBLESHOOTING STEPS

Code 36

Action	Result
Verify PT1 pressure transducer is reading correctly.	

COMPRESSOR CODE 50

Separator Tank Temperature

Explanation:
The WEDGE has received a separator tank temperature from RT1 that is greater than 247 degrees F.

Effect:
Code 50 is a shutdown condition and will shutdown the machine.

TROUBLESHOOTING STEPS

Code 50

Action	Result
Step1: Check for package air inlet restrictions.	
Step 2: Check for dirty or clogged coolers.	

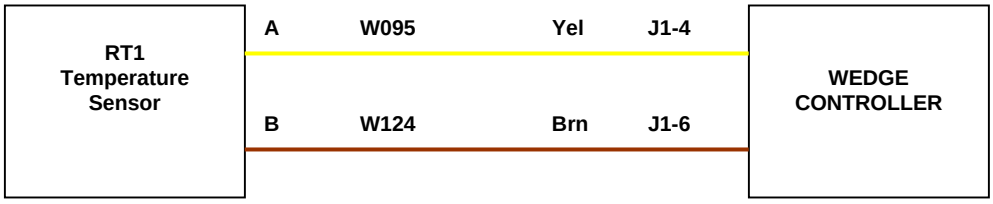
COMPRESSOR CODE 53

RT1, Discharge Temperature Sensor Fault

Explanation:
The WEDGE has received an out of limits reading from the RT1 temperature sensor. This reading could be on the high or low end of the range. It is out of the normal range for temperature measurement.

Effect:
Code 53 is a shutdown condition and will shutdown the machine.

RT1 Temperature Sensor Circuit:



Circuit Description:

The thermistor temperature sensor connects to the WEDGE controller as shown in the schematic above. The temperature range of RT1 is –30 to 255 degress F. The thermistor is a 10K ohm device.

Component Location:

RT1 thermistor is located in the side of the separator tank.

TROUBLESHOOTING STEPS

Code 53

Action	Result
Step1: Substitute the thermistor simulator (I-R # 22073878) for RT21 Use the WEDGE service diagnostics to read the value for RT21 It should be approximately 32 degrees F.	Should read approx. 32 Deg F If not, there is a harness or WEDGE problem.

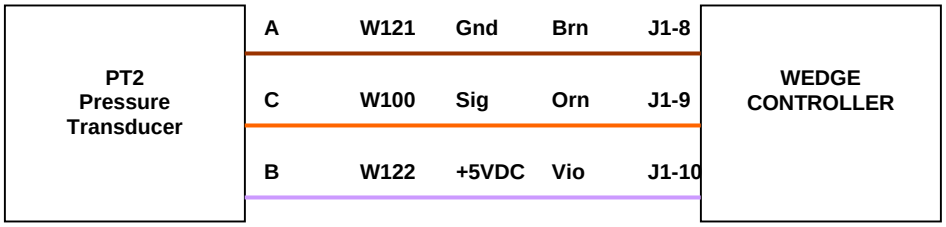
COMPRESSOR CODE 54

PT2 Regulation System Sensor Fault

Explanation:
The WEDGE has received an out of limits reading from the PT2 pressure transducer. This reading could be on the high or low end of the range. It is out of the normal range for pressure.

Effect:
Code 54 is an ALERT condition and will not shutdown the machine.

PT2 Pressure Transducer Circuit:



Circuit Description:

The pressure transducer is a 3-wire device that connects to the WEDGE controller as shown in the schematic above. The violet wire (W122) is the 5 VDC excitation supply. This is spliced in the harness near the breakout for the harness branch that goes to the separator tank. The “sig” wire is the output signal that has a range o .45 to 4.5 volts DC. The pressure range of this transducer is 0 – 100 psig.

Component Location:

PT2 pressure transducer is located in the pneumatic circuit near the compressor inlet valve.

TROUBLESHOOTING STEPS

Code 54

Action	Result
Step1: Substitute the pressure transducer simulator (I-R # 22168868) for PT2. Use the WEDGE service diagnostics to read the value for PT2. It should be approximately 30 – 50 psi.	Should read 30 – 50 psi. If not, there is a harness or WEDGE problem.

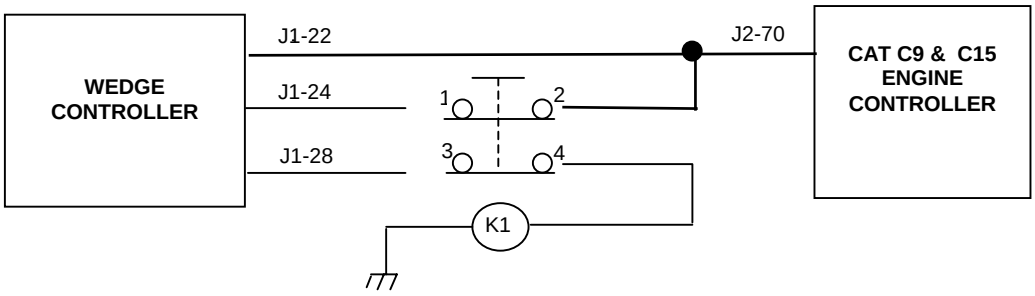
COMPRESSOR CODE 55

Estop Button

Explanation:
The WEDGE has received an indication that the emergency stop button has been pressed.

Effect:
Code 55 is a shutdown condition and will shutdown the machine. If the machine is in the cranking mode when ESTOP is pressed, the starter will be disengaged simultaneously with engine key switch signal turn off.

Emergency Stop Button Circuit:



Circuit Description:

The estop button is in series with the engine key switch signal and the auxiliary start relay, K1. Pressing the button opens both of these circuits simultaneously. The WEDGE reads a sense input that is connected to the estop button to determine if the estop button is pressed.

Component Location:

The estop button is located above the machine control panel on the front of the machine.

TROUBLESHOOTING STEPS

Code 55

Action	Result
Step1: If the estop button is installed, determine if it is pressed.	Release the estop button to operate the machine.
Step 2: If the estop button is not installed, a jumper plug will be installed in the harness at the connection point for the estop button, P9.	Verify the jumper plug is functional
Step 3: Perform a continuity check of the harness wires from the WEDGE through the jumper plug to the engine connector.	

COMPRESSOR CODE 56

Minimum Pressure Not Met

Explanation:
The separator tank has not reached 50 psi within 20 seconds from time engine starts.

Effect:
Code 56 is an ALERT condition and will not halt machine operation.

TROUBLESHOOTING STEPS

Code 56

Action	Result
Step1: Check air piping system for restriction.	
Step2: Verify engine speed has increased to 1800 rpm when Service Air switch is pressed.	

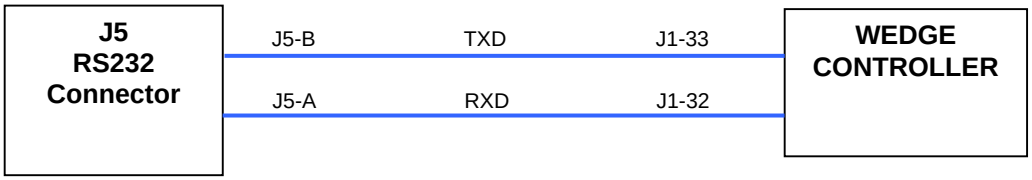
COMPRESSOR CODE 70

Serial Communications

Explanation:
The WEDGE controller cannot communicate with an external computer over the RS232 serial link.

Effect:
This code can only occur when a laptop computer or PDA Service Tool is connected to the WEDGE. The WEDGE may otherwise be functional and this event may not be mission disabling

RS 232 Communications Circuit:



Circuit Description:

The RS232 serial communications link is used for re-programming the WEDGE controller and is the communications port used with the PDA Service Tool. The J5 connector contains the RS232 port. It is normally located very close to the WEDGE. There are two signals associated with the RS232, TXD and RXD. TXD is the transmit signal and the RXD is the received signal.

Component Location:

The J5 harness connector is located near the WEDGE controller.

TROUBLESHOOTING STEPS

Code 70

Action	Result
Step1: If the current RS232 device (laptop computer, etc.) will not communicate with the WEDGE, substitute another RS232 device. Note: The second device must have proper software loaded to communicate with the WEDGE.	If second device will not communicate with WEDGE, replace the WEDGE.

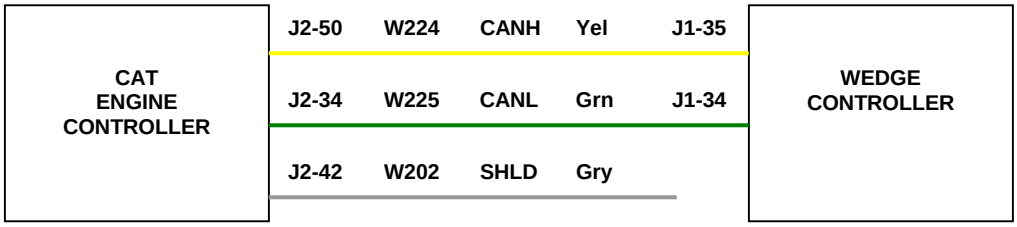
COMPRESSOR CODE 71

CAN Communications

Explanation:
The WEDGE controller cannot communicate with the engine controller. The J1939 CAN (Controller Area Network) broadcast of engine parameters cannot be received.

Effect:
The WEDGE will not be able to display engine parameters using the diagnostic Display function. The compressor will continue to operate since Code 71 is an ALERT condition.

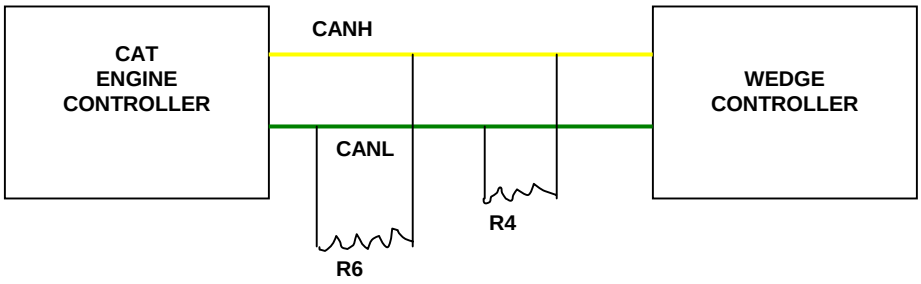
CAN Communications Circuit:



Circuit Description:

The CANH, CANL and SHLD wires are a cable that is located in the main harness. CANH refers to CAN HI and CANL refers to CAN LO and SHLD is the shield of the CAN cable. This is the cable that carries the communications between the engine and WEDGE controller and any other devices that are connected to the CAN cable. This cable is also referred to as the CAN Network since it may have multiple devices connected to it.

The CAN network has two terminating resistors, one located near the engine controller and one near the WEDGE controller. The value of each of these resistors is 120 ohms. They are connected in parallel, as shown below, across the network. The resistors are mounted in a special Deutsch connector. One connector is tagged R4 and the other is tagged R6.



Component Location:

The machine harness (P2) plugs into the J2 connector. The CAT controller is located on the left side of the engine. The harness P2 connector plugs into the CAT customer connector located near the controller.

The WEDGE controller is mounted to the machine control panel on the back side. Resistor R6 is stubbed out of the harness near the engine controller and resistor R4 is stubbed out of the harness near the WEDGE controller.

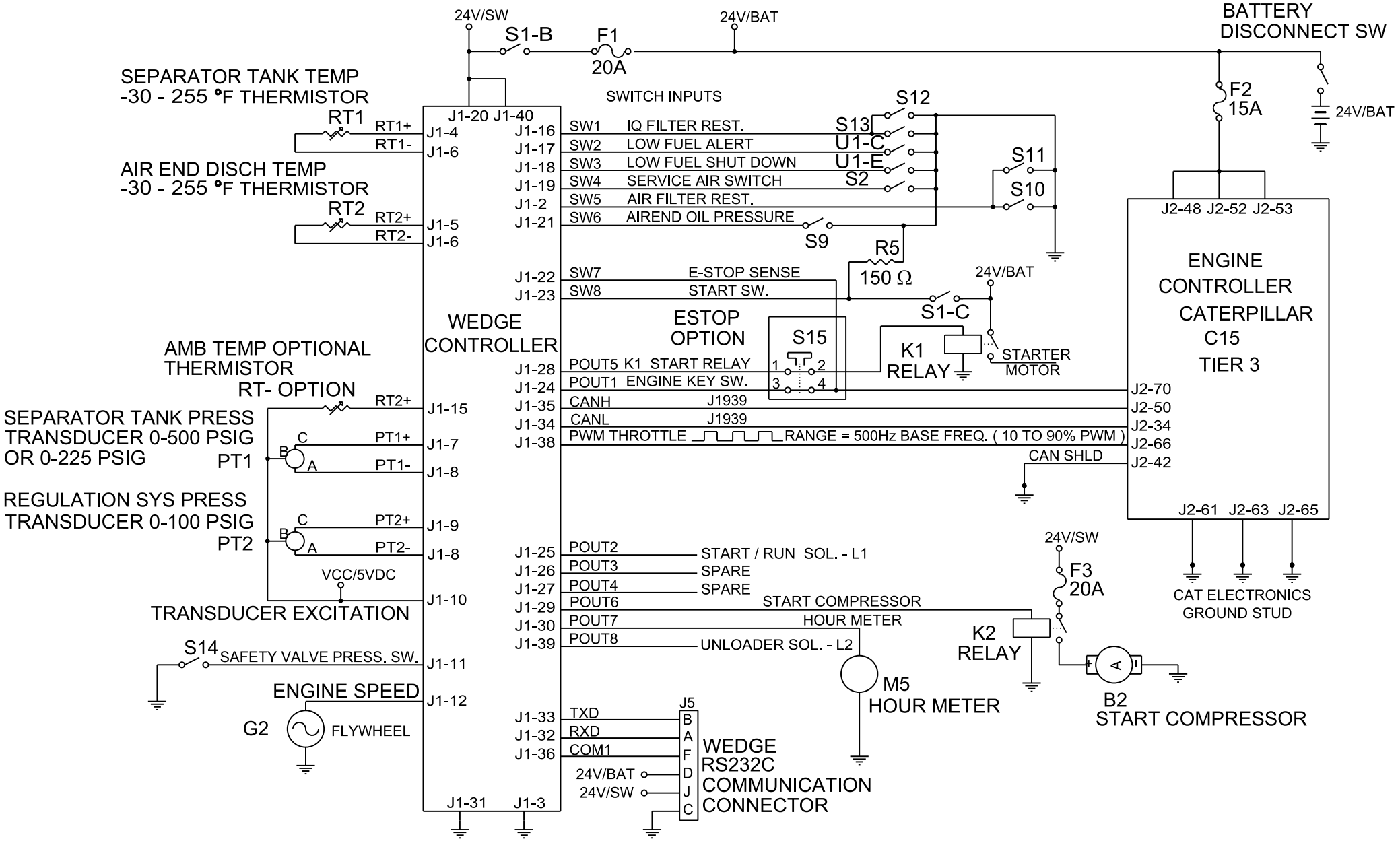
TROUBLESHOOTING STEPS

Code 71

Action	Result
Step 1: Verify P1 harness connector pins 34, 35, and 1 are firmly seated into The connector at the WEDGE controller.	
Step 2: Verify P2 harness connector pins 37, 46, and 36 for Cummins engine or pins 34, 50, and 42 for CAT engine are firmly seated into the connector at the engine electronic controller.	
Step 3: Setup the digital multimeter to read ohms. (Refer to the section in this manual on how to use the multimeter). Disconnect P1 harness connector from the WEDGE controller. If the engine is a Cummins, disconnect the P2 harness connector from the engine controller. If the engine is a CAT engine, leave P2 connected to the engine Controller. Connect one of the multimeter test leads to P1-34 and the other test Lead to P1-35.	Meter should read approximately 60 ohms. If so, go to Step 5. If not, go to Step 4.
Step 4: If you did not get the results of Step 3, there is a problem with the wiring harness. This problem could be a defective splice, broken wire or defective wire connection at a pin. The CANH and CANL wires should be tested for continuity from P1 to P2. The resistor stub outs should be tested for continuity.	Make harness repairs as necessary.
Step 5: Setup the multimeter to read DC volts. (Refer to the section in this manual on how to use the multimeter). The harness should be connected to the engine controller and the WEDGE controller. Turn the machine power to the “ON” position, but do not start the Engine. Using insulation piercing probes (I-R P/N 22216725), connect the red multimeter lead to P1-34 wire and connect the black multimeter lead to the battery negative post or one of the brown wires on the back of the control panel.	Multimeter should read approximately 2.5 volts DC.

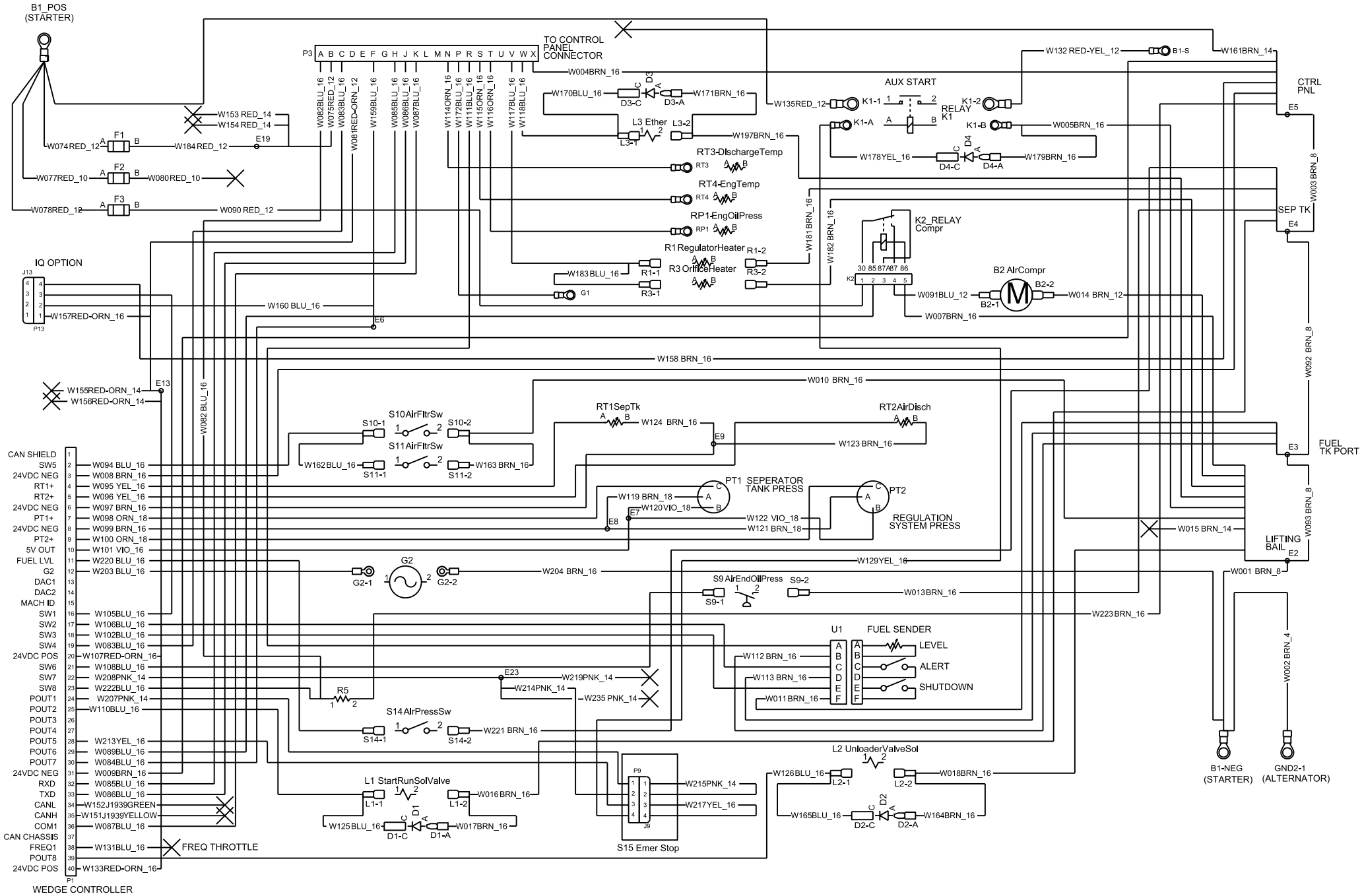
Disconnect the test lead from P1-34 wire and connect to P1-35 wire.	Multimeter should read approximately 2.5 volts DC. If 2.5 volts cannot be read, replace WEDGE controller. If WEDGE controller is OK, harness should be checked as outlined in Step 4.

SECTION 5
SYSTEM SCHEMATIC DIAGRAMS



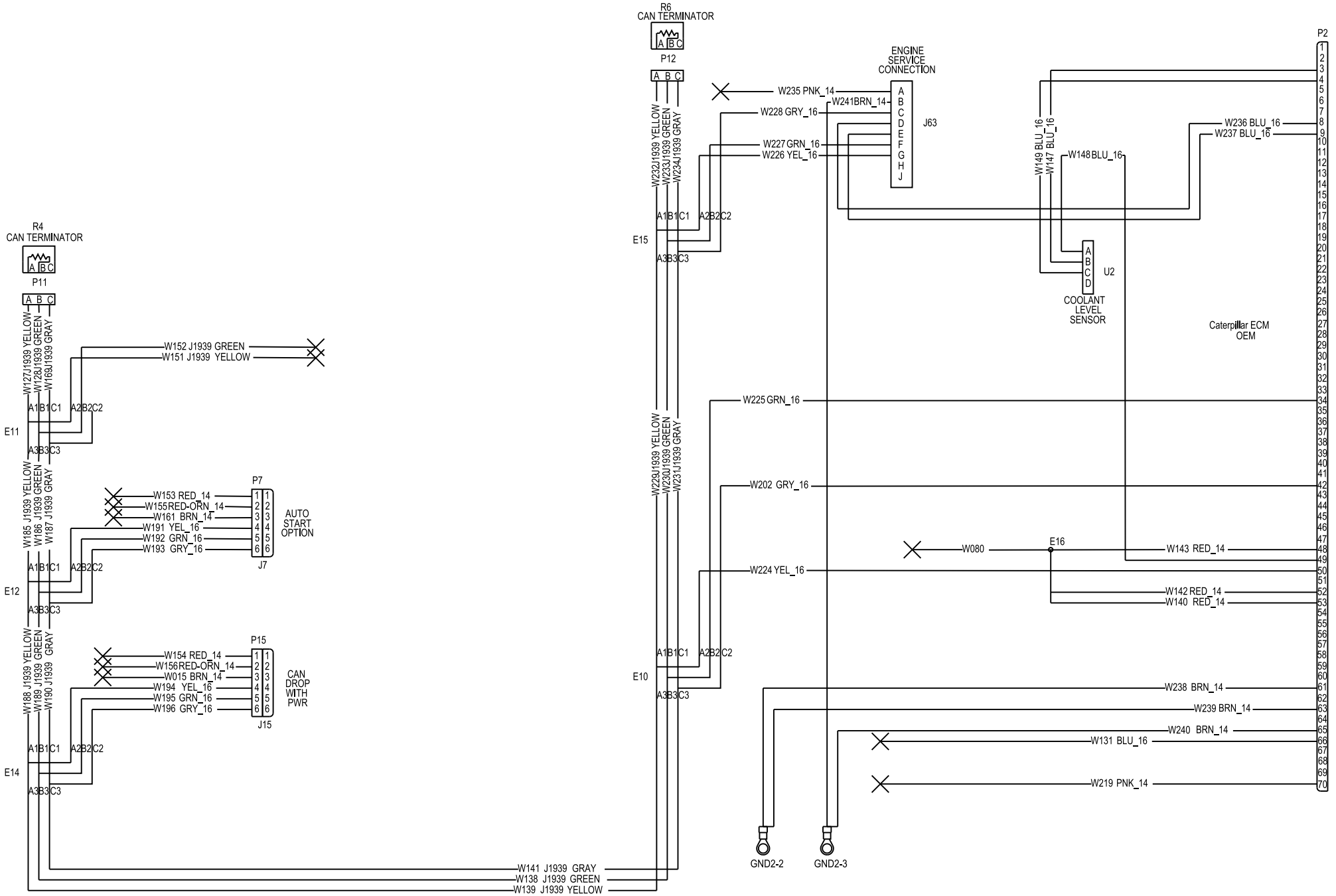
XHP1170CAT/CATF-EX-T3

XHP1170CAT/CATF-EX-T3 CONTROL SYSTEM SCHEMATIC

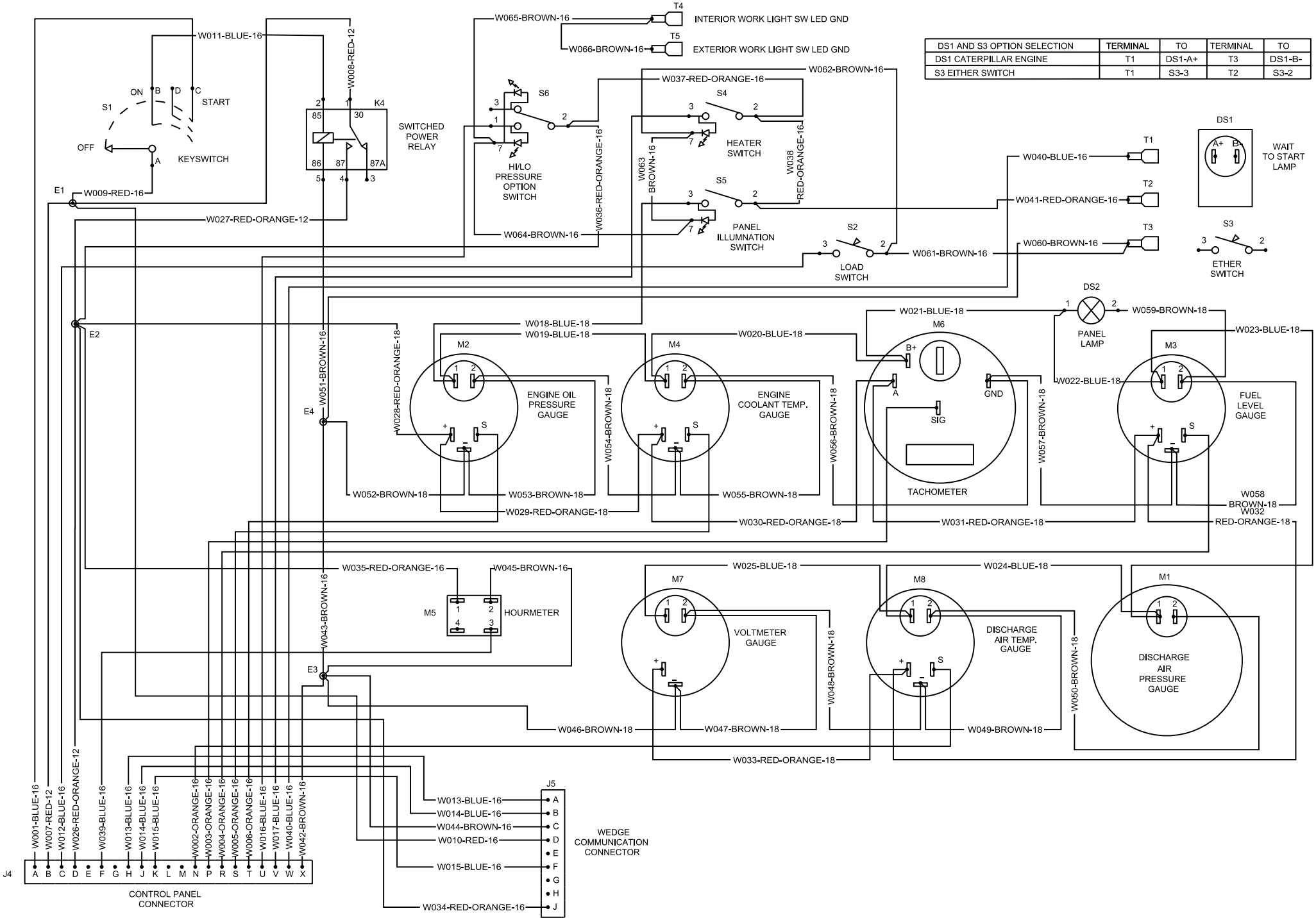


XHP1170CAT/CATF-EX-T3

XHP1170CAT/CATF-EX-T3 CHASSIS HARNESS WIRING DIAGRAM



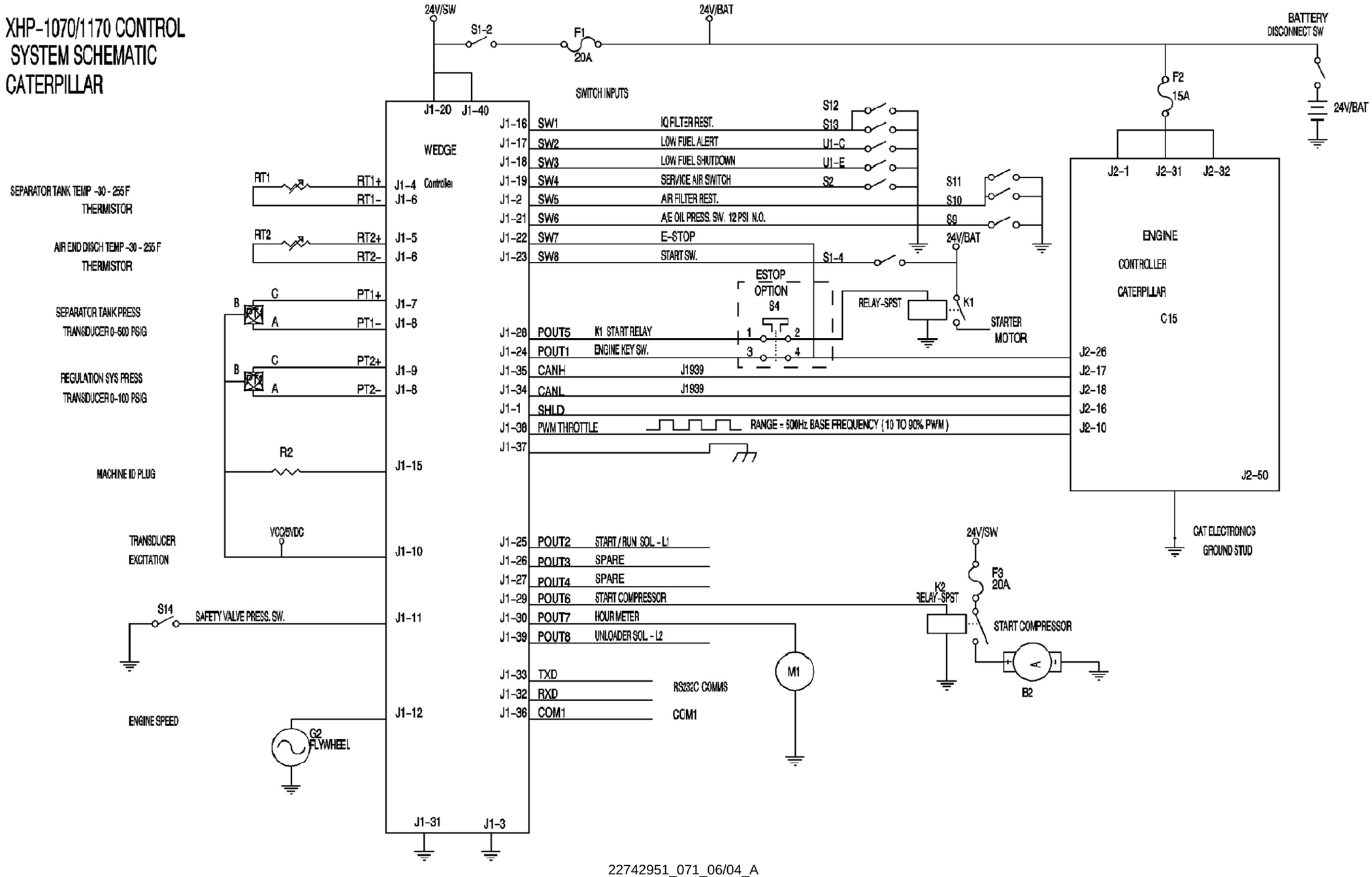
XHP1170CAT/CATF-EX-T3 **XHP1170CAT/CATF-EX-T3 CAN BUS HARNESS WIRING DIAGRAM**



DS1 AND S3 OPTION SELECTION	TERMINAL	TO	TERMINAL	TO
DS1 CATERPILLAR ENGINE	T1	DS1-A+	T3	DS1-B-
S3 EITHER SWITCH	T1	S3-3	T2	S3-2

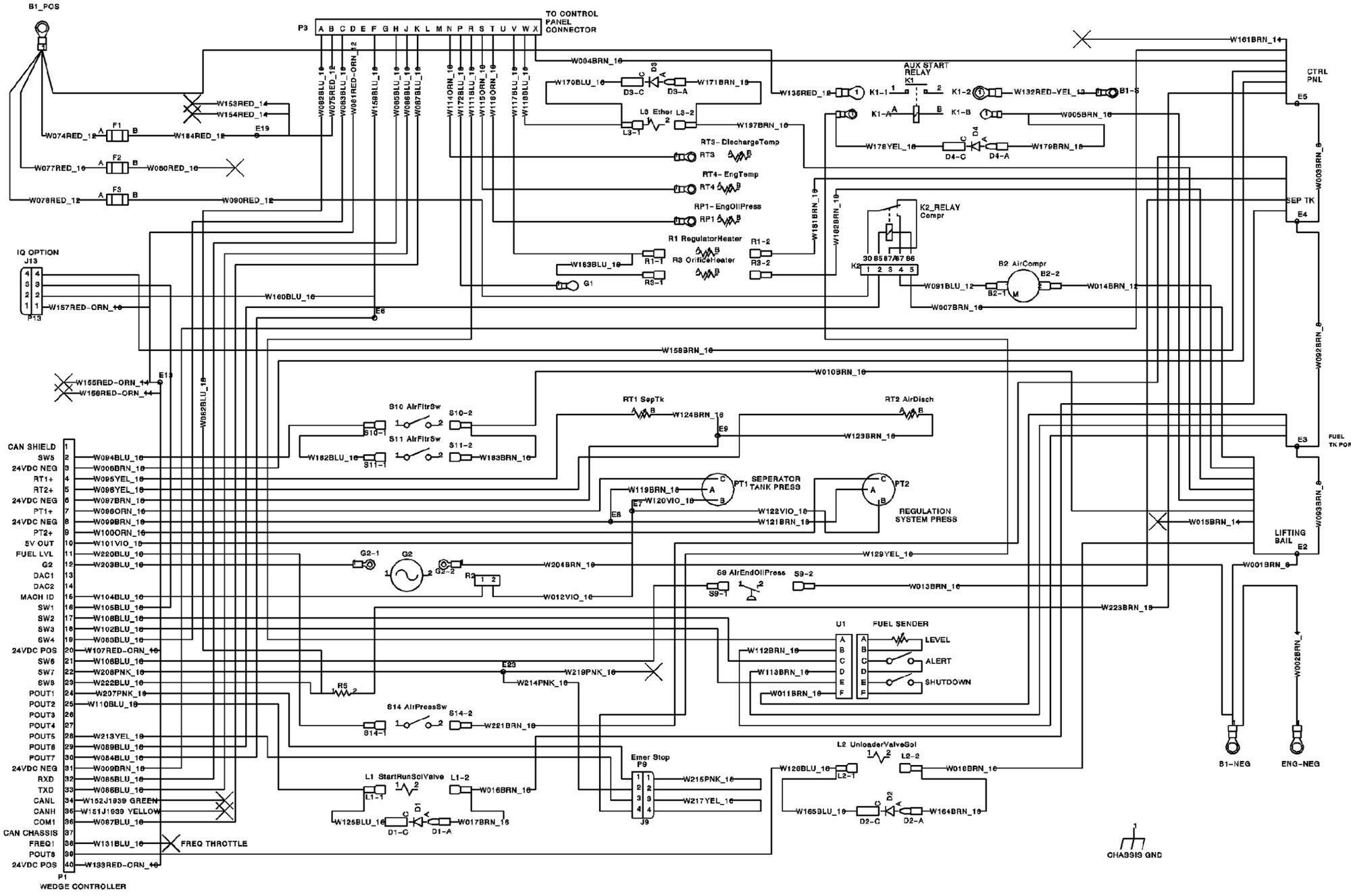
XHP1170CAT/CATF-EX-T3

XHP1170CAT/CATF-EX-T3 CONTROL PANEL WIRING DIAGRAM

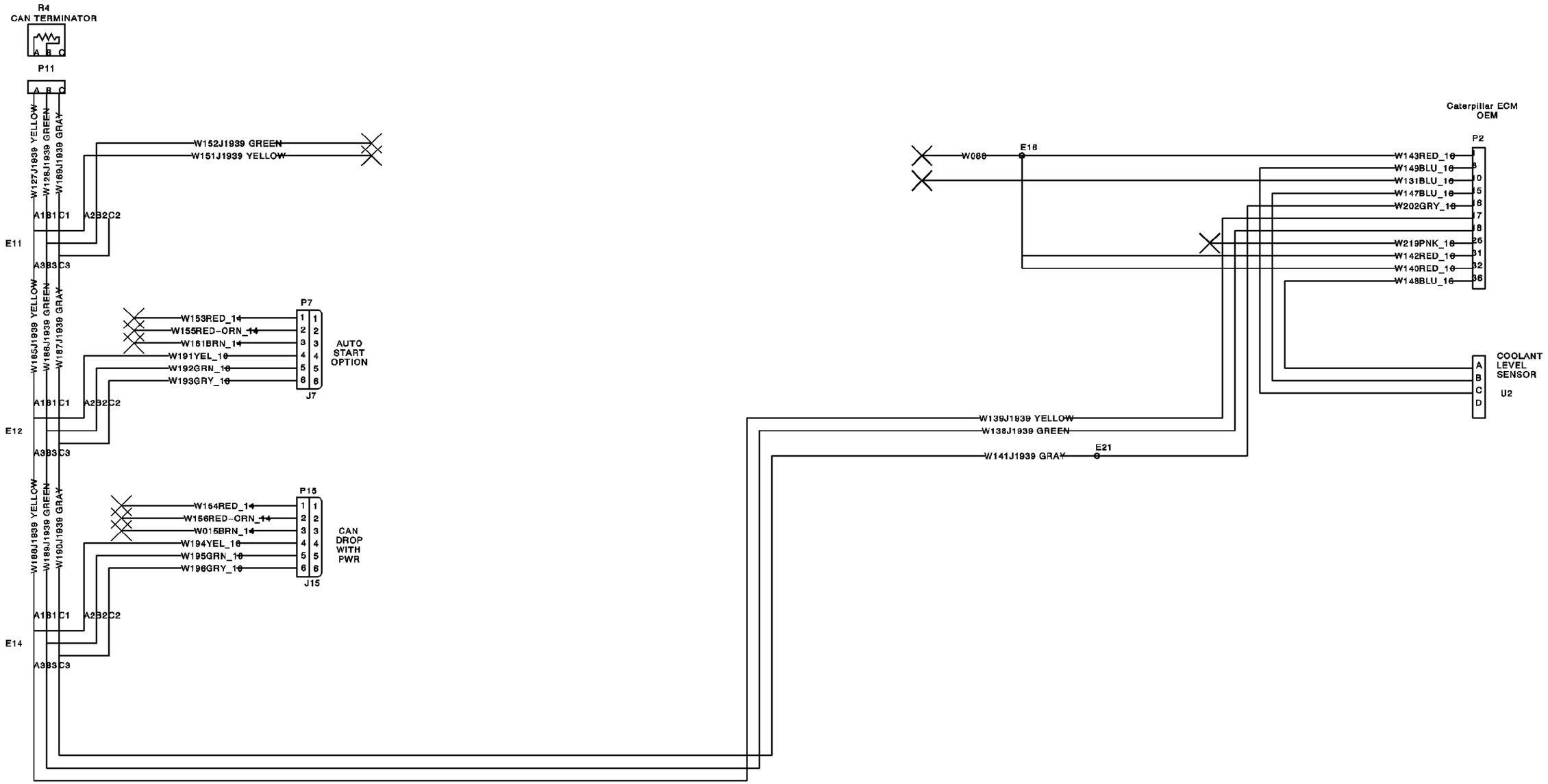


22742951_071_06/04_A

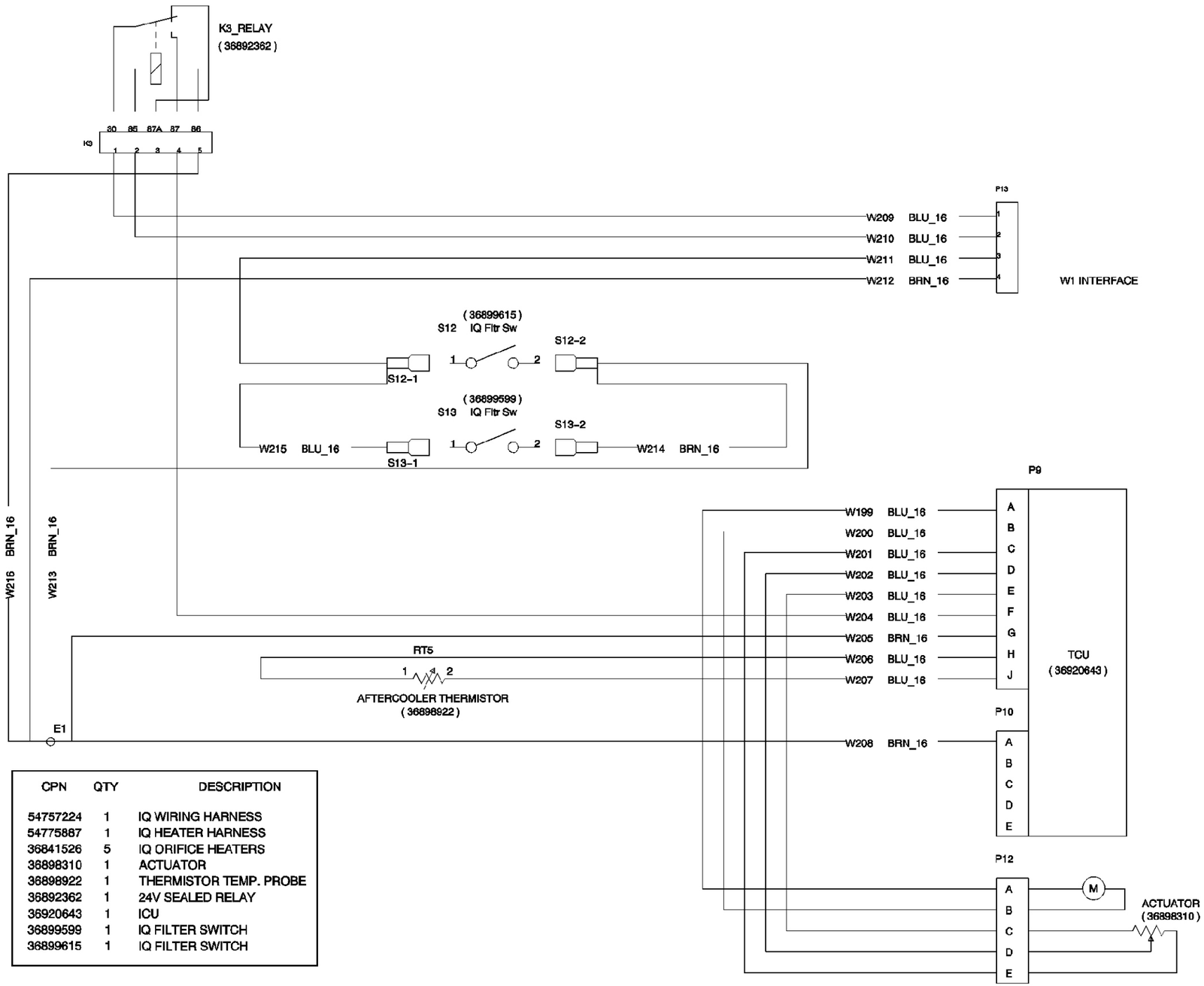
Control System Wiring Diagram



22742951_072_06/04_A


R4
CAN TERMINATOR
A B C
P11
A B C
W127J1939 YELLOW
W128J1939 GREEN
W169J1939 GRAY
W152J1939 GREEN
W151J1939 YELLOW
A1B1C1
A2B2C2
E11
A3B3C3
W165J1939 YELLOW
W186J1939 GREEN
W187J1939 GRAY
P7
W153RED_14
W155RED-ORN_14
W161BRN_14
W191YEL_16
W192GRN_16
W193GRY_16
1 2 3 4 5 6
1 2 3 4 5 6
J7
AUTO START OPTION
A1B1C1
A2B2C2
E12
A3B3C3
W188J1939 YELLOW
W189J1939 GREEN
W190J1939 GRAY
P15
W154RED_14
W156RED-ORN_14
W015BRN_14
W194YEL_16
W195GRN_16
W196GRY_16
1 2 3 4 5 6
1 2 3 4 5 6
J15
CAN DROP WITH PWR
A1B1C1
A2B2C2
E14
A3B3C3
Caterpillar ECM
OEM
P2
W086
E18
W143RED_16
W149BLU_16
W131BLU_16
W147BLU_16
W202GRY_16
W219PNK_16
W142RED_16
W140RED_16
W148BLU_16
3 10 15 16 17 18 26 31 32 36
A B C D
COOLANT LEVEL SENSOR
U2
W139J1939 YELLOW
W138J1939 GREEN
W141J1939 GRAY
E21

IQ Wiring Diagram



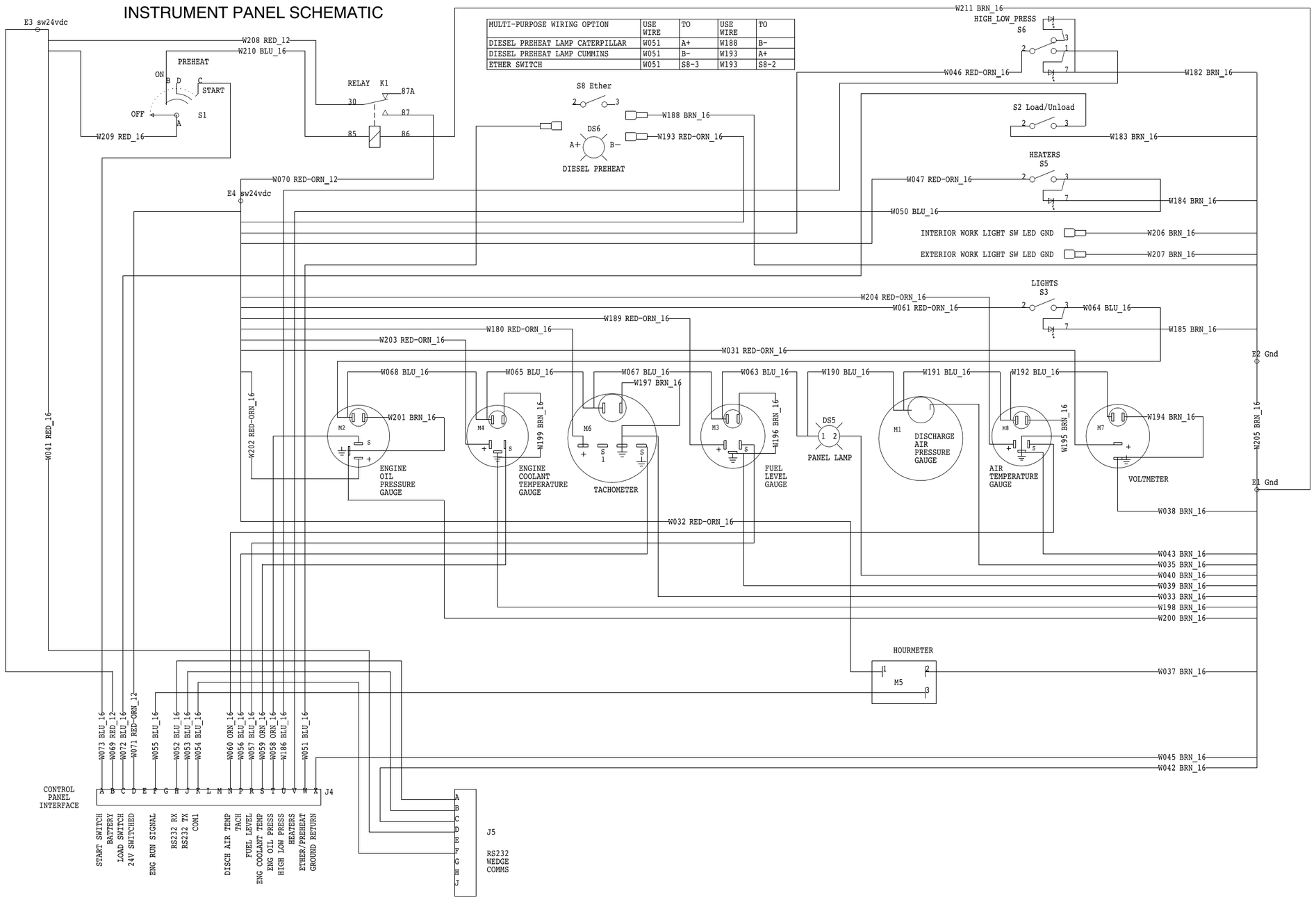
CPN	QTY	DESCRIPTION
54757224	1	IQ WIRING HARNESS
54775887	1	IQ HEATER HARNESS
36841526	5	IQ ORIFICE HEATERS
36898310	1	ACTUATOR
36898922	1	THERMISTOR TEMP. PROBE
36892362	1	24V SEALED RELAY
36920643	1	ICU
36899599	1	IQ FILTER SWITCH
36899615	1	IQ FILTER SWITCH

22742951_074_06/04_A

Control System Wiring Diagram

INSTRUMENT PANEL SCHEMATIC

MULTI-PURPOSE WIRING OPTION	USE WIRE	TO	USE WIRE	TO
DIESEL PREHEAT LAMP CATERPILLAR	W051	A+	W188	B-
DIESEL PREHEAT LAMP CUMMINS	W051	B-	W193	A+
ETHER SWITCH	W051	S8-3	W193	S8-2



22742951_072_06/04_A

NOTES:

1. USE THIS DIAGRAM WITH WIRING HARNESS DWG 22661854, REV. B

REVISIONS						
ZONE	REV	ECN	DESCRIPTION	DATE	DWN	APV
-	A	CPR31907	ORIGINAL RELEASE	02-02-05	DRP	DRP
-	B	CPR31943	CHANGED NOTE 1	05-06-16	KVB	JTG

CONNECTOR PARAMETERS	
CONN REF	MODEL NAME
B2	IGNORE
B1-NEG	1526282-2
B1-S	33457
B1_POS	320344
B2-1	41450
B2-2	41450
D1	35376169
D2	35376169
D3	35376169
D4	35376169
D1-A	60660-1
D1-C	735153-2
D2-A	60660-1
D2-C	735153-2
D3-A	60660-1
D3-C	735153-2
D4-A	60660-1
D4-C	735153-2
E2	SPLICE
E3	SPLICE
E4	SPLICE
E5	SPLICE
E6	SPLICE
E7	SPLICE
E8	SPLICE
E9	SPLICE
E10	CAN_SPLICE
E11	CAN_SPLICE
E12	CAN_SPLICE
E13	SPLICE
E14	CAN_SPLICE
E15	CAN_SPLICE
E16	SPLICE
E19	SPLICE
E23	SPLICE
F1	12085030
F2	12085030
F3	12085030
G1	08911072
G2	IGNORE
G2-1	34122
G2-2	34122
GND2-1	31812
GND2-2	33220
GND2-3	33220
ISSPRO	IGNORE
J7	DT04-6P
J9	DT04-4P
J13	IGNORE
J15	DT04-6P
J63	HD14-9-96P
K1	IGNORE
K2	12065686
K1-1	33459
K1-2	33459
K1-A	34123
K1-B	34123
K2_RELAY	IGNORE
L1	IGNORE
L2	IGNORE
L3	IGNORE
L1-1	41450
L1-2	41450
L2-1	41450
L2-2	41450
L3-1	41450
L3-2	41450
P1	DRC18-40SA
P2	776241-1
P3	HDP26-24-21SN
P7	DT06-6S
P9	DT06-4S

P11	DT06-3S-E008
P12	DT06-3S-E008
P13	DT06-4S
P15	DT06-6S
PT1	15477863
PT2	15477863
R1	IGNORE
R3	IGNORE
R4	DT04-3P-P006
R5	SPLICE
R6	DT04-3P-P006
R1-1	41450
R1-2	41274
R3-1	41274
R3-2	41274
RP1	34122
RP1-	IGNORE
RT1	15300027
RT2	15300027
RT3	34122
RT4	34122
RT3-	IGNORE
RT4-	IGNORE
S9	IGNORE
S10	IGNORE
S11	IGNORE
S14	IGNORE
S10-1	41450
S10-2	41450
S11-1	41274
S11-2	41274
S14-1	41274
S14-2	41274
S9-1	41274
S9-2	41274
U1	12015799
U2	12065298

ITEM	QTY	TERMINAL
1	1	31812
2	2	33220
3	1	33457
4	2	33459
5	5	34122
6	2	34123
7	9	41274
8	11	41450
9	1	320344
10	1	08911072
11	8	12033997
12	3	12048074
13	2	12066814
14	4	12077411
15	6	12124580
16	6	15326267
17	2	0462-203-12141
18	4	1060-14-0144
19	7	1060-16-0144
20	2	1062-14-0122
21	15	1062-14-0144
22	43	1062-16-0122
23	30	1062-16-0144
24	1	1526282-2
25	4	60660-1
26	4	60798-2
27	59	SPLICE

B1_POS
TO CONTROL PANEL CONNECTOR
P3 A B C D E F G H J K L M N P R S T U V W X
W004 BRN_16
W153 RED_14
W154 RED_14
W074 RED_12
F1
W184 RED_12
E19
W077 RED_10
F2
W080 RED_10
W078 RED_12
F3
W090 RED_12
W082 BLU_16
W075 RED_12
W083 BLU_16
W081 RED-ORN_12
W159 BLU_16
W085 BLU_16
W086 BLU_16
W087 BLU_16
W114 ORN_16
W172 BLU_16
W111 BLU_16
W115 ORN_16
W116 ORN_16
W117 BLU_16
W118 BLU_16
W170 BLU_16
D3-C
D3
D3-A
W171 BRN_16
L3 Ether
L3-1
L3-2
W197 BRN_16
RT3- DischargeTemp
RT3
RT4- EngTemp
RT4
RP1- EngOilPress
RP1
R1 RegulatorHeater
R1-1
R1-2
R3 OrificeHeater
R3-1
R3-2
W183 BLU_16
G1
W181 BRN_16
W182 BRN_16
W135 RED_12
AUX START
K1-1
K1-2
RELAY K1
K1-A
K1-B
W005 BRN_16
W178 YEL_16
D4-C
D4
D4-A
W179 BRN_16
W132 RED-YEL_12
B1-S
W161 BRN_14
CTRL PNL
E5
W003 BRN_8
SEP TK
E4
K2_RELAY Compr
30 85 87A 87 86
K2
1 2 3 4 5
B2 AirCompr
B2-1
B2-2
W091 BLU_12
W014 BRN_12
W007 BRN_16
IQ OPTION
J13
P13
W160 BLU_16
W157 RED-ORN_16
E6
W158 BRN_16
W155 RED-ORN_14
W156 RED-ORN_14
E13
W082 BLU_16
W010 BRN_16
S10 AirFltrSw
S10-1
S10-2
S11 AirFltrSw
S11-1
S11-2
W162 BLU_16
W163 BRN_16
RT1 SepTk
RT2 AirDisch
W124 BRN_16
W123 BRN_16
E9
W092 BRN_8
E3
FUEL TK PORT
CAN SHIELD
SW5 2 W094 BLU_16
24VDC NEG 3 W008 BRN_16
RT1+ 4 W095 YEL_16
RT2+ 5 W096 YEL_16
24VDC NEG 6 W097 BRN_16
PT1+ 7 W098 ORN_18
24VDC NEG 8 W099 BRN_16
PT2+ 9 W100 ORN_18
5V OUT 10 W101 VIO_16
FUEL LVL 11 W220 BLU_16
G2 12 W203 BLU_16
DAC1 13
DAC2 14
MACH ID 15
SW1 16 W105 BLU_16
SW2 17 W106 BLU_16
SW3 18 W102 BLU_16
SW4 19 W083 BLU_16
24VDC POS 20 W107 RED-ORN_16
SW6 21 W108 BLU_16
SW7 22 W208 PNK_14
SW8 23 W222 BLU_16
POUT1 24 W207 PNK_14
POUT2 25 W110 BLU_16
POUT3 26
POUT4 27
POUT5 28 W213 YEL_16
POUT6 29 W089 BLU_16
POUT7 30 W084 BLU_16
24VDC NEG 31 W009 BRN_16
RXD 32 W085 BLU_16
TXD 33 W086 BLU_16
CANL 34 W152 J1939 GREEN
CANH 35 W151 J1939 YELLOW
COM1 36 W087 BLU_16
CAN CHASSIS 37
FREQ1 38 W131 BLU_16
POUT8 39
24VDC POS 40 W133 RED-ORN_16
P1
WEDGE CONTROLLER
FREQ THROTTLE
W19 BRN_18
W120 VIO_18
E7
E8
PT1 SEPERATOR TANK PRESS
PT2
REGULATION SYSTEM PRESS
W122 VIO_18
W121 BRN_18
W015 BRN_14
LIFTING BAIL
E2
W001 BRN_8
W129 YEL_16
G2-1
G2
G2-2
W204 BRN_16
S9 AirEndOilPress
S9-1
S9-2
W013 BRN_16
W223 BRN_16
U1 FUEL SENDER
W112 BRN_16
W113 BRN_16
W011 BRN_16
LEVEL
ALERT
SHUTDOWN
W002 BRN_4
B1-NEG
GND2-1
E23
W219 PNK_14
W214 PNK_14
W235 PNK_14
R5
S14 AirPressSw
S14-1
S14-2
W221 BRN_16
L1 StartRunSolValve
L1-1
L1-2
W016 BRN_16
W125 BLU_16
D1-C
D1
D1-A
W017 BRN_16
Emer Stop
F9
J9
W215 PNK_14
W217 YEL_16
L2 UnloaderValveSol
L2-1
L2-2
W018 BRN_16
W126 BLU_16
W165 BLU_16
D2-C
D2
D2-A
W164 BRN_16

R6
CAN TERMINATOR
A B C
P12
A B C
W232 J1939 YELLOW
W233 J1939 GREEN
W234 J1939 GRAY
A1 B1 C1 A2 B2 C2
E15
A3 B3 C3
W235 PNK_14
W241 BRN_14
W228 GRY_16
W227 GRN_16
W226 YEL_16
ENGINE SERVICE CONNECTION
J63
A B C D E F G H J
W149 BLU_16
W147 BLU_16
W148 BLU_16
W236 BLU_16
W237 BLU_16
U2
A B C D
COOLANT LEVEL SENSOR
P2
Caterpillar ECM OEM
W225 GRN_16
W202 GRY_16
W080
E16
W143 RED_14
W224 YEL_16
W142 RED_14
W140 RED_14
W238 BRN_14
W239 BRN_14
W240 BRN_14
W131 BLU_16
W219 PNK_14
GND2-2
GND2-3
W229 J1939 YELLOW
W230 J1939 GREEN
W231 J1939 GRAY
A1 B1 C1 A2 B2 C2
E10
A3 B3 C3
W141 J1939 GRAY
W138 J1939 GREEN
W139 J1939 YELLOW

R4
CAN TERMINATOR
A B C
P11
A B C
W127 J1939 YELLOW
W128 J1939 GREEN
W169 J1939 GRAY
W152 J1939 GREEN
W151 J1939 YELLOW
A1 B1 C1 A2 B2 C2
E11
A3 B3 C3
W185 J1939 YELLOW
W186 J1939 GREEN
W187 J1939 GRAY
P7
W153 RED_14
W155 RED-ORN_14
W161 BRN_14
W191 YEL_16
W192 GRN_16
W193 GRY_16
J1
AUTO START OPTION
A1 B1 C1 A2 B2 C2
E12
A3 B3 C3
W188 J1939 YELLOW
W189 J1939 GREEN
W190 J1939 GRAY
P15
W154 RED_14
W156 RED-ORN_14
W015 BRN_14
W194 YEL_16
W195 GRN_16
W196 GRY_16
J15
CAN DROP WITH PWR
A1 B1 C1 A2 B2 C2
E14
A3 B3 C3

WIRE				FROM			TO		
NAME	TYPE	AWG	COLOR	REF DES	REF 2	TERM	REF 1	REF 2	TERM
W001	GXL	8	BROWN	B1-NEG	1	1526282-2	E2	1	SPLICE
W002	SXL	4	BROWN	B1-NEG	1	1526282-2	GND2-1	1	31812
W003	GXL	8	BROWN	E4	1	SPLICE	E5	1	SPLICE
W004	GXL	16	BROWN	P3	X	1062-16-0122	E5	1	SPLICE
W005	GXL	16	BROWN	K1-B	1	34123	E2	1	SPLICE
W007	GXL	16	BROWN	K2	5	1206661 4	E2	1	SPLICE
W008	GXL	16	BROWN	P1	3	1062-16-0122	E5	1	SPLICE
W009	GXL	16	BROWN	P1	31	1062-16-0122	E5	1	SPLICE
W010	GXL	16	BROWN	S10-2	1	41450	E2	1	SPLICE
W011	GXL	16	BROWN	U1	F	12124580	E3	1	SPLICE
W013	GXL	16	BROWN	S9-2	1	41274	E4	1	SPLICE
W014	GXL	12	BRN	B2-2	1	41450	E2	1	SPLICE
W015	GXL	14	BRN	P15	3	1062-14-0144	E2	1	SPLICE
W016	GXL	16	BROWN	L1-2	1	41450	E4	1	SPLICE
W017	GXL	16	BROWN	D1-A	1	60660-1	L1-2	1	41450
W018	GXL	16	BROWN	L2-2	1	41450	E2	1	SPLICE
W074	GXL	12	RED	B1_POS	1	320344	F1	A	12033997
W075	GXL	12	RED	E19	1	SPLICE	P3	B	0462-203-12141
W077	GXL	10	RED	B1_POS	1	320344	F2	A	12033997
W078	GXL	12	RED	B1_POS	1	320344	F3	A	12033997
W080	GXL	10	RED	F2	B	12033997	E16	1	SPLICE
W081	GXL	12	RED-ORN	P3	D	0462-203-12141	E13	1	SPLICE
W082	GXL	16	BLUE	R5	1	SPLICE	P3	A	1062-16-0122
W083	GXL	16	BLUE	P1	19	1062-16-0122	P3	C	1062-16-0122
W084	GXL	16	BLUE	P1	30	1062-16-0122	E6	1	SPLICE
W085	GXL	16	BLUE	P1	32	1062-16-0122	P3	H	1062-16-0122
W086	GXL	16	BLUE	P1	33	1062-16-0122	P3	J	1062-16-0122
W087	GXL	16	BLUE	P1	36	1062-16-0122	P3	K	1062-16-0122
W089	GXL	16	BLUE	P1	29	1062-16-0122	K2	2	12066614
W090	GXL	12	RED	K2	1	12033997	F3	B	12033997
W091	GXL	12	BLU	K2	4	12033997	B2-1	1	41450
W092	GXL	8	BROWN	E4	1	SPLICE	E3	1	SPLICE
W093	GXL	8	BROWN	E3	1	SPLICE	E2	1	SPLICE
W094	GXL	16	BLUE	P1	2	1062-16-0122	S10-1	1	41450
W095	GXL	16	YELLOW	P1	4	1062-16-0122	RT1	A	12077411
W096	GXL	16	YELLOW	P1	5	1062-16-0122	RT2	A	12077411
W097	GXL	16	BROWN	E9	1	SPLICE	P1	6	1062-16-0122
W098	TXL	18	ORANGE	P1	7	1062-16-0122	PT1	C	15326267
W099	GXL	16	BROWN	P1	8	1062-16-0122	E8	1	SPLICE
W100	TXL	18	ORANGE	P1	9	1062-16-0122	PT2	C	15326267
W101	GXL	16	VIOLET	P1	10	1062-16-0122	E7	1	SPLICE
W102	GXL	16	BLUE	P1	18	1062-16-0122	U1	E	12124580
W105	GXL	16	BLUE	P1	16	1062-16-0122	P13	3	1062-16-0144
W106	GXL	16	BLUE	P1	17	1062-16-0122	U1	C	12124580
W107	GXL	16	RED/ORN	P1	20	1062-16-0122	E13	1	SPLICE
W108	GXL	16	BLUE	P1	21	1062-16-0122	S9-1	1	41274
W110	GXL	16	BLUE	P1	25	1062-16-0122	L1-1	1	41450
W111	GXL	16	BLUE	U1	A	12124580	P3	R	1062-16-0122
W112	GXL	16	BROWN	U1	B	12124580	E3	1	SPLICE
W113	GXL	16	BROWN	U1	D	12124580	E3	1	SPLICE
W114	GXL	16	ORANGE	P3	N	1062-16-0122	RT3	1	34122
W115	GXL	16	ORANGE	P3	S	1062-16-0122	RT4	1	34122
W116	GXL	16	ORANGE	P3	T	1062-16-0122	RP1	1	34122
W117	GXL	16	BLUE	P3	V	1062-16-0122	R1-1	1	41450
W118	GXL	16	BLUE	P3	W	1062-16-0122	L3-1	1	41450
W119	TXL	18	BROWN	PT1	A	15326267	E8	1	SPLICE
W120	TXL	18	VIOLET	E7	1	SPLICE	PT1	B	15326267
W121	TXL	18	BROWN	PT2	A	15326267	E8	1	SPLICE
W122	TXL	18	VIOLET	E7	1	SPLICE	PT2	B	15326267
W123	GXL	16	BROWN	E9	1	SPLICE	RT2	B	12077411

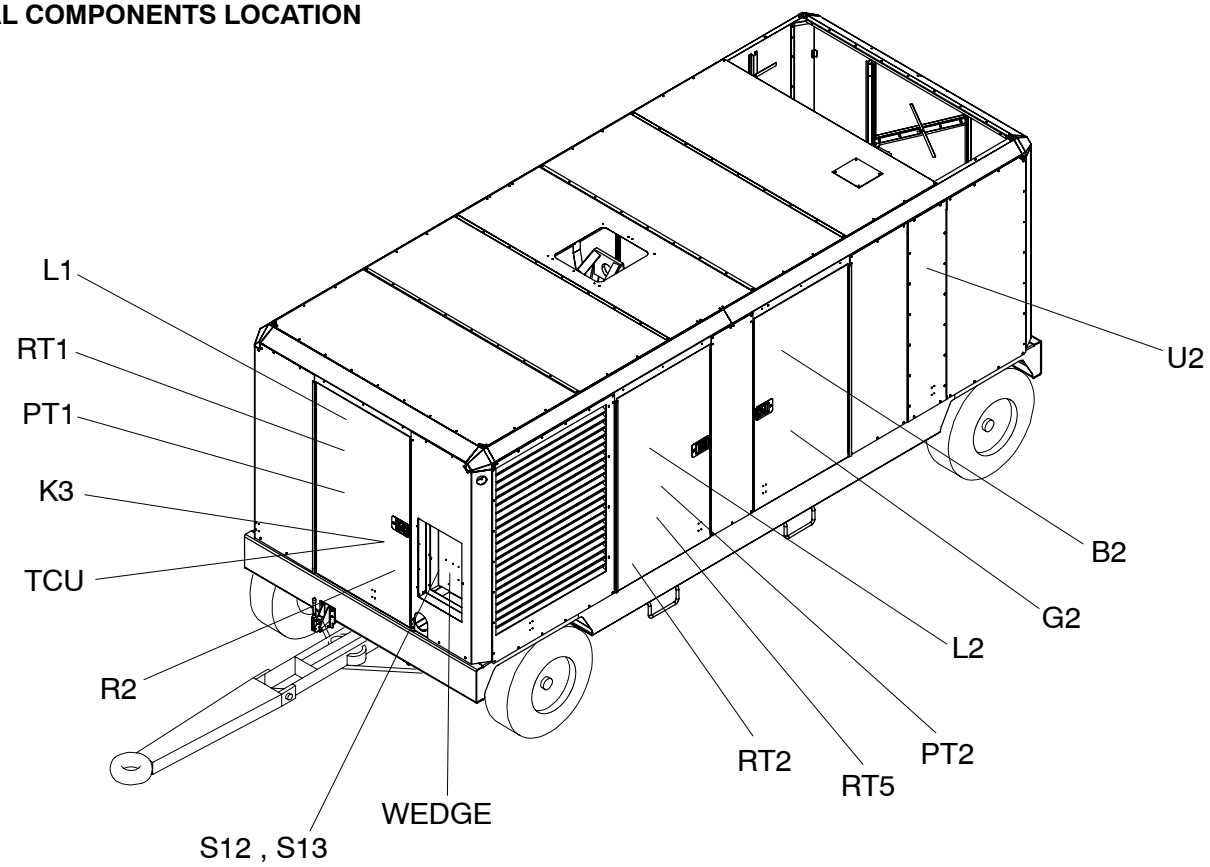
WIRE				FROM			TO		
NAME	TYPE	AWG	COLOR	REF DES	REF 2	TERM	REF 1	REF 2	TERM
W124	GXL	16	BROWN	E9	1	SPLICE	RT1	B	12077411
W125	GXL	16	BLUE	D1-C	1	60798-2	L1-1	1	41450
W126	GXL	16	BLUE	P1	39	1062-16-0122	L2-1	1	41450
W127			YELLOW	P11	A	1062-16-0144	E11	A1	SPLICE
W128			GREEN	P11	B	1062-16-0144	E11	B1	SPLICE
W129	GXL	16	YELLOW	P9	4	1062-16-0144	K1-A	1	34123
W131	GXL	16	BLUE	P1	38	1062-16-0122	P2	66	1062-16-0144
W132	GXL	12	RED/YEL	K1-2	1	33459	B1-S	1	33457
W133	GXL	16	RED/ORN	P1	40	1062-16-0122	E13	1	SPLICE
W135	GXL	12	RED	B1_POS	1	320344	K1-1	1	33459
W138			GREEN	E10	B3	SPLICE	E14	B3	SPLICE
W139			YELLOW	E10	A3	SPLICE	E14	A3	SPLICE
W140	GXL	14	RED	P2	53	1062-14-0144	E16	1	SPLICE
W141			GRAY	E10	C3	SPLICE	E14	C3	SPLICE
W142	GXL	14	RED	P2	52	1062-14-0144	E16	1	SPLICE
W143	GXL	14	RED	P2	48	1062-14-0144	E16	1	SPLICE
W147	GXL	16	BLUE	P2	3	1062-16-0144	U2	B	12048074
W148	GXL	16	BLUE	P2	49	1062-16-0144	U2	A	12048074
W149	GXL	16	BLUE	P2	4	1062-16-0144	U2	C	12048074
W151			YELLOW	P1	35	1062-16-0144	E11	A2	SPLICE
W152			GREEN	P1	34	1062-16-0144	E11	B2	SPLICE
W153	GXL	14	RED	E19	1	SPLICE	P7	1	1062-14-0144
W154	GXL	14	RED	E19	1	SPLICE	P15	1	1062-14-0144
W155	GXL	14	RED-ORN	E13	1	SPLICE	P7	2	1062-14-0144
W156	GXL	14	RED-ORN	E13	1	SPLICE	P15	2	1062-14-0144
W157	GXL	16	RED/ORN	E13	1	SPLICE	P13	1	1062-16-0144
W158	GXL	16	BROWN	P13	4	1062-16-0144	E5	1	SPLICE
W159	GXL	16	BLUE	E6	1	SPLICE	P3	F	1062-16-0122
W160	GXL	16	BLUE	E6	1	SPLICE	P13	2	1062-16-0144
W161	GXL	14	BRN	E5	1	SPLICE	P7	3	1062-14-0144
W162	GXL	16	BLUE	S11-1	1	41274	S10-1	1	41450
W163	GXL	16	BROWN	S11-2	1	41274	S10-2	1	41450
W164	GXL	16	BROWN	D2-A	1	60660-1	L2-2	1	41450
W165	GXL	16	BLUE	D2-C	1	60798-2	L2-1	1	41450
W169			GRAY	P11	C	1062-16-0144	E11	C1	SPLICE
W170	GXL	16	BLUE	D3-C	1	60798-2	L3-1	1	41450
W171	GXL	16	BROWN	D3-A	1	60660-1	L3-2	1	41450
W172	GXL	16	BLUE	P3	P	1062-16-0122	G1	1	08911072
W178	GXL	16	YELLOW	K1-A	1	34123	D4-C	1	60798-2
W179	GXL	16	BROWN	K1-B	1	34123	D4-A	1	60660-1
W181	GXL	16	BROWN	R1-2	1	41274	E4	1	SPLICE
W182	GXL	16	BROWN	R3-2	1	41274	E2	1	SPLICE
W183	GXL	16	BLUE	R1-1	1	41450	R3-1	1	41274
W184	GXL	12	RED	E19	1	SPLICE	F1	B	12033997
W185			YELLOW	E11	A3	SPLICE	E12	A1	SPLICE
W186			GREEN	E11	B3	SPLICE	E12	B1	SPLICE
W187			GRAY	E11	C3	SPLICE	E12	C1	SPLICE
W188			YELLOW	E12	A3	SPLICE	E14	A1	SPLICE
W189			GREEN	E12	B3	SPLICE	E14	B1	SPLICE
W190			GRAY	E12	C3	SPLICE	E14	C1	SPLICE
W191	GXL	16	YELLOW	P7	4	1062-16-0144	E12	A2	SPLICE
W192	GXL	16	GREEN	P7	5	1062-16-0144	E12	B2	SPLICE

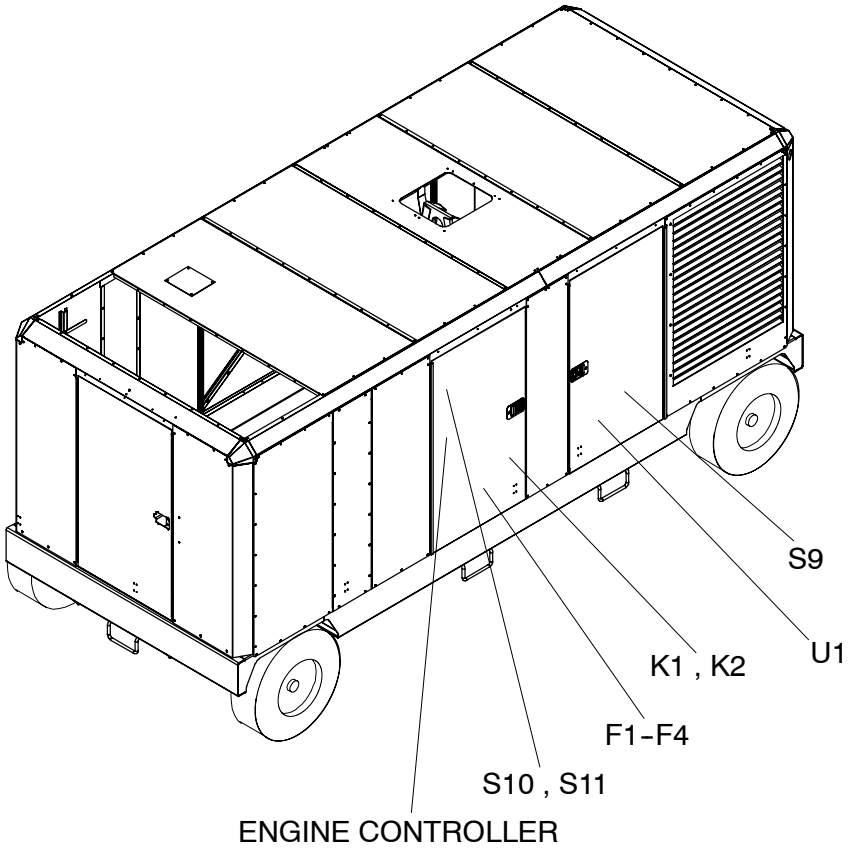
WIRE				FROM			TO		
NAME	TYPE	AWG	COLOR	REF DES	REF 2	TERM	REF 1	REF 2	TERM
W193	GXL	16	GRAY	P7	6	1062-16-0144	E12	C2	SPLICE
W194	GXL	16	YELLOW	E14	A2	SPLICE	P15	4	1062-16-0144
W195	GXL	16	GREEN	E14	B2	SPLICE	P15	5	1062-16-0144
W196	GXL	16	GRAY	E14	C2	SPLICE	P15	6	1062-16-0144
W197	GXL	16	BROWN	L3-2	1	41450	E2	1	SPLICE
W202	GXL	16	GRAY	E10	C2	SPLICE	P2	42	1062-16-0144
W203	GXL	16	BLUE	P1	12	1062-16-0122	G2-1	1	34122
W204	GXL	16	BROWN	G2-2	1	34122	B1-NEG	1	1526282-2
W207	GXL	14	PINK	P1	24	1062-14-0122	P9	1	1062-14-0144
W208	GXL	14	PINK	E23	1	SPLICE	P1	22	1062-14-0122
W213	GXL	16	YELLOW	P1	28	1062-16-0122	P9	3	1062-16-0144
W214	GXL	14	PINK	P9	2	1062-14-0144	E23	1	SPLICE
W215	GXL	14	PINK	J9	2	1060-14-0144	J9	1	1060-14-0144
W217	GXL	16	YELLOW	J9	3	1060-16-0144	J9	4	1060-16-0144
W219	GXL	14	PINK	E23	1	SPLICE	P2	70	1062-14-0144
W220	GXL	16	BLUE	P1	11	1062-16-0122	S14-1	1	41274
W221	GXL	16	BROWN	S14-2	1	41274	E4	1	SPLICE
W222	GXL	16	BLUE	P1	23	1062-16-0122	R5	1	SPLICE
W223	GXL	16	BROWN	R5	2	SPLICE	E5	1	SPLICE
W224	GXL	16	YELLOW	E10	A2	SPLICE	P2	50	1062-16-0144
W225	GXL	16	GREEN	E10	B2	SPLICE	P2	34	1062-16-0144
W226	GXL	16	YELLOW	J63	G	1060-16-0144	E15	A2	SPLICE
W227	GXL	16	GREEN	J63	F	1060-16-0144	E15	B2	SPLICE
W228	GXL	16	GRAY	J63	C	1060-16-0144	E15	C2	SPLICE
W229			YELLOW	E10	A1	SPLICE	E15	A3	SPLICE
W230			GREEN	E10	B1	SPLICE	E15	B3	SPLICE
W231			GRAY	E10	C1	SPLICE	E15	C3	SPLICE
W232			YELLOW	E15	A1	SPLICE	P12	A	1062-16-0144
W233			GREEN	E15	B1	SPLICE	P12	B	1062-16-0144
W234			GRAY	E15	C1	SPLICE	P12	C	1062-16-0144
W235	GXL	14	PINK	E23	1	SPLICE	J63	A	1060-14-0144
W236	GXL	16	BLUE	P2	8	1062-16-0144	J63	D	1060-16-0144
W237	GXL	16	BLUE	P2	9	1062-16-0144	J63	E	1060-16-0144
W238	GXL	14	BRN	P2	61	1062-14-0144	GND2-2	1	33220
W239	GXL	14	BRN	P2	63	1062-14-0144	GND2-2	1	33220
W240	GXL	14	BRN	P2	65	1062-14-0144	GND2-3	1	33220
W241	GXL	14	BRN	J63	B	1060-14-0144	GND2-3	1	33220

SECTION 6

ELECTRONIC COMPONENT LOCATION DRAWINGS

ELECTRICAL COMPONENTS LOCATION





HARNESS CONNECTOR LOCATIONS

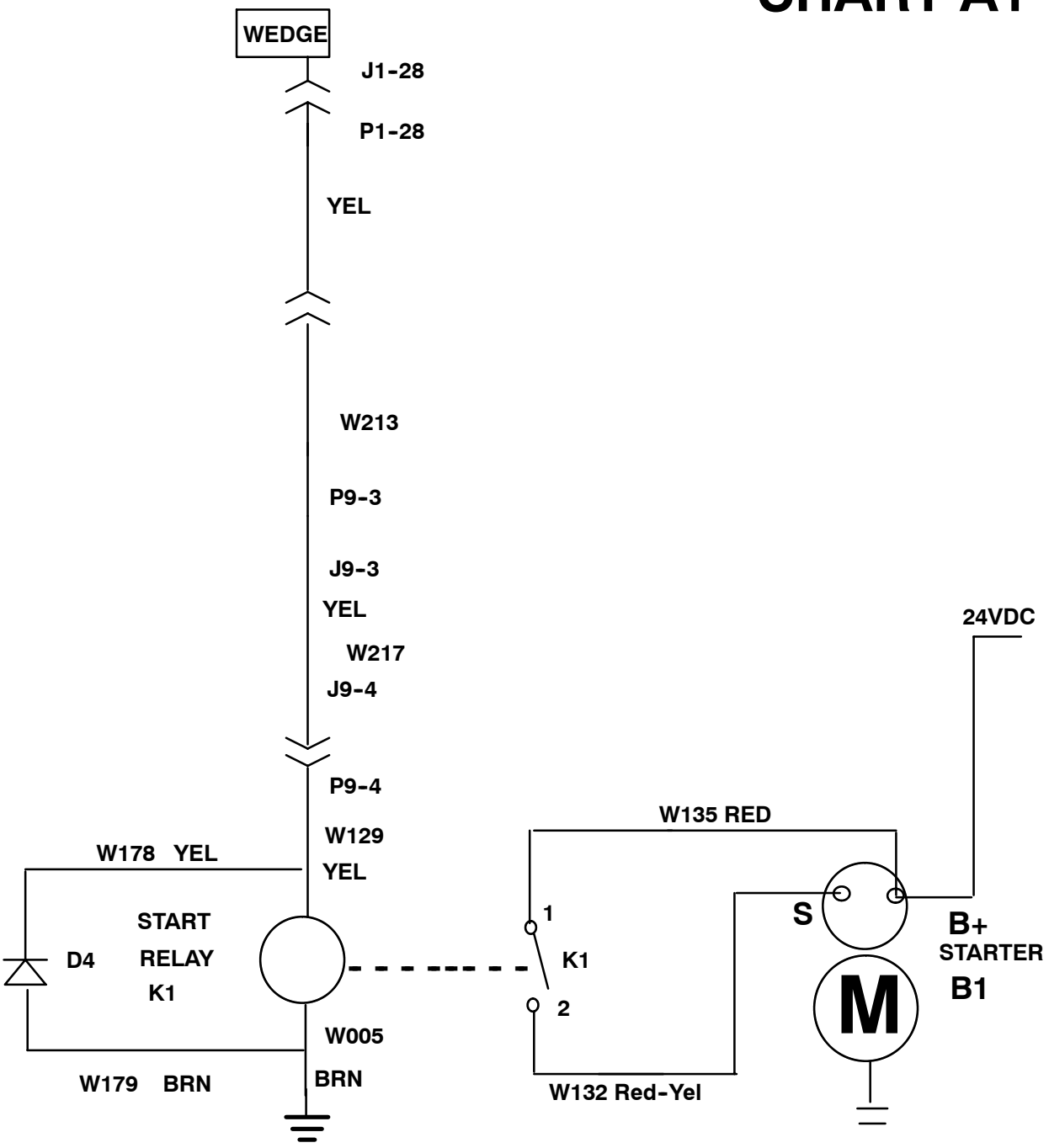
J1:	Located on back of WEDGE controller
J2:	70 pin connector located on engine electronic controller
P3:	21 pin connector located on back of control panel box
P12:	3 pin connector for termination resistor on CAN backbone near Engine electronic controller
P7:	6 pin connector for auto start option, located behind control panel
P9:	4 pin connector for the ESA emergency stop button, located behind control panel
P11:	3 pin connector for termination resistor on CAN backbone near WEDGE controller
P13:	4 pin connector for IQ System option located behind control panel
P15:	6 pin connector for various options, located at lifting bail
J5:	9 pin connector for RS232 communications, located behind control panel

SECTION 7

INDIVIDUAL CIRCUIT DIAGRAMS

ENGINE START CIRCUIT

CHART A1



CIRCUIT DESCRIPTION

The WEDGE drives the engine starter through the auxiliary start relay, K1.

K1 is mounted on the lifting rail near the engine.

K1 has a single set of contacts that connect to the starter solenoid.

Diode D4 is for field suppression across K1's coil.

The control signal leaving the WEDGE on J1-28 passes through the W1 harness and through a jumper plug. The jumper plug is replaced with an ESTOP switch for ESA versions.

CIRCUIT TROUBLESHOOTING

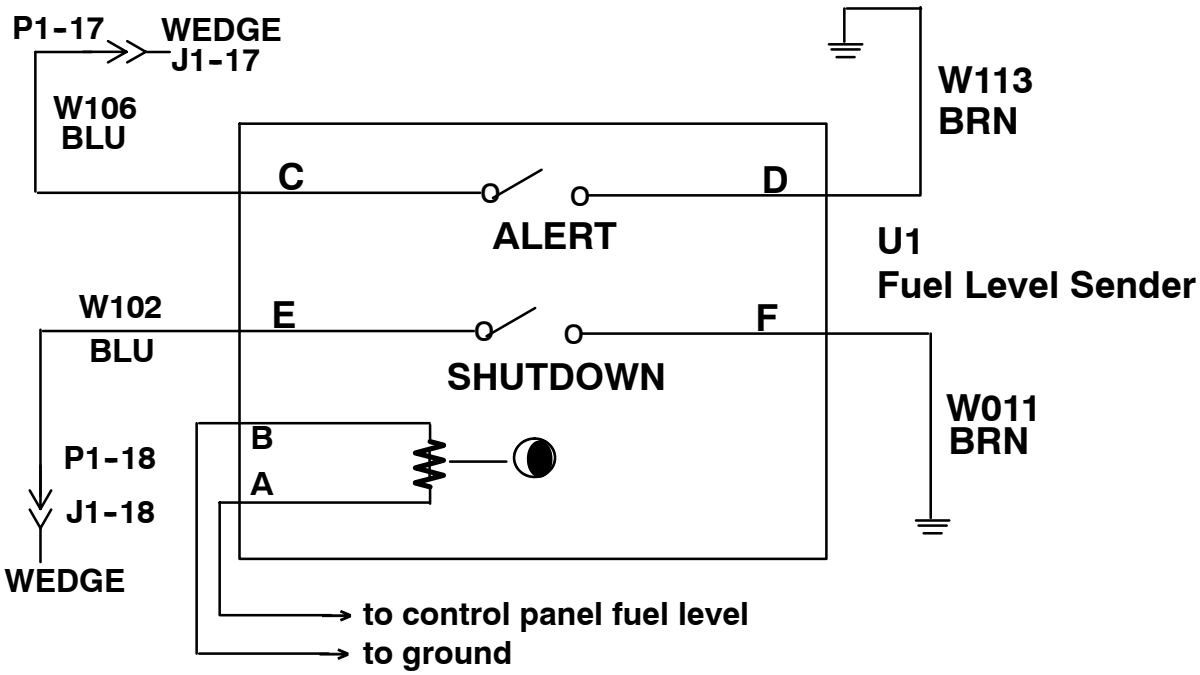
If the starter will not engage during a crank cycle, check the voltage at the coil of K1 during the crank cycle. It should be 14-22VDC. If voltage is not at K1, check for voltage back through the ESTOP jumper and to the WEDGE.

If voltage is at K1 coil, verify voltage is sent to the starter solenoid by K1 contact.

Voltage available at the starter solenoid during a no-crank condition indicates a starter problem.

FUEL SENDER CIRCUIT

CHART B1



CIRCUIT DESCRIPTION

The fuel sender is a resistive device that sends a 10–180 ohm signal to the fuel gauge indicating fuel level. It also contains two switches, one for low fuel level and another that will shutdown the machine when the fuel reaches this level. These two switch inputs connect to the WEDGE controller.

CIRCUIT TROUBLESHOOTING

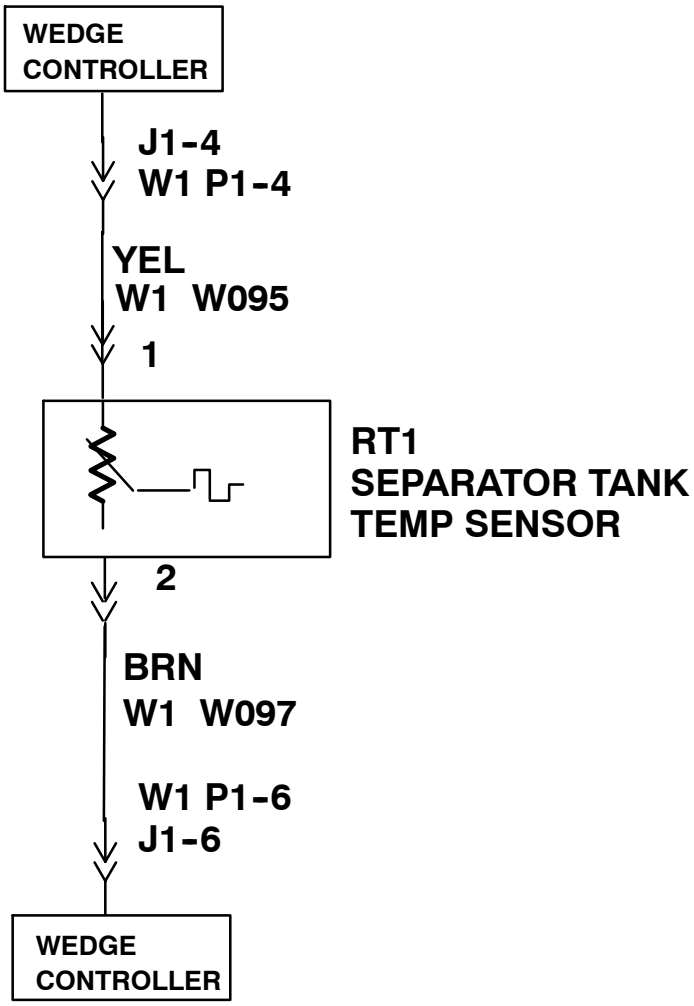
If the fuel reading appears incorrect, check the fuel level in the tanks to see if it corresponds with the gauge. If not, remove the fuel sender and disconnect the harness plug. Connect an ohmeter across terminals A and B on the Packard Weather–Pack connector. Tilting the sender tube should produce resistance reading between 10 and 180 ohms. If not, replace the sender.

The two switches can be checked with the sender removed from the tank. Use an ohmeter to verify switch operation. Tilting the sender tube back and forth should activate the switches.

RT1 SEPARATOR TANK TEMPERATURE CIRCUIT

CHART C1

Temp °C	Temp °F	Resistance (Ohms)
-20	-4	25,490
-10	14	18,088
-5	23	12,221
0	32	9,369
5	41	7,240
15	59	4,427
25	77	2,786
40	104	1460
60	140	668.7
70	158	467.2
90	194	241.0
100	212	177.5
105	221	153.1
110	230	132.8



CIRCUIT DESCRIPTION

Separator tank temperature is read by RT1 thermistor. It is mounted in the side of the separator tank and connects to the W1 harness. The temperature range is -30 to 255°F. The thermistor is a 10K ohm device.

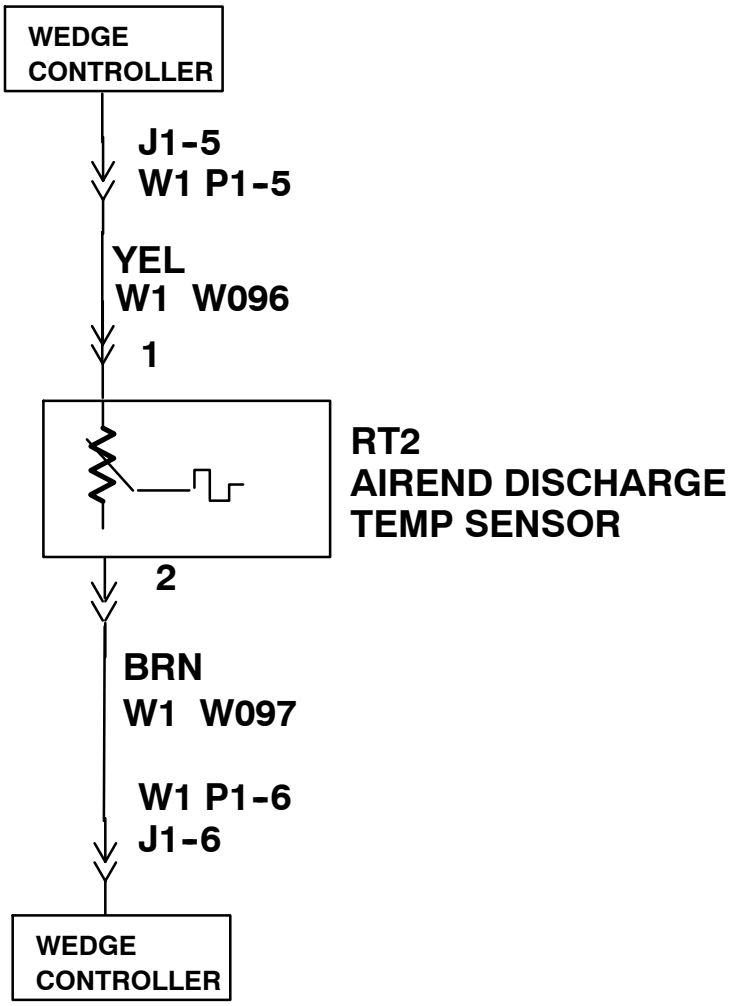
CIRCUIT TROUBLESHOOTING

If the WEDGE Controller has an incorrect reading for the RT1 channel, disconnect the thermistor and install the Thermistor Simulator Plug (PN 22073878) into the harness connector. Read the channel again and it should read 32 degrees F ± 5 degrees (0C ± 3C). If the reading is correct, replace the thermistor. If not, disconnect the WEDGE Controller P1 connector. Connect an ohmmeter between pins P1-4 and P1-6. The ohmmeter should read 33.2K ohms ±1%. If the reading is correct, replace the WEDGE Controller. If not, there is a problem with the W1 harness or the P1-4, P1-6 connector pins.

RT2 AIREND DISCHARGE TEMP

CHART D1

Temp °C	Temp °F	Resistance (Ohms)
-20	-4	25,490
-10	14	18,088
-5	23	12,221
0	32	9,369
5	41	7,240
15	59	4,427
25	77	2,786
40	104	1460
60	140	668.7
70	158	467.2
90	194	241.0
100	212	177.5
105	221	153.1
110	230	132.8



CIRCUIT DESCRIPTION

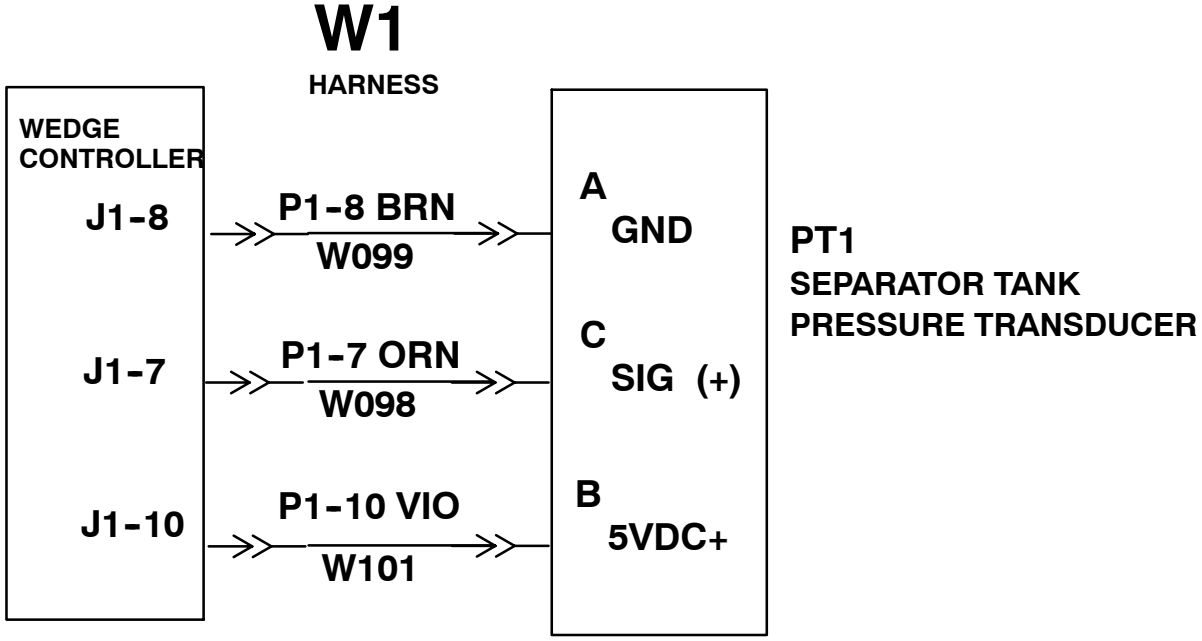
Airend discharge temperature is read by RT2 thermistor. It is mounted in the airend discharge piping and connects to the W1 harness. The temperature range is -30 to 255°F.

CIRCUIT TROUBLESHOOTING

If the WEDGE Controller has an incorrect reading for the RT2 channel, disconnect the thermistor and install the Thermistor Simulator Plug (PN 22073878) into the harness connector. Read the channel again and it should read 32 degrees F ± 5 degrees (0C ± 3C). If the reading is correct, replace the thermistor. If not, disconnect the WEDGE Controller P1 connector. Connect an ohmmeter between pins P1-5 and P1-6. The ohmmeter should read 33.2K ohms ±1%. If the reading is correct, replace the WEDGE Controller. If not, there is a problem with the W1 harness or the P1-5, P1-6 connector pins.

PT1 SEPARATOR TANK PRESSURE CIRCUIT

CHART E1



CIRCUIT DESCRIPTION

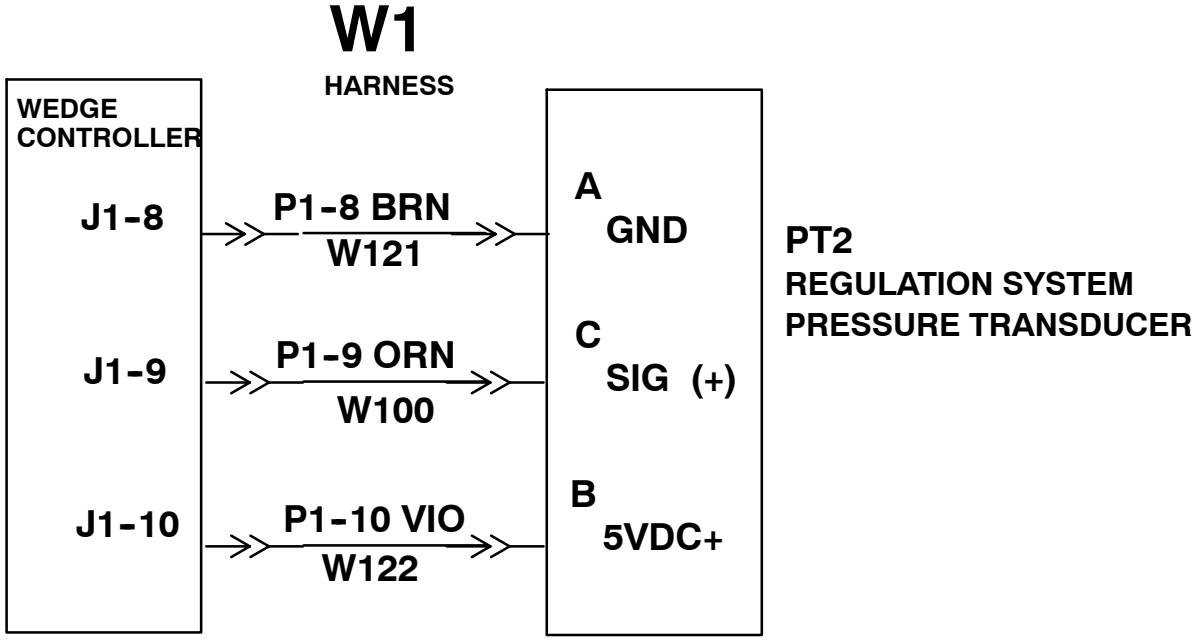
The WEDGE reads separator tank pressure from PT1. It is a gauge pressure transducer mounted on the separator tank. The WEDGE provides 5 VDC excitation voltage to pin B (+5) and pin A (GND). The pressure signal on pin C connects to the WEDGE input. The signal range is .45 to 4.5 volts. The transducer range is 0 to 500 psig.

CIRCUIT TROUBLESHOOTING

To verify the operation of PT1, connect a gauge in parallel with it. The test gauge should be at least 1% accuracy to match accuracy of PT1. Use the WEDGE diagnostics to display the readings of PT1. If PT1 does not track the test gauge, replace it.

PT2 REGULATION SYSTEM PRESSURE CIRCUIT

CHART F1



CIRCUIT DESCRIPTION

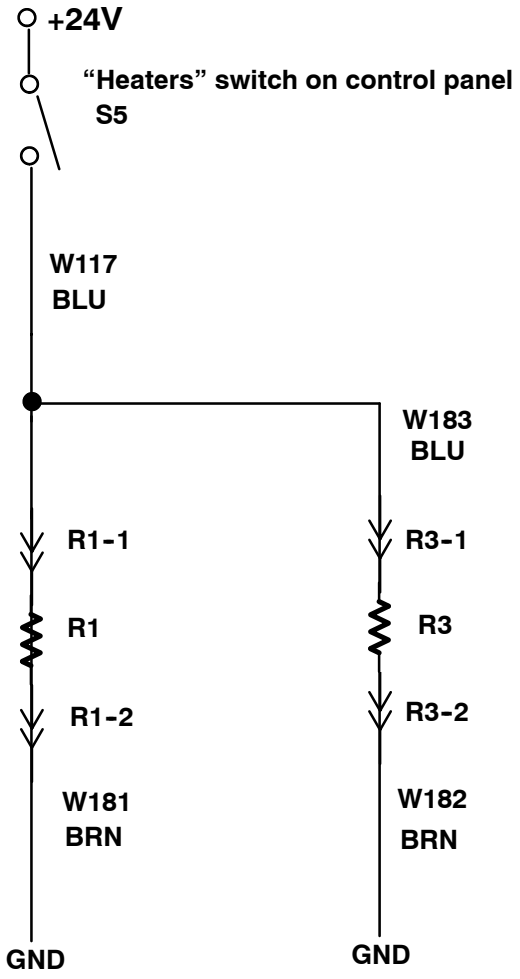
The WEDGE reads regulation system pressure from PT2. It is a gauge pressure transducer mounted near the inlet unloader. The WEDGE controller provides 5 VDC excitation voltage to pin B (+5) and pin A (GND). The pressure signal on pin C connects to the WEDGE input. The signal range is .45 to 4.5 volts. The transducer range is 0 to 100 psig.

CIRCUIT TROUBLESHOOTING

To verify the operation of PT2, connect a gauge in parallel with it. The test gauge should be at least 1% accuracy to match the accuracy of PT2. Use the WEDGE diagnostics to display the readings of PT2. If PT2 does not track the test gauge, replace it.

DC HEATER CIRCUIT

CHART G1



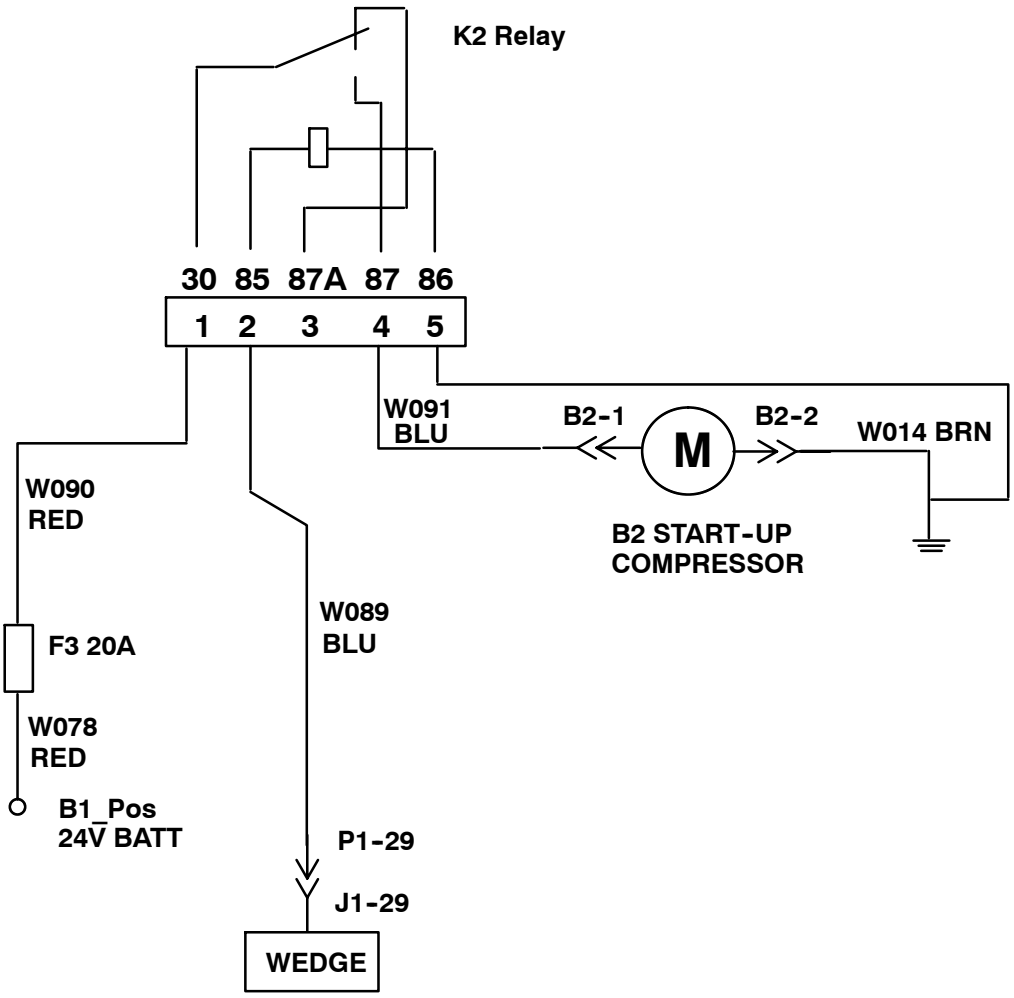
R1 = Regulation Heater
R3 = Orifice Heater

CIRCUIT DESCRIPTION

A DC heater system is provided to prevent the orifices from freezing in cold temperatures. It is turned on by control panel switch, S4. Fuse F1, a 20 amp fuse, supplies power to the heaters.

B2 STARTUP AIR COMPRESSOR

CHART H1



CIRCUIT DESCRIPTION

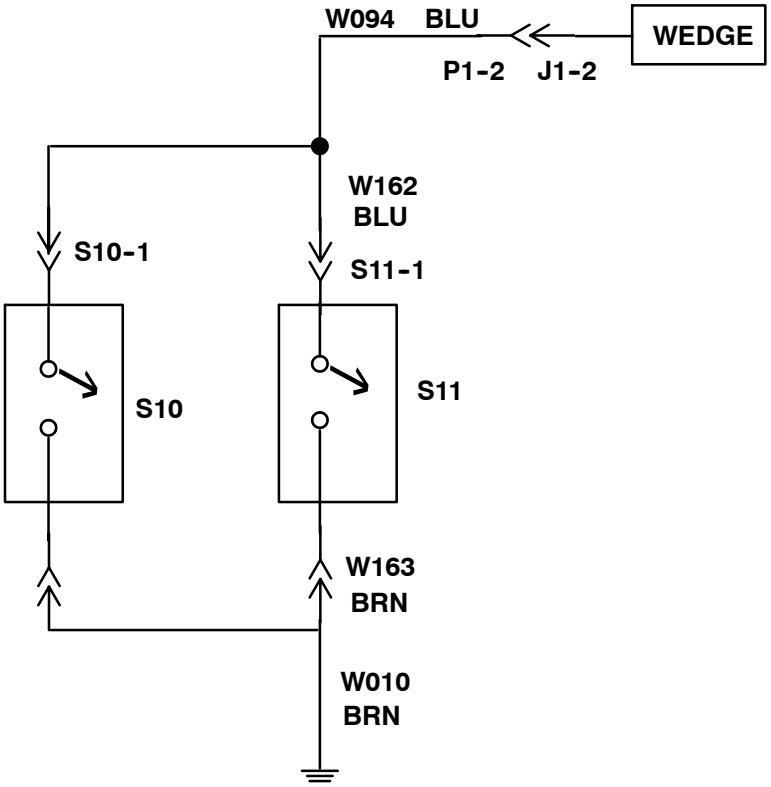
The WEDGE connects to the startup compressor through relay K2. The startup compressor is activated at engine crank to provide air to close the inlet valve to the airend. The circuit is protected by a 20 amp fuse, F3. The K2 relay is activated by one of the high side driver outputs on the WEDGE controller, through P1-29.

CIRCUIT TROUBLESHOOTING

The start compressor activate signal is turned on at engine crank for 10 seconds. At all other times it is off. First ensure the fuse F3 is not blown. Then verify the control signal from the WEDGE to the K2 relay is activated at engine crank. This can be measured at P1-29 at the WEDGE or at pin 2 (85) on K2 relay.

S10, S11 AIR FILTER SWITCHES

CHART I1



CIRCUIT DESCRIPTION

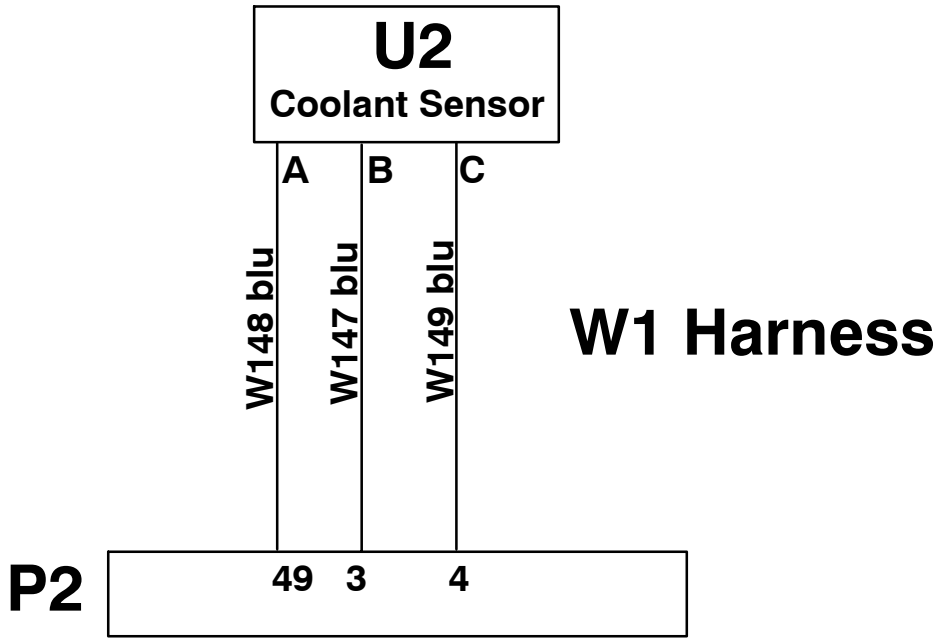
The WEDGE reads the air filter switches, S10 and S11. S10 is connected to the compressor air filter and S11 is connected to the engine air filter. These are normally open switches and close when the air filter restriction reaches 20 inches of water. The switches provide a ground connection to an opto coupler input on the WEDGE controller.

CIRCUIT TROUBLESHOOTING

To verify the circuit operation, another type of switch can be substituted for the filter switch, or a wire jumper can be used to activate the circuit. Disconnect S10 and S11 and install the test switch or jumper. Closing the test switch or installing the jumper should activate the circuit, and the “Air Filter” alarm light on the control panel should light. Forcing the alarm lamp to turn on and off will verify proper circuit operation.

U2 ENGINE COOLANT LEVEL SENSOR

CHART K1



CIRCUIT DESCRIPTION

The engine coolant level sensor is a capacitive probe mounted in the radiator top tank. The probe connects to the engine controller. The probe has two complementary outputs (when one is on, the other is off). The sensor is powered by a 5VDC supply from the engine controller. The sensor connects to the engine controller at the J2 connector, near the engine controller.

CIRCUIT TROUBLESHOOTING

If the probe fails shorted, it can pull down the 5VDC supply and cause other sensors to not function properly. Generally, a engine fault code of 21 indicates a 5VDC power supply problem. If a sensor problem is suspected, check to see if engine fault codes have been set.

The probe can be tested, using a container of water. Pin C connects to +5VDC, Pin B to ground. Pins A and D are the two outputs. Using a container of water, they should operate as follows:

Pin	Out Of Water	In Water
A	5.0V	0V
D	0V	5.0 V

SECTION 8

ELECTRICAL CONNECTOR INFORMATION

CONNECTOR PARTS INFORMATION

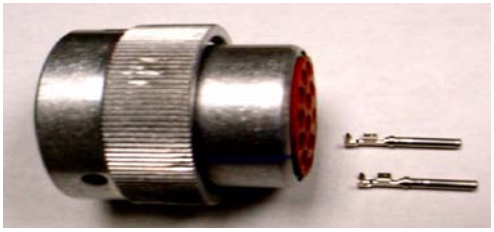
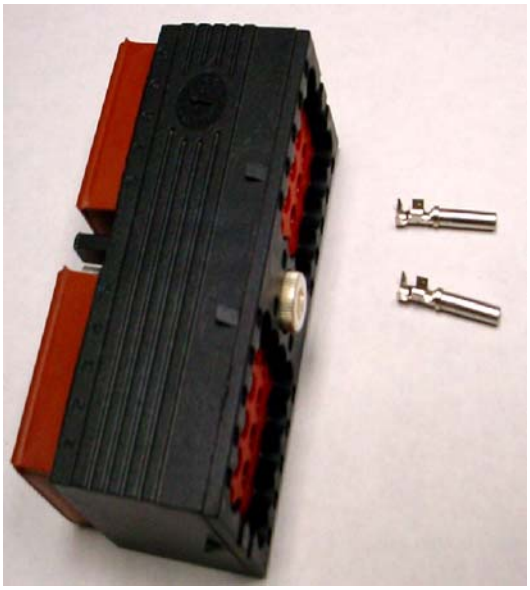
The following is a list of the connector parts used with the harnesses and devices. Most connectors consist of 1 to 4 items per side (harness or device). The devices can be located on the schematics and then referenced to this list.

PART	Manufacturer	Part No.
RT1, RT2		
Plug, 2 Way	Packard	22869515
TPA, 2 Way	Packard	22969523
Seal, Cable	Packard	54750567
Contact, Female	Packard	22869531
PT1,PT2		
Plug, 3 Way	Packard	22869499
TPA, 3 Way	Packard	22869754
Seal, Cable	Packard	22869762
Contact, Female; 18AWG	Packard	22869507
U1, Fuel Level		
Plug, 6 Way	Packard	22869416
Seal, Cable	Packard	54750567
Contact, Female	Packard	54750526
P1, Wedge Controller		
Plug, 40 Way	Deutsch	22868939
Socket, 16 AWG, Tin Stamp	Deutsch	22869044
Socket, 16 AWG, Gold Stamp	Deutsch	22869069
Socket, 14 AWG, Tin Stamp	Deutsch	22868947
P2, Caterpillar ECM		
Plug, 70 Way	AMP	22869804
Backshell, 70 Way	AMP	22869770
Socket, 14 AWG, Tin Stamp	Deutsch	22868947
Socket, 16 AWG, Gold Stamp	Deutsch	22869069
U2, Coolant Level Sensor		
Plug, 4 Way	Packard	54750658
TPA, 4 Way	Packard	22869473
Seal, Cable	Packard	54750682
Plug, Sealing	Packard	22869465
Contact, Female	Packard	54750674

PART	Manufacturer	Part No.
J63, Engine Service		
RCPT, 9 Way	Deutsch	22869077
Conn. Cap w/lanyard	Deutsch	22689085
Pin, 16 AWG, Gold Stamp	Deutsch	22869093
Plug, Sealing, Size 12–16	Deutsch	22868954
P11, P12		
Plug, 3 Way	Deutsch	22869150
Wedge, 3 Way	Deutsch	22870000
Socket, 16 AWG, Gold Stamp	Deutsch	22869069
P3, Control Panel		
Plug, 21 Way	Deutsch	
Plug, Sealing, 12–16 AWG	Deutsch	
Socket, 12 AWG, Tin Stamp	Deutsch	
Socket, 16 AWG, Tin Stamp	Deutsch	
F1, F3; Fuses		
Connector, Fuse, 12 AWG	Packard	
Terminal, Female, 12–10 AWG	Packard	
Cover, Fuse	Packard	
F2, Fuse		
Connector, Fuse, 16 AWG	Packard	22869150
Terminal, Female, 12–10 AWG	Packard	22870000
Cover, Fuse	Packard	22869069
D1–D4, Diodes		
Diode, Molded M/F	Portable Power	35376169
Connector, Overmold M/F	Portable Powe	36882694
SHUR, RCPT .180 dia.	AMP	22869606
SHUR, Plug .180 dia.	AMP	22869598
K2, Relay		
Connector, Relay, 4 way	Packard	22869440
Terminal, Female, 12–10 AWG	Packard	22869432
Terminal, Female 16–14 AWG	Packard	22869424
P9, P13		
Plug, 4 way	Deutsch	22869002
Socket, 16 AWG, Gold Stamp	Deutsch	22869069
Wedge, Lock, 4 way	Deutsch	22869028
P7, P15		
Plug, 6 way	Deutsch	22868988
Socket, 16 AWG, Gold Stamp	Deutsch	22869069
Wedge, Lock, 6 way	Deutsch	22868996
R4, R6; Can Terminator		
Resistor, Plug Assy	Deutsch	54750633

Removal Tool Usage

TERMINAL P/N	Manufacturer	Removal Tool P/N
54699525	Deutsch	54699624
22869044	Deutsch	54699632
22869069	Deutsch	54699632
22868947	Deutsch	54699624
22869093	Deutsch	54699632
22869531	Packard	54749643
22869507	Packard	54749643
54750526	Packard	54749643
54750674	Packard	54749643
54699525	Packard	54749643
22869044	Packard	54749643
22869432	Packard	54749643
22869424	Packard	54749643

Deutsch DT Series Connector (Note the orange wedgelock)	
Packard Metri Pack Series Connector (Note the green wire seals and blue Terminal Position Assurance Connection)	
Deutsch HD Series Connector	
Deutsch DRC Series Connector It is very important that connectors be properly assembled. Use of the correct pin crimp tool is required to ensure high quality terminations. The manufacturer's instructions must be followed as to selection and use of crimp tools. Improper crimps not only provide unreliable connections but can damage the connector housing. Troubleshooting Harnesses – For extensive harness troubleshooting, a detailed schematic will be required. Splice location details can be very useful since problems do occur at splices. The proper test adapters are recommended for harness troubleshooting. Some examples of these are shown in Section 2 concerning multimeters. Use of these adapters will prevent harness damage during testing. The first item to perform during harness troubleshooting is a physical inspection of the harness for damage. Look for cut or frayed conductors, melted insulation and conductors pulled from connectors. The next item to check is connector pin seating. Ensure the connector pins in the circuit under test are properly seated in the connector housing. A tug on the wire should confirm this. If the harness is not physically damaged and all connector pins are seated, perform a continuity check of the circuit conductors. The ohmeter function of the multimeter can be used for this test.	 Check to ensure there are not any ground faults or conductor shorts to ground. Finally, measure the signals on the circuit under test. Start at the point of origin of the signal and verify at as many points along the harness as possible, ending at the termination point.

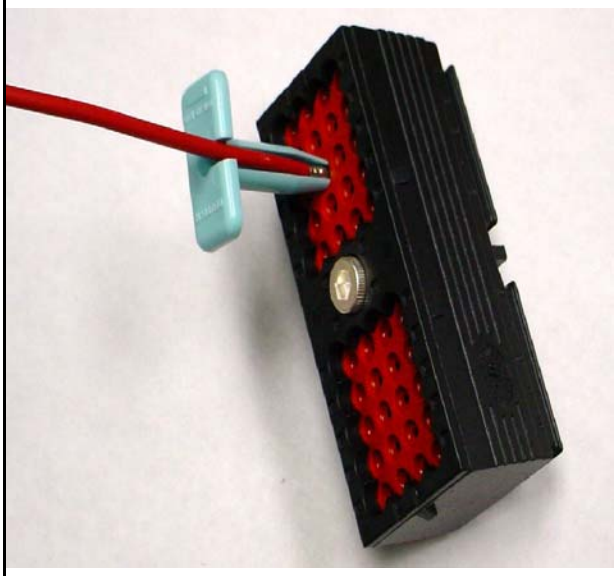
Use of Harness Tools

These pictures describe the proper methods of use of harness tools.

Proper removal tool usage is shown in the above picture. The removal tools are color coded as to wire size. The Table below lists the colors and wire sizes.

Removal Tool Color	Wire Size	P/N
Red	20-24	54699640
Blue	16-18	54699632
Yellow	12-15	54699624
Green	8-10	54699616

The wire is placed into the slot on the removal tool and the tool is slid along the wire inserted into the back of the connector. Gently pull on the wire as the tool is pushed into the connector. The pin should release from the connector. To insert a pin, push it into the connector until it locks.

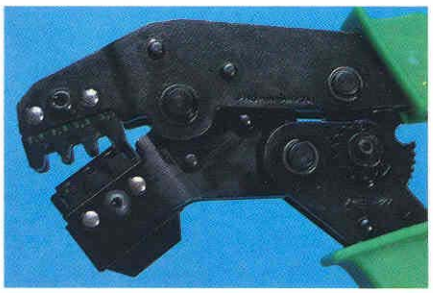


Removal Tools

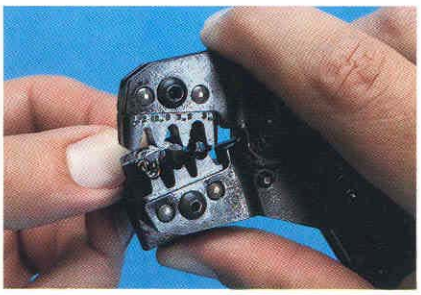
This picture shows the various removal tools for the Deutsch connectors.

The following two pages will show how the Deutsch crimp tools are to be used. One is used for machined contacts and the other for stamped and formed contacts.

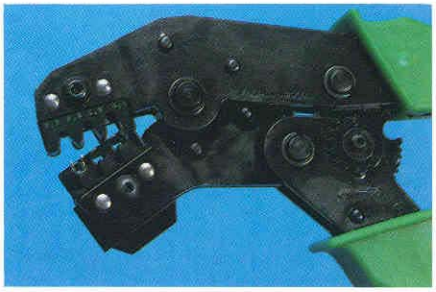
ASSEMBLY INSTRUCTIONS



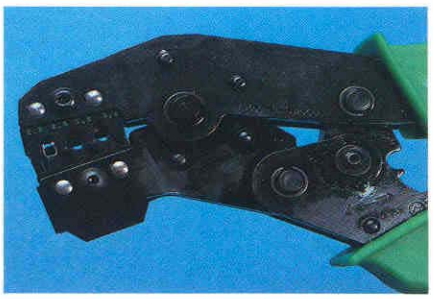
1. Cycle the hand tool to the open position.



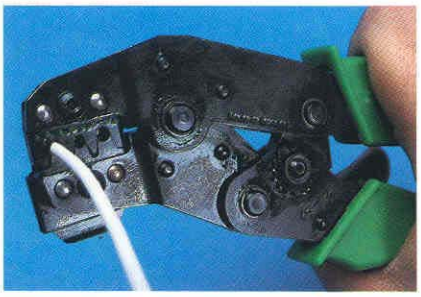
2. While pressing upward on the locator spring, insert the contact with the tails upward completely into the locator.



3. When correctly positioned, the contact should be located beyond flush with the edge of the hand tool and positioned on the concave polished split level crimp areas.



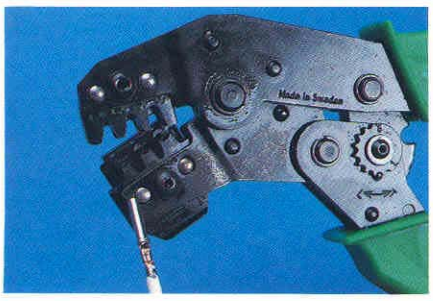
4. Partially (usually the first click) cycle the hand tool assuring that the upward thrusting tails of the contact has started engaging with the top jaw of the took. (There is a slight tendency for the contact to roll out of vertical alignment.)



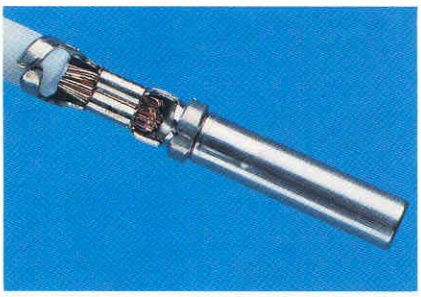
5. Insert the prestripped wire into the crimp area of the contact and completely cycle the tool.

Recommended strip length .175 ± .025.

6. While pressing upward on the locator spring withdraw the crimped termination.



7. The result will be a perfect termination.



8. Note that there are no unterminated wire strands, and that some strand ends can be seen at the forward edge of the crimp. Also note the insulatin is gripped by the smaller secondary crimp. Distortion is at a minimum.

Crimping Procedure
(HDT-48-00)

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.

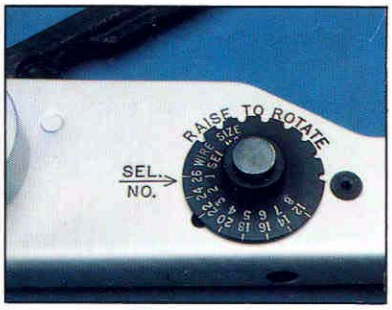
4) Insert contact, turn adjusting screw counter clockwise out until contact is flush with indentor cover. Tighten lock nut.

5) Insert wire in contact, contact must be centered between indicators, close handles until handle contacts the stop.

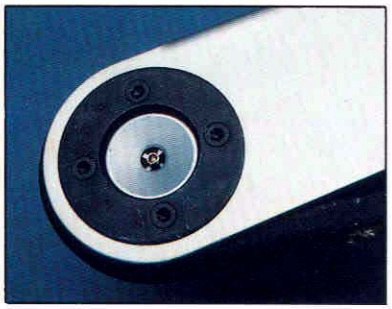
6) Release handles and remove crimped contact.

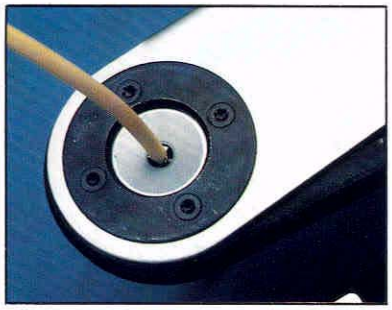
7) Inspect terminal to insure that all strands are in crimp barrel.

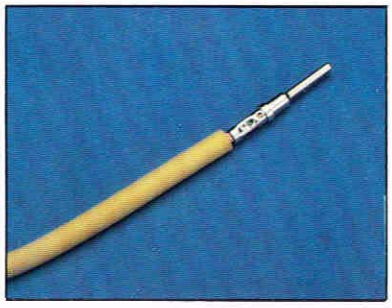
NOTE: Tool must be readjusted for each type/size of contact.



1)
2)
3)


4)


5)
6)


7)

Wire Termination

Do's and Don'ts

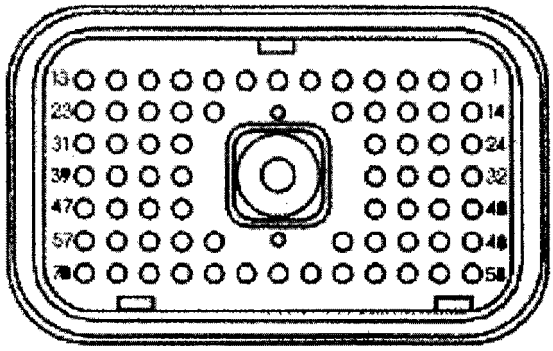
Do's

- Check strip lengths.
- Protect wire strands.
- Gauge the crimp indenters.
- Check crimp selector for correct wire size settings.
- Check air pressure on semi- and automatic crimp equipment.
- Tensile pull test.
- Specify Deutsch manufactured terminals.
- Check crimp locations.

Don'ts

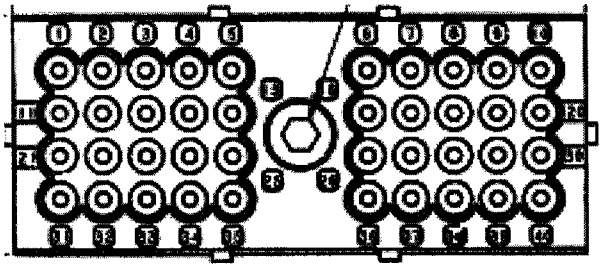
- Add solder.
- Apply heat.
- Leave exposed conductor wire strands.
- Overcrimp.
- Rely on T-Dim measurments only.
- Use "Field-Maintenance" crimp tools for volume production.
- Buy bogus terminals.

CAT Customer Connector (P2) located on engine controller:



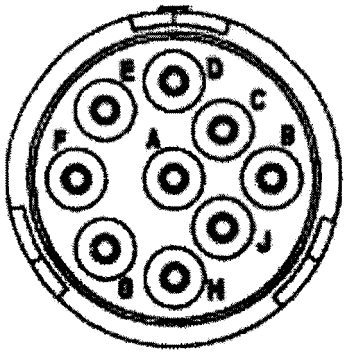
View from front side (non-wire side)

WEDGE connector (P1) pinout:



View from back side (wire side)

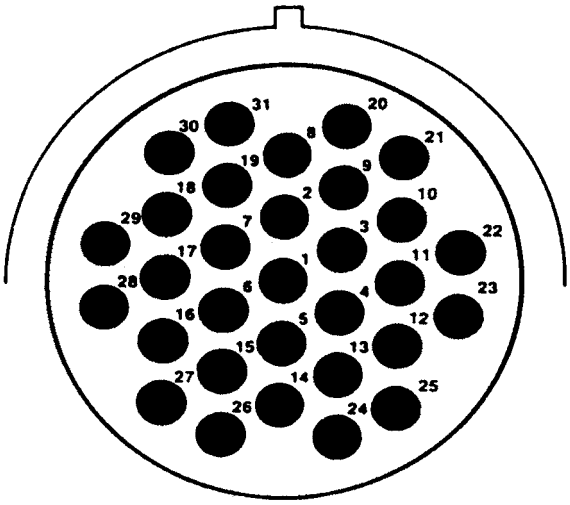
Circular connectors J5 and J63 pinout. J5 is located near the back of the control panel and J63 is located near the engine controller. The pinout of these are the same, however they are keyed differently.



View from front side (non-wire side)

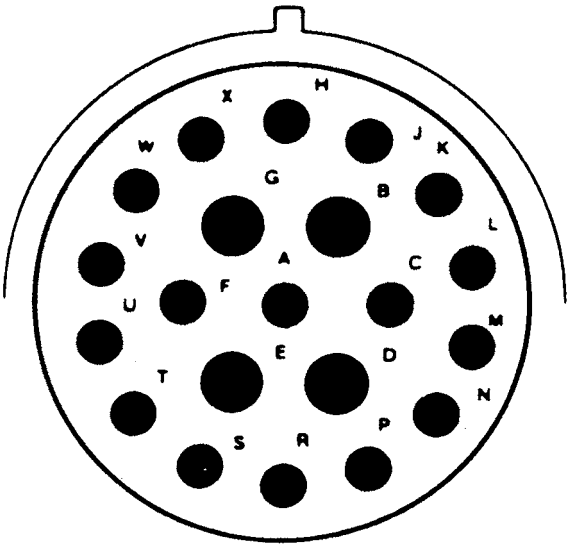
Circular Connector P3, located under the engine controller ECM

VIEW FROM WIRE ENTRY SIDE



Circular Connector P4, located in the back of the control panel box

VIEW FROM WIRE ENTRY SIDE



SECTION 9

ELECTRICAL PARTS LIST

Item	Part No.	Description
	CHASSIS & CAN BUS HARNESS	
B2	36850691	Compressor, Electric 24V
D1	35376169	Diode
D2	35376169	Diode
D3	35376169	Diode
D4	35376169	Diode
F1	23091838	Fuse, 20A
F2	22071575	Fuse, 15A
F3	23091838	Fuse, 20A
G2	36870665	Sensor, Speed Mag. Pickup
J63	23366768	Cap (Replacement)
K1	35577873	Relay
K2	36892362	Relay
L1	36842300	Valve, Solenoid
L2	36842318	Valve, Solenoid
L3	35306158	Valve, Ether Solenoid
P2	23366776	Backshell (Replacement)
PT1	54765946	Sensor, Pressure 0 - 500 psi
PT2	36920825	Sensor, Pressure 0 - 100 psi
R1	36841526	Heater
R3	36841526	Heater
RP1	36870608	Sender, Pressure 0 - 150 psi
RT1	23294820	Sensor, Temperature
RT2	23294820	Sensor, Temperature
RT3	36841138	Sender, Temperature
RT4	36841138	Sender, Temperature
S9	N/A	N/A
S10	36847838	Switch, Vaccum
S11	36847838	Switch, Vaccum
S14	36757581	Switch, Pressure

Item	Part No.	Description
	CHASSIS & CAN BUS HARNESS	
S15	N/A	N/A
U1	54672811	Sender, Low Fuel (High Speed)
	54672803	Sender, Low Fuel (Wagon)
U2	22102339	Sensor, Coolant Level
W1	22661854	Harness, Chassis
~	46636279	Controller, Wedge
~	36896975	Switch, Battery Disconnect
~	36783488	Strap, Ground
~	23268105	Cable, Positive Battery
~	54765375	Cable, Positive Battery
~	35128982	Cable, Battery Jumper
~	36780609	Cable, Negative Battery
~	35225788	Battery, 12 VDC
	IQ ONLY	
~	54757224	IQ Wiring Harness
~	54775887	IQ Heater Harness
~	36841526	IQ Orifice Heater
~	36898310	Actuator
RT5	23294820	Sensor, Temperature
K3	36892362	Relay, 24VDC SPDT
TCU	36920643	IQ Controller
S12	36899615	Switch, Filter
S13	36899599	Switch, Filter

Item	Part No.	Description
	INSTRUMENT PANEL HARNESS	
DS1	N/A	N/A
DS2	36852622	Light, Instrument Panel
	22113880	Lamp, 4.76 W
J5	23366768	Cap (Replacement)
K4	36892362	Relay, SPST
M1	36841468	Gauge, Pressure (Discharge Air)
	22137426	Lamp, 28 V
M2	22692628	Gauge, Pressure (Oil)
	22137426	Lamp, 28 V
M3	22692602	Gauge, Fuel Level
	22137426	Lamp, 28 V
M4	22692610	Gauge, Temperature (Engine Coolant)
	22137426	Lamp, 28 V
M5	54766704	Hourmeter
M6	22055883	Tachometer
	22137426	Lamp, 28 V
M7	22692594	Voltmeter
	22137426	Lamp, 28 V
M8	22692610	Gauge, Temperature (Discharge Air)
	22137426	Lamp, 28 V
S1	22127385	Switch, Ignition
	22134118	Knob, Switch
S2	22054076	Switch, Rocker (Push After Warm Up)
S3	22054068	Switch, Rocker (Ether)
S4	22054050	Switch, Rocker (Heater)
S5	22053896	Switch, Rocker (Lamp)
S6	N/A	N/A
~	22817829	Harness, Instrument Panel

SECTION 10

ALERTS AND SHUTDOWNS LIST

WEDGE SERVICE DIAGNOSTICS

SYSTEM PARAMETERS CAN BE READ ON THE WEDGE 4 DIGIT DISPLAY WHEN THE ON/OFF POWER SWITCH IS IN "ON".

- IF THE ENGINE IS RUNNING, MOMENTARILY TURN THE ON/OFF START SWITCH TO "START" TO STEP THROUGH THE DISPLAY NUMBERS.
- IF THE ENGINE IS NOT RUNNING, PRESS AND RELEASE THE SERVICE AIR SWITCH TO STEP THROUGH THE DISPLAY NUMBERS.
- AFTER SELECTION, THE DISPLAY NUMBER (2-20) WILL BE DISPLAYED FOR ONE (1) SECOND, THEN THE PARAMETER VALUE WILL BE DISPLAYED.
- AFTER STEPPING THROUGH NUMBER 20, THE DISPLAY WILL START OVER AT NUMBER 2.
- THE DISPLAY WILL AUTOMATICALLY RETURN TO NORMAL MODE AFTER 3 MINUTES.

DISPLAY	PARAMETER	REMARKS
2	RPM	ACTUAL FROM ENGINE FLYWHEEL SENSOR
3	ENGINE RPM	FILTERED RPM VALUE
4	REGULATION SYSTEM PRESSURE	PSI
5	SEPARATOR TANK PRESSURE	PSI
6	DISCHARGE TEMPERATURE	DEGREES FAHRENHEIT
7	SEPARATOR TANK TEMPERATURE	DEGREES FAHRENHEIT
8	ENGINE TARGET RPM	WEDGE SIGNAL TO ENGINE
9	MACHINE I. D.	CONSULT FACTORY
10	ENGINE COOLANT TEMPERATURE	DEGREES FAHRENHEIT
11	ENGINE OIL TEMPERATURE	DEGREES FAHRENHEIT
12	ENGINE OIL PRESSURE	PSI
13	INTAKE MANIFOLD TEMPERATURE	DEGREES FAHRENHEIT
14	RPM	ENGINE CONTROLLER (ECM)
15	ENGINE FAULT CODE LIST	FROM ENGINE ECM
16	THROTTLE POSITION	
17	BOOST PRESSURE	PSI
18	ENGINE HOURS	
19	LOAD AT SPEED	PERCENT (%)
20	SET MACHINE ID	(NOT AVAILABLE WHEN MACHINE IS RUNNING)

Wedge Diagnostic Display Codes

If the  fault indicator lamp is illuminated, refer to the  Alert/Shutdown list.

If the  fault indicator lamp is illuminated, refer to the  Engine diagnostic list.

 ALERT/SHUTDOWN CONDITIONS

Condition	Alert		Shut Down		
	Code	Light (Blinks)	Code	Light (Steady)	Delay (sec.)
Engine Speed < 950 RPM			1	Compressor Malfunction	30
Engine Speed > 1950 RPM			2	Compressor Malfunction	30
Engine Crank Time Exceeded 15 sec			3	Compressor Malfunction	0
Engine Not Responding To Throttle	10	Compressor Malfunction			
Too Many Start Attempts During Autostart			11	Compressor Malfunction	0
Engine Shut Down: reason unknown			29	Compressor Malfunction	0
Discharge Temperature (RT2) Sensor Fault			32	Compressor Malfunction	10
Separator Tank Pressure (PT1) Sensor Fault	33	Compressor Malfunction			
Separator Tank Pressure >20 PSI During Start			34	Compressor Malfunction	0
Separator Tank Pressure (PT1) > 410 PSI			35	Compressor Malfunction	1
Safety Valve Open			36	Compressor Malfunction	2
Separator Tank Temperature >248deg. F			50	Compressor Malfunction	3
Machine ID Not Valid			51	Compressor Malfunction	0
Separator Tank Temp. (RT1) Sensor Fault			53	Compressor Malfunction	10
Reg. Sys. Pressure (PT2) Sensor Fault	54	Compressor Malfunction			
Estop Button Pushed	55	Compressor Malfunction	55	Compressor Malfunction	3
Minimum Pressure Not Met	56	Compressor Malfunction			
RS232 Serial Communication Failure	70	Compressor Malfunction			
Engine ECM Communication Failure	71	Compressor Malfunction			
Auto Start/Stop Module Communication Fault (Note 1)	73	Compressor Malfunction	73	Compressor Malfunction	0

WEDGE: 22173579 - SOFTWARE V2.07 to V2.25
WEDGE: 46636279 - SOFTWARE V3.00 and GREATER

XHP1170CAT/CATF-EX-T3

Wedge Diagnostic Display Codes

If the  fault indicator lamp is illuminated, refer to the  Alert/Shutdown list.

If the  fault indicator lamp is illuminated, refer to the  Engine diagnostic list.

 ALERT/SHUTDOWN CONDITIONS

Dedicated Lights	Alert		Shut Down		
	Code	Light (Blinks)	Code	Light (Steady)	Delay (sec.)
Low Fuel Level			4	Fuel Level	3
Low Battery Voltage		Battery Charging Condition			
Engine Oil Pressure < 18 PSI (Note 2)		Low Engine Oil Pressure		Low Engine Oil Pressure	3 sec. after Shut Down
Low Coolant Level (Note 2)		Engine Coolant Level		Engine Coolant Level	3 sec. after Shut Down
Engine Coolant Temperature >= 220 deg.F (Note 2)		High Engine Temperature		High Engine Temperature	3 sec. after Shut Down
IQ Filter Restriction (IQ Equipped Only)			52	IQ Filter Restriction	3
High Discharge Temperature > 248 deg. F)			30	High Compressor Temperature	3

Notes:

1 - User Option to Shut Down, Run, or No Action.
2 - CAN Derived Data

Machine ID:

4 = XHP1170/1070WCAT-T3
XHP1170CAT/CATF-EX-T3
XHP1170FCAT-T3

WEDGE: 22173579 - SOFTWARE V2.07 to V2.25
WEDGE: 46636279 - SOFTWARE V3.00 and GREATER

XHP1170CAT/CATF-EX-T3

Engine Malfunction Diagnostic Light

ENGINE DIAGNOSTIC CODES

CODE	DEFINITION
13	FUEL TEMPERATURE OPEN/SHORT TO POSITIVE (+) BATTERY
	FUEL TEMPERATURE SHORT TO GROUND
21	5 VOLT SENSOR DC POWER SUPPLY SHORT TO POSITIVE (+) BATTERY
	5 VOLT SENSOR DC POWER SUPPLY SHORT TO GROUND
	8 VOLT DC SUPPLY SHORT TO POSITIVE (+) BATTERY
	8 VOLT DC SUPPLY SHORT TO GROUND
24	ENGINE OIL PRESSURE OPEN/SHORT TO POSITIVE (+) BATTERY
	ENGINE OIL PRESSURE SHORT TO GROUND
	ENGINE OIL PRESSURE ABNORMAL RATE OF CHANGE
25	BOOST PRESSURE SENSOR ABNORMAL RATE OF CHANGE
	BOOST PRESSURE SENSOR OPEN/SHORT TO POSITIVE (+) BATTERY
	BOOST PRESSURE SENSOR SHORT TO GROUND
26	ATMOSPHERIC PRESSURE OPEN/SHORT POSITIVE (+) BATTERY
	ATMOSPHERIC PRESSURE SHORT TO GROUND
27	ENGINE COOLANT TEMPERATURE OPEN/SHORT TO POSITIVE (+) BATTERY
	ENGINE COOLANT TEMPERATURE SHORT TO GROUND
28	THROTTLE POSITION CALIBRATION REQUIRED
32	THROTTLE POSITION SIGNAL ABNORMAL
34	ENGINE SPEED SIGNAL ABNORMAL
	SECONDARY ENGINE SPEED SIGNAL ABNORMAL
35	ENGINE OVERSPEED WARNING / SHUT DOWN

Engine Malfunction Diagnostic Light

ENGINE DIAGNOSTIC CODES

CODE	DEFINITION
37	FUEL PRESSURE OPEN/SHORT TO POSITIVE (+) BATTERY OR SHORT TO GROUND
38	INTAKE MANIFOLD AIR TEMPERATURE OPEN/SHORT TO POSITIVE (+) BATTERY OR SHORT TO GROUND
39	INJECTOR ACTUATION PRESSURE SIGNAL ERRATIC / HIGH / LOW / FAULT
42	ENGINE TIMING CALIBRATION REQUIRED
46	LOW ENGINE OIL PRESSURE WARNING / DERATE / SHUT DOWN
51	SYSTEM VOLTAGE INTERMITTENT / ERRATIC / HIGH / LOW
56	CHECK PROGRAMMABLE PARAMETERS
58	J1939 DATA LINK COMMUNICATIONS
61	HIGH ENGINE COOLANT TEMPERATURE WARNING / DERATE / SHUT DOWN
62	LOW ENGINE COOLANT LEVEL WARNING / DERATE / SHUT DOWN
63	HIGH FUEL PRESSURE WARNING
64	HIGH INLET AIR TEMPERATURE WARNING / SHUT DOWN
65	HIGH FUEL TEMPERATURE WARNING / DERATE / SHUT DOWN
71	INJECTOR CYCLINDER #1 FAULT
72	INJECTOR CYCLINDER #2 FAULT
73	INJECTOR CYCLINDER #3 FAULT
74	INJECTOR CYCLINDER #4 FAULT
75	INJECTOR CYCLINDER #5 FAULT
76	INJECTOR CYCLINDER #6 FAULT

FAULT CODES FOR CAT C15 ENGINE

Fault Code	Description
13	Fuel Temperature Open/Short to + batt Fuel Temperature Short to Ground
21	5 Volt Sensor DC Power Supply short to + batt 5 Volt Sensor DC Power Supply short to ground 8 Volt DC Supply short to + batt 8 Volt DC Supply short to ground
24	Engine Oil Pressure open/short to + batt Engine Oil Pressure short to ground Engine Oil Pressure Abnormal Rate of Change
25	Boost Pressure Sensor Abnormal Rate of Change Boost Pressure Sensor open/short to + batt Boost Pressure Sensor short to ground
26	Atmospheric Pressure open/short + batt Atmospheric Pressure short to ground
27	Engine Coolant Temperature open/short to + batt Engine Coolant Temperature short to ground
28	Throttle Position calibration required
32	Throttle Position signal abnormal
34	Engine Speed Signal Abnormal Secondary Engine Speed Signal Abnormal
35	Engine Overspeed Warning Engine Overspeed Shutdown
37	Fuel Pressure open/short + batt Fuel Pressure short to ground
38	Intake Manifold Air Temp open/short + batt Intake Manifold Air Temp short to ground
39	Injector Actuation Pressure Signal Erratic Injector Actuation Pressure Voltage High Injector Actuation Pressure Voltage Low Injector Actuation Pressure System Fault

42	Engine timing calibration required
46	Low Engine Oil Pressure Warning Low Engine Oil Pressure De-rate Low Engine Oil Pressure Shutdown
49	Air Inlet Heater Relay Open/Current Below Normal Air Inlet Heather Relay Grounded/Current Above Normal
51	System Voltage intermittent/erratic/High/Low
56	Check Programmable Parameters
58	J1939 Data Link Communications
61	High Engine Coolant Temperature Warning High Engine Coolant Temperature De-Rate High Engine Coolant Temperature Shutdown
62	Low Engine Coolant Level Warning Low Engine Coolant Level De-Rate Low Engine Coolant Level Shutdown
63	High Fuel Pressure Warning
64	High Inlet Air Temperature Warning High Inlet Air Temperature Shutdown
65	High Fuel Temperature Warning High Fuel Temperature De-Rate High Fuel Temperature Shutdown
71	Injector Cylinder #1 fault
72	Injector Cylinder #2 fault
73	Injector Cylinder #3 fault
74	Injector Cylinder #4 fault
75	Injector Cylinder #5 fault
76	Injector Cylinder #6 fault

EVENT CODES – Refer to engine operating conditions such as low oil pressure or high coolant temperature. Logged events usually indicate a mechanical problem instead of an electronic system problem.

35	Engine Overspeed Shutdown Engine Overspeed Warning
63	Fuel Filter Restriction Derate Fuel Filter Restriction Shutdown
61	High Engine Coolant Temperature Derate High Engine Coolant Temperature Shutdown High Engine Coolant Temperature Warning
64	High Inlet Air Temperature Derate High Inlet Air Temperature Warning
46	Low Engine Oil Pressure Derate Low Engine Oil Pressure Shutdown Low Engine Oil Pressure Warning
65	High Fuel Temperature Derate High Fuel Temperature Shutdown High Fuel Temperature Warning
62	Low Engine Coolant Level Derate Low Engine Coolant Level Shutdown Low Engine Coolant Level Warning
63	Fuel Filter Restriction Warning High Fuel Pressure
46	Low Engine Oil Pressure Warning
35	Engine Overspeed Warning

CATERPILLAR C15 ENGINE SHUTDOWNS

			Trip	Delay	On/Off
Low Oil Pressure			1800		
Warn			None – Not Adjustable	8	On
Derate				8	On
Shutdown				4	On
High Coolant Temp			°F		
Warn			221	10	On
Derate			223	10	On
Shutdown			225	10	On
Engine Overspeed					
Warn			2100	1	On
Shutdown			2100	1	On
Hi Intake Manifold Temp					
Warn			167	8	On
			174	8	On
Shutdown			Always OFF		Off
Hi Oil Temperature					
Warn			NA	NA	NA
Derate			NA	NA	NA
Shutdown			NA	NA	NA
Low Coolant Level					
Warn			None	10	On
Derate				10	On
Shutdown				10	On
High Fuel Temperature					
Warn			194	30	On
Derate			196	10	On
Shutdown			196	10	On
Hi Fuel Pressure					
Warn			109.9	8	On
Hi Fuel Filter Restriction			1800		
Warn			70	10	On
Derate			63	10	Off
Shutdown			63	10	Off

SECTION 11

RECOMMENDED SPARE PARTS

Quantity	Description	Part Number
1	WEDGE Controller	46636279
2	Thermistor Temperature Sensor	36898922
3	0–100 psig Pres Transducer	36920825
3	0–500 psig Pres Transducer	54765946

SECTION 12

SOFTWARE INFORMATION

Software Updates

Software updates are available on a website for downloading. The website will always contain the latest software revisions for all applications of Utility Equipment products. Software files will be available for the Virtual Technician I (PDA based service tool), and Virtual Technician II PC based service tool.

The website address is: WWW.irembedded.com

Service Manuals

The website has Electrical/Electronics service manuals for all equipment requiring this manual. They are stored in .PDF format and can be viewed or downloaded as needed.

Service Bulletins

Service Bulletins will be posted at the site as needed. These will describe any actions that need to be taken involving hardware or software.

Revision History

Rev.	EC Number	Comments
A		Original release
B	CN024621	Updated Front Cover
C	CN026881	Doosan reference updates
D		Added Models to Front Cover

Doosan Infracore Portable Power
1293 Glenway Drive
Statesville, N.C. 28625
www.doosanportablepower.com

Doosan Infracore
Portable Power