

Engine Cost Saver

Model 1550



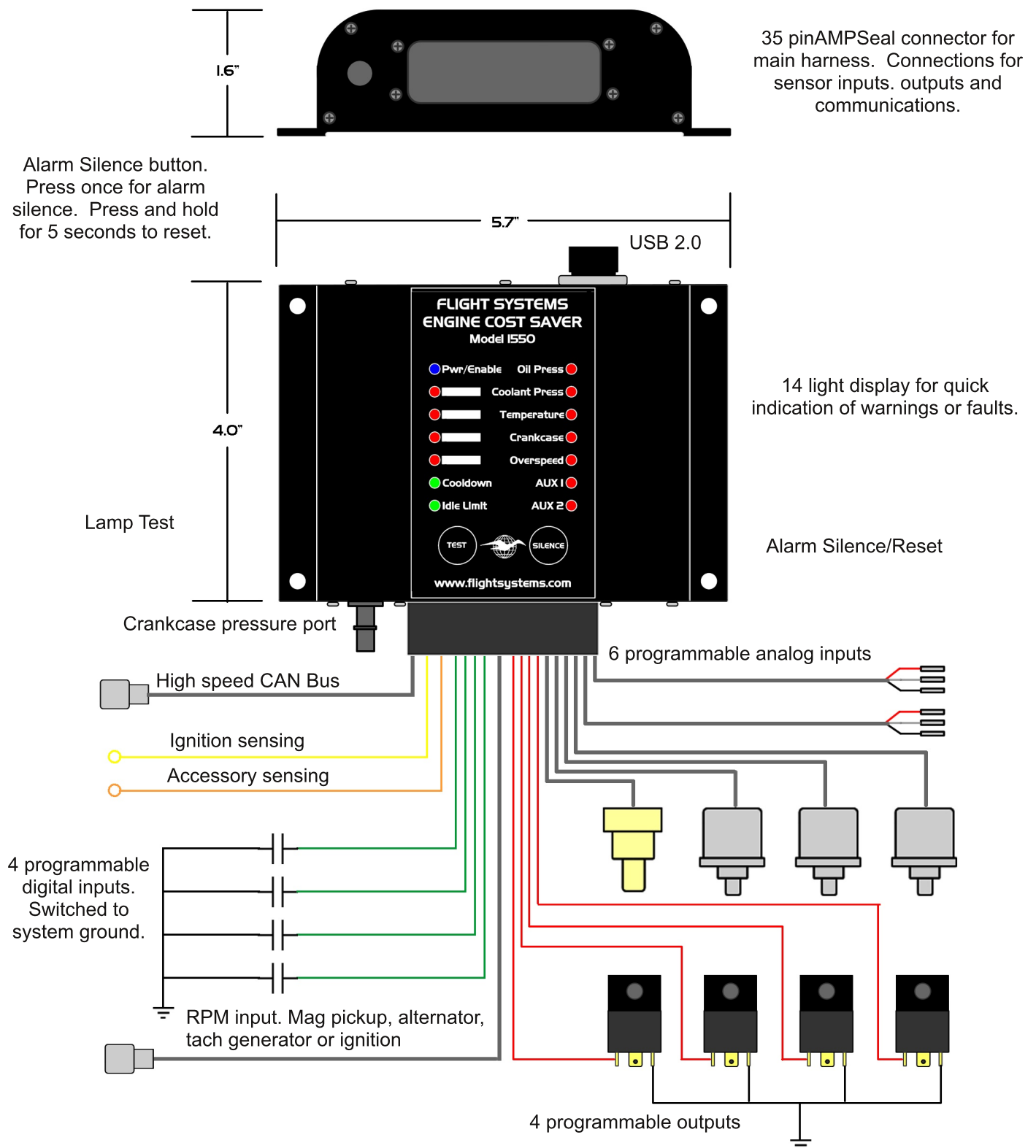
User Manual

Applicable to s/n 1550-11 and up.

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MODEL I550 - SIZE, LAYOUT AND FEATURES



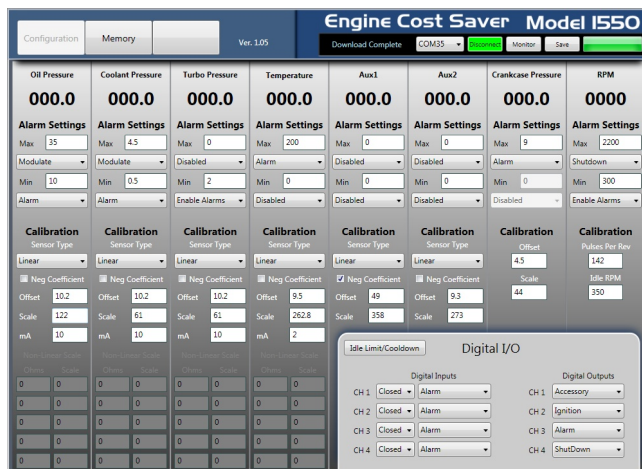
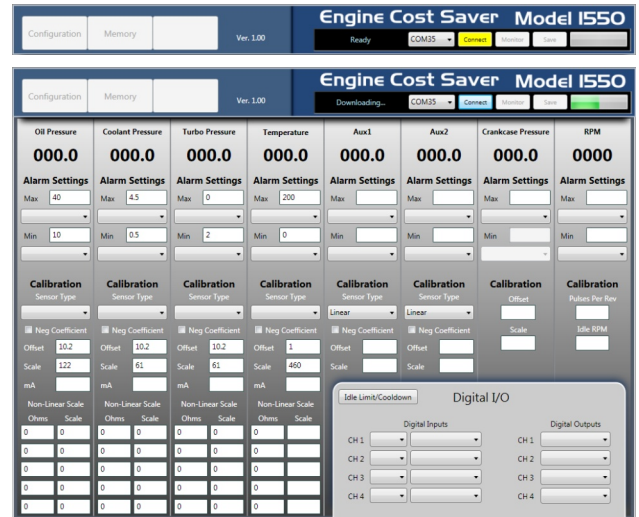
For reference only

Quick Start Guide

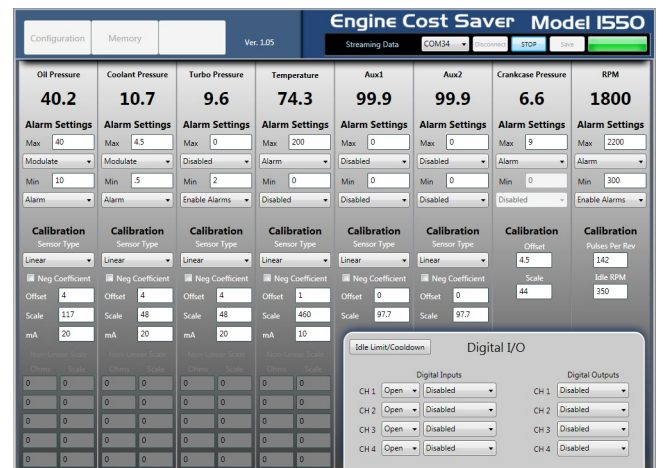
Install the model 1550 and connect wiring as shown in the example wiring diagrams at the end of this manual.

Connect the model 1550 to an available USB port with the included USB cable. Power on the Engine Cost Saver. Drivers can be installed manually or downloaded from windows update automatically.

Start the Model 1550 software and select the correct port from the drop down menu. The connect button will highlight yellow to indicate the port is available. Click connect. If the Model 1550 responds to the request the connect will highlight green and the configuration window will open. Wait for the user settings to download.



Click monitor to view the live readings and confirm they are correct. You can connect to the Engine Cost Saver at anytime to monitor, change settings, view the fault log or clear the fault data. The Model 1550 will continue to monitor the engine while connected.



When setup is complete remove the USB cable from the Engine Cost Saver. Always return the protective cover to prevent corrosion or other damage to the USB port.

Introduction

The Engine Cost Saver is a fully user programmable microprocessor based engine performance monitor with 6 analog, 4 digital and RPM sensing inputs; CAN bus, 4 digital outputs; turbo cooldown, idle limiting and fault logging features built in. Each input and output can be individually configured by any Windows based PC or laptop running the Engine Cost Saver software supplied with the purchase of a unit. The software features an easy to read user interface with a live stream of actual readings from each sensor as high or low trip points, alarm conditions, sensor calibration or optional outputs are entered and then monitored anytime at the user's discretion

Installation

The unit can be engine compartment mounted or cab mounted. If the unit is cab mounted, the status lights and USB connection is available to the operator and the optional remote indicator is not needed unless data logging is desired. For engine compartment mounting – install the unit vertically with the wiring harness down to prevent moisture from resting on the back of the wiring harness connector.

Connect the main harness to the Model 1550 and route the wiring to the transducers/sensors as shown on the Installation Diagrams, at the end of this manual, with the included wire avoiding excessive heat and moving parts then secure. Connect the battery + (red) directly to the battery positive with the included fused 16 gauge wire and the battery - (black) to battery negative. If battery negative is grounded to the frame, the black wire can be connected to any frame ground.

The ACC and IGN inputs are switched to system voltage to monitor the status of the ignition key for Idle Limit / Cooldown and startup. If Idle Limit and or Cooldown features are not used the Ignition input (yellow) must be connected to an active ignition circuit. See example wiring diagrams for using these options.

Connect a low-pressure hose from the Model 1550 to the crankcase well above the oil level (near or on the oil filler connection or on the actual pipe below the cap recommended)

After installation is complete, turn the ignition on. With the engine not running verify that the model 1550 is powered up (blue LED flashing). Return the ignition to the off position and verify the unit shuts down (all indicators off).

Turn the ignition on to power up the 1550. With the engine not running plug the USB cable into the 1550 and connect it to an available USB port on a windows based laptop. If this is the first time connecting the 1550 to the laptop you will be prompted to install drivers for the virtual com port. You can allow the computer to locate and install these drivers automatically (search online) or manually install the drivers from the software cd.

With the drivers successfully installed start the Engine Cost Saver software. **IMPORTANT!** You must have the model 1550 powered on with the drivers for the virtual com port installed **BEFORE** starting the Engine Cost Saver software. The software will automatically find all available com ports. Select the correct com port for the model 1550. The connect button will enable and highlight yellow. Click connect to download the user settings from the Engine Cost Saver. See section on Software Configuration for information on changing settings.

Software Configuration

Analog Inputs

Analog inputs accept any source that will produce a variable voltage with a range of 0 - 5vdc. Optionally resistive sensors can be used on channels 1-4 (Oil, Coolant, Turbo pressure and Temperature) by adjusting the current to produce a linear 0- 5vdc signal and shorting the 5v(red) to the signal(white) making a 2 wire connection. See wiring diagrams at the end of this manual.

These are standard values and usually can be found already installed on most engines. Other analog sensor values can be programmed during calibration. The model 1550 offers factory-supplied optional transducers for oil pressure, coolant pressure, turbo pressure and a sensor for coolant temperature. Purchase only those you need. Sensor calibration will be set for these sensors on channels 1 - 4 and are labeled accordingly. AUX1 and AUX2 are for additional desired analog inputs like gear pressure, fuel pressure, EGT etc. If alternative analog transducers/sensors are preferred you will have to adjust the offset and scaling factors. See section on analog sensor calibration.

Oil and Coolant pressure trip points can be increased with RPM. If you only wish to monitor for a single trip point, Set the "Min" pressure point and enable the alarm by selecting "Alarm". If you wish to modulate the trip point set your maximum low pressure point in the "Max" setting and select "Modulate".

Oil Pressure	Coolant Pressure	RPM
000.0	000.0	0000
Alarm Settings	Alarm Settings	Alarm Settings
Max 40	Max 4.5	Max 2200
Modulate	Modulate	Alarm
Min 10	Min .5	Min 300
Alarm	Alarm	Enable Alarms

**You must enter the Min(Alarm Enable) and Max(Overspeed) values in the RPM settings for this option to work properly. Even if overspeed is disabled the model 1550 uses these values to create a normal operating range for oil and coolant pressure.*

Turbo pressure can be configured to enable alarms or to determine if a cooldown is required. Set the "Max" trip point and select "Cooldown" from the option to enable the cooldown monitor. If cooldown is enabled, the 1550 uses the "Max" trip point to determine when the turbo has spooled up. Selecting "Disabled" will force the 1550 into cooldown on every shutdown. Set the "Min" trip point and select "Alarms Enable" to use turbo pressure to enable alarms. Both RPM and Turbo pressure can be used to enable alarms at the same time.

**See section on Idle Limiting and Cooldown for more information on activating the cooldown features.*

Turbo Pressure
000.0
Alarm Settings
Max 10
Enable Cooldown
Min 2
Enable Alarms

Temperature	Aux1	Aux2
000.0	000.0	000.0
Alarm Settings	Alarm Settings	Alarm Settings
Max 190	Max 80	Max 0
Alarm	Idle Inhibit	Disabled
Min 70	Min 40	Min 0
Idle Inhibit	Idle Inhibit	Disabled

Coolant temperature can be configured as high temperature alarm and a low temperature idle shutdown inhibit. Set the "Max" setting and select alarm or shutdown. Set the "Min" setting and select "Idle Inhibit" to prevent idle limit shutdown when the temperature is low. Aux1 and Aux2 have similar features on both High and Low settings if an ambient temperature probe is desired.

Crankcase pressure is preset by factory and you only need to enable or disable an alarm and set the trip point. This sensor is internal and requires no adjustment. If Crankcase pressure is disabled the port should be plugged to prevent damage to the internal sensor.

Analog Sensor Calibration

For the sensors to display the correct result they must be calibrated by entering the correct values into the scaling and offset settings. By default the Engine Cost Saver is calibrated for Flight Systems supplied oil pressure, coolant pressure, turbo pressure and temperature sensors. If you wish to use other sensors you will have to adjust these settings accordingly. First, select your sensor type (Linear/NonLinear) for the sensor you are adjusting. For linear sensors a window will open with entries for range and voltage. You can obtain these values from the manufacturer or check them manually with a multimeter. clicking on the Calibrate button will enter the correct values into the offset and scale settings. Clicking X will cancel and close the window. You can also fine tune these settings by entering the values directly. Offset will shift the sensors 0 reading above 0 volts. Scale will increase the overall reading. For sensors with a negative coefficient select the Neg Coefficient box. For 0-5vdc sensors set the constant current to 10 mA. For resistive sensors, adjust the constant current to get the best resolution possible but not exceeding 4vdc at maximum resistance. (20mA for 0-200 ohms)

Calibration
 Sensor Type
 Linear
☐ Neg Coefficient
 Offset 10.2
 Scale 85.4
 mA 10
 Non-Linear Scale
 Ohms Scale

MinScale 0

MaxScale 70

MinVolt .5

MaxVolt 4.5

Calibrate

X

**Resistive transducers (mechanical) work well for monitoring trip points but are not recommended for data logging applications. For data logging and displaying accurate readouts consider using 0-5vdc transducers.*

**See General Specifications section on page 9 for calibration on factory supplied sensors/transducers.*

RPM

The RPM input can sample frequencies from 20 - 20,000 Hz typically from a magnetic pickup on the flywheel, alternator, tach generator or ignition. Set the calibration for the pulses per revolution or the number of teeth on the flywheel to display accurate RPM. "Idle" must be set for Idle Limit (if enabled by RPM) to function properly. Max (Overspeed) and Min RPM must be set as well for sensor modulation. You can enable or disable the overspeed alarm. If you want RPM to enable alarms enter the speed in the "Min" setting and select "Enable Alarms" from the options. You may also set to enable alarms with turbo pressure as a backup. If neither option is selected the 1550 will run a delayed alarm enable of 15 sec by default.

Idle Limit and Cooldown

See wiring diagrams for Idle Limit and Cooldown. Set the outputs for Ignition and Accessory as well as the idle limit delay and how you want to activate the timer (SW4, RPM) with the Engine Cost Saver software. You can activate idle limit with a switch closure, RPM sensing or both. After resetting the unit the idle limit LED (green) will illuminate to show that idle limiting is enabled. When the vehicle is at idle the idle limit LED (green) will flash to indicate it is active. After the preset idle limit has expired the Engine Cost Saver will disconnect power from the ignition and accessory circuits. After shutdown the model 1550 will remain powered but will enter sleep mode. Power consumption is minimal, less than 10mA. Reset the Engine Cost Saver by switching the ignition off then on again.

RPM

0000

Alarm Settings

Max2200

Alarm

Min300

Enable Alarms

Calibration

Pulses Per Rev

142

Idle RPM

350

Digital I/O

Idle Limiting and Turbo Cooldown

Idle Limiting

Enabled

Active with

Digital Input 4

Delay in Sec.

300

Cooldown

Enabled

Keep active

Digital Input 4

Delay in Sec.

Digital I/O

Idle Limiting and Turbo Cooldown

Idle Limiting

Enabled

Active with

Digital Input 4

Delay in Sec.

300

Cooldown

Enabled

Keep active

Ignition Only

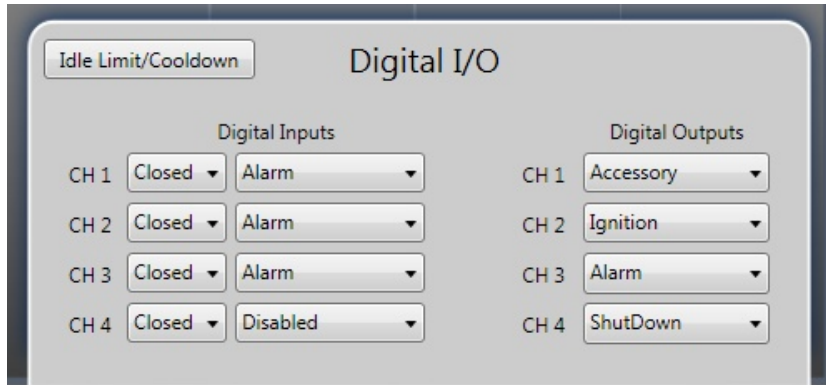
Delay in Sec.

60

To activate cooldown set the "Cooldown" setting to enabled and set for Ignition or Ignition and Accessory. Setting for "Ignition Only" will allow the accessory circuit to shutdown while keeping the ignition circuit running. Set the cooldown delay in seconds. After saving settings the cooldown indicator (green) will illuminate to show that cooldown is enabled. With cooldown enabled the cooldown timer will only activate after alarms have been enabled and turbo pressure has exceeded the "Max" trip point. Upon shutting off the ignition the timer will start and the cooldown indicator will flash. After the delay expires the Engine Cost Saver will shutdown the accessory and or the ignition, then removes power from itself. The cooldown feature will override Idle Limiting.

Digital Outputs

Digital outputs 1-4 are limited to 2 amps. Set outputs accordingly for your application. Setting an output for "Ignition" will be active when the ignition sensing wire is active. Setting for "Accessory" will be active when the accessory sensing wire is active. Setting for "Alarm" will be active anytime there is an active fault with alarm enabled. Setting for "Shutdown" will be active anytime there is a fault with shutdown enabled. Multiple outputs can share the same function.



Digital Inputs

Digital inputs 1 - 4 are switched to ground and can be a normally open or normally closed switch by setting the open or closed status of each channel. Label each channel accordingly and set the action you would like the model 1550 to take when activated. Disable the Alarm on SW4 if it is to be used with idle shutdown.

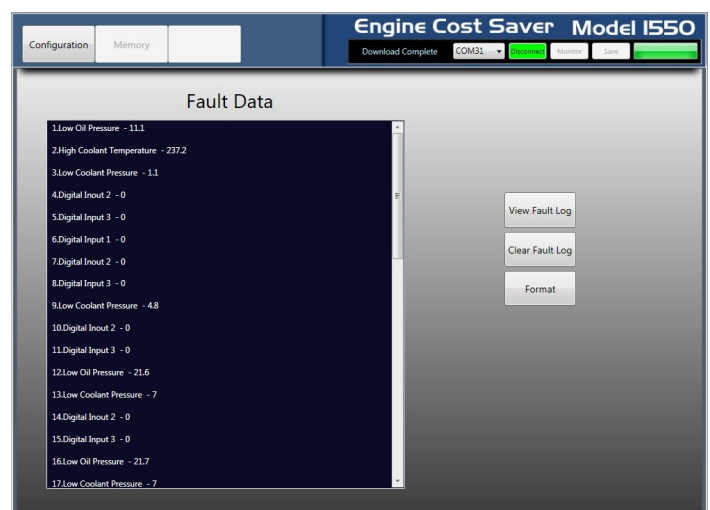
Alarm Status

Every input has options for each alarm condition. Select "Disabled" if the input is unused or the alarm is not relevant to the sensor. Selecting "Alarm" will illuminate the indicator light as well as activate any channel set for "Alarm" and remain active until the alarm is cleared. Selecting "Shutdown" will illuminate the indicator light, activate any channel set for "Alarm" as well as any channel set for "Shutdown". The alarm status will be latched until the model 1550 is reset. Anytime an alarm condition occurs, if the alarm is enabled, an entry in the fault log is created. You can view this information at anytime by connecting the module to a laptop or PC. Fault entries are limited to 250 entries before the memory is full. If the memory is full, fault logging will be disabled until the data is erased. You can clear the fault log at anytime by clicking the "Clear Fault Log" button when connected with the Engine Cost Saver software.

While connected to the computer the Engine Cost Saver continues to monitor and function normally. Always click disconnect before restarting the Engine Cost Saver. Never remove power from the Engine Cost Saver while saving or downloading data.

Firmware Updates

Firmware updates and custom programming may be available for the Engine Cost Saver. Contact Flight Systems for instructions on custom programming and updating firmware in the field.

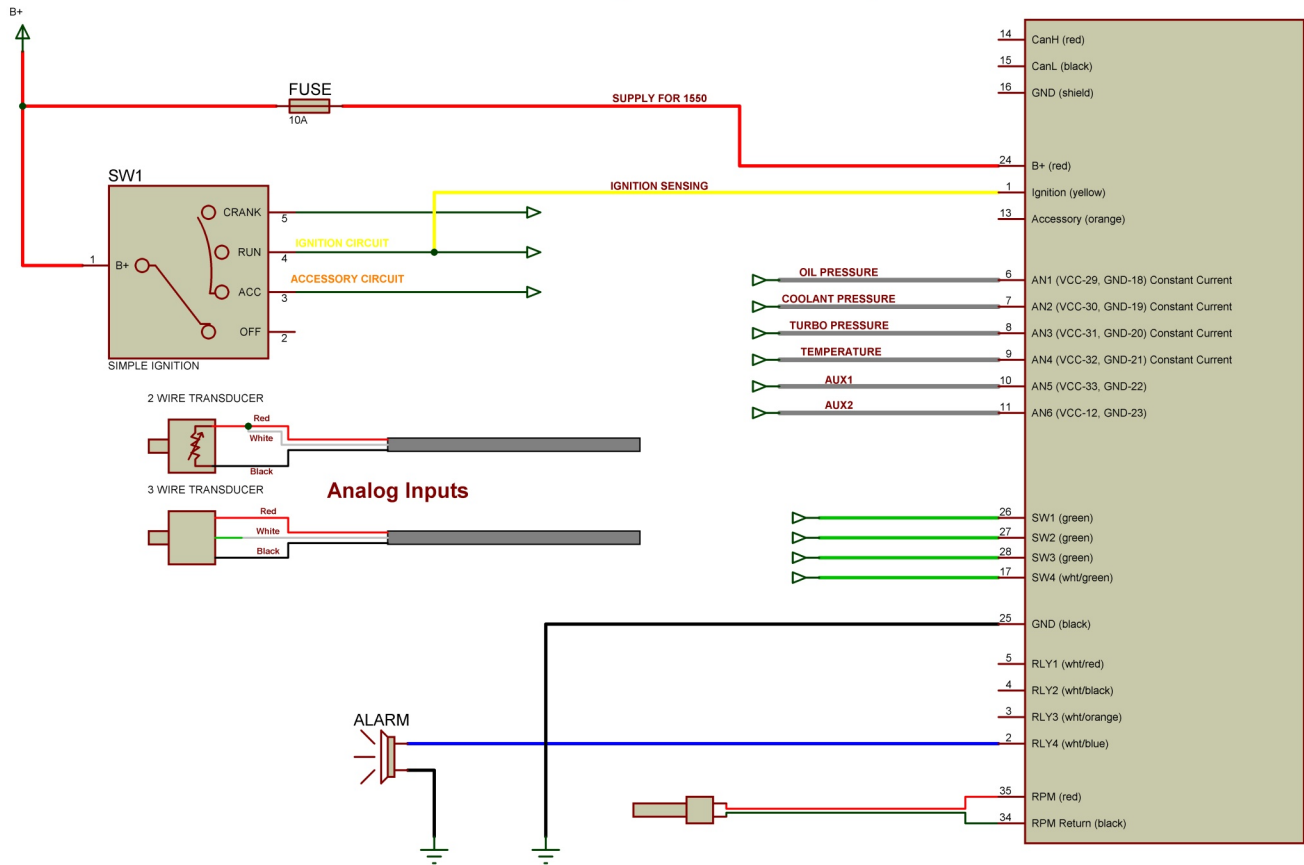


CAN Bus

The current status of each input as well as any alarm conditions are broadcast over the CANBus for optional accessories such as data logging and remote annunciators. The Engine Cost Saver is a slave device and does not **require** any software configuration or anything to be installed. Accessories can be added at anytime.

MODEL 1550 - General Specifications	Sensor/Transducer Calibration				
<p>Supply Voltage: 8V Min. 30V Max. Transient voltage protection. Reverse battery protection.</p> <p>Analog Inputs 1-6: 0 - 5 VDC Max. Overvoltage protected</p> <p>Digital Inputs 1-4: Switch closure to system negative.</p> <p>Accessory and Ignition Inputs: Switch closure to system voltage Overvoltage protection Transient voltage protection</p> <p>RPM Input: 0.5 VDC Min. 28 VDC Max. 20000 Hz Max.</p> <p>Crankcase Pressure Input: 0 - 40 inches of water column, 1.5 psi Max.(10.54 kPa)</p> <p>Digital Outputs 1-4: Overload protected at 2A Max. per channel Thermal shutdown Short circuit shutdown Model 1550 will work with all types of resistive, inductive and capacitive loads not exceeding 2 amps per channel.</p> <p>CanBus 2.0: For use with Flight Systems 57-1550-02 Remote Light Bar with USB Port/Data Logger.</p> <p>USB 2.0: USB port built in for PC/Laptop connection</p>	Sensor/ Transducer	Neg	Offset	Scale	Current (mA)
	57-5500-12		4.0	117.0	20
	57-5500-45		4.0	48.0	20
	57-5500-04		4.0	48.0	20
	57-1550-04		10.2	61.0	20
	57-1550-05		10.2	122.0	20
	57-1550-06		9.3	273.0	20
	57-1550-07	X	49.0	358.0	20

Connections for Engine Monitor Only



Connections for Cooldown and Idle Limiting

IGNITION AND ACCESSORY

