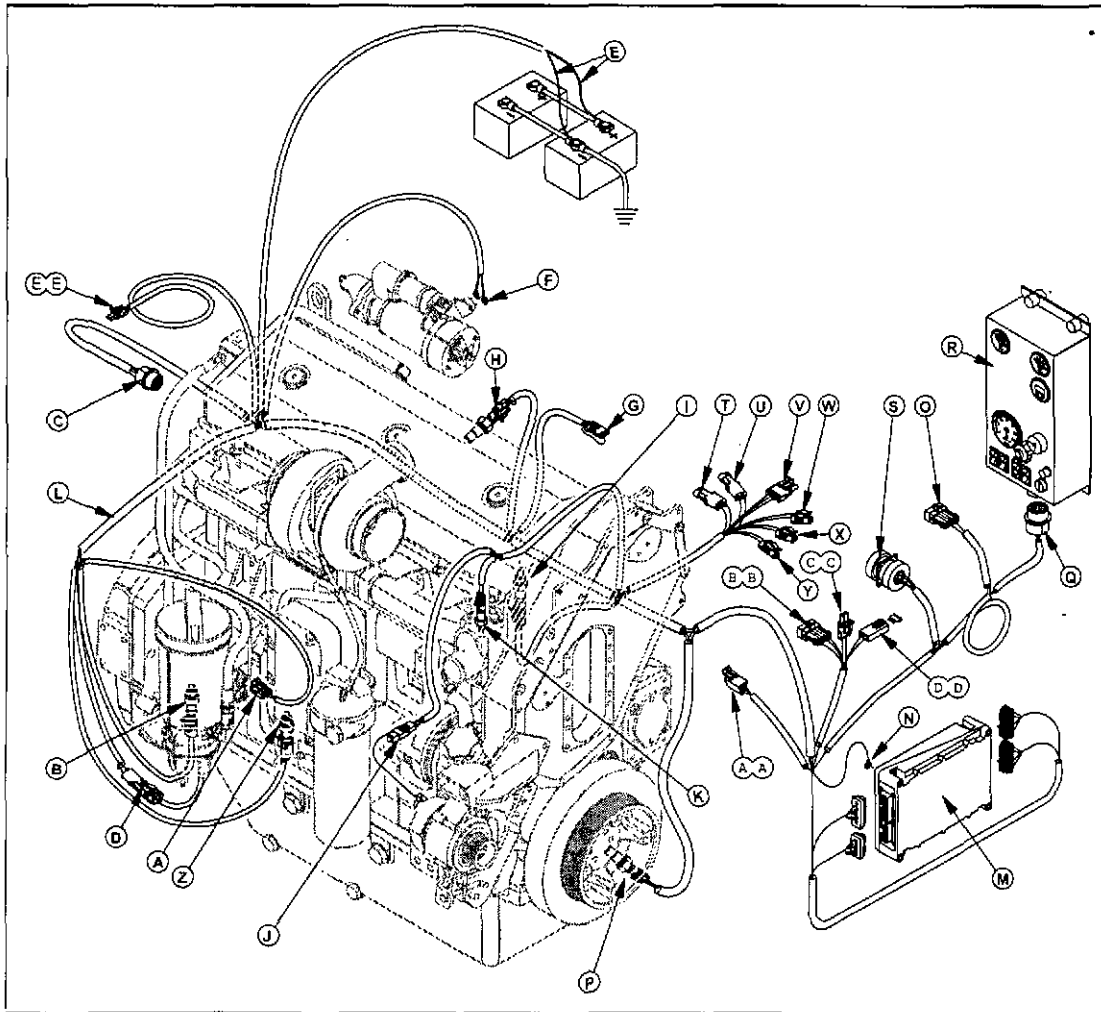
Electronic Engine Controls -- JDEC (12.5 L)

Contents / Notes **Page**

Continued - -

Electronic Engine Controls -- JDEC (12.5 L)

Contents / Notes **Page**



A- FUEL PRESSURE SENSOR
B- FUEL TEMPERATURE SENSOR
C- UNIT INJECTION CONNECTOR
D- WATER IN FUEL SWITCH
E- POWER AND GROUND CONNECTIONS
F- STARTER RELAY CONNECTIONS
G- MANIFOLD AIR PRESSURE (MAP) SENSOR
H- CAM POSITION SENSOR
I- MANIFOLD AIR TEMPERATURE (MAT) SENSOR
(NOT USED ON "A" ENGINES)
J- ALTERNATOR
K- COOLANT TEMPERATURE SENSOR
L- ENGINE WIRE HARNESS
M- ENGINE CONTROL UNIT
N- SYSTEM GROUND
(ECU MUST ALSO BE GROUNDED TO FRAME)
O- CRUISE CONTROL CONNECTOR
P- CRANKSHAFT POSITION SENSOR
Q- INSTRUMENT PANEL CONNECTOR
R- OPTIONAL INSTRUMENT PANEL
S- DIAGNOSTIC CONNECTOR
T- AUXILIARY "WARNING" LAMP CONNECTOR
U- AUXILIARY "STOP ENGINE" LAMP CONNECTOR
V- SECONDARY ANALOG THROTTLE
W- LOW COOLANT LEVEL SWITCH CONNECTOR
X- EXTERNAL DERATE SWITCH CONNECTOR
Y- EXTERNAL ENGINE SHUT DOWN SWITCH CONNECTOR
Z- OIL PRESSURE SENSOR
AA- SAE 1939 CAN CONNECTOR
BB- PERFORMANCE PROGRAM CONNECTOR
CC- TRANSIENT VOLTAGE PROTECTION (TVP) CONNECTOR
DD- MAIN SYSTEM FUSE (30 AMP)
EE- AIR CLEANER RESTRICTION SWITCH CONNECTOR

Figure AG-15 - 01, John Deere Electronic Control System (12.5 L)

INTRODUCTION

The John Deere Electronic Control system used on 12.5L engines is very similar to the systems used on 6.8L and 8.1L engines. It is designed to use the same RE162429 instrument panel with adjustable 2-state throttle used on all 6.8L and 8.1L engines with JDEC controls.

The power connections and 21-pin instrumentation and controls connector are exactly the same as used on the 6.8L and 8.1L engines. Unlike the 6.8L and 8.1L, there are no unterminated wires. Additional wires for special features such as cruise control are located in several special connectors.

FEATURES

Engine Diagnostics and Engine Protection

The ECU can detect abnormal engine operating conditions or faults in several engine systems. Faults are stored in the ECU for later use by service personnel, and are reported to the operator with a Fault Lamp.

The ECU can detect several types of engine problems and may take actions to minimize engine damage that may result if these problems are not corrected. There are two levels of engine problems, "Warning" and "Shutdown."

"Warning" faults are engine problems that may lead to engine failures if not corrected. "Warning" faults include higher-than-normal fuel temperature, lower-than-normal oil pressure, higher-than-normal coolant temperatures, higher-than-normal charge air temperatures, or power derates. The warning lamp will be on when a "Warning" problem is detected.

"Shutdown" faults are engine problems that indicate imminent engine failure. "Shutdown" problems include extremely low oil pressure, extremely high coolant temperatures, loss of coolant, and extremely high fuel temperature. The stop-engine lamp indicates "Shutdown" problems.

ENGINE PROTECTION

Three levels of engine protection are available: No protection, engine protection without shutdown, and engine protection with shutdown.

You must select the level of protection desired by option code when the engine is ordered. All levels may not be offered at every power rating. See the 1600 group descriptions and Engine Performance Curves to determine which injection pump / ECU options include engine protection or shutdown features.

No Protection

Engine ECU's with "No Protection" do not derate the engine when coolant temperature, oil pressure, or charge-air temperature "Warning" faults are detected, and do not shutdown the engine if a "Shutdown" fault occurs. The fault lamp will illuminate when a "Warning" fault is detected by the ECU, and the stop-engine lamp will illuminate when a "Shutdown" fault is detected. The engine operator is responsible for reducing engine speed and power when a "Warning" fault exists and for shutting down the engine when a "Shutdown" fault exists.

Engine Protection Without Shutdown

The Engine Protection feature is only in ECU's with Engine Protection programmed into the ECU. All engine protection sensors including fuel temperature, coolant temperature, and oil pressure must be installed if engine protection is specified. Otherwise, a fault will be detected, and the fault lamp will light.

The engine derate schedules will be active but the engine will not shutdown if a "Shutdown" fault is detected. The warning lamp will be on when a "Warning" fault is detected by the ECU or when the engine is derated by the ECU. The stop-engine lamp will illuminate when a "Shutdown" fault is detected. The engine operator is responsible for shutting down an engine with a "Shutdown" fault.

Engine Protection With Shutdown

The Engine Shutdown feature is only in ECU's with Engine Protection and Shutdown programmed into the ECU. All engine protection sensors, including coolant temperature and oil pressure must be installed if engine protection is specified. Otherwise, a fault will be detected, and the fault lamp will illuminate.

The engine derate schedules will be active and the engine will shutdown in 30 seconds if a "Shutdown" fault is detected. The warning lamp will illuminate when a "Warning" fault is detected by the ECU or when the engine is derated by the ECU. The stop-engine lamp will illuminate for 30 seconds before shutting down when a "Shutdown" fault is detected.

Shutdown Override Control

The operator may delay a shutdown for 30 seconds by pushing the "Shutdown Override" button. The "Shutdown Override" switch resets the shutdown timer to 30 seconds, and may be used repeatedly. However, continuously holding down the "Shutdown Override" switch will not reset the 30 second timer.

On an ECU with the Shutdown feature, shutting down the engine by turning "off" the key switch will reset the engine Shutdown feature and will allow at least 30 seconds of running after restart. After 30 seconds, the engine will again shutdown unless the "Shutdown" fault condition has cleared

LOW OIL PRESSURE

There are two low oil protection features, Low Oil Pressure WARNING and Low Oil Pressure SHUTDOWN. The set-points for Low Oil Pressure WARNING and SHUTDOWN are variable based on engine speed, and are preset at the factory.

At the Low Oil Pressure WARNING set-point the ECU turns on the warning lamp. On systems with the protection option enabled a slow power derate begins. If the oil pressure goes above the Low Oil Pressure WARNING set point, power slowly increases until the power is back to full power. The fault lamp will continue until the power returns to normal even if the fault condition has gone away and the recovery is in process.

At Low Oil Pressure SHUTDOWN set-point the ECU turns on a stop-engine lamp. On systems with the protection option enabled, a faster power derate begins. On systems with the shutdown option enabled, if the oil pressure does not go above the SHUTDOWN set-point within 30 seconds, the engine will shutdown. If oil pressure goes above Low Oil Pressure SHUTDOWN set point within 30 seconds, power derate reverts to the Low Oil Pressure WARNING curve.

COOLANT TEMPERATURE

There are two standard coolant temperature features, High Coolant Temperature WARNING, and High Coolant Temperature SHUTDOWN.

At the High Coolant Temperature WARNING set-point the ECU turns on the warning lamp. On systems with the protection option enabled a slow power derate begins. If the coolant temperature goes below the High Coolant Temperature WARNING set point, power increases slowly until the power is back to full power. The fault lamp will continue until the power returns to normal even if the fault condition has gone away and the recovery is in process.

At High Coolant Temperature SHUTDOWN set-point the ECU turns on the stop-engine lamp. On systems with the protection option enabled a faster power derate begins. On systems with the shutdown option enabled, if the coolant temperature does not go below the SHUTDOWN set-point within 30 seconds, the engine will shutdown. If coolant temperature goes below High Coolant Temperature SHUTDOWN set point within 30 seconds, power derate reverts to the High Coolant Temperature WARNING curve.

WATER IN FUEL

If the water-in-fuel sensor detects the presence of water in the primary fuel filter, a fault code will be generated and the warning light illuminates. On systems with the protection option enabled, a slow power derate begins. The operator has approximately one hour to stop the engine, drain the water from the primary fuel filter, and find and correct the source of the water. If water is still present in the primary fuel filter after one hour, the "Stop Engine" light will illuminate. On systems with the shutdown option enabled, the engine will shut down 30 seconds after the "Stop Engine" light illuminates.

HIGH CHARGE AIR TEMPERATURE

If the air temperature in the intake manifold rises above the maximum allowable temperature, the ECU turns on the warning lamp and generates a fault code. On systems with the protection option enabled, a slow power derate begins. If the temperature drops below the allowable maximum while derated, power slowly increases until the power is back to full power. The fault lamp will continue until the power returns to normal even if the fault condition has gone away and the recovery is in process. There is no shutdown function for High Charge Air Temperature. The maximum derate is 20%.

HIGH FUEL TEMPERATURE

If the fuel temperature rises above a preset "warning" temperature, the ECU illuminates the warning lamp, generates a fault code, and begins to derate. There is no shutdown function for high fuel temperature.

EXTERNAL LOSS OF COOLANT INPUT

The Loss of Coolant feature is an optional customer input. The loss-of-coolant circuit can be used to trigger a derate and shutdown from an external low-coolant indicator such as a Murphy coolant level switch. When a loss-of-coolant signal is detected, the ECU turns on the stop-engine lamp. On systems with the protection option enabled a rapid power derate begins. On systems with the shutdown option enabled, if the Loss-of-Coolant switch does not reset within 30 seconds, the engine will shutdown. If the Loss-of-Coolant switch resets within 30 seconds, power increases at the same rate until back to full power.

The engine will continue to run for 30 second after the external low coolant sensor is triggered. If an immediate shutdown is required, a separate external shutdown circuit is provided.

EXTERNAL DERATE AND SHUTDOWN INPUTS

Two additional inputs are provided for external derates and shutdown. These inputs can be used to allow the OEM to trigger a 20% reduction in engine power or an engine shutdown from external switches, such as a loss-of-prime switch or hydraulic over-temperature switch. These switches are active on all ECUs, even if "No Protection" is specified. They derate or shut down the engine immediately. There is no 30 second delay. If the user doesn't wish to use this feature, the wires should be left disconnected.

ONBOARD DIAGNOSTIC GAUGE REQUIREMENT

All applications using a 12.5L engine with JDEC control system must be equipped with a permanent onboard diagnostic gauge. The RE68155 *Diagnostic Gauge is available either separately or as part of the* RE162429 instrument panel for this purpose.

The RE68155 Diagnostic Gauge is a complete on-board engine diagnostic and display system. It includes built-in "Warning" and "Stop-engine" lights to alert the operator of problems, and it digitally displays diagnostic codes, rpm, hours, oil pressure, coolant temperature, voltage, engine load, fuel consumption, manifold temperature and other engine parameters.

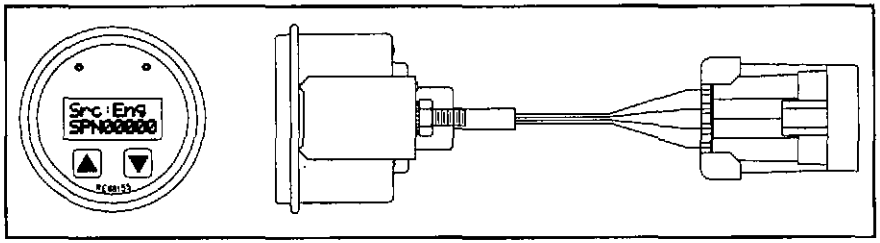


Figure AG-15 - 02, RE68155 Diagnostic Gauge

It can also be used to drive analog gauge displays for rpm, oil pressure, coolant temperature, and many other parameters available on the digital display. The RE68155 diagnostic gauge works with all JDEC control systems. It fits in a standard 2-inch SAE instrument panel opening. It is pre-installed in the RE162429 instrument panel, and included with the RE508625 instrument panel kit.

You can also provide your own SAE J1939-based on-board diagnostic system using the information provided over the SAE J1939 Controller Area Network (CAN) described later in this manual.

Power Bulge Protection

It will not be possible to operate engines continuously at higher than 102% power by keeping in the "Power Bulge" zone of the torque curve. Operation above 102% load will only be allowed for a maximum of 1 minute out of every 10 minutes. After 1 minute of operation at greater than 102% power within a 10 minute time interval, the ECU will automatically derate the engine to no more than 102% of rated power as shown on the "Minimal Power Bulge" portion of the published performance curve. The derate will take about one minute, and will stay in effect until the 10 minute time interval is complete, at which time power bulge operation will be allowed again for up to one minute during the next 10 minute time interval.

Fuel Temperature Compensation

Fuel temperature compensation provides constant power regardless of fuel temperature

Throttle Options

Three throttle inputs are available on the 12.5L engine. There are two analog (potentiometer) throttles, and a special adjustable 2-state throttle. Any of the three inputs can be used alone or in any combination with the other two.

ANALOG (POTENTIOMETER) THROTTLES

The two available analog throttle inputs both can use any 2000-15,000 Ohm potentiometer. Many prefabricated foot and hand throttle assemblies are available from various suppliers including Morse and Williams Controls. When both analog throttles are used, the throttle signals are additive, up to the factory preset fast-idle setting or the maximum speed set with the Adjustable 2-State Throttle. There will be no "dead band" in either throttle. When you move the foot throttle, speed will immediately increase regardless of where the hand throttle is set.

The secondary analog throttle feature is not intended for use with two throttles located remotely from each other. Because the throttle signal is additive, if either throttle is at the full speed position, the other throttle will have no control. Both throttles must be in the slow-idle position for the engine to operate at slow idle.

ADJUSTABLE 2-STATE THROTTLE

An adjustable 2-state throttle feature is available on the 12.5L JDEC System. No mechanical or analog (potentiometer) throttle is required to operate the engine. The Adjustable 2-State throttle allows you to preset one high and one low operating speed, and switch between them electrically without the use of potentiometers or mechanical adjustments of any kind.

If an analog (foot or hand) throttle is desired, you can add up to two throttle potentiometers that would operate between the preset high and low operating speeds. The Adjustable 2-State throttle must be set in the "Low-Speed" position for the Analog throttle to work.

Three switches make up the Adjustable 2-State Throttle: The High/Low Select Switch, the Bump Enable Switch, and the Speed Select Switch.

The High/Low Select Switch

The High/Low Select Switch allows you to choose between two operating speeds. Unless you adjust the speed points differently, the engine will operate at the factory pre-set fast idle speed when the High/Low Select Switch is in the "Fast" position, and it will operate at the factory pre-set slow idle speed when the High/Low Select Switch is in the "Slow" position. However, the preset "Fast" and "Slow" operating speeds may be reset to any desired speeds between factory fast and slow idles using the Speed Select and Bump Enable switches.

The Bump Enable Switch

The Bump Enable Switch serves as a lock for the Speed Select Switch to make sure the operating speed is not changed accidentally or as a result of the Speed Select circuit failure. The Bump Enable Switch must be "On" for the Speed Select Switch to work.

The Speed Select Switch

The Speed Select Switch allows you to adjust either the "Fast" or "Slow" preset speeds. When the High/Low Select Switch is on "High," and the Bump Enable Switch is "On," moving the Speed Select Switch to the "-" (minus) position will decrease the pre-selected "Fast" speed slightly, and moving the Speed Select Switch to the "+" (plus) position will increase the pre-selected "Fast" speed slightly (but not past fast idle). When the High/Low Select Switch is on "Low", and the Bump Enable Switch is "On," moving the Speed Select Switch will adjust the "Slow" pre-set operating speed.

The Speed Select Switch works like the "Accel" and "Coast" buttons on a cruise control. A momentary tap on the switch will bump the speed up or down about 10 rpm. However, if you hold the switch down, speed will continue to ramp up or down continuously until the switch is released, then it will lock in at whatever rpm it has reached at that point.

To permanently set high and low speeds, press the bump enable button (3) three times after adjustment. Both preset speeds (high and low) will be remembered, even if the ignition is turned off or the battery is disconnected.

Cruise Control

The Cruise Control is an off-road type that maintains a constant engine RPM under varying load conditions. An automotive type cruise control maintains a constant road speed.

The Cruise Cancel/Resume function is a one-button, Cancel-then-Resume function. The first time button contact is made with Cruise Control active, the Cruise Control will disengage and the engine speed will drop to idle. If the contact is made again within one minute and with the engine speed above 1300 RPM, the Cruise Control will "Resume." This feature allows the placement of the Cancel/Resume button in a convenient location in the vehicle cab and does not require the use of the normal Cruise controls for momentary interruptions in cruise operation.

The Cancel/Resume function is intended for applications like Ag tractors and sprayers that turn around at the end of each row in a field. This allows the operator to use the throttle and/or brake to turn the vehicle around. When ready to resume field operations, the operator brings the engine speed above 1300 RPM and activates the Cancel/Resume function again to resume cruise speed. An internal timer gives the operator one minute to complete the turnaround maneuver.

The Cruise Control has the normal functions of:

Cruise Control power "ON" or "OFF"
"Set" or "Bump Up" Engine Speed
"Resume" or "Bump Down" Engine Speed
Vehicle brake or clutch pedal to disengage Cruise Control

These feature generally function exactly like an automotive cruise control. Refer to the cruise control wiring instructions later in this section for more details.

The engine speed can be set from two different locations. The primary location is normally in the cab of the vehicle and is used to set a constant engine speed while the vehicle is driven. The secondary cruise control is normally used in a location that provides for engine PTO speed control and is used with the engine in "neutral" or out of gear. Both locations can have the normal Cruise functions.

Selectable Torque Curves and Governor Regulation

The New John Deere ECU can have up to four programmed torque curves. The power levels for each curve are identified in the engine performance curves. The governor can be set for either normal droop or isochronous operation. Normal droop gives a drop in engine speed with an increase in load, or an increase in engine speed with a decrease in load. The normal % droop for your engine is listed in the engine performance curve. When isochronous governing is selected the droop is set to 0%, and there is no change in engine speed with changing loads until the engine's torque limit is reached.

PERFORMANCE PROGRAM CONNECTOR

The ECU can be programmed with multiple power and governor curves. Refer to the specific Engine Performance Curve for your engine to determine what variations are available to you. To switch between the available power and speed regulation curves, insert jumper wires between certain terminals in the wiring harness.

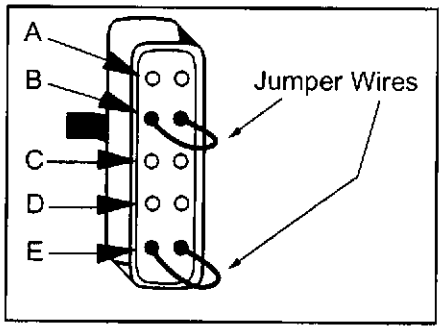


Figure AG-15 - 03, Performance Program Connector

On the engine wiring harness you will find a 10-pin Metri-Pack connector that is capped off and not plugged into anything. This is the Performance Program Connector. To change programming, add and/or remove jumper wires from one or more of the five adjacent pairs of terminals.

Three RE500927 jumper wires are included with each engine. Additional jumper wires can be made with an R65594 Metri-Pack crimping tool (Packard # 6285847), and the following parts:

1 - 18-Gauge GXL Wire, 4 inches long (25 mm)
2 - R104846 Terminals (Packard #12048074)
2 - 57M7258 Seals (Packard #12048086)

Jumpers can be inserted into the connector by hand. However, once installed, they cannot be removed by hand. A special tool (Packard #12094429) is required to remove the connector, or the wire can simply be cut and taped off.

The Performance Program Connector is programmed as follows:

ECU Function	Pins				
	A	B	C	D	E
Intermittent Power, Curve #1	No Jumper Wire	No Jumper Wire	Not Used*	Not Used*	
Continuous Power, Curve #2	**Jumper Wire Installed**	No Jumper Wire	Not Used*	Not Used*	
Intermittent Derate Power, Curve #3	No Jumper Wire	**Jumper Wire Installed**	Not Used*	Not Used*	
Continuous Derate Power, Curve #4	**Jumper Wire Installed**	**Jumper Wire Installed**	Not Used*	Not Used*	
Standard Droop Governor			Not Used*	Not Used*	No Jumper Wire
Isochronous Governor (See gen-set setting notes below.)			Not Used*	Not Used*	**Jumper Wire Installed**

* Locations "C" and "D" are not used at this time. No jumpers should be installed.

Table AG-15 - 01, Performance Program Connector Programming

GOVERNOR SETTINGS FOR GEN-SETS

Isochronus Governing

Most gen-sets are normally operated with the isochronus governor selected. Isochronus governing is intended for use with either stand-alone gen-sets, or gen-sets that are paralleled using a commercial load sharing module.

For stand-alone gen-sets, either prime or standby, the throttle switch can be left in the fast-idle position and/or the analog (adjustable) throttle should be turned all the way up to the max speed position. With the throttle in the fast idle position, the governor will try to maintain exactly 1800 rpm (or 1500 rpm for 50-Hz units).

The isochronus governor programmed into gen-set ECUs is non-linear. It does not increase speed evenly as the throttle is turned up. For an 1800 rpm gen-set, it follows the curve shown below.

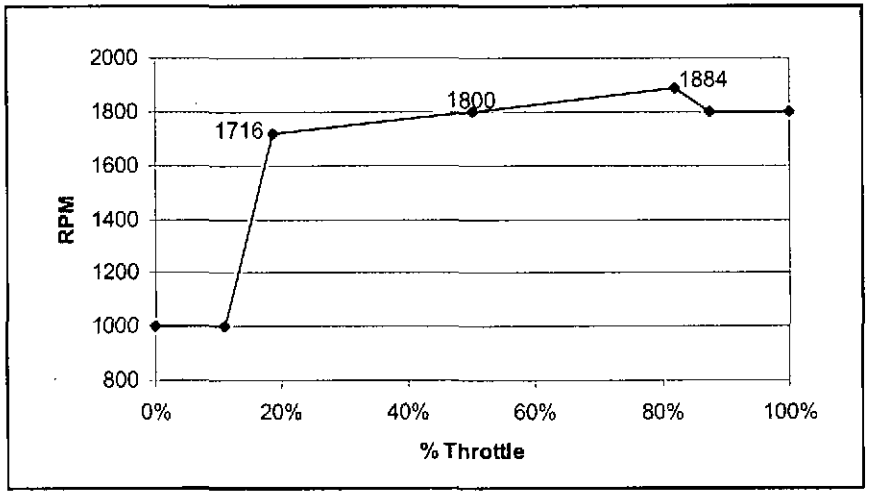


Figure AG-15 - 04, Isochronous Governor

The 1500 rpm ECU behaves similarly. Most of the throttle travel is used to adjust speed within plus or minus 84 rpm of rated speed. This allows very fine adjustment of speed in that range if needed, and it meets the requirements of commercially available load sharing modules. If throttle travel exceeds 82%, speed will reduce until it reaches rated speed at 87.5% travel. Because of this feature, the gen-set will operate at rated speed (1800 or 1500 rpm) when the throttle switch is in the "fast idle" position, or if the analog throttle is turned all the way up, or in the event of a throttle wiring failure, or if no analog or 2-state throttle is installed.

This isochronus governor can be used directly with commercially available load sharing modules. When two or more engines are being controlled by a load sharing module, the load sharing module output can be connected directly to the analog throttle input to the ECU, as shown in the analog throttle wiring section later in this document.

Standard Droop Governing

Standard droop governing is intended for use when sharing load between two John Deere electronically controlled engines without the aid of a commercial load sharing module.

With a gen-set engine in standard droop mode and the throttle control at fast idle, the engine will operate with breakaway at exactly 1800 rpm as shown below (or 1500 rpm on 50 Hz units). Fast idle speed will be 20-60 rpm above rated speed, depending on governor droop for your particular engine. Governor droop for each engine is listed on the certified performance curve.

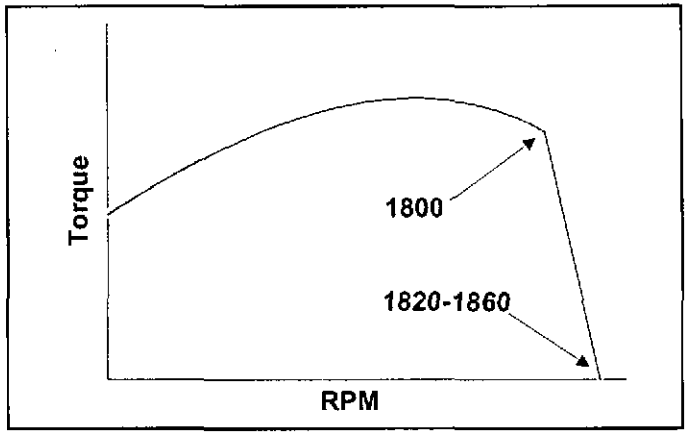


Figure AG-15 - 05, Standard Droop Governor

Multiple John Deere engines with JDEC controls operated in this mode and wired directly in parallel will automatically share load, although frequency will vary with load. This mode is intended for use with other electronically controlled John Deere engines in the same operating mode. It is not intended to be used to parallel with other models of engines, or to parallel with the utility grid directly. To share load at exactly 1800 rpm (60 Hz), a commercial load sharing module must be used.

Controller Area Network (CAN)

The CAN buss is a high speed open interconnect network for electronic systems on on-highway and off-road vehicles and stationary equipment. It allows electronic systems to communicate with each other through a standard architecture of electronic signals over shielded twisted-pair wires. Engines can communicate with throttles, transmissions and brakes. Vehicles can communicate with trailers. Agricultural and construction equipment can communicate with implements and accessories. Stationary equipment can communicate with controllers or other networked equipment. Information on the network can be displayed to the operator on a virtual terminal (instrument panel) or relayed to another location via telemetry. Up to 30 Electronic Control Units or modules can be connected together through a single CAN network segment.

A CAN connection (SAE J1939) is provided in two different locations on the engine wiring harness. A round Deutsch 9-pin connector is provided primarily for service/diagnostic purposes. A Deutsch 3-pin wedge connector, intended for customer computer interface, has also been provided.

The pins in the Deutsch connectors are:

Deutsch 9-pin Round Connector Pin	**Function**
Pin A, Wire #050E (black)	Ground
Pin B, Wire #012C (red)	Power Supply (+12 or +24 volts)
Pin C, Wire #904D (yellow)	CAN_H
Pin D, Wire #905D (dark green)	CAN_L
Pin E, Wire #020D (black)	Shield
Pins F through J	Spare (unused)

Deutsch 3-pin Wedge Connector Pin	**Function**
Pin A, Wire #904A (yellow)	CAN_H
Pin B, Wire #905A (dark green)	CAN_L
Pin C, Wire #020A (black)	Shield

The CAN buss is also accessable through the 21-pin instrumentation and controls connector, which is described in the Instrumentation and Controls Wiring section.

Standard CAN buss messages are listed in the Component Technical Manual. Special CAN messages are required for use with electronically controlled Allison transmissions.

For details on how to use this system, refer to SAE J1939/11 published by the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale PA 15097-0001.

BASIC INSTALLATION

ECU Mounting Requirements

The ECU is enclosed in a "wedge box" style enclosure. The wiring harness is mated to the ECU connector with 4 jackscrews. The recommended torque on the jackscrews is 0.8 to 1.5 NM.

An engine-mounted or remote-mounted ECU can be specified. For an engine-mounted ECU, all mounting hardware will be provided. A remote-mount ECU is normally mounted within the operator compartment or on the operator platform. It should be mounted securely with the four corner mounting holes in a vertical plane with the mating connectors pointing downward. This orientation provides maximum moisture resistance. Other acceptable mounting orientations are shown below. All wiring harnesses must be routed downward from the ECU enclosure so that moisture cannot drain into the connector. A "drip loop" is required when the harness is to be routed above the ECU enclosure.

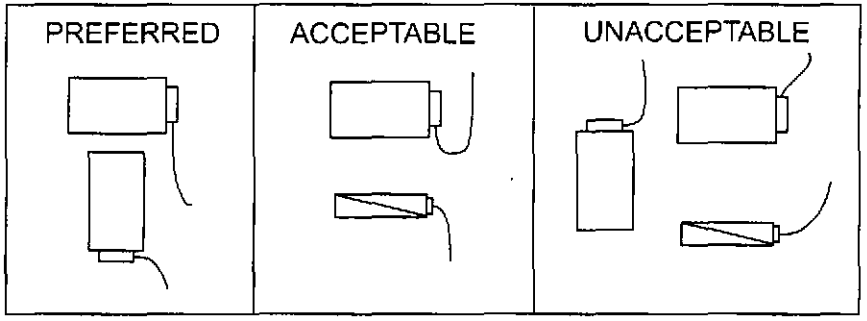


Figure AG-15 - 06, ECU Mounting Position

The ECU is not intended to be mounted in a location that is subject to severe vibration or high shock loading.

The ECU case must be grounded to the chassis to protect against electrostatic discharge. The strap can be as small as 12 gage (primarily for mechanical strength reasons). This is in addition to the ECU ground connection point on the engine/ECU wiring harness.

The engine/ECU wiring harness should be routed to provide access to the diagnostic connectors for service diagnostic work.

Engine Mounted ECU Environment

Special high temperature ECUs are used for engine mounted ECU options. For engine mounted ECUs, the air temperature at the ECU should not exceed 105 °C (221 °F). If the ECU is engine-mounted, it must be in the factory location on the lower right side of the engine, and the engine must be fan cooled. For applications cooled with a heat exchanger, the ECU must be mounted remotely, in the shade, and outside of the engine compartment or any other area where it is exposed to heat from other components. ECUs intended for remote mounting must not be mounted in the engine compartment.

Remote Mounted ECU Environment

For remote (chassis) mounted ECUs, the air temperature at the ECU should not exceed 73 °C (163 °F). Remote mounted ECUs should be mounted in or near the operator's station where environmental conditions are best. For applications cooled with a heat exchanger, the ECU must be mounted remotely, in the shade, and outside of the engine compartment or any other area where it is exposed to heat from other components.

Never cut or splice into the ECU wiring harnesses. Do not wire any other loads into the ECU wiring harnesses.

All wiring must be installed and routed to avoid sharp bends, kinking, pinching, cutting, rubbing or excessive pulling. Use cable clamps or wire ties as needed. Do not over tighten wire ties. Do not run screws through the wiring harnesses. Protective shields may be needed to protect the harnesses from road hazards, sharp surfaces, corrosive materials or excessive heat.

Welding Precautions

Welding causes high currents or electrostatic discharge in electronic components that can cause permanent damage to the ECU. We recommend that "No Welding" signs be prominently displayed on the vehicle chassis. The following steps should be used to protect from damage when welding on the vehicle chassis:

1. Remove the ground connection from the ECU to the vehicle frame.
2. Disconnect the connectors from the ECU.
3. Connect the welder ground close to the welding point and be sure ECU or other electronic components are not in the ground path.

For applications that require routine or daily welding, (i.e., for bucket tooth resurfacing, etc.) contact Sales Engineering.

Power and Ground Connections

After all other wiring is completed, and immediately before operating the system for the first time, the main power and ground connections to the battery should be made. Unterminated system power and ground wires are provided in the engine wiring harness for this purpose. These wires should be connected directly to the battery if possible. The battery can be located up to 10 feet (3 M) from the engine. Connect as follows:

Battery Power (Wire #002C, red, 10 gauge) -
Should be connected directly to the positive terminal of the battery.

Ground (Wire #050G, black, 10 gauge) -
Should be connected directly to the negative terminal of the battery.

If a battery disconnect switch is used on the negative battery terminal, Wire #050E should be connected to the 'disconnectable' side of the switch, not the battery terminal.

The ECU case must also be grounded to the chassis separately to protect against electrostatic discharge. The strap can be as small as 12 gauge (primarily for mechanical strength reasons). This is in addition to the ECU ground connection wire on the engine wiring harness.

12-volt or 24-volt operation must be specified when ordering the engine. The engine ECU has the voltage requirements described in the following table.

12 Volts DC	24 Volts DC	Description
0 to 5.3 volts	0 to 10.6 volts	System does not operate - No ECU damage
5.3 to 9.0 volts	10.6 to 18.0 volts	Cranking Voltage Range - Some features "inactive"
9.0 to 16.0 volts	18.0 to 32.0 volts	Normal Operation - All features "active"
16.0 to 26.5 volts	32.0 to 36.0 volts	Over-voltage, ECU can operate for up to 5 minutes without damage - Some features "inactive"
>26.5 volts	>36.0 volts	ECU damage

Table AG-15 - 02, ECU Voltage Requirements

TRANSIENT VOLTAGE PROTECTION

There are two different Transient Voltage Protection (TVP) modules; *12 volt and 24 volt. The 12-volt TVP module protects the engine ECU* from transient voltage spikes (such as alternator load dump) greater than 24 volts. The 24-volt TVP module protects against voltage spikes greater than 36 volts. The TVP module can be wrapped in the wiring harness or mounted in the vehicle. If the TVP module is mounted in the vehicle, it should be mounted vertically with the pigtail wires exiting form the bottom of the module. The mounting location should be away from battery fumes, engine heat and vibration, such as in a control cabinet, vehicle chassis, or cab. Mounting ears of the TVP module *may not withstand overtightening of mounting bolts. The* TVP module does not protect against sustained over-voltage to the ECU.

The TVP Module mates with the TVP Connector in the engine wiring harness. The TVP module is not always required. Some alternators have internal TVP protection. A TVP module will be provided if needed, depending on the alternator option specified. If you provide your own alternator, a TVP module must be used.

REVERSE CURRENT PROTECTION

The ECU has limited internal reverse current protection if the ECU power supply is connected in reverse. The ECU will not be damaged with reverse voltage up to 26.5 volts on a 12-volt system and 36.0 volts on a 24-volt system. Reverse current at higher voltages will damage the ECU.

Starter Relay

The standard engine wiring harness is designed for use with a starter relay located within 2 feet (600 mm) of the starter. Under no circumstances should the starter solenoid be operated directly from the key switch without a relay.

INSTRUMENTATION AND CONTROLS WIRING

To complete a runable engine, instrumentation and operator controls must be added. There are three ways to add basic instrumentation and operator controls to the system:

1. Use the John Deere RE162429 instrument panel.
2. Use the RE508625 instrumentation and wiring kit to build your own instrument panel
3. Design your own instrumentation and controls (without the RE508625 kit).

Using the RE162429 Instrument Panel

The easiest way to provide all the control system parts that do not come on the engine is to use the John Deere RE162429 instrument panel.

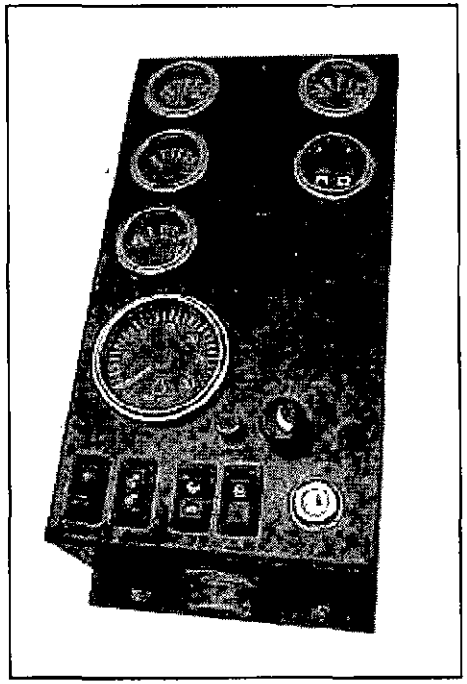


Figure AG-15 - 07, Instrument Panel, RE162429

The 21-pin Deutsch connector on the engine wiring harness plugs directly into the bottom of the RE162429 Instrument panel. To operate an engine with the RE162429 instrument panel, you need only install the engine wiring harness, connect the power and ground to the battery, plug the 21-pin Deutsch connector into the RE162429 Instrument Panel, and turn the key. The RE162429 panel operates on 12 or 24 volts.

The following features are standard on the RE162429 Instrument panel:

STANDARD INSTRUMENT PANEL FEATURES

- Ignition switch
- Panel mounted fuse
- Adjustable 2-state throttle switches
- Shutdown override button
- RE68155 Diagnostic Gauge
- Tachometer
- Oil pressure analog gauge
- Coolant temperature analog gauge.

The following optional features are available. To use the optional features, just order the parts and plug in. Connectors and panel cutouts are provided in the standard panel:

OPTIONAL INSTRUMENT PANEL FEATURES

- RE69667 Analog throttle potentiometer
- RE163436 Percent load gauge
- RE162422 12-volt voltage gauge
- RE163277 24-volt voltage gauge
- RE162427 Audible warning alarm
- RE162449 Backlight dimmer control
- RE162448 Converter for 24-volt backlighting
- RE506969 12-foot extension harness

Using the RE508625 Instrumentation and Wiring Kit

The second easiest way to provide all the control system parts that do not come on the engine is to use the John Deere RE508625 instrumentation and wiring kit.

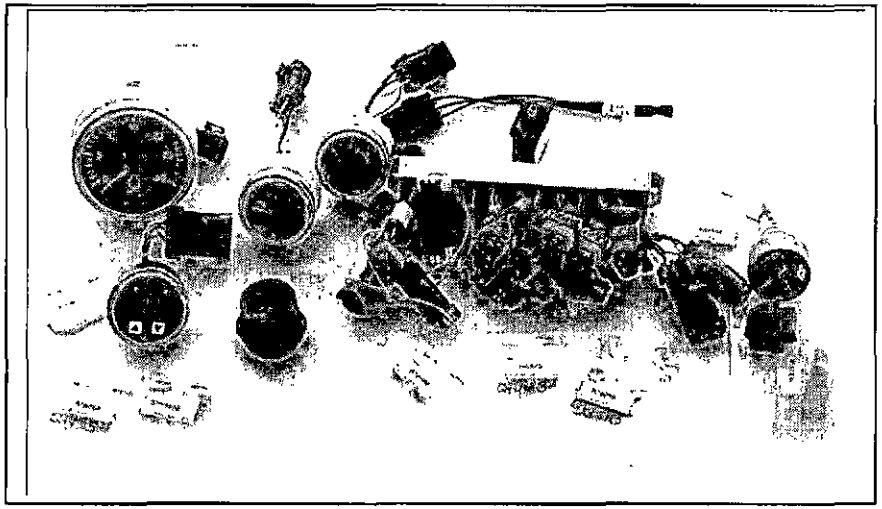


Figure AG-15 - 08, Instrumentation and Wiring Kit, RE508625

The RE508625 instrumentation and wiring kit includes all the parts that are included in the RE162429 instrument panel except for the adjustable 2-state throttle switches, which can be added by purchasing a separate RE508626 switch kit. The RE508625 kit includes ignition switch, shutdown override switch, all needed wiring connectors, and the RE162450 Databus Module which can be used to add up to three additional auxiliary gauge displays (in addition to the included tach, coolant temp, and oil pressure gauges). All you need to add is the actual wires and a throttle control.

All optional features of the RE162429 panel also apply to the RE508625 instrumentation kit.

Making Your Own Instrumentation and Controls

If you choose not to use the RE162429 instrument panel or the RE508625 instrumentation kit, you will have to provide your own ignition switch, fuse holder, throttle device, wiring harness, diagnostics, and any other instrumentation and controls you need.

All required electrical connections to the engine, including throttle, instrumentation, key switch, starter, and alternator connections, are made through a single 21-pin Deutsch connector provided on the engine wiring harness. Several special connectors are provided for optional features.

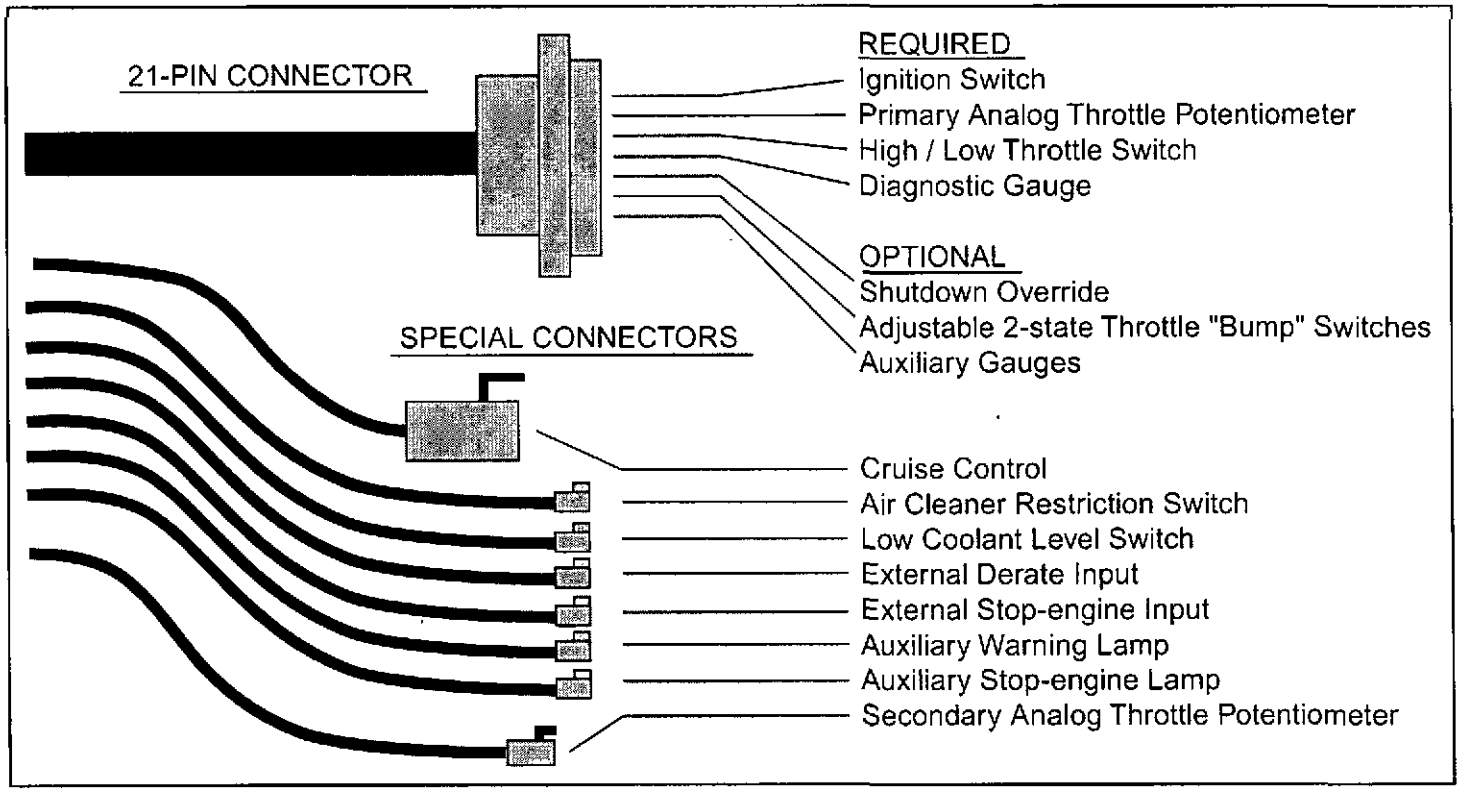


Figure AG-15 - 09, Instrumentation Connections

MINIMUM REQUIRED WIRING

All required wiring attachments can be made through the 21-pin instrumentation and controls connector. Some kind of ignition switch is always required. Diagnostics are also required. For 8.1L and 12.5L engines, you must install the RE68155 Diagnostic Gauge or equivalent CAN-based instrumentation. The RE68155 Diagnostic Gauge is not strictly required on 4.5L and 6.8L engines because they are also equipped with blink-code diagnostics. However, it is still highly recommended because it is the easiest way to meet all diagnostic and wiring requirements. If you do not use the RE68155 Diagnostic Gauge on 4.5L and 6.8L engines, you must provide a warning lamp, stop-engine lamp, hourmeter, and other desired instrumentation such as tachometer, oil pressure gauge, and coolant temperature gauge separately.

For gen-set applications that start and operate at full rated speed only (1500 or 1800 rpm), it is not necessary to connect anything except the key switch and diagnostics.

For industrial applications, the analog throttle circuit must also be completed. If you choose to operate without an analog (potentiometer) throttle, you still must install a resister bridge to terminate the circuit. The high/low speed select switch must also be connected on all industrial (non-gen-set) ECUs. If you choose not to use the high/low select feature, this circuit can be easily terminated with a single resister.

For details on wiring all required and optional circuits, refer to the following sections.

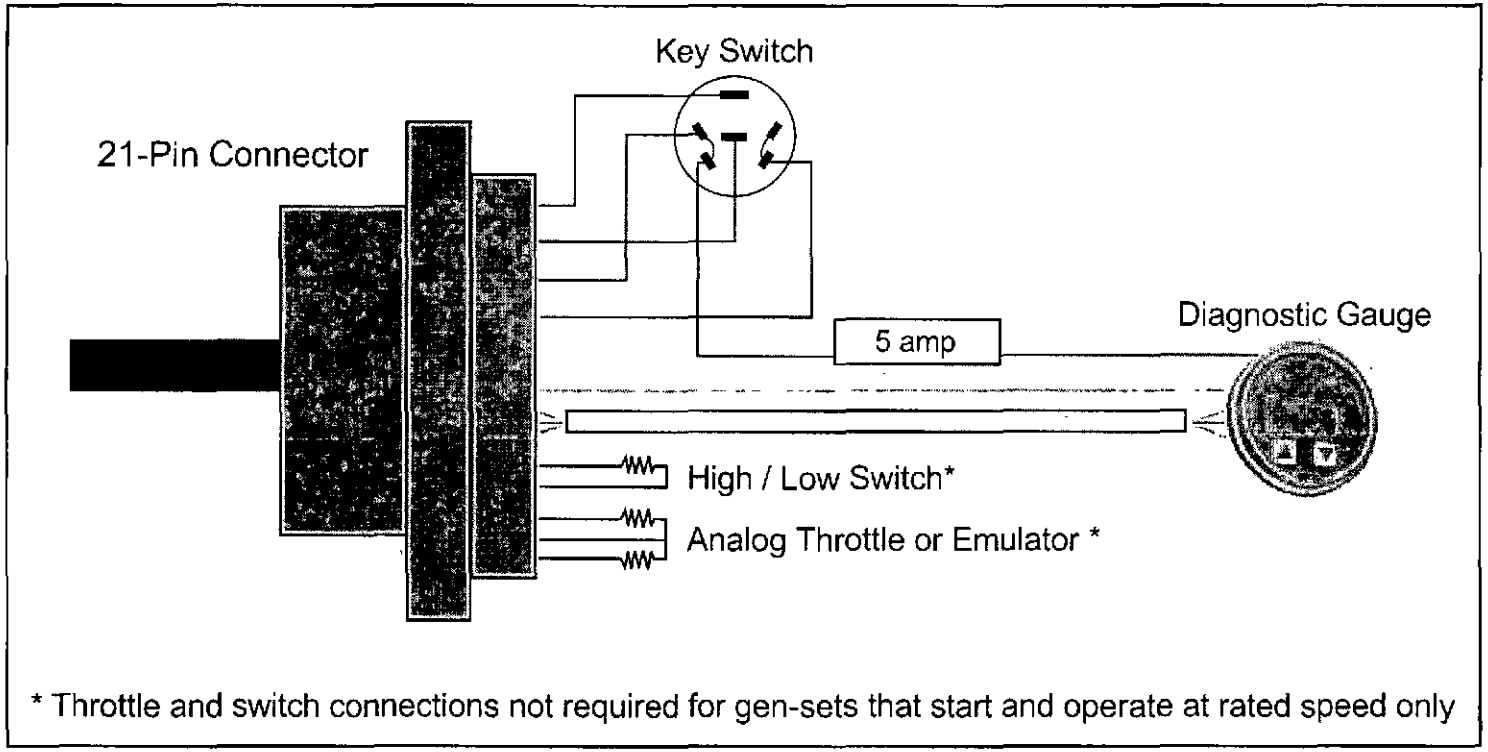


Figure AG-15 - 10, Minimum Required Wiring

BASIC INSTRUMENTATION AND CONTROLS HARNESS

For all required connections, and for the more common optional connections that are made through the 21-pin connector, refer to the following wiring diagram. This diagram provided a complete wiring harness to interface the 21-pin connector with your instrument panel. The connectors shown fit the recommended John Deere gauges, switches, etc. listed. If you choose to use other components, different connectors may be required.

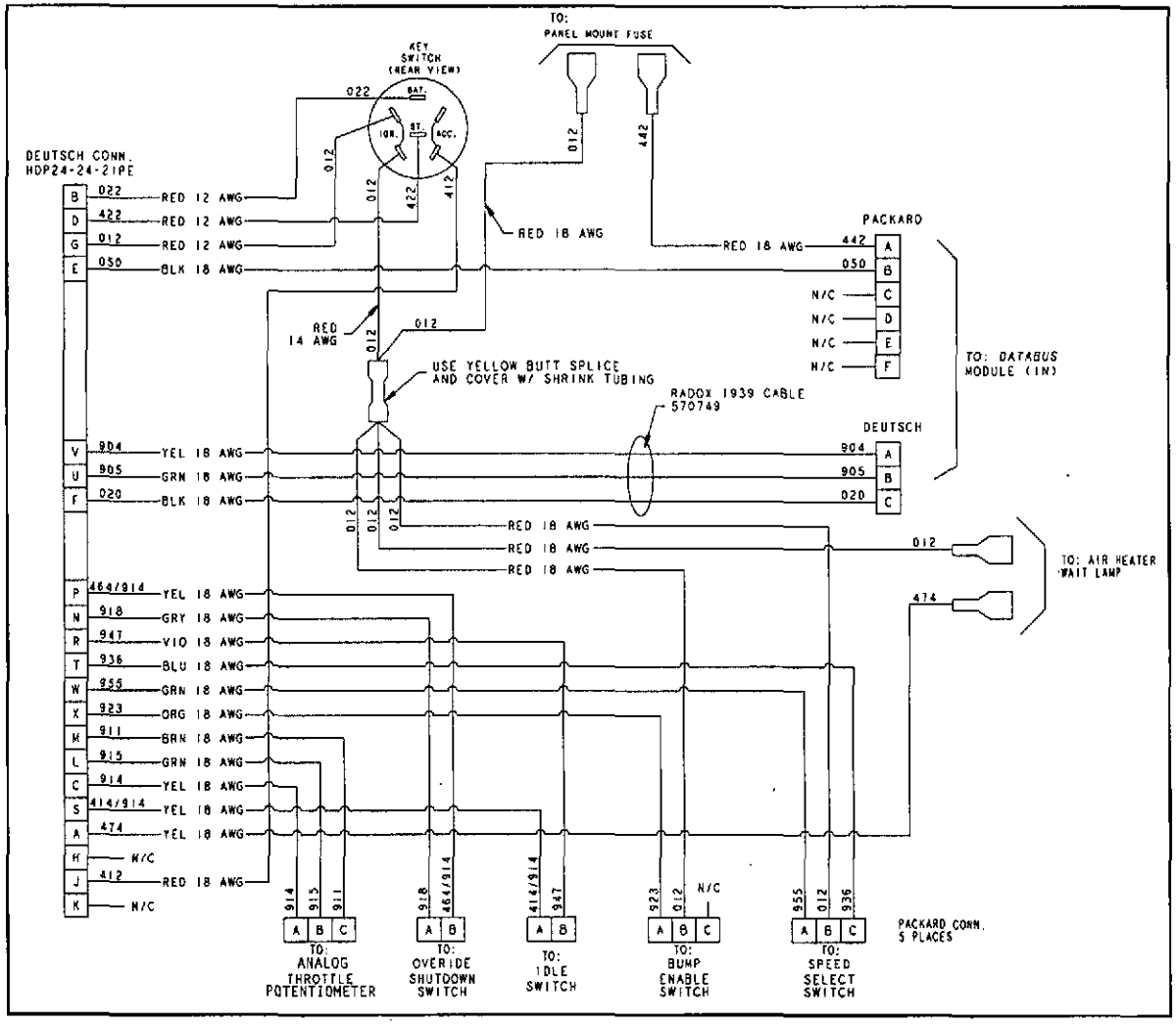


Figure AG-15 - 11, Instrumentation and Controls Connections

Refer to the following sections for details on each connector.

21-Pin Deutsch Instrument Panel Connector

The 21-pin Deutsch connector makes the main connection between the engine and your instrumentation and controls. The RE508625 instrumentation and wiring kit includes this connector. If you provide your own harness, you will have to provide this connector with pin assignments per the following chart. Use (1) 57M7748 Connector (Deutsch HDP24-24-21PE), (5) R78068 12-ga to 14-ga pins (Deutsch 0460-204-12141), (16) R78066 16-ga to 18-ga pins (Deutsch 0460-202-16141), and (3) R78069 plugs (Deutsch 114017).

Instrument Panel Connector Pin Assignments			
Pin	**Wire**	**Description**	**Used On**
A	NA	NA	This pin is not currently used.
B	022C	Battery power	To "B" terminal of your ignition switch
C	914B	Sensor return	To the primary analog throttle potentiometer or emulator
D	422	Starter relay	To "Start" terminal on your ignition switch
E	050D	Ground	Grounded on engine side to the battery and ECU. Use for any non-sensor ground (lights, gauge power, etc)
F	020F	CAN shield	To any CAN connectors including the diagnostic gauge
G	012B	Battery power to ECU (switched)	Must be wired to the "Ignition" terminal of key switch
H	N/A	N/A	This pin is not currently used
J	412	Alternator ignition	Must be wired to the "Accessory" terminal of a two-pole ignition switch.
K	N/A	N/A	This pin is not currently used
L	915	Primary analog throttle input voltage	To center (sensing) terminal of the primary analog throttle potentiometer (or throttle emulator)
M	911B	+5 Volts (sensor power)	To the throttle potentiometer
N	918	Shutdown override return	To shutdown override switch
P	464B	Shutdown override	To shutdown override switch
R	947	High/Low speed select	To the High/Low speed select switch
S	414B	High/Low speed return	To the High/Low speed select switch
T	936C	Resume / Coast / Bump Speed Down	To the 2-state throttle speed select switch and/or the cruise control resume/coast switch
U	905E	CAN low	To the 9- and 3-pin CAN connectors, Diagnostic gauge and/or Instrument panel databus module
V	904E	CAN high	To the 9- and 3-pin CAN connectors, Diagnostic gauge and/or Instrument panel databus module
W	955C	Set / Accelerate / Bump Speed Up	To the 2-state throttle speed select switch and/or the cruise control set/accelerate switch
X	923	Bump enable and brake enable	To the cruise brake enable switch and/or 2-state throttle bump enable switch

Ignition Switch

The ignition switch must be connected on all applications. All connections are made through the 21-pin connector. Pin J on the 21-pin connector is the alternator ignition circuit. The alternator ignition must be isolated from switched power to the ECU (pin G) by using a 2-pole ignition switch or the engine may not shut down when the key is turned off.

If necessary to support heavy accessory loads through the key switch (flood lights, electric motors, etc.), battery power to the "BAT" terminal of the key switch can be taken from a separate heavy-duty source instead of Pin B in the 21-pin connector. Pin B is provided for your convenience to simplify wiring on simple power unit installations. However, the fuse and wire gauges are sized for engine fuel system power requirements only. It should not be used if additional loads of more than a few amps will be carried through the key switch. The starter relay and alternator ignition connections can also be made through separate circuits instead of Pins J and D. Only switched power to the ECU must be connected through the 21-pin connector.

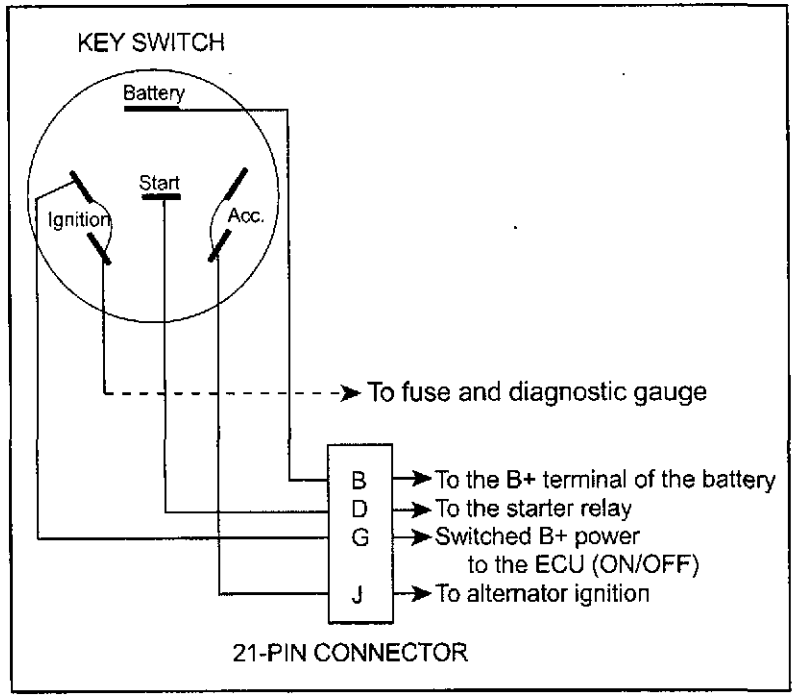


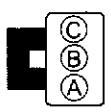
Figure AG-15 - 12, Ignition Switch Connections

Analog Throttle Potentiometer

You must complete this circuit for all industrial applications, even if you don't use the analog throttle feature. If you don't use an analog potentiometer, you must install a throttle emulator (Resister Bridge) that sets the throttle in the low idle range.

If this circuit is not connected on industrial applications, a fault code will be generated. The warning lamp will light and the system will revert to the secondary analog throttle and/or adjustable 2-state throttle inputs. If no throttle input is present on industrial applications, the system will revert to low idle. No connection is required on gen-set applications that are intended to run at rated speed only with no adjustability.

The connector shown below will fit the RE69667 analog throttle or the RE503681 throttle emulator. The harness connection is a Packard Weather Pack 3-cavity, female connector, #12020829, with male terminals, #12124582, and cable seals installed. Note that these are the opposite terminals usually used with this connector.



Pin	Circuit	Color	Size	Destination
C	911	Brown	18 AWG	to Pin M on 21-Pin Connector
B	915	Orange	18 AWG	to Pin L on 21-Pin Connector
A	914	Yellow	18 AWG	to Pin C on 21-Pin Connector

Figure AG-15 - 13, Analog Throttle Potentiometer

If you do not use an analog potentiometer, you must install a resister bridge that sets the throttle in the low idle range. You can either use the RE503681 throttle emulator with the connector shown above, or you can wire your own equivalent resister bridge into the appropriate pins on the 21-pin connector as shown below. The exact size of the resisters is not important, as long as total resistance is 2,000-15,000 Ohms, and the small resister is 6% to 20% of the large resister size.

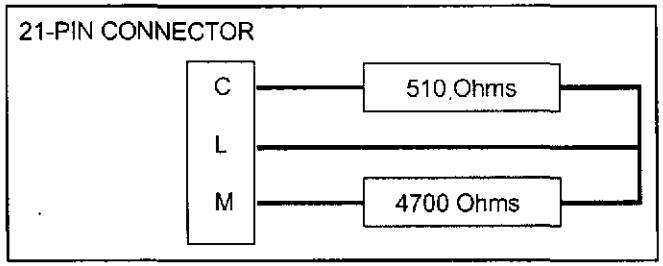


Figure AG-15 - 14, RE503681 Throttle Emulator (or Equivalent)

The RE69667 analog throttle is a multi-turn 5000-Ohm potentiometer throttle designed for stationary applications. Many other throttle styles, including various foot pedal throttles are available from Morse, Williams Controls, and other suppliers. Any potentiometer-style analog throttle will work, as long as total resistance is in the 2,000-15,000 Ohm range.

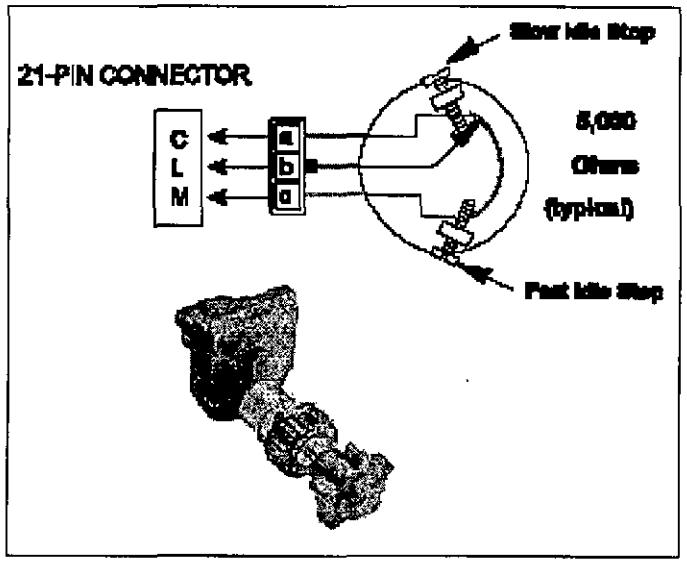


Figure AG-15 - 15, RE69667 Analog Throttle

GEN-SET LOAD SHARING MODULES

A commercial gen-set load sharing module that can provide a throttle input signal in the 1 to 4 volt range can be wired directly to the analog throttle input (pin L). If the load sharing module provides for a reference voltage connection, a 5-volt reference voltage should be taken from Pin M. Sensor ground (Pin C) should not be used to ground the load sharing module. Engine speed stability problems can result under some circumstances. The load sharing module should be grounded directly to the engine cylinder block, or to the negative terminal of the battery.

THROTTLE POTENTIOMETER PRE-ADJUSTMENT PROCEDURE

On industrial applications, if the voltage on 21-pin connector Pin L goes above 4.75 volts or below 0.25 volts, the ECU will generate a fault code and return the engine to slow idle. It does this so that a break or short circuit in the wire does not cause the engine to go to fast idle unexpectedly.

To prevent error codes and unexpected changes in speed, the fast and slow idle stops on the throttle potentiometer must be adjusted so that the voltage on Pin L cannot go below 0.25 volt or above 4.75 volts.

Industrial (non-gen-set) applications also have an Auto-Cal feature that automatically adjusts the analog throttle range to match your sensor. Once the stops are adjusted to limit low and fast idle voltage, the Auto-Cal feature of the ECU will check the exact range of your throttle potentiometer and adjust the ECU to that range. However, your initial installation must be within certain resistance limits for the Auto-Cal feature to work.

Before plugging it into the wiring harness, adjust the throttle potentiometer using the following procedure:

1. With the potentiometer against the slow idle stop, adjust the stop so that the resistance measured between the ground and wiper connections of the potentiometer (21-pin connector Pins C and L) is between 6% and 20% of overall potentiometer resistance.

2. With the potentiometer against the fast idle stop, adjust the stop so that the resistance measured between the power and wiper connections of the potentiometer (21-pin connector Pins M and L) is also between 6% and 20% of overall potentiometer resistance.

This does not have to be a precise adjustment. The Auto-Cal feature will make a precise adjustment automatically. Once it has been done a few times, you will probably find that adjusting each throttle stop screw a predetermined number of turns is accurate enough.

POTENTIOMETER WITHOUT MECHANICAL ADJUSTMENT STOPS

If a potentiometer without fast and slow idle stops is used, additional fixed resistors can be wired in series with 21-pin connector Pins C and M as shown below to prevent the analog throttle voltage from going outside the upper and lower limits and generating a fault code.

For the Auto-Cal system to work properly, each added resistor should be between 6%-20% of the nominal throttle potentiometer resistance. Total resistance of the potentiometer and both resistors should be in the range of 2000 to 15,000 Ohms.

You do not have to connect this circuit for gen-set applications. Gen-set ECUs default to rated speed (1800 or 1500 rpm), and do not generate a fault code if the throttle isn't connected. If the analog throttle is not connected, the engine will run at rated speed (1800 or 1500) only, with no adjustment.

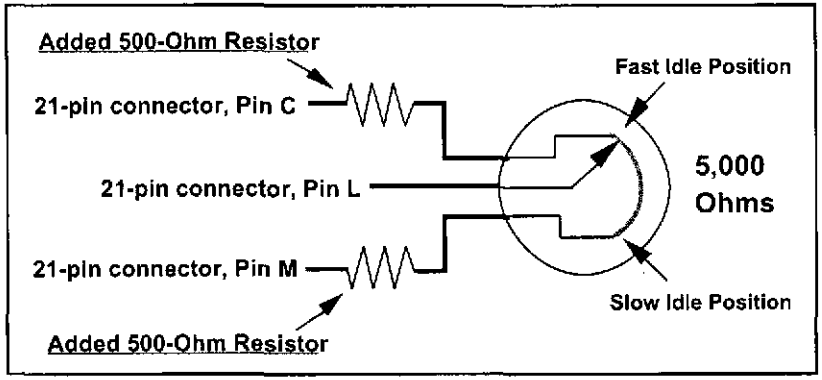


Figure AG-15 - 16,
Potentiometer Without Mechanical Adjustment Stops

Adjustable 2-State Throttle

The Adjustable 2-State Throttle wiring consists of three switches, the High/Low Select ("Idle") switch, the Speed Select ("Bump") switch, and the Bump Enable switch. Only the High/Low Select switch must be connected. The bump feature is optional

HIGH / LOW SELECT ("Idle") SWITCH

The High/Low Select switch circuit must be connected on all industrial applications, even if you do not intend to use the feature.

The High/Low Select switch is part of the Adjustable 2-State Throttle. The high/low switch switches between preset high speed and low speed operating points (normally the factory high idle and low idle). The switch must be in the low-speed position for the analog (potentiometer) throttle to work. You must either provide a high/low switch or you must terminate the circuit through a resister.

If this circuit is not connected on industrial applications, a fault code will be generated. The warning lamp will light and the system will revert to the analog throttle inputs. If no throttle signal is present on industrial applications, the system will revert to low idle. No connection is required on gen-set applications that are intended to run at rated speed only with no adjustability.

The John Deere RE162425 switch is a single-pole, double-throw switch, designed to be used for the High/Low Select switch. It can be purchased separately, or as part of the RE508626 Switch kit

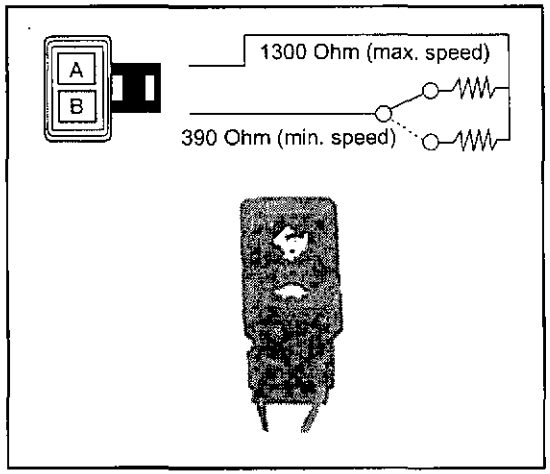
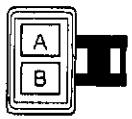


Figure AG-15 - 17, RE162425 High / Low Select Switch

The mating connector to this switch is a Packard Metri-Pack 150 Series two-cavity female connector, #12052641, with #12048074 sealed female terminals, cable seals and a #12052634 TPA or secondary lock.



Pin	Circuit	Color	Size	Destination
A	914	Yellow	18 AWG	to Pin "S" on 21-Pin Connector
B	947	Violet	18 AWG	to Pin "R" on 21-Pin Connector

Figure AG-15 - 18, High / Low Select Pin Connectors

The switch contains two resistors, 390-Ohm and 1.3K-Ohm. When in the slow idle position, the 390-Ohm resistor is placed in the circuit and when in the high-idle position, the 1.3k-Ohm resistor is placed in the circuit.

If you do not use the RE162425 High/Low Selector switch, you must provide your own switch, or terminate the circuit with a resister as shown below.

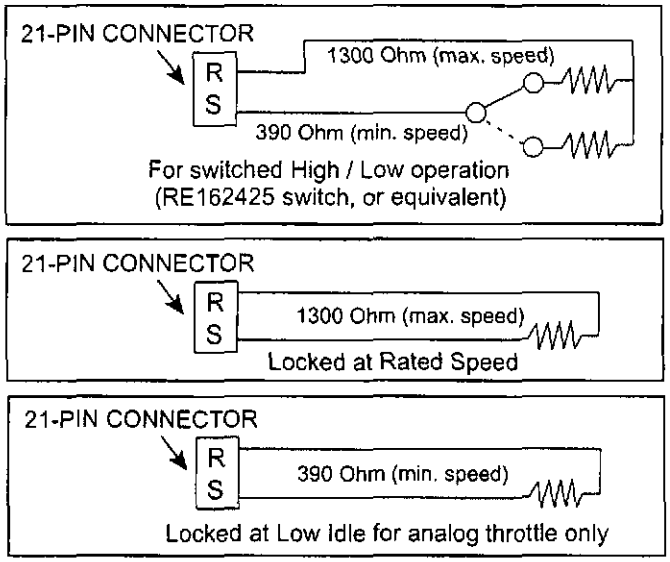


Figure AG-15 - 19, High / Low Select Connect Without RE162425

This connector must not be left open on ECUs equipped with the adjustable 2-state throttle. If the 2-state toggle-switch throttle is not used, one of the two following things must be done:

1. For continuous operation at the factory preset rated speed, with no ability to operate at low idle or any other reduced speed, a 1300-Ohm resistor can be permanently wired between Pins R and S.

2. For use with an analog throttle potentiometer without a 2-state toggle-switch throttle, a 390-Ohm resistor should be permanently wired between Pins R and S.

SPEED SELECT ("Bump") SWITCH

The speed select switch, also known as the "Bump" switch, is used to increase and decrease the minimum and maximum operating speeds. It must be used with the bump enable switch (see below). The bump switch works like the "Accel" and "Coast" buttons on a cruise control. A momentary tap on the switch bumps the speed up or down about 10 rpm. If the switch is held down, speed will continue to ramp up or down continuously until the switch is released, then it will lock in at whatever rpm it has reached at that point. You are not required to connect this circuit unless you intend to use this feature. If you do use this feature, you can use the John Deere RE162423 bump switch shown below, or any single-pole, double-throw, momentary switch with a detented center off position.

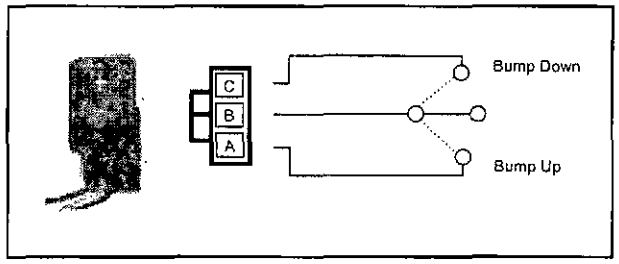
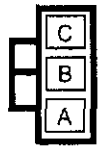


Figure AG-15 - 20, RE162423 Speed Select (Bump) Switch

The mating connector for the RE162423 switch is shown below. It is a Packard Metri-Pack 150 Series three-cavity male connector, #12129615, with #12045773 sealed male terminals, #12048086 cable seals, and #12052845 TPA or secondary locks.



Pin	Circuit	Color	Size	Destination
C	936	Blue	18 AWG	to Pin "T" on 21-Pin Connector
B	012	Red	18 AWG	to IGN circuit from key switch
A	955	Green	18 AWG	to Pin "W" on 21-Pin Connector

Figure AG-15 - 21, RE162423 Mating Connector

If you choose not to use the RE162423 switch, you can use any single-pole, double-throw, momentary switch with a detented center "off" position, wired as shown below

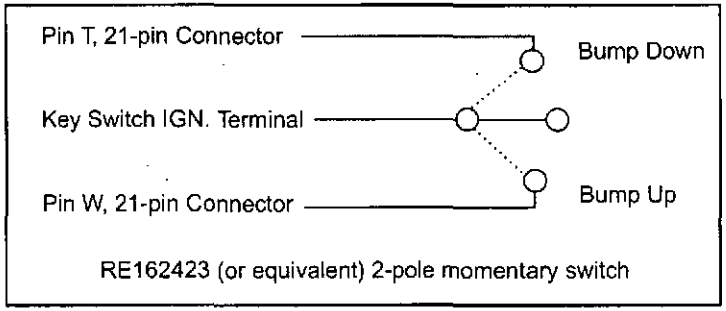


Figure AG-15 - 22, RE162423 Wiring Diagram

To permanently set high and low speeds, press the bump enable button (3) *three times after adjustment.* Both preset speeds (high and low) will be remembered, even if the ignition is turned off or the battery is disconnected.

If the adjustable 2-state toggle-switch throttle is not used, nothing is required to be plugged in to this connector

BUMP ENABLE SWITCH

The bump enable switch is used in conjunction with the speed select switch to adjust minimum and maximum operating speed. The bump enable switch enables the speed select switch to be read by the ECU. To adjust the minimum or maximum operating speed, the bump enable switch and speed select switch must be operated simultaneously. This prevents unexpected operating speed changes in the event of a failure of the speed select circuit.

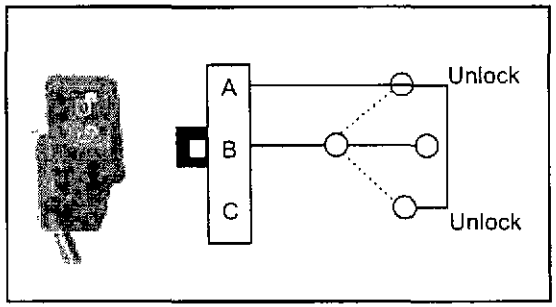


Figure AG-15 - 23, RE162424 Bump Enable Switch

As a convenience for the operator, we offer the RE162424 bump enable switch with two enabling positions, up or down, with the center "off." That way, when placed next to the RE162423 bump switch, both switches can be pressed simultaneously by laying your finger across them. The switch is a single-pole, double-throw, momentary with a detented center "off" position. Both active positions are wired to connect the same two-wire circuit when pressed.

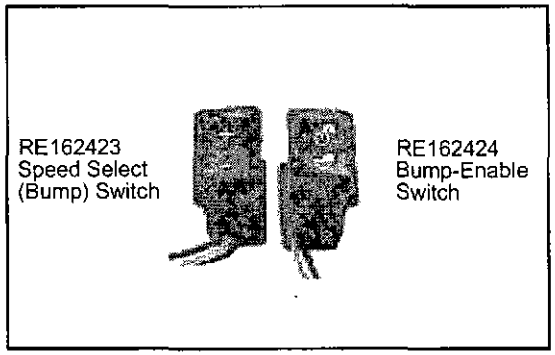
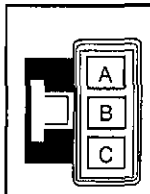


Figure AG-15 - 24, Throttle Switches

The mating connector on the RE162424 bump enable switch is shown below. It is a Packard Metri-Pack 150 Series three-cavity female connector, #12110293, with #12048074 sealed female terminals, #12048086 cable seals, and #12052845 TPA or secondary locks. The unused cavity has a #12059168 cavity plug installed.



Pin	Circuit	Color	Size	Destination
A	923	Orange	18 AWG	to Pin X on 21-Pin Connector
B	012	Red	18 AWG	to IGN circuit from key switch
C		Cavity Plug		Unused

Figure AG-15 - 25, RE162424 Mating Connector

If the RE162424 switch is not used, any similar single-pole, double-throw, momentary switch with a detented center off position switch, or a simple single-pole momentary switch can be wired as shown below to provide the bump-enable function.

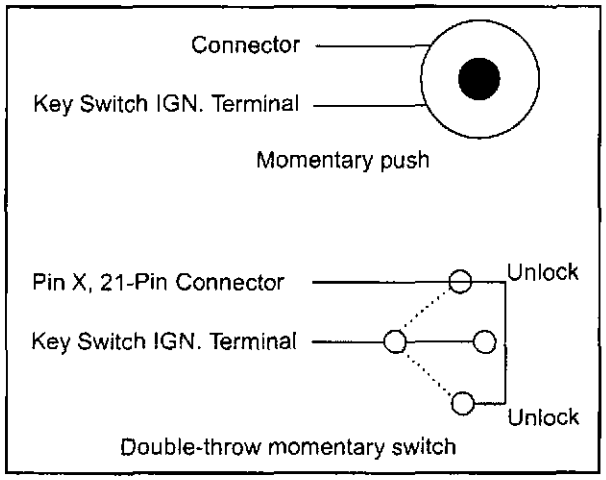


Figure AG-15 - 26, RE162424 Wiring Diagram

If the speed bump feature is not used, this circuit does not need to be connected.

RE68155 Diagnostic Gauge

We require the RE68155 or equivalent SAE J1949 CAN based on-board diagnostic system for all 12.5L applications. The RE68155 Diagnostic Gauge is a complete on-board engine diagnostic and display system. It includes built-in "Warning" and "Stop Engine" lights to alert the operator of any problems, and it digitally displays diagnostic codes, rpm, hours, oil pressure, coolant temperature, voltage, engine load, fuel consumption, manifold temperature and other engine parameters.

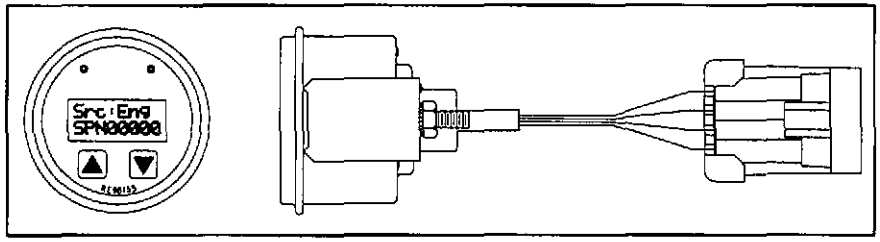


Figure AG-15 - 27, RE68155 Diagnostic Gauge

There are three ways to connect the RE68155 Diagnostic Gauge to your system:

1. Wire the RE68155 Diagnostic Gauge directly to the 21-pin instrumentation and controls connector.
2. Use the RE507276 adapter harness to connect the Diagnostic Gauge to the 9-pin diagnostic connector.
3. Use the RE162450 Databus Module to connect the RE68155 Diagnostic Gauge and up to six auxiliary gauges plus backlighting to the 21-pin instrumentation and controls connector.

WIRING THE DIAGNOSTIC GAUGE DIRECTLY TO THE 21-PIN CONNECTOR

Refer to the following illustration to connect the RE68155 Diagnostic Gauge to the 21-pin instrumentation and control connector.

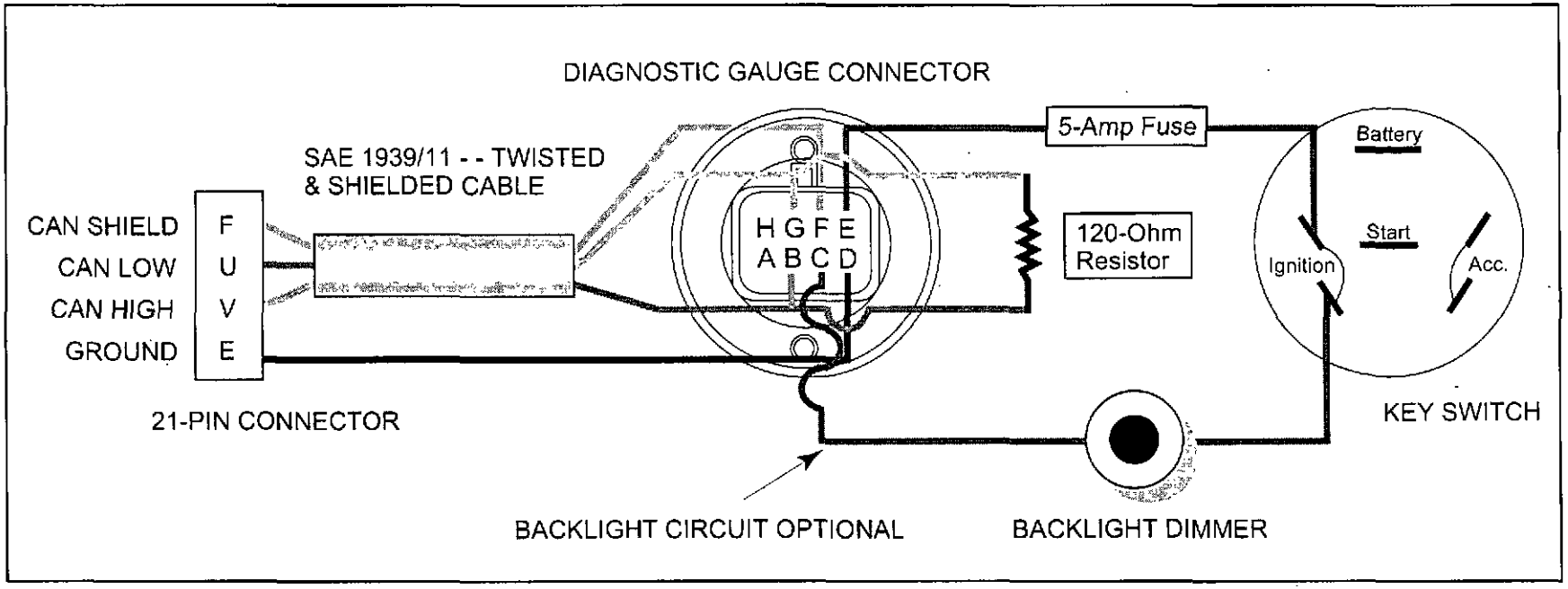


Figure AG-15 - 28, RE68155 Diagnostic Gauge

Pin "E" is the battery connection, and has an allowable voltage range of 9 to 32 volts with respect to Pin D, or ground, for proper operation.

The mating connector for the diagnostic gauge is a Packard Metri-Pack, 150 Series, 8-way female connector.

Part	Part Number
Female connector assembly	12047937
TPA	12066304
Sealed terminals, 16-18 AWG(1.0-.8 sq mm)	12048074
Sealed terminals, 20-22 AWG(.5-.35 sq mm)	12084200
Cable seals, 2.85-2.03 mm dia	12048086
Cable seals, 2.15-1.60 mm dia	12089678
Cable seals, 1.70-1.29 mm dia	12048087

The terminal and cable seals should be selected for the size of wire used. All of the terminal positions on the diagnostic gauge connector are used. If the mating connector does not use a position for a particular application, it should be filled with a cavity plug, part number 12059168, to ensure sealing of the entire connector assembly.

All the connecting wires you need are in the 21-pin instrument panel connector. If you aren't going to use backlighting or auxiliary gauges, you only have to hook up CAN H, CAN L, CAN Shield, power, and ground to the gauge. Power must come from the ignition terminal of the key switch through a 5-amp fuse.

SAE 1939/11-type shielded cable should be used to connect the CAN H, CAN L and CAN Shield wires from the 21-pin connector to the gauge. SAE 1939/11-type shielded cable is available from many commercial sources including Champlain Cable. To make your own cable, the CAN H and CAN L wires need to be twisted together along their entire length, and shielded with a metal cover. The CAN Shield wire should be a bare copper wire running inside (and contacting) the metal shield alongside the twisted CAN H and CAN L wires. It is a good idea to switch to an insulated wire where the wire exits the shield so it does not ground out against anything.

The CAN H and CAN L wires must be connected through a 120-Ohm resister on the end of your harness where they connect to the diagnostic gauge. If you use more than one CAN-based device, only one 120-Ohm resister should be connected. It must be connected at the end of the CAN buss, where the furthest device from 21-pin connector is connected.

If you want backlighting, just follow the schematic and find the corresponding pins you need in the 21-pin connector. If dimming is desired, normally a dimmer (RE162449) is used. This reduces the voltage to the backlighting from full voltage (about 14 volts for a 12-volt system) for full brightness to about 2 volts for the lowest brightness. If a 24-volt system is used, the voltage regulator (RE162448) should be used to provide 12 volts for the backlighting.

The backlight system is an LED. LEDs require about 2 volts to turn on. The voltage range for the backlighting is about 2 volts to 16 volts.

A 5-Amp fuse with the following characteristics (per SAE J1284) must be used:

Rating	Blow Time
110%	100 hours, minimum
135%	1500 seconds, maximum
200%	5 seconds, maximum
350%	0.08 seconds, minimum

USING THE RE507276 DIAGNOSTIC GAUGE ADAPTER HARNESS

An easier way to connect the RE68155 Diagnostic Gauge is to use the RE507276 adapter harness, available through service parts. The RE507276 adapter harness connects with the 9-pin Deutsch diagnostic connector, which is present on every engine wiring harness. It includes connectors for the RE162449 backlight dimmer and the RE162448 24-volt-to-12-volt converter, which is required to operate the 12-volt backlight system with a 24-volt engine electric system. It can also be used with the available RE508492 and RE508493 jumper wires for fixed (constant and non-dimmable) backlighting on 12-volt systems. The RE507276 adapter harness is approximately 12-feet long from the diagnostic port connector to the gauge connector. It includes a standard 3-pin Deutsch CAN connector with 120-Ohm terminator that can be used to transmit the SAE J1939 CAN signal to other devices.

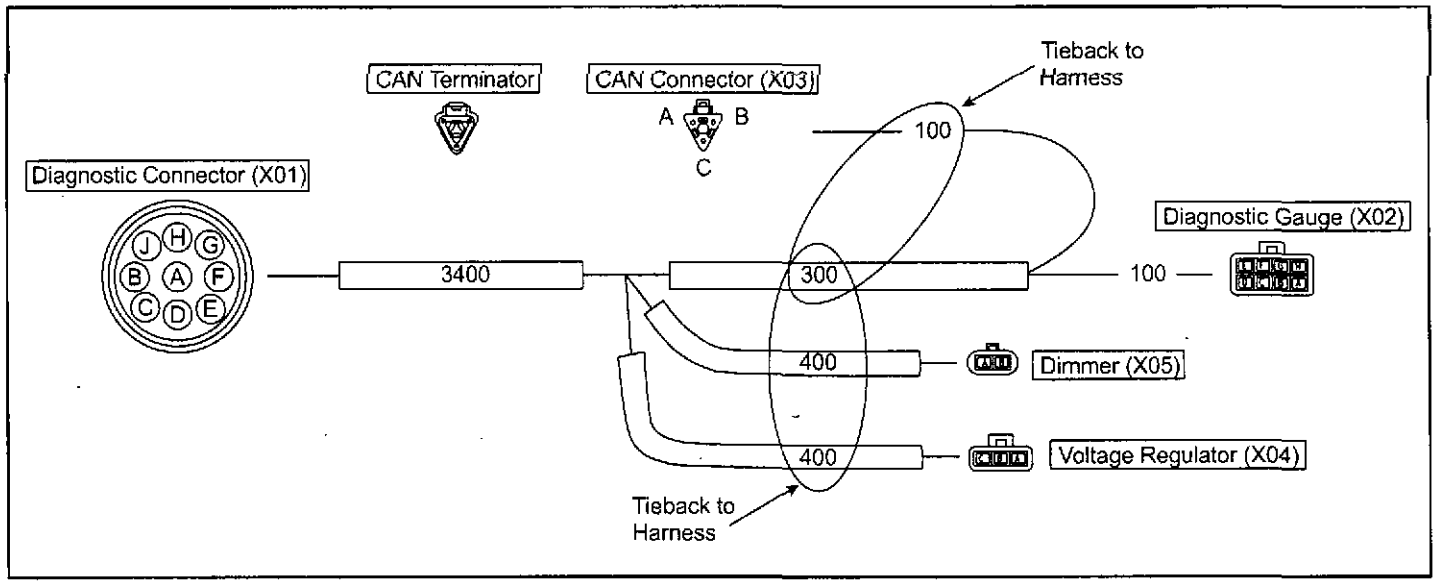


Figure AG-15 - 29, RE507276 Adapter Harness

The RE507276 adapter harness does not connect to any wires in the 21-pin instrumentation and control connector or any unterminated wires. It connects to the 9-pin diagnostic connector that is normally used only for service. It leaves 21-pin connector and unterminated wires free. It does not include wiring for any auxiliary gauges.

Direct Auxiliary Gauge Wiring

The RE68155 Diagnostic Gauge can drive the following optional auxiliary gauges:

RE163436	Percent load gauge
RE162422	12- volt voltage gauge
RE163277	24- volt voltage gauge
RE162419	Tachometer
RE162418	Gauge, Oil Pressure
RE162416	Gauge, Coolant Temp
RE162427	Audible warning alarm

These are simple display gauges that operate from a second proprietary buss from the diagnostic gauge.

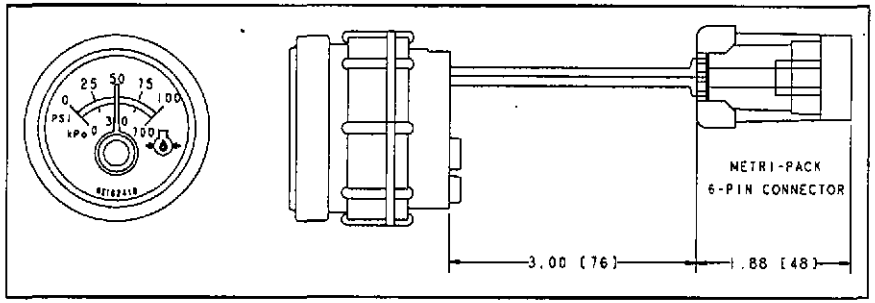


Figure AG-15 - 30, Typical Auxiliary Gauge

The RE162427 audible alarm module is applied in the same way as the analog gauges. The audible alarm module is also prewired for a single-pole, double-throw (normally open / normally closed) relay output. The relay output can drive 0.5 Amps at 125 VAC max, 1 Amp at 24 VDC max, or 62.5 VA, 30 Watts max. To connect to the relay, the RE162427 audible alarm module has a second Metri-Pack connector as shown below. The connector mates with a Metri-Pack 150-series, 3-way connector, part number 12110293.

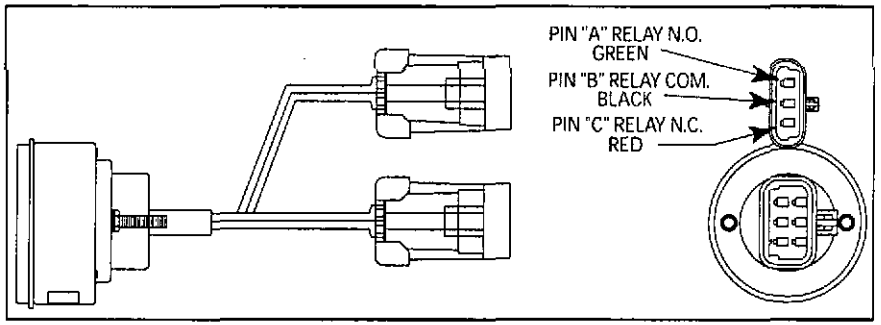


Figure AG-13 - 31, Audible Alarm Module, RE162427

There are two ways to connect the auxiliary gauges, a direct wiring connection, and the RE162450 databus module.

Refer to the following diagram to directly wire auxiliary gauges.

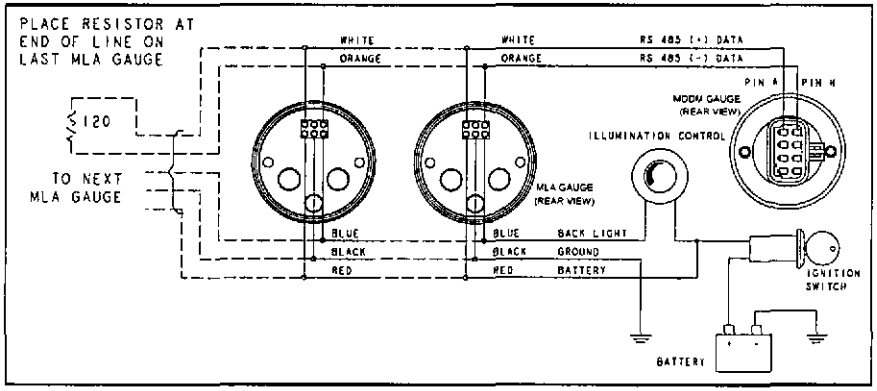


Figure AG-15 - 32, Auxiliary Gauge Wiring Diagram

As many auxiliary gauges as desired can be connected in parallel as shown. The proprietary buss must also be terminated with a 120-Ohm resister, as shown.

Note that the auxiliary gauge signal wires, Pins A and H are not connected on the RE507276 diagnostic gauge adapter harness, although they can be connected to the harness by adding the appropriate terminals and cable seals listed in the chart in the previous section to the Metri-Pack 8-way connector.

Using the RE162450 Databus Module

By far the easiest way to wire the diagnostic gauge and multiple auxiliary gauges is to use the RE162450 Databus Module. It includes shielded wiring and connectors for the diagnostic gauge and up to 6 auxiliary gauges. It also includes plugs for all backlighting accessories and 120-Ohm terminators for the SAE J1939 CAN buss and the proprietary auxiliary gauge buss. *It is included with RE162429 panel and RE508625 kit or available* separately from parts.

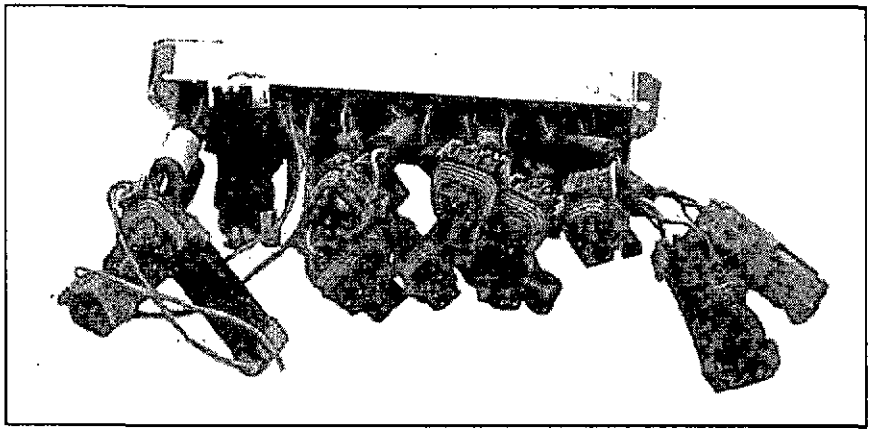


Figure AG-15 - 33, RE162450 Databus Module

The diagnostic gauge, all backlighting accessories, and all six auxiliary gauges plug right into the databus module. Only the CAN link and power and ground connectors have to be provided by the user.

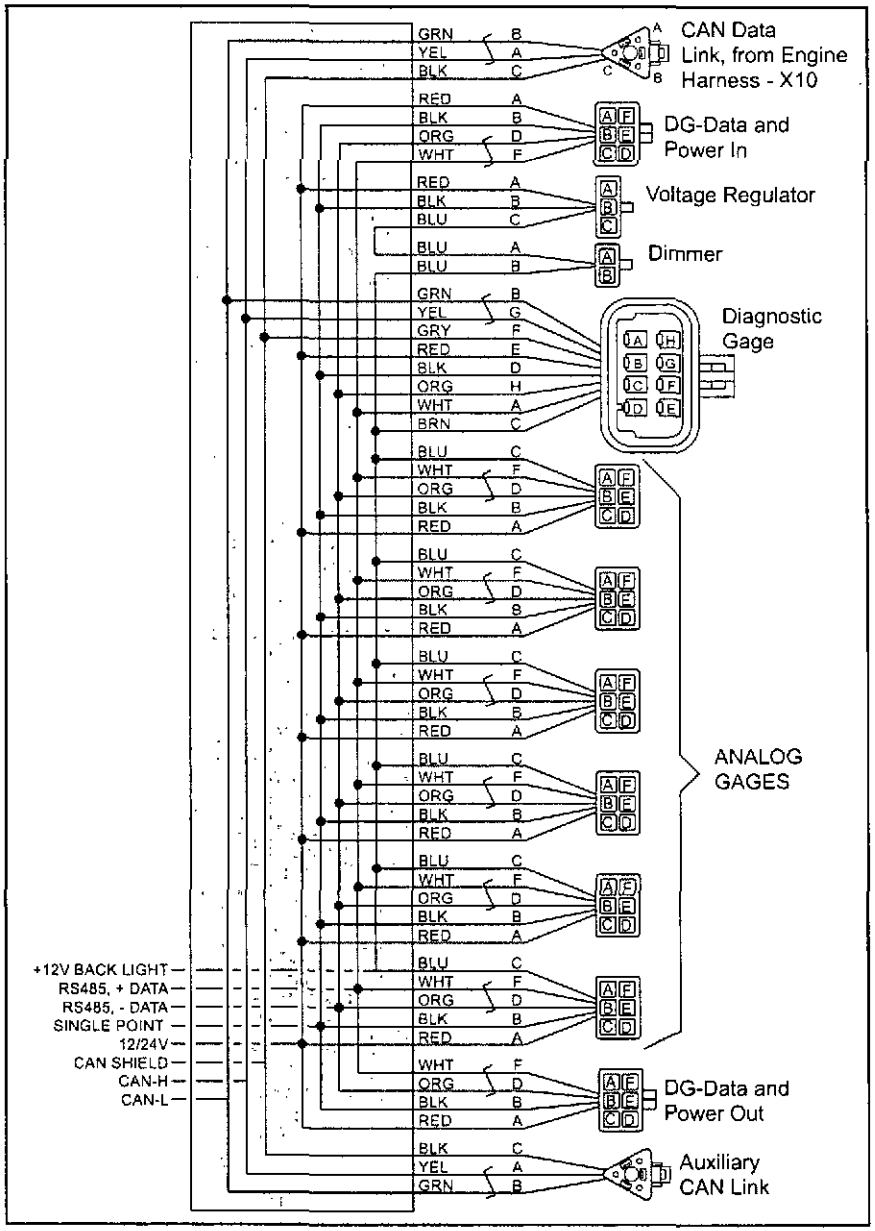


Figure AG-15 - 33a, RE162450 Databus Module Wiring Schematic

For installation of gauges and backlighting accessories, refer to the following diagram.

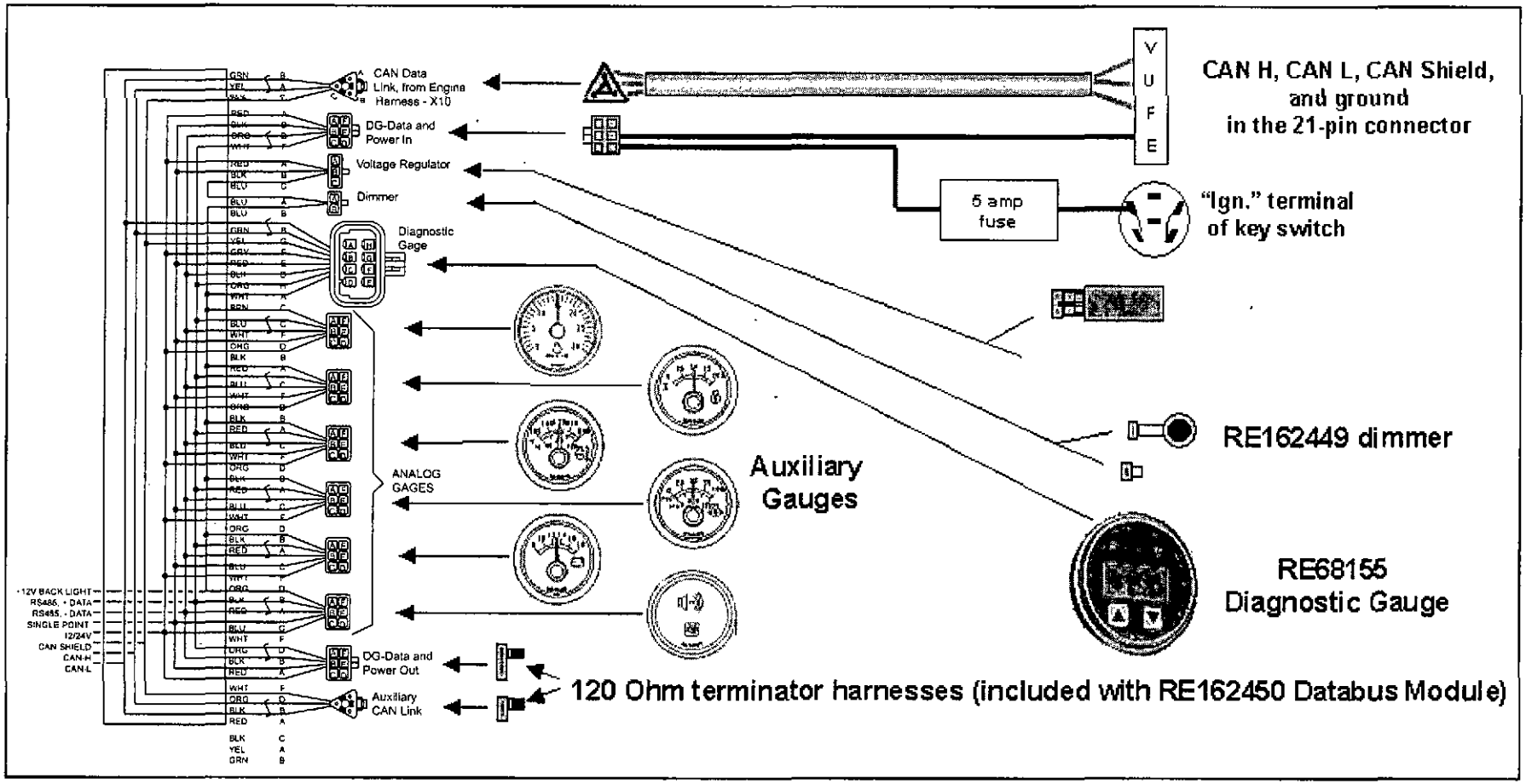


Figure AG-15 - 34, RE162450 Databus Module; Gauges and Backlighting Accessories

Refer to the following three sections for CAN Connector, Power Connector, and backlighting wiring details.

CAN CONNECTION TO RE162450 DATABUS MODULE

The CAN connection to the databus module is made through SAE J1939 compatible shielded, twisted-pair cable. The mating connector for the databus CAN connection is a Deutsch DT06-3S-E003 connector with W3S-1939 secondary locking wedge, as shown below. It plugs in to the databus as shown. The shield is attached to black wires at each end for proper termination in the connectors.

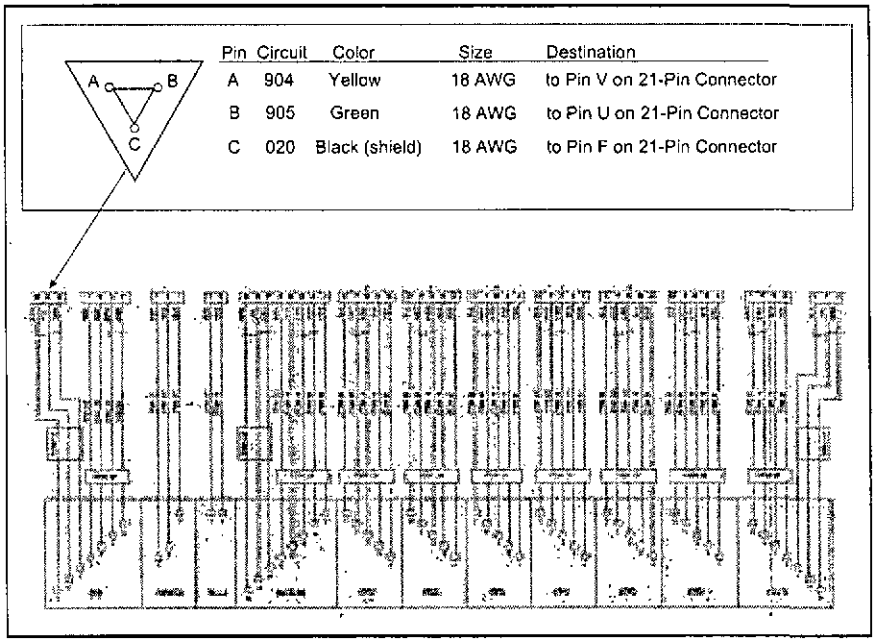


Figure AG-15 - 35, CAN Connection to the Databus Module

SAE 1939/11 shielded cable is available from various suppliers, including Champlain Cable.

POWER CONNECTION TO THE DATABUS MODULE

Power is provided to the databus module through a Packard Metri-Pack. 150 Series 6-cavity male connector, #12124107, with #12045773 sealed male terminals, #12048086 cable seals, and #12052845 TPA or secondary locks on the instrument panel harness. The unused cavities are plugged with #12059168 cavity plugs. The mating connector is shown below. It plugs in to the databus as shown.

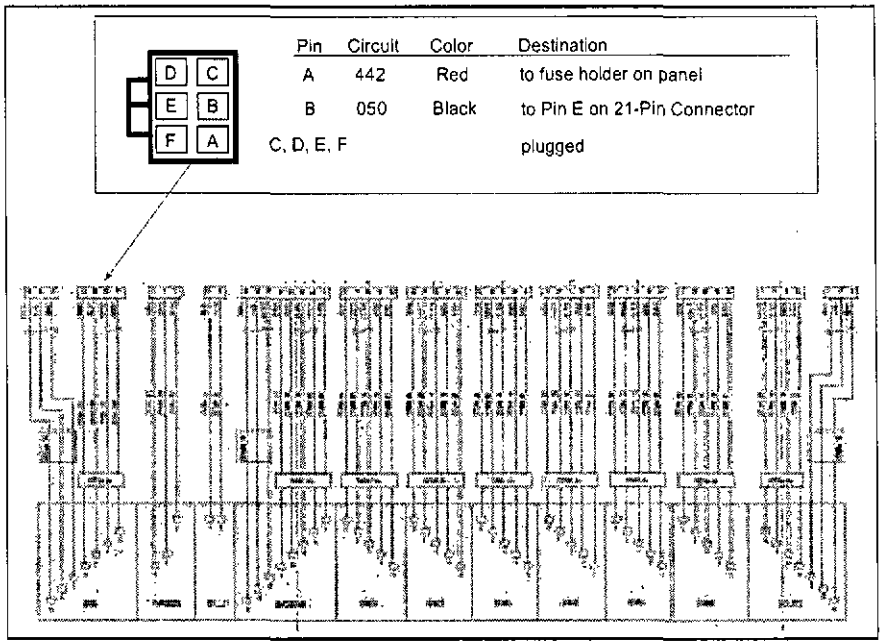


Figure AG-15 - 36, Power Connection to the Databus Module

BACKLIGHTING CONNECTIONS TO THE DATABUS MODULE

For 12-volt operation, the RE508493 12-volt backlight jumper should be installed. This provides 12-volt power directly to the backlight circuit. For 24-volt operation, an RE162448 24-volt-to-12-volt converter must be plugged into the 3-pin connector, to reduce 24-volt battery power to 12 volts.

Do not leave the RE508493 12-volt backlight jumper in place for 24-volt operation. This would provide 24 volts to the 12-volt instrumentation backlights, and result in failures of the Diagnostic Gauge, tachometer, and all other auxiliary gauges. Always order and install the RE162448 24-volt-to-12-volt converter for 24-volt backlighting. The gauges will operate on either 12 or 24 volts. RE162448 is only required if backlighting is used.

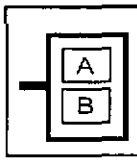
Wiring of the dimmer connector is the same for 12-volt or 24-volt operation. For "no backlighting," do not connect anything to this connector. For backlighting to be fully "on" all the time, install the RE508492 jumper wire. To turn backlighting on and off, a simple on/off toggle switch can be added to the wire between on the RE508492 jumper.

Shutdown Override Switch

The shutdown override switch is a single-pole, single-throw, normally-open, momentary switch used to temporarily override an engine shutdown.

On Engine ECU's with the Engine Protection Shutdown feature active, the engine protection shutdowns can be overridden for 30 seconds at a time. The Shutdown Override is activated when Pin P on the 21-pin connector is connected to Pin N on the 21-pin connector.

A special RE163465 push-button assembly is available from John Deere for this purpose that plugs directly into the shutdown override connector. The harness connection for the RE163465 shutdown override button assembly is a Packard Metri-Pack 150 Series two cavity male connector, #12162000 with #12045773 sealed male terminals, cable seals and a #12052634 TPA or secondary lock.



Pin	Size	Destination
A	18 AWG	to Pin "N" on 21-Pin Connector
B	18 AWG	to Pin "P" on 21-Pin Connector

Figure AG-15 - 37, Shurdown Override Switch

If you choose not to use the RE163465 push button assembly, any normally open momentary switch wired as shown below can be used.

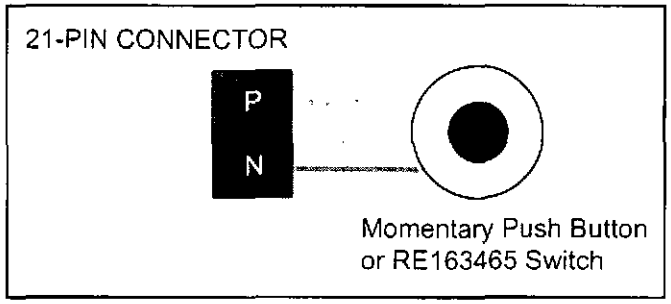


Figure AG-15 - 38, Shutdown Override Switch (RE163465)

If the circuit is open (button not pushed), the engine will shutdown 30 seconds after an automatic shutdown sequence starts. Each time the circuit is completed (button pushed), the shutdown timer is reset to a full 30 seconds and the engine runs in a derated power mode. Repeated connection of the Shutdown Override circuit each 30 seconds allows for continued engine operation.

Note: Holding the Shutdown Override continuously "ON" does not reset the 30-second timer.

Manually shutting down the engine and turning power "off" to the ECU resets the ECU. Using the Shutdown Override is not required on engine starts or restarts if the ECU power has been turned "off."

On Engine ECU's that do not have the shutdown feature active, the Shutdown Override is disabled.

Additional Features

Cruise Control

The Cruise Control feature is intended for use on mobile applications. Refer to the following diagram when wiring the Cruise Control feature.

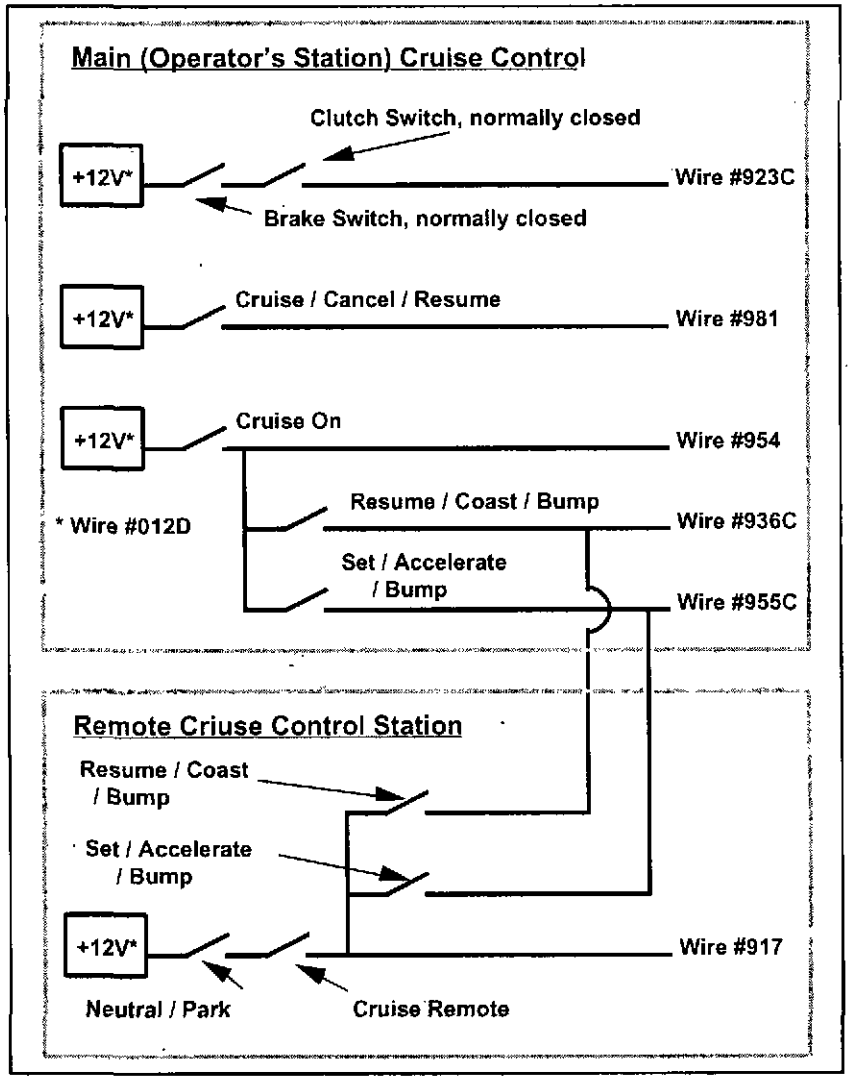
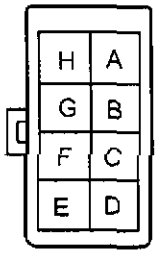


Figure AG-15 - 39, Cruise Control Wiring Diagram

The cruise control wires shown on the chart above are accessed through one Female 8-way Metri-Pack 150 connector on the Engine/ECU wiring harness.



Pin "A" - Wire #012, (red) Power (12 or 24 volts, keyed)
Pin "B" - Wire #954, (yellow) Cruise Control "ON"
Pin "C" - Wire #981, (brown) Cancel / Resume
Pin "D" - Wire #917, (purple) Remote Cruise Station "ON"
Pin "E" - Wire #935, (dark green) Brake / Clutch Switch
Pin "F" - Wire #955, (dark green) Set / Accelerate
Pin "G" - Wire #936, (light blue) Resume / Coast
Pin "H" - Wire #050J (black) Ground

Figure AG-15 - 40, Cruise Control Connector

For details of each wire and feature, refer to the following individual wire instructions:

CRUISE ON - WIRE #954 (yellow)

The Cruise Control at the operators station can be turned "ON" by supplying system voltage (+12 volts or +24 volts) to the Cruise On wire #954. Switched battery voltage can be accessed through Wire #012.

Two other conditions must exist for the main Cruise Control station to be active. The Cruise Brake/Clutch Enable - Wire #935 must also be connected to the positive system voltage lead; and the Cruise Remote - Wire #917 must be unpowered (i.e., turned "off"). The main cruise control station and the remote station cannot be active at the same time.

Power for Wire #936 and Wire #955 should come from Wire #954 as shown in the above illustration. See the following sections on the functions of Wire #936 and Wire #955.

CRUISE RESUME / COAST / BUMP SPEED DOWN -
WIRE #936C (light blue)

At the main cruise control station, a momentary contact switch should be connected from Wire #936 to Wire #954. When the cruise control is "ON," a momentary contact on this circuit returns the engine speed to it's previous set speed. When contact is maintained, the engine speed set point slowly decreases. The Cruise Resume / Coast / Bump Speed Down function has a ramped speed adjustment rate. The engine speed decreases faster, the longer the contact is held "ON."

At the remote cruise control station (if used), a momentary contact switch should be connected from Resume / Coast / Bump Down (Wire #936C) to Wire #917. (See Wire #917 instructions.)

CRUISE BRAKE ENABLE - WIRE #935 (orange)

The Cruise Brake Enable (Wire #935) should be connected to system voltage (+12 volts or +24 volts) through a normally closed switch on the vehicle brake system. 12 or 24 volts can be accessed through Wire #012. When the brakes are engaged, the circuit is broken and the cruise control is disconnected but will retain the engine set speed in memory. For a transmission with a clutch, normally closed clutch and brake switches in series should be used.

The Cruise Brake Enable circuit (Wire #935) disconnects both the main cruise controls in the operator's station and the remote cruise control station, if used.

CRUISE SET / ACCELERATE / BUMP SPEED UP -
WIRE #955 (dark green)

At the main cruise control station, a momentary contact switch should be connected from Wire #955 to Wire #954. When the cruise control is "ON", a momentary contact on this circuit sets the engine speed in memory. When contact is maintained, the engine speed set point slowly increases. The Cruise Set / Accelerate / Bump Speed Up function has a ramped speed adjustment rate. The engine speed increases faster, the longer the contact is held "ON."

At the remote cruise control station (if used), a momentary contact switch should be connected from the Set / Accelerate / Bump Up (Wire #955) to Wire #917. (See Wire #917 instructions.)

CRUISE CANCEL / RESUME - WIRE #981 (brown)

The Cruise Cancel / Resume (Wire #981) is connected to battery voltage (+12 or +24 Volts) with a momentary contact switch. A high quality switch with gold contacts should be used. 12 or 24 volts can be accessed through Wire #012.

The Cancel / Resume function can be used to temporarily interrupt a "set" cruise speed. To do so, the operator contacts the Cancel / Resume button and speed decreases toward idle. To resume the "set" cruise speed, the operator must contact the Cancel / Resume button again within one minute. (This could be used by a tractor operator at the end of each crop row.) If the second Cancel / Resume contact is not made within one minute, the engine reverts to normal cruise control and to resume "set" speed requires using the "Resume" switch.

Cruise Cancel / Resume does not resume at engine speeds below 1300 RPM.

The Cruise Cancel / Resume function does not operate when Cruise Remote (Wire #917, purple) is active. (See Wire #917 instructions.)

CRUISE REMOTE - WIRE #917 (purple)

Wire #917 is used to turn a second (remote) cruise control station on and off. This is intended for use where a remote engine speed adjustment is needed, such as at an external PTO location. When Wire #917 is connected to battery voltage, the second cruise control station is switched "on." When Wire #917 is turned "off" (no voltage, open circuit) the second cruise control station is switched off. The primary (dashboard) cruise control must be turned off for the second station to be used. If the ECU detects that both cruise control stations are "ON," the cruise control will not function.

GROUND - Wire #050J (black)
A ground is not needed for any of the primary cruise functions. This ground wire is provided for any other needs the customer might have, such as wiring a cruise indicator light at the operators station.

High Air Cleaner Restriction Switch

A 2-way Weather-Pack male connector is provided in the engine/ECU wiring harness for a customer-provided high air cleaner restriction switch.

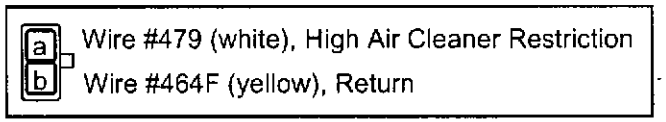


Figure AG-15 - 41, High Air Cleaner Restriction Connector

When this circuit is open (Wires #479 and #464F not connected, or nothing plugged into this connector), the engine will operate normally and no error code will be generated. When Wire #479 is connected to Wire #464F, the ECU will illuminate a fault lamp and generate a high air cleaner restriction error code. If an ECU with engine derate protection is specified, the engine will derate 2% per minute to a maximum derate of 20%. If the switch opens during the derate sequence, the power will increase at 2% per minute until normal power is reached or until the switch closes again. The current fault code will remain on until normal power is reached.

The high air cleaner restriction switch will not activate a shutdown sequence, regardless of which ECU you have specified. It is up to the operator to shut down and resolve the problem.

Low Coolant Level Switch

A female 2-way Metri-Pack 280 connector is provided in the engine/ECU wiring harness for a customer-provided low coolant level switch.

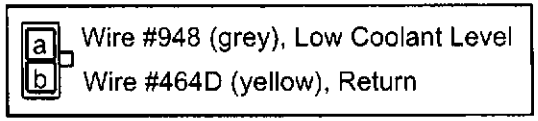


Figure AG-15 - 42, Low Coolant Level Switch Connector

When this circuit is open (Wire #948 and #464D not connected, or nothing plugged into this connector), the engine will operate normally. When Wire #948 is connected to Wire #464D, the ECU will illuminate a fault lamp and generate a low coolant level error code. It may also activate a derate/shutdown sequence, depending on which ECU you have specified:

1. For ECUs without any "Engine Protection" features enabled: The ECU will not derate the engine or shut it down. It is up to the operator to shut down and resolve the problem.
2. For ECUs with the "Engine Derate" feature enabled: The ECU will reduce engine power at 20% per minute to a maximum reduction of 40% (60% of normal power remaining), but it will not shut the engine down. It is up to the operator to shut down and resolve the problem.
3. For ECUs with the "Engine Shutdown" feature enabled: After 30 seconds, the engine will automatically shut down.

If Wire #924B returns to an open circuit condition within the 30-second delay period, the engine gradually increases back to original power, and the engine does not shut off. The fault lamp illuminates until the power returns to normal, then it shuts off.

The engine does not shut down immediately when Wire #924B is grounded, so it should not be used if an immediate shutoff is required. For an immediate shutdown, the external stop-engine input wire should be used (see instructions, below).

External Stop-Engine Input

A female 2-way Metri-Pack 150 connector is provided in the Engine/ECU wiring harness for an immediate external shutdown input. This allows the OEM to trigger an immediate shutdown from external switches, such as a loss of prime switch, or hydraulic overtemperature switch. Any number of normally open switches that close to trigger the shutdown can be added in parallel.

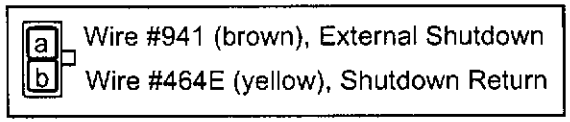


Figure AG-15 - 43, External Stop-Engine Input Connector

When the 2-wire circuit is open, the engine operates normally. When the 2-wire circuit is closed, the ECU shuts the engine off immediately and triggers a fault code. (For details, see the Operator's Manual.)

Note: The External Shutdown function is always active, even if an ECU without shutdown is specified. Also, the external shutdown function shuts down the engine immediately, with no delay period and no opportunity to override. If you do not wish to use this feature, do not connect anything to the wires.

External Derate Input

A Male 2-way Metri-Pack 150 connector is provided in the Engine/ECU wiring harness for an external derate input. This allows the OEM to trigger a 20% reduction in engine power from external switches, such as a loss of prime switch or hydraulic overtemperature switch. Any number of normally open switches that close to trigger the derate can be added in parallel.

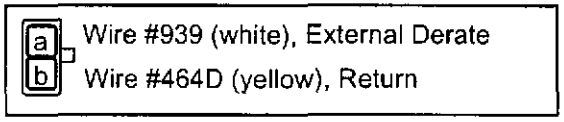


Figure AG-15 - 44, External Derate Input Connector

When the circuit between Pins A and B closes, the engine will derate at a rate of 2% per minute for a total derate of 20% in 10 minutes. A fault code and warning light will also be generated. If the circuit opens during that time, the engine will increase power at 2% per minute until reaching full power. Once the engine returns to full power the warning light will turn off.

Note: The External Derate function is always active, even if an ECU without derate is specified. If you do not wish to use this feature, do not connect anything to the wires.

Auxiliary "Warning" Lamp

A female 2-way Metri-Pack 150 connector with Wires #012E (red, Pin A) and #473 (orange, Pin B) is provided in the Engine/ECU harness to operate an auxiliary "Warning" lamp. Pin A (Wire# 012E) goes to the positive terminal of a 12- or 24-volt indicator light. Pin B (Wire #473) goes to the ground side of the bulb. Pin A is always "live" with 12 or 24 volts when the key is on. The ground (Pin B) acts as the switch.

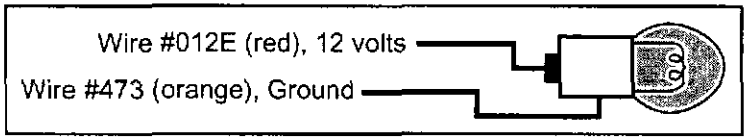


Figure AG-15 - 45, Auxiliary "Warning" Lamp Wiring

Use an amber-colored light for the warning lamp. When a "Warning" problem is detected by the ECU, the lamp blinks. "Warnings" include lower-than-normal oil pressure, higher-than-normal coolant temperatures, higher-than-normal charge air temperatures, or power derates.

This circuit supports a maximum current of 100 mA. It should not be used to drive any load larger than a 1-Watt bulb. To drive larger loads, such as audible alarms, we recommend installing the RE162427 alarm module that plugs into the databus module in the instrument panel. It includes a relay for additional loads up to 0.5 Amps at 125 volts AC, 1 Amp at 12-24 volts DC, or 62.5 VA, 30 Watts max.

Connecting this terminal is not required if you use the RE68155 diagnostic gauge. The RE68155 diagnostic gauge has amber ("Warning") and red ("Stop Engine") lamps built in.

The warning light driver also serves as the "blink light" for blink-code dagnostics.

Auxiliary "Stop-Engine" Lamp

A male 2-way Metri-Pack 150 connector with series female terminals is provided in the engine/ECU harness to operate an auxiliary "Stop Engine" lamp. Pin A (Wire #012D) goes to the positive terminal of a 12- or 24-volt indicator light. Pin B (Wire #474) goes to the ground side of the bulb. Pin A is always "live" with 12 or 24 volts when the key is on. The ground (Pin B) acts as the switch.

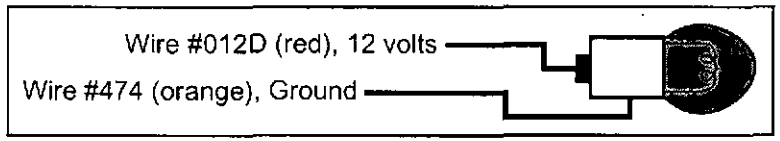


Figure AG-15 - 46, Auxiliary "Stop-Engine" Lamp Wiring

Use a red-colored light for the stop-engine lamp. When a "Shutdown Engine" problem is detected by the ECU, this fault lamp blinks. "Shutdown" problems include extremely low oil pressure, and extremely high coolant temperatures. On ECU's with shutdown enabled, an "ON" lamp indicates that the engine will shutdown within 30 seconds.

This circuit supports a maximum current of 100 mA. It should not be used to drive any load larger than a 1-Watt bulb. To drive larger loads, such as audible alarms, we recommend installing the RE162427 alarm module that plugs into the databus module in the instrument panel. It includes a relay for additional loads up to 0.5 Amps at 125 volts AC, 1 Amp at 12-24 volts DC, or 62.5 VA, 30 Watts max.

Connecting this terminal is not required if you use the RE68155 diagnostic gauge. The RE68155 diagnostic gauge has amber ("Warning") and red ("Stop Engine") lamps built in.

Secondary Analog Throttle Potentiometer Connector

For installations where two analog throttles are needed, a second 3-pin male Weather-Pack throttle connector is provided on the engine wiring harness. The adjustable 2-state throttle must be set in the "low speed" position for either analog throttle to work. The "Secondary" analog throttle can be used with or without the "Primary" analog throttle installed.

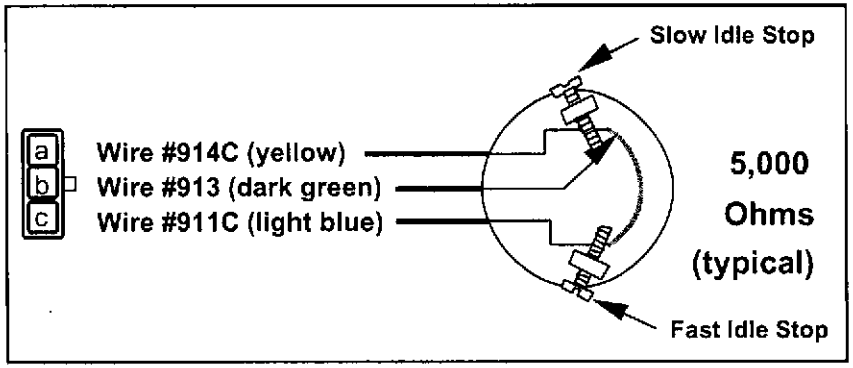


Figure AG-15 - 47, Secondary Analog Throttle Potentiometer

The second analog throttle feature is intended for use when a foot throttle and a hand throttle must both be provided. It can also be used when two throttle inputs are operated by the same lever or pedal for back-up purposes. When both analog throttles are used, the throttle signals will be additive, up to the factory preset fast idle setting or the maximum speed set with the adjustable 2-state throttle. There is no "dead band" in either throttle. When you move the foot throttle, speed immediately increases regardless of where the hand throttle is set.

The secondary analog throttle feature is not intended for use with two throttles located remotely from each other. Because the throttle signal is additive, if either throttle is at the full-speed position, the other throttle will have no control. Both throttles must be in the slow idle position for the engine to operate at slow idle.

For remote throttle applications, we suggest the use of the cruise control feature instead of the secondary throttle.

If used, the secondary analog throttle must be wired and adjusted exactly the same as the primary analog throttle. It can be used with the RE69667 potentiometer throttle or any similar unit.

Unlike the primary throttle, if the secondary throttle is not used, the special RE503681 throttle emulator is not required. To install a secondary analog throttle, unplug the dust cap provided with the wiring harness, and plug the throttle into the same connector. If a secondary throttle is not used, the dust cap should be left in place.

MAKING YOUR OWN ENGINE WIRING HARNESS

The engine wiring harness connects the ECU, all engine mounted sensors and actuators, the 21-pin instrumentation and controls connector, the alternator ignition wire, and the starter relay. To manufacture your own engine wiring harness you will need this document, a copy of the RE502338 ECU wiring diagram, and the latest manufacturing drawing of the standard John Deere wiring harness for your engine. Only the specified John Deere sensors can be used. Other sensors should not be applied.

We strongly recommend following the John Deere harness drawing as closely as possible, varying only cable lengths as needed to fit your installation. All cable lengths that connect engine-mounted components such as sensors and actuators must be exactly per the print. All connectors shown on the John Deere wiring harness drawing must be provided, including all diagnostic connectors and the CAN terminator connector. Please use the same wire colors and circuit numbers shown on the print, so service technicians will be able to trouble-shoot the system using our standard procedures and manuals. We strongly recommend that you use the same 21-pin connector used on the John Deere harness for your instrument panel connector. Not only will that facilitate service, but many of our customers find it very useful to be able to plug in one of our standard instrument panels for diagnostic and experimental purposes. Starter relay connections are included in our harness, but you can operate the starter relay separately from the engine harness if you prefer. You can also bring 12 V power to your key switch separately from the engine wiring harness if needed, to carry high accessory loads. However, the main engine power connections must be made directly to the battery (not the starter terminal) through the unterminated battery connection circuits shown on the John Deere wiring harness drawing. Other unterminated wires shown on the John Deere wiring harness drawing are optional and can be left out if not used. Please refer to the Instrumentation and Controls wiring section of this document for operating and wiring details of each circuit.

REFERENCE INFORMATION

"Metri-Pack" and "Weather Pack" connectors are products of the Packard Electronics Division of Delphi Automotive Systems.

Delphi Automotive Systems
Worldwide Headquarters, United States & Canada Headquarters
One Pontiac Plaza
Pontiac, Michigan 48340-2952
USA
Toll Free: [1] 888.255.7179
Tel: [1] 810.857.4323
Fax: [1] 810.857.4248
web: http:\\www.delphiauto.com/electric/

Delphi Automotive Systems
Asia Pacific Headquarters
1-1-110 Tsutsujigaoka
Akishima-shi, Tokyo 196
Japan
Tel: [81] 425.49.7200
Fax: [81] 425.42.3018
Delphi Automotive Systems
European Headquarters
117 Avenues des Nations, BP 60059
Zac Paris Nord II
95972 Roissy Charles de Gaulle Cedex
France
Tel: [33] 1.4990.4990
Fax: [33] 1.4990.4950

Delphi Automotive Systems
Mexico & South American Headquarters
Av. Goiás, 1820
São Caetano do Sul
São Paulo 09550-050
Brasil
Tel: [55] 11.741.9500
Fax: [55] 11.741.9599

For information on SAE J1939 CAN standards contact:

Society of Automotive Engineers (SAE)
400 Commonwealth Drive
Warrendale PA 15097-0001
USA
Tel: 412-776-4841
Fax: 412-776-5760
Email: isales@sae.org
web: http:\\www.sae.org/

Electronic Throttle Manufacturers:

Teleflex Morse Electrical Systems
(formerly Morse Controls)
6980 Professional Parkway East
Sarasota, FL 34240

Tel: 941-907-1000
Fax: 941-907-1020
web: http://www.tflx.com
Technical Support: techsupport@tflx.com

SAE 1939 Cable Manufacturer:

Champlain Cable
175 Hercules Drive
Colchester, Vermont 05446
Tel: 800-451-5162
Fax: 802-654-4224
web: http:\\www.champcable.com