

544G Repower Work Instructions

6068HF285-544G



Revision: B

27 July, 2010



JOHN DEERE

Attention - Service Manager - Attention

Experience has shown that putting Tier 2 and Tier 3 power plants into engine compartments designed for much older Tier 0 and Tier 1 models almost always involves trade-offs and compromises. You need to be aware that the equipment options on your candidate machine may differ from the options installed on the prototype unit used for kit development. Particular examples might include cabs on bulldozers and the presence of air conditioning. In addition, individual interpretations abound with respect to the “best way” to execute a repower. For these reasons, Western Power Products will not be responsible for any additional cost an installing dealer incurs to 1) adapt a kit to a machine configuration different from the machine used to develop the kit or 2) to provide additional kit elements or alternate component mounts or orientations employed to satisfy individual dealer preferences for their final repower product. So before quoting, always start with a thorough review the installation instructions and engine codes to identify potential areas you suspect might require additional material and labor. If you are uncertain, talk to a Western Power Products’ engineer at 888-ENG-POWR or 661-397-9155. They will help you develop a more complete picture of the scope of your repower project.

Table of Contents

544G Repower Work Instructions	1
6068HF285-544G	1
1 Parts	5
2 Removing Old Engine	6
3 Service Radiator	6
4 Installing New Engine	6
5 Wiring and Wire Harness	9
6 Modifying Controls	13
6.2 3 State Throttle (Must Install For Maximum Throttle Feature)	18
6.1 Key Switch	19
7 Hood Modifications	20
7.1 Exhaust Mounting	21
7.2 CAC Mounting	22
7.3 Air Cleaner Mounting	23
8 CAC Tube Mounting	25
Appendix A: 6068HF285 Engine Specification	27
Appendix B: Electronics	29

Figures and Tables

Figure 1: Installed Drive Adapter on New Engine	7
Figure 2: Reason for Modifying Front Right Motor Mount	7
Figure 3: Motor Mount Modification	8
Figure 4: Motor Mount Modification	8
Figure 5: Front Right Motor Mount Installed on New Engine	9
Figure 6: New Engine Installation	9
Figure 7: Wiring Harness Routing.....	10
Figure 8: Rear Left Wiring Harness Routing.....	10
Figure 9: ECU Mounting Location	11
Figure 10: ECU Mounting Bracket.....	11
Figure 11: Harness Routing Through ECU Compartment	12
Figure 12: Underside of ECU Compartment	12
Figure 13: Modified Instrument Panel with PowerView	13
Figure 14: RE534022B Instrument Panel Harness	14
Figure 15: Power View Mounting Plate Front Side.....	14
Figure 16: Wiring Harness Routing Under Cab	15
Figure 17: AG-11 Analog Foot Throttle Wiring.....	16
Figure 18: Potentiometer Mounting On Accelerator Pedal	17
Figure 19: Underside of Accelerator with Potentiometer	17
Figure 20: Trim Features	18
Figure 21: Key Switch	19
Figure 20: New Exhaust Stack, CAC, and Air Cleaner Locations	20
Figure 21: Muffler Mounting Location.....	21
Figure 22: CAC Mounting to Left Side of Hood.....	22
Figure 23: CAC Mounting to Top Right Side of Hood	23
Figure 24: Air Cleaner Mounting To Underside of Hood	24
Figure 25: Hot CAC Tube Mounting.....	25
Figure 26: Cold CAC Tube Mounting	26
Figure 27: 21-pin Deutsch Instrument Panel Connector.....	29
Figure 30: 21-pin Deutsch Instrument Panel and Controls.....	29
Figure 31: Wiring Harness.....	30

1 Parts

Table 1: Parts List

CATEGORY	PART	QTY	DESCRIPTION
KIT		6068HF285-544G	
CAC	51-200-300-300-110	2	3" TO 2" REDUCER
	52-200-400-110	2	2" HUMP COUPLER
	WRP544GA04	1	HOT CAC TUBE
	AT105289	6	2" CLAMP
	AT301456	2	3" CLAMP
	WRP750CA05	1	COLD CAC TUBE
	AT176779	1	CAC
	T159781	1	CAC MOUNTING LEFT
	T159780	1	CAC BRACKET RIGHT
RADIATOR	T173771	1	RADIATOR HOSE
	26517	1	GREEN STRIPE
	13P-200	1	D&A 45 DEGREE BEND
	51-175-200-300-110	1	1.75" TO 2" REDUCER
	AR40418	2	1.75" RADIATOR HOSE CLAMP
	TY22472	3	2" RADIATOR HOSE CLAMP
EXHAUST	PM86144M	1	MUFFLER
	9V15881	1	EXHAUST CLAMP
	P208386	1	EXHAUST EXTENSION AND RAIN CUT
	4"X3" TUBING	1	4" X 3" SLEEVE
FAN	AT211347	1	26" BLOWER FAN
	19M7898	4	FAN BOLTS
	R524736	1	3.937" FAN SPACER
ELECTRONICS	RE534022B	1	INSTRUMENT PANEL
	AT332120	1	FOOT THROTTLE
	AT332121	1	HARNESS, SERVICE JUMPER
	AT332122	1	PLATE, ACCEL SERVICE
	REPOWER_ECU_BRACKET	1	REMOTE ECU MOUNTING BRACKET
AIR CLEANER	AT225535B	1	AIR CLEANER KIT
	AT175358	1	INTAKE RAINCAP
	AR64937	2	SUPPORT BAND
	1675-202	1	1/8" FITTING
	RE67747	4	HOSE CLAMP
	135501-10825	1	FILTER
	H88782	2	AIR CLEANER ELBOW HOSE

	R517439	1	AIR FLOW TUBE
MISC	WRP624HA02	1	ACCELERATOR PEDAL MOUNTING PLATE
	R123468	1	V-BELT 65.157", 8 GROOVE
	M20X140	2	BOLT
	19M7944	4	M10X120 FLANGED BOLT
	R500509	1	BRACKET SUPPORT LH

*Due to differences in configurations, you may need to supply miscellaneous mounting hardware.

2 Removing Old Engine

- Remove old engine according to the 544G Service Manual
- Remove drive adapter from old engine
- Remove motor mounts from old engine

3 Service Radiator

- Check radiator and service if necessary

4 Installing New Engine

- Install drive adapter on new engine
- Modify Front Right Motor Mount
- Install motor mounts
- Install new engine per service repair manual
- Reinstall hydraulic pump



Figure 1: Installed Drive Adapter on New Engine



Figure 2: Reason for Modifying Front Right Motor Mount



Figure 3: Motor Mount Modification



Figure 4: Motor Mount Modification



Figure 5: Front Right Motor Mount Installed on New Engine



Figure 6: New Engine Installation

- Re-install radiator if it needed to be removed for service
- Connect radiator hoses, fuel lines

5 Wiring and Wire Harness

- Install wiring harness per service repair manual
- Be sure to keep harness away from high temperature locations such as the exhaust manifold
- Connect sensors to engine
- Secure harness to engine with zip ties

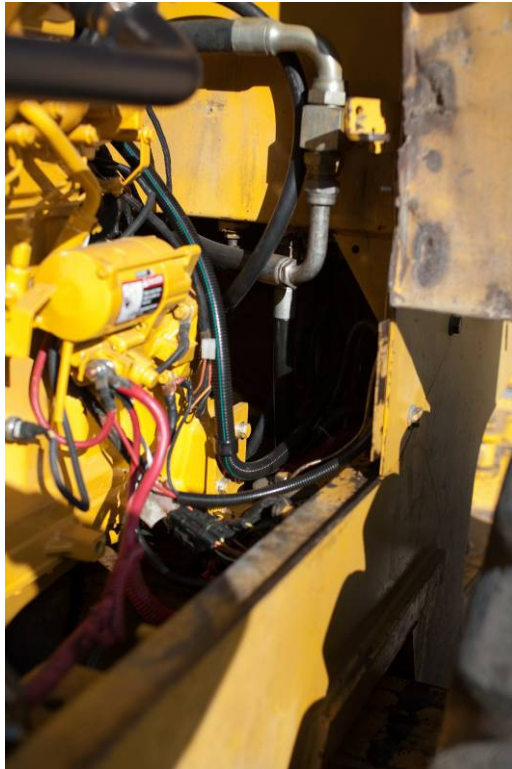


Figure 7: Wiring Harness Routing



Figure 8: Rear Left Wiring Harness Routing

- Run excess wiring underneath the right side of the cab

- On the right side of the cab undo the 2 screws holding the access panel closed.

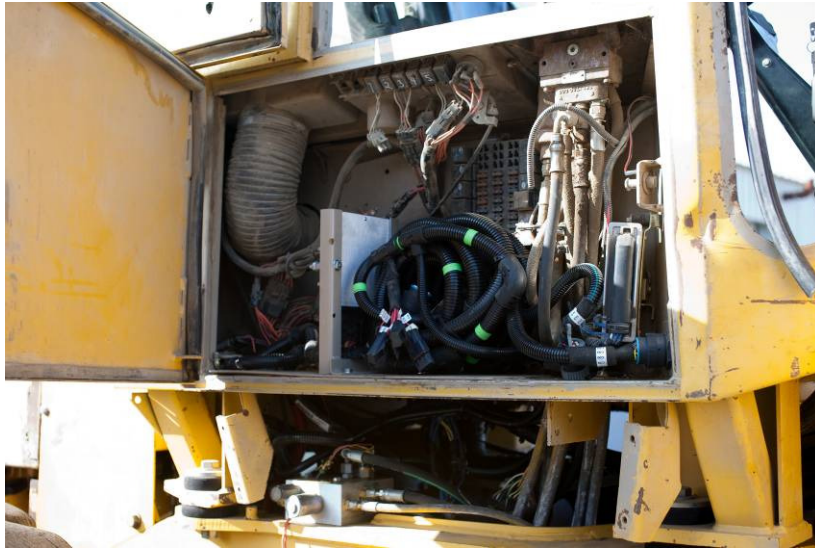


Figure 9: ECU Mounting Location



Figure 10: ECU Mounting Bracket

- In the access panel, you will find 2 power control modules and wiring
- Mount the engine control module to the pre-threaded holes on the wall that separates the other power control module that it already installed; see Figure 10: ECU Mounting Bracket



Figure 11: Harness Routing Through ECU Compartment



Figure 12: Underside of ECU Compartment

- With cutting torch, cut a hole below the ECU to route the wiring harness underneath the cab to engine and connect to ECU

6 Modifying Controls

6.1.1 Power View Installation



Figure 13: Modified Instrument Panel with PowerView

- Remove the wiring harness, switches, and Power View from the instrument panel, key switch, see Figure 14
- Using 1 ½ inch hole saw cut a hole next to the floorboard and the hydraulic control panel
- Remove ashtray; PowerView will be installed in the old ash tray location
- On the left hand side of the dash with 1 ½" hole saw cut a hole even with the ashtray
- Route PowerView wiring connector to the hole on the left hand side of the dash
- Connect the PowerView to CAN Bus and power
- Install PowerView in ash tray location
- Carefully route harness extension from the left side of the dash below and around the right side of the cab. Ensure that the cable does not interfere or damage foot pedal controls
- Once past all foot pedals, lift up the floor mat and run harness around the contour of the cab
- Reinstall floor mat



Figure 14: RE534022B Instrument Panel Harness



Figure 15: Power View Mounting Plate Front Side



Figure 16: Wiring Harness Routing Under Cab

- Connect harness to the 21 pin connector through the 1 ½” hole previously drilled through the cab and the hydraulic control box

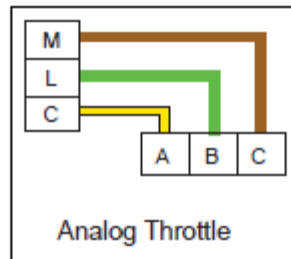
6.1.2 Throttle Modification

The mechanical throttle linkage must be changed to accommodate the new electronic engine. Replace the mechanical system with the throttle potentiometer.

- Remove old pedal and cable
- Install new pedal with provided WRP624HA02 bracket
- Route throttle sensor wires through floor of cab and to 21 pin instrumentation and controls connector on the wiring harness.
- See AG11-P-11 for additional details on the foot throttle:

Electrical Hook-up

To attach the primary analog throttle to the JDEC controller, a Packard 3-way Male Connector (P/N 12015793), using 12033674 terminals, needs to be attached to the John Deere wiring harness pins as shown.



M is the 5V reference voltage pin
L is the throttle signal pin
C is the ground.

The corresponding connection in the throttle connector is as follows:

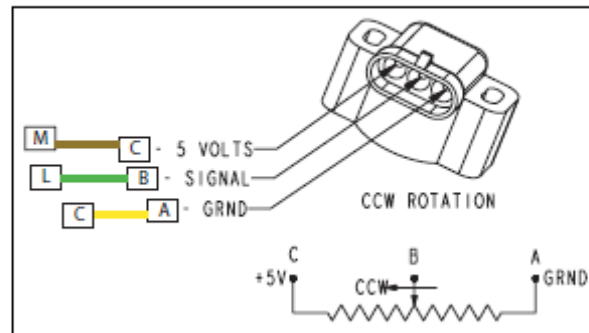


Figure 17: AG-11 Analog Foot Throttle Wiring

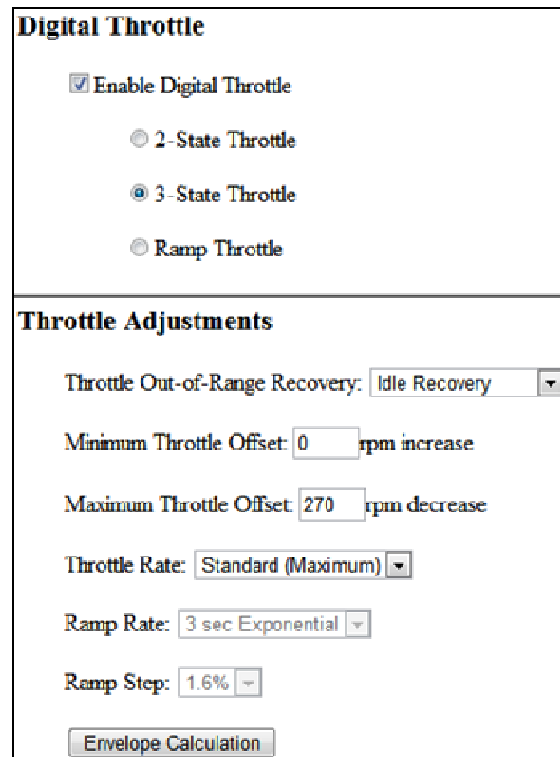


Figure 18: Potentiometer Mounting On Accelerator Pedal



Figure 19: Underside of Accelerator with Potentiometer

6.2 3 State Throttle (Must Install For Maximum Throttle Feature)



The screenshot shows a settings window with two main sections. The top section, titled "Digital Throttle", contains a checked checkbox for "Enable Digital Throttle" and three radio button options: "2-State Throttle", "3-State Throttle" (which is selected), and "Ramp Throttle". The bottom section, titled "Throttle Adjustments", includes several controls: a dropdown for "Throttle Out-of-Range Recovery" set to "Idle Recovery", input fields for "Minimum Throttle Offset" (0) and "Maximum Throttle Offset" (270) with units "rpm increase" and "rpm decrease" respectively, a dropdown for "Throttle Rate" set to "Standard (Maximum)", a dropdown for "Ramp Rate" set to "3 sec Exponential", and a dropdown for "Ramp Step" set to "1.6%". At the bottom of this section is a button labeled "Envelope Calculation".

Figure 20: Trim Features

John Deere Custom Performance (Trim Features)

Enable the Digital 3-state throttle and set the Maximum Throttle to 2200rpm

Throttle Switch (Low Position)

Tape or zip tie the Throttle switch to the off position. The adjustable 3-state throttle must be set in the "Low Speed" position for the foot throttle to work with the 3-state throttle.

Bump Enable Switch (Off Position)

Tape or zip tie the Bump Enable switch to the off position. The Bump Enable switch serves as a lock for the Bump switch to make sure the operating speed is not changed accidentally or as a result of a Bump circuit failure.

6.3 Key Switch

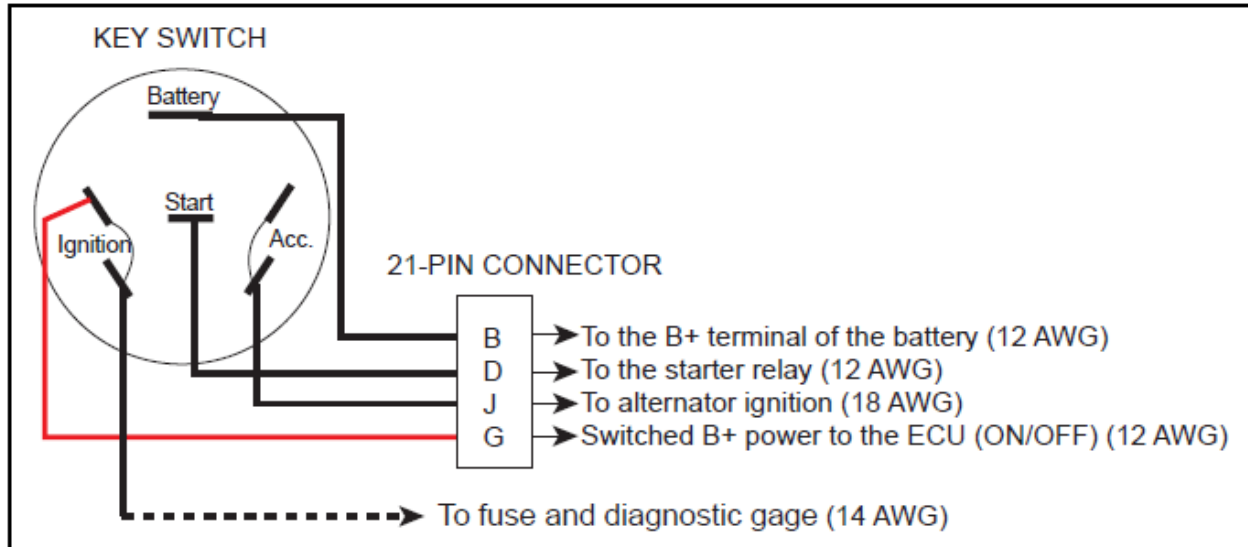


Figure 21: Key Switch

Key Switch

Install the wiring harness into the original key switch or transfer the key switch from the RE534022B instrument panel.

7 Hood Modifications

The new engine configuration requires modifications to the hood to accept the new air cleaner, new CAC, and exhaust. The Tier III 6068HF285 2 valve engine only comes in front exhaust configuration, so the change from a rear exhaust engine to front exhaust necessitates the relocation of the air cleaner.

The following figures point out the purpose of each modification to the hood:

- Mount the Exhaust Stack as shown in Figure 23: Muffler Mounting Location
- Mount the CAC to the underside of the hood
- Mount Air Cleaner in old Exhaust Stack Location



Figure 22: New Exhaust Stack, CAC, and Air Cleaner Locations

7.1 Exhaust Mounting



Figure 23: Muffler Mounting Location

7.2 CAC Mounting



Figure 24: CAC Mounting to Left Side of Hood

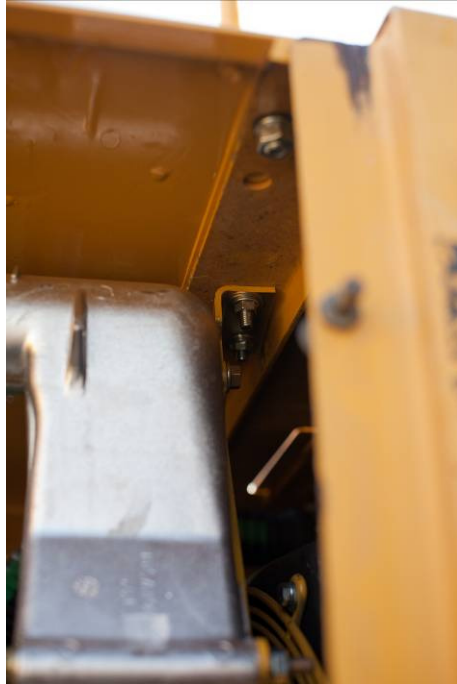


Figure 25: CAC Mounting to Top Right Side of Hood

- Use tubes to align CAC
- Mark where to drill hood and left side to bolt CAC supports
- Drill holes for CAC supports
- Mount CAC

7.3 Air Cleaner Mounting

- Mount Hood to the 544G
- The Air Cleaner will be installed in the location of the previous engine's exhaust stack
- Install turbo inlet hose and use hose to adjust the forward / aft position of the air cleaner in the saddle brackets.



Figure 26: Air Cleaner Mounting To Underside of Hood

- Align air inlet to go through the existing hole in the hood
- Mark the hood where to drill to mount the saddle brackets
- Bolt the air cleaner to the underside of the hood

8 CAC Tube Mounting

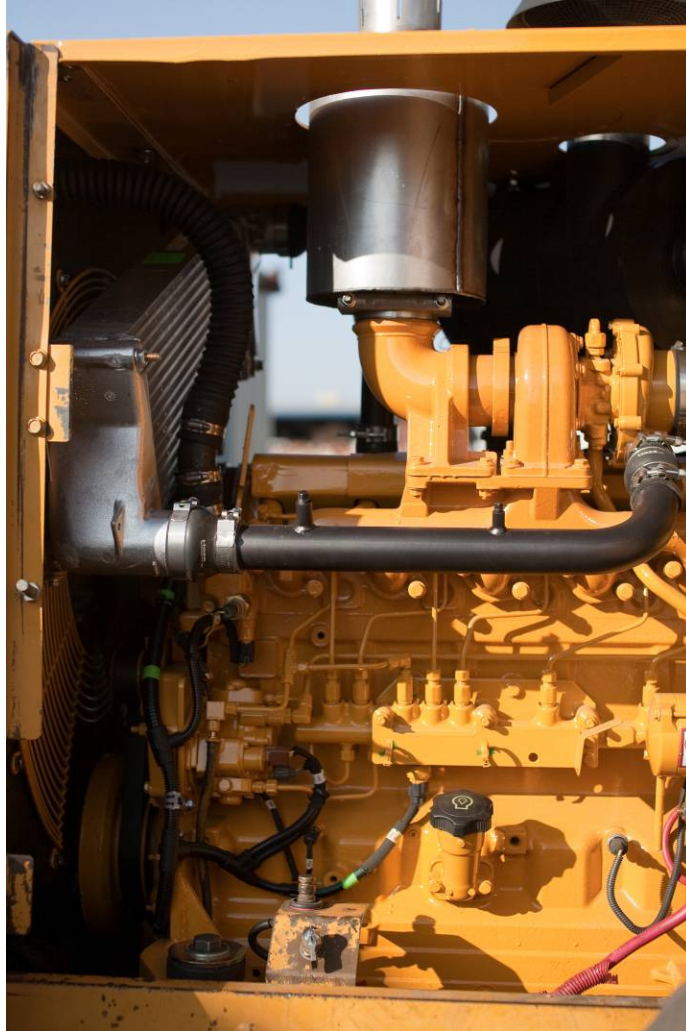


Figure 27: Hot CAC Tube Mounting

- Install hot CAC tube from turbo to the CAC



Figure 28: Cold CAC Tube Mounting

- Install cold CAC tube from the CAC to the engine air inlet

Appendix A: 6068HF285 Engine Specification

Table 2: Engine Option Codes

Base	PE 6068HF285 Diesel Engine (2684F)
1142	Rocker Arm Cover, Rear Fill, w/ John Deere Nameplate
1204	Oil Filler, LH, w/ Spacer, for use w/ Remote Mounted ECU
1324	Crankshaft Pulley, 168mm (6.6"), Standard Duty Damper, for Taper Nose Crank
1406	Flywheel Housing, SAE #3, LH, 3 Bolt Type 1 Starter Mount, Front Access for Torque Converter, Magnetic PU
1503	Flywheel for SAE #3, 11.5" OCC, 129 Tooth 8/10 Pitch Ring Gear
16B4	Fuel System, Denso HPCR w/ECU, 800cc Flow Injector, Industrial - 104kW (140hp)
1783	Air Intake, Vertical Intake
1908	Oil Pan, Aluminum, Center Sump, w/ Heater Ports, 35° Off Level, 19L
2156	Thermostat Cover, Vertical Outlet, Single Thermostat, Two Sensor Ports
2201	Thermostat, Single
2342	Fan Housing, Nodular Iron, Heavy Duty Bearing, Fan Height Less Than 402mm (15.8"), Max 12kg Fan
2496	No Fan Belt w/ Idler Pulley (pulley required for all A/C and Fan Heights 290mm (11.4") & Below)
2699	No Engine Cylinder Block Heater
28AV	Exhaust Manifold, High Mount Turbocharger
2957	Vent System, 90° Elbow w/o Clamp, 1100mm (43") Vent Hose, Clamped to Right Side of Flywheel Housing
3006	12V Denso, 6.0 HP (4.5 kW), LH, 3-Bolt, Type 1 Mount, Gear Reduction
3138	12V, 75 Amp Iskra, w/ Wiring Harness
35ED	6.0", 2 Micron Final Fuel Filter, RH Side, Engine Mounted (contains port for optional low pressure fuel sensor)
3614	Front Plate, w/Aux-Drive, HPCR
3999	No Thermostat Housing (Cover Only)
4002	Dipstick, RH Side Service
4199	No Auxiliary Front Drive Pulley
4399	No Starting Aid
4447	Timing Gear Cover, Aux Drive, w/ Fan Mount support, for (Low Mount Alternator)
5204	Base Engine Auxiliary Drive w/ Shipping Cover (less drive gear)
5399	No Fuel Heater
5569	Shipping Stand, Metal
5603	Industrial Yellow
5722	Water Pump Inlet, Downward Orientation w/ M18 Port
5902	Oil Cooler, 7 Plate
6099	No Auxiliary Fan Drive Pulley
6288	Alternator Mounting, Low Position, Bosch 45-120 Amp, for Aux Drive
6387	Engine Mounted Primary Filter, High RH Rear Engine Mounted Final Filter - Air Compressor Compatible
6438	Exhaust Elbow
65RN	Turbocharger, High Mount, Industrial (129kW/173hp and below), RH Low Rear Oil Filter
6730	Base Engine Sensors
6901	Serial Number Plate

72MM	12V, 140Hp, 104kW@2400, 0% PB, 30% TR
7499	No Air Conditioning Compressor Bracket
7899	No Air Compressor
8171	RH Side, Engine Mounted, High RH Side, 6.0", 30 Micron Primary Fuel Filter w/ Water Separator and W.I.F Sensor
83EJ	ECU Software, John Deere Custom Performance - Industrial 104kW (140HP) (500 Hour Oil Change Interval)
8454	Remote Mounted ECU, 12V, w/wiring harness and hardware installed, ECU shipped loose, Distributor/OEM Installed, w/10 foot of harness, less than 402mm fan height
8608	168mm (6.61") Diameter, 338mm (13.3") Fan Height
8718	Belt Tensioner, Auto, High Mount & Low Mount Alternator, for use w/Aux-Drive
8843	Oil Filter, RH Low Rear
9109	Extension Harness - 21 Pin, Customer/Panel Interface Harness to Instrument Panel, 12 Foot (3.7M), Qty - 1 (packaged & shipped w/engine)
9113	Customer/Panel Interface Harness, Remote Mounted ECU to Instrument Panel, packaged & shipped w/engine (contains the 21 & 23 pin connectors, 9 pin diagnostic connector, starter relay leads, power/ground leads, TVP, Aux Power, CAN Terminator, Remote On
93GR	Emission Label, Tier 3 Industrial Applications (140hp / 104kW)

Appendix B: Electronics

Pin	Circuit No.	Color	Wire Gauge	Description	Function
	Ext.				
A	474	yellow	18	Intake heater wait lamp	To ground side of intake air heater wait lamp
B	032+	red	12	Fused unswitched battery power	To "B" terminal of your ignition switch
C	914*	yellow	18	Sensor return	To the primary analog throttle potentiometer or emulator
D	422	red	12	Starter relay	To "Start" terminal on your ignition switch
E	050	black	18	Ground	Grounded on the engine side to the battery and ECU. Use for any non-sensor ground (lights, gauge power, etc)
F	020	black	18	CAN shield	To any CAN connectors including the PowerView Diagnostic gauge
G	012	red	12	Battery power to ECU (switched)	Must be wired to the "Ignition" terminal of key switch.
H	473	orange	18	Warning lamp driver	To ground side of the warning lamp
J	412	red	18	Alternator ignition	Should be wired to the "Acc'y." or "Ignition" terminal of the ignition switch.
K	439	white	16	Tachometer output	A synthesized frequency signal that can be used to drive a non-CAN electronic tachometer
L	915*	green	18	Primary analog throttle input voltage	To center (sensing) terminal of the primary analog throttle potentiometer (or throttle emulator)
M	911*	brown	18	+5 Volts (sensor power)	To the throttle potentiometer
N	918	gray	18	Shutdown override	To shutdown override switch
P	911	brown	18	Shutdown override return	To shutdown override switch
R	947	violet	18	Throttle switch	Throttle switch (2-state or Ramp)
S	914	yellow	18	Sensor return	Sensor return
T	936*	blue	18	Resume / Coast / Bump Speed Down	To the 2-state throttle speed select switch and/or the cruise resume/coast switch
U	905	green	18	CAN low	To any SAE J1939 CAN-based devices including the Diagnostic gauge
V	904	yellow	18	CAN high	To any SAE J1939 CAN-based devices including the diagnostic gauge
W	955*	green	18	Set/Accelerate/Bump Speed Up	For adjustable 3-state throttle option.
X	923*	orange	18	Bump enable and brake enable	For adjustable 3-state throttle option.

+ DE10 Standard ECU Circuit Number is 022.

* Not available on DE10 Standard ECU.

Figure 29: 21-pin Deutsch Instrument Panel Connector

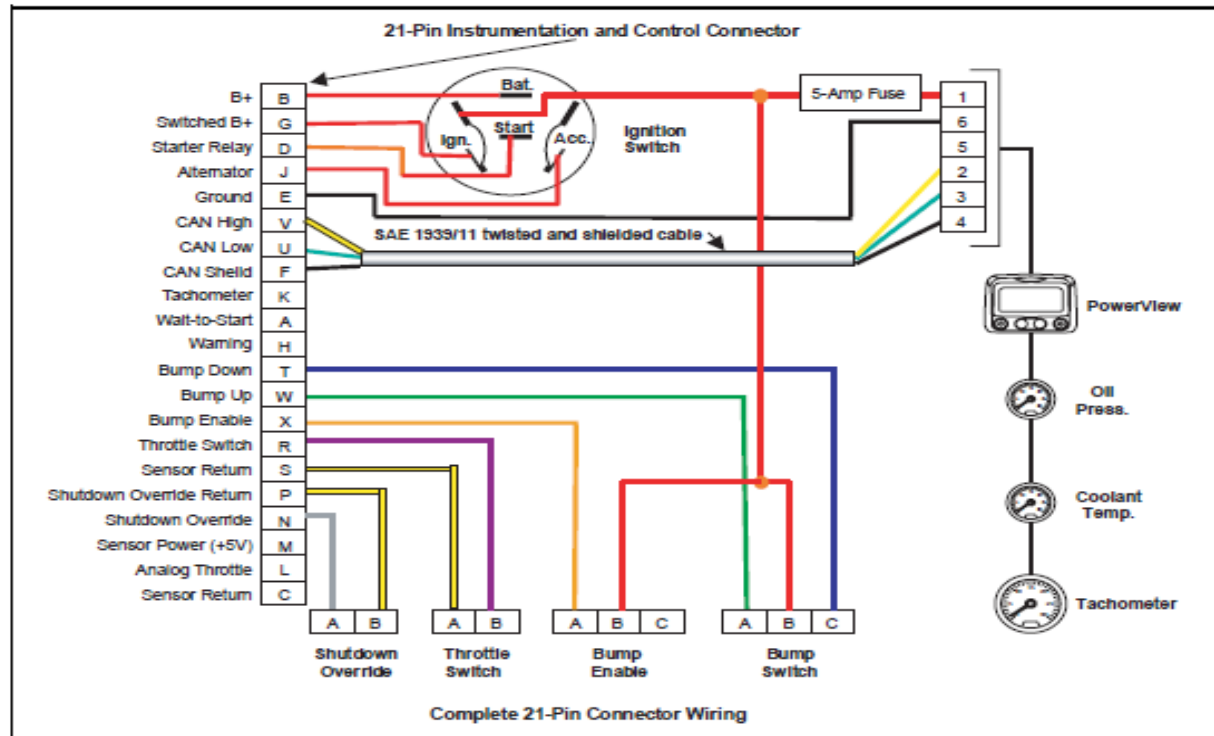


Figure 30: 21-pin Deutsch Instrument Panel and Controls

L16 Application Interface

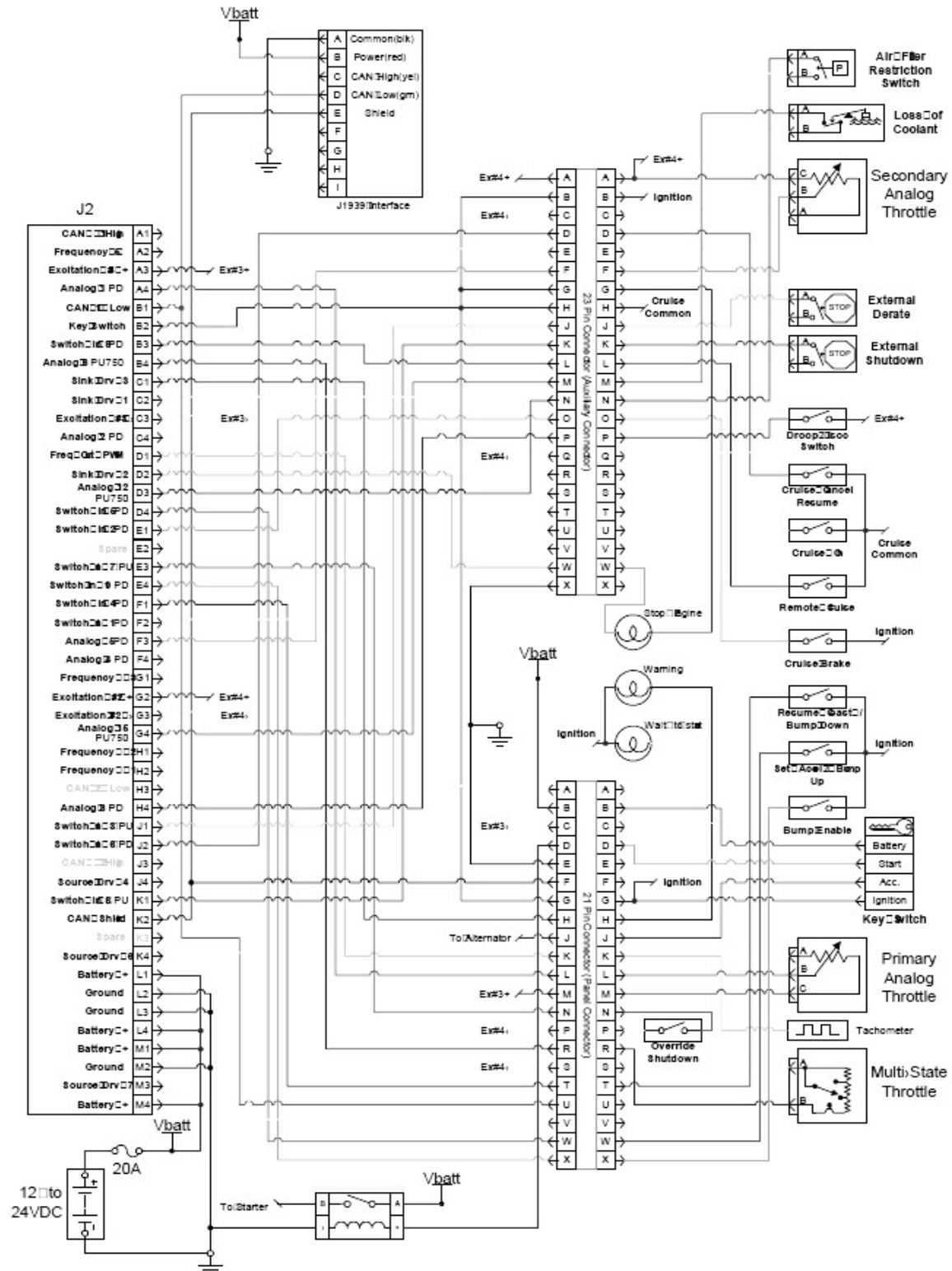


Figure 31: Wiring Harness