PMECM-12/24

idleWATCH® II

Power Management and Engine Start Controller

Table of Contents

Introduction and General Description…… 3

Specifications…… 4

Theory of Operation…… 5

Installation Instructions…… 15

Typical Application/Wiring…… 20

Troubleshooting…… 23

Introduction

Thank you for purchasing Vanner's *PMECM-12/24 Power Management and Engine Start Controller,* commonly referred to as *idleWATCH® II.* The *idleWATCH® II* is an idle reduction system that helps fleets meet the industry's no-idle regulations in addition to reducing fuel consumption and exhaust emissions.

We are confident that you will be pleased with its performance because Vanner products are designed and manufactured by skilled professionals using the highest standards in workmanship. With minimum maintenance and care, you can be assured of many years of trouble free service.

General Description

The Vanner *idleWATCH® II* constantly monitors the state of charge (SOC) and state of health (SOH) of a vehicle's auxiliary batteries. When the *idleWATCH® II* Auto Start functionality is enabled, the engine will start automatically to recharge the batteries when they reach a user defined state of charge (SOC). This enables a worker to run 12V or 24V loads during the workday, while in park and the engine off, without the worry of discharging the batteries.

When the auxiliary batteries are discharged to a user configurable "Engine On" state of charge, the *idleWATCH® II* sends a signal to a remote starter* to start the engine and recharge the batteries. Fast idle mode* will be employed during the recharge cycle if it is necessary. Once the battery's "Engine Off" state of charge is achieved, the *idleWATCH® II* will automatically turn the engine off.

The *idleWATCH® II* is also provisioned with fuel saving idle shutdown functionality in the event the vehicle is key started while in park. The duration of idle time is user configurable via Vanner's Dashboard Interface software.

The *idleWATCH® II* is J1939 CAN (Controller Area Network) enabled and is fully configurable over a J1939 compliant network via laptop. (Reference the *Vanner CAN Interface User Manual* for configuration instructions.)

A typical *idleWATCH® II* system consists of the following;

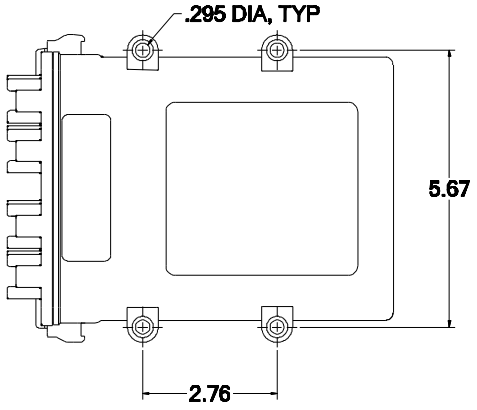
1) PMECM-12/24
   a) Main power and control circuitry housed in a sealed plastic enclosure
   b) Four, 12 position Deutsch connectors for sensor and vehicle I/O plus CAN communication
2) Panel or Dash Mounted Remote
   a) Enables and disables the *idleWATCH® II* system
   b) LED status indicators
   c) Audible buzzer for engine shutdown warning (30 seconds prior to engine shutdown)
3) Current Sensor (VSS-C80/600 or VSS-C80)
   a) Toroid style current sensor
   b) One or more current sensors may be required depending on system configuration
4) Battery Voltage and Temperature Sensor (VSS-VT)
   a) Stud mounted sensor for monitoring battery voltage and temperature
5) Custom Fortin Remote Start Module (Optional)
   a) The custom, application specific Fortin Remote Start Module must be purchased through Vanner.
6) In certain applications, an additional Fortin module is required for Security Key bypass capabilities, this module is configured on the vehicle.

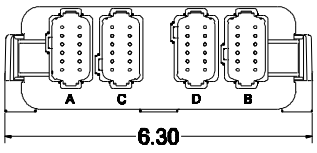
*** Note:** The *idleWATCH® II* is provisioned with the capability of starting the vehicle without the use of a remote start module. Engine crank time, crank interval, crank attempts and cranking delay are all user configurable via a laptop provisioned with Vanner's Dashboard Interface.

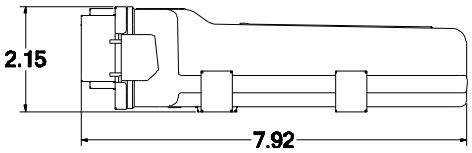
Specifications

PMECM-12/24 Power Management and Engine Start Controller	
Model Number	PMECM-12/24
Input Voltage Range (VDC)	9.5 – 32 (Reverse Polarity Protected)
Max Input Current (AMPS)	15
Output Voltage Range (VDC)	9.5 - 32
Max Ripple Voltage (mV)	<100mV RMS
Standby Current (Milliamps)	<30mA @ 24V, <60mA @ 12V
Operating Temp.	-40°C to +60°C (-40°F to 140°F)
Storage Temp.	-40°C to +85°C (-40°F to 185°F)
Serviceable	Internal components to be serviced by Vanner personnel only.
Environmental Considerations	Sealed plastic enclosure (Nylon 6/6) provides protection against salt, fungus, dust, water, fuel vapors and all fluids associated with commercial and off-highway vehicle operations. IP67 Rated.
Mounting Location	Mount on a flat surface. Location should be protected from battery acid and gases.
Weight (lbs.)	1.25 lbs (.6 kG)

Dimensional Specifications
(All Dimensions are in Inches)







Theory of Operation

Battery Monitoring

The primary function of the *idleWATCH® II* is to monitor and manage the auxiliary batteries on a vehicle. The monitoring algorithm analyzes battery voltage, current, and temperature inputs, and calculates the SOC (State of Charge), SOH (State of Health), SOCach (Achievable State of Charge based on SOH and temperature of battery), U (Estimated Time to Run), and Up (Estimated Time to Run adjusted by SOH and temperature of battery) of the battery.

In order for the *idleWATCH® II* system to accurately calculate/estimate the SOC, SOH and SOCach, of the battery/batteries, there are three critical settings that need to be configured. The settings are as follows;

- **Battery Type**: This is defined by the make and model of the battery being used.
- **Nb**: This is the number of batteries that are connected in parallel
- **Voltage Level**: The voltage level setting defines whether it is a 12V single, 24V single or 24/12V dual battery arrangement

An *idleWATCH® II* is ordered from the factory with the customer defined battery profile, Nb and voltage level settings pre-loaded. Please review Vanner's smart part numbering document, A916580, to ensure you specify the appropriate model number for the application.

Alternatively, the appropriate battery profile, Nb and voltage level settings can be loaded during system installation via Vanner's CAN interface software, commonly referred to as Dashboard. A laptop provisioned with the Dashboard software allows the user to enter battery parameters and customize configuration settings and validate the system works via CAN bus. Please reference the *Vanner CAN Interface User Manual* which is available at http://www.vanner.com.

Battery Type

The characteristics of a battery differ by type, manufacturer, and capacity. **It is critical to use the appropriate battery profile for accurate battery monitoring**. The battery models that are currently available are listed below. (**Note:** Please contact Vanner Sales if your intended battery is not listed.)

Group 31 Batteries	8D Batteries	Other
EAST PENN 8A31DT	LIFELINE GPL-8DL	LIFELINE GPL-30HT
DEKA 7T31	LIFELINE GPL-4DL	OPTIMA 34 RED TOP
DEKA DOMINATOR 8G31	DEKA INTIMIDATOR 8A8D	INTERSTATE SRM29
LIFELINE GPL-31T	DYNO H8DC	HAWKER 6TAGM
GENESIS XE95	EAST PENN 8A8D	
EXIDE EXHC-200D		
DEKA INTIMIDATOR 9A31		
ODYSSEY EXTREME 31-PC2150		
TROJAN OVERDRIVE AGM31 & TRANSPOWER ST1000		
DISCOVER EV31A-A		

Nb

The Nb setting represents the number of batteries connected in parallel. The chart below represents the appropriate Nb setting for different 12 and 24 volt battery configurations.

Table 1

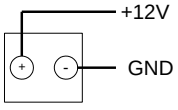
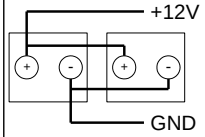
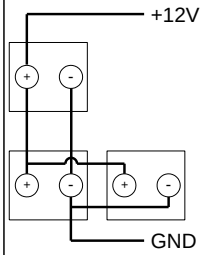
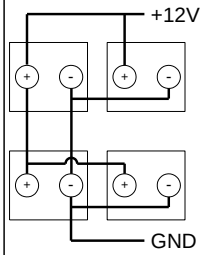
Nb	Single 12V Battery Configuration	Single 24V Battery Configuration: 24V Loads Only	Dual 24V/12V Battery Configuration: 12 and 24V Loads
1	One 12V Battery	Two 12V Batteries in Series	Two 12V Batteries in Series
2	Two 12V Batteries in Parallel	Four 12V Batteries in Series/Parallel	Four 12V Batteries in Series/Parallel
3	Three 12V Batteries in Parallel		
4	Four 12V Batteries in Parallel		

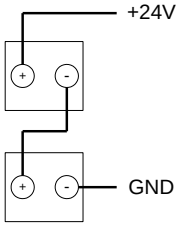
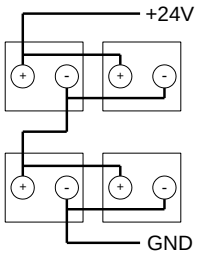
Battery Configuration

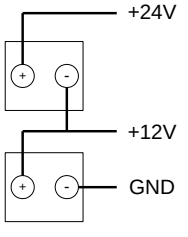
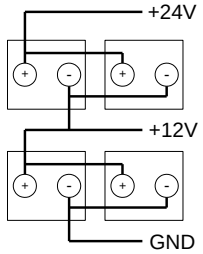
The available system level configurations are as follows;

- Single 12V – 12V battery/batteries and loads only
- Single 24V – two or four 12V batteries connected in series or series/parallel with 24V loads only
- Dual 24V/12V – two or four 12V batteries connected in series or series parallel with both 24V loads and 12V loads

Note: Do NOT change Nj (number of cells per battery) from 6 to 12 for a 24V system. Choose the appropriate system voltage level instead. See illustrations below for assistance in selecting the appropriate battery and Nb configurations.

12V Single Battery Configuration				
Nb	1	2	3	4

24V Single Battery Configuration		
Nb	1	2

24/12V Dual Battery Configuration		
Nb	1	2

Configurable Settings

There are multiple settings in the *idleWATCH® II* that are user configurable to maximize system efficiency. Once the configurable settings are defined, they can be stored in a file and imported into other *idleWATCH® II* units. This ensures consistency of the settings from one unit to the next. These settings can be configured with a laptop via Vanner's CAN interface software. Please reference the *Vanner CAN Interface User Manual* which is available at www.vanner.com.

Engine Controls

Engine starting/stopping controls are turned on if the "Auto Start" function is enabled from the remote by pressing and holding the two enable keys for three seconds (see illustration of remote on page 21).

Engine control is based on the battery SOC estimated from the battery monitoring module, the battery charging current, and predefined parameters that are outlined in Table 1.

Table 2: List of Engine Control Parameters used by *idleWATCH® II* software

No	Parameter	Description
1	SOC_EngineOn	SOC setpoint to turn on engine (%)
2	SOC_EngineOff	SOC setpoint to turn off engine (%)
3	SOC_LoadOff	SOC setpoint to turn off all loads (%)
4	TopOffChargeEnable	Top off charge enable control
5	TopOffChargeCycles	Number of charge/discharge cycles to top off charge
6	AltMaxVoltage	Maximum alternator voltage (V)
7	FastIdleCurrent	Charging current setpoint for fast idle control (A)
8	FastIdleDelay	Delay to enter fast idle after engine start (Sec)

When "Auto Start" is enabled, the engine control logic is as follows;

- If battery SOCach < *SOC_EngineOn* then start engine.
- If battery SOC > *SOC_EngineOff* then stop engine.
- If *TopOffChargeEnable* is enabled, every *TopOffChargeCycles* charge/discharge cycle allows a top off charge (100% SOC, or 2 hours beyond *SOC_EngineOff*).
- If the average charge current is less than *FastIdleCurrent* and alternator voltage is 0.5V lower than *AltMaxVoltage* then fast idle is enabled.
- If alternator is > 0.5V below *AltMaxVoltage* at full voltage, and charge current is lower than *FastIdleCurrent,* then fast idle is disabled unless that results in low charge current.

When Auto Start is enabled, the time to turn on the engine is also estimated by the battery monitoring subroutine. The number of charge/discharge cycles before the next top off charge is also updated.

Key Sense Parameters

Key sense circuitry is used for different system controls. If a key is inserted in the barrel while Auto Start functionality is enabled, the detection circuitry will automatically disable Auto Start functionality. If key sense is "Not Available" (some vehicles don't have key sense circuitry), the ignition switch status will be used to control Auto Start and Load A and B outputs.

Table 3: Key sense settings

No	Value	Description
1	Active High	12 or 24V signal
2	Active Low	Ground signal
3	Not Available	

Load Control

There are two 1A outputs that are switched to ground, labeled as Load A and Load B. These outputs can be used to control larger loads via relays or contactors.

- When the ignition is off and Auto Start is enabled, both Load A and Load B outputs are turned on.
- When the key is inserted or the hood is opened, Auto Start will be disabled and both outputs turned off.
- When the ignition is on but the transmission is still in park, both Load A and Load B outputs will be turned off.
- When the ignition is on and the transmission is out of park (driving mode), the Load B output will be turned on while Load A is turned off. This enables a user to configure loads that might be required while driving.

Table 4: Load Control Settings

No	Parameter	Description
1	SOC_LoadOff	SOC setpoint to turn off all loads (%)
2	LoadBOffDelay	Delay to turn off Load B when vehicle is put in park (Sec)
3	LoadAOffDelay	Delay to turn off Load A when key is plugged in (Sec)
4	LoadBOffDelay2	Delay to turn off Load B when key is plugged in (Sec)

The "Load Control Settings" outlined in table 4 give the user flexibility in customizing the Load A and Load B outputs for their application.

Tach or Oil Pressure Signal

Wiring into the vehicles tachometer or oil pressure signal is required to communicate that the engine has started which in turn stops engine cranking.

Table 5: Tach/Oil Pressure Settings

No	Value	Description
1	Active Low	Gnd signal when oil pressure is detected
2	Active High	+12/24V signal when oil pressure is detected
3	* Tach Pulses	PWM signal relative to engine RPM
4	Not Available	

*** Note:** When using the *idleWATCH® II* for engine cranking/starting, this value must be set to "Tach Pulses". When using a Fortin start module, the oil pressure (Low or High) or tach pulses may be used. When the Tach Pulses setting is used, the proper tach frequency to engine RPM ratio must be defined. See Table 7, "Engine Crank Settings", for determining "RatioTachRPM" settings.

Idle Shutdown Control

If the vehicle is started normally with a key, the transmission is in park, and the parking brake is set, fuel saving idle shutdown controls will shut the engine down at a user defined interval.

Table 6: Idle Shutdown Settings

No	Parameter	Description
1	IdleShutdownEnable	Idle shutdown functionality can be enabled or disabled
2	IdleShutdownDelay	Delay, in seconds, that engine is shutdown after start

Engine Cranking Controls

Several engine cranking control parameters are available to ensure proper engine starts, including a cranking delay for diesel engines.

Table 7: Engine Crank Settings

No	Parameter	Description
1	CrankSpeed	Engine speed to stop cranking (RPM)
2	CrankTime	Engine crank time during each attempt (Sec)
3	CrankIntervals	Delay time between cranking attempts (Sec)
4	CrankAttempt	Maximum number of cranking attempts (Sec)
5	IgnitionCrankingDelay	Delay to crank engine after ignition is on (Sec)
6	* RatioTachRPM	Ratio to convert tach frequency to engine RPM (RPM/Hz)

*** Note:** A ratio must be defined to convert the tach signal frequency to engine RPM. To determine the appropriate number, the simplest way is to use a laptop provisioned with Vanner's Dashboard interface software. An RPM value will be displayed on the main PMEC (idleWATCH™ II) startup screen in the "Tach Signal ON" tab. Compare this number to the actual RPM displayed by the vehicles tachometer.

Multiply the RatioTachRPM default value, 15, by the actual RPM to Tach Signal ON ratio. For instance, if the vehicle actual RPM is 350 and the Tach Signal ON RPM is 300, multiply 350/300 * 15. The resultant value, 17.5, is then entered for the RatioTachRPM value.

Battery Parameter Data

Saving of Battery Data at Power Down

An unmaskable external interrupt will be triggered when the ignition signal to the *idleWATCH® II* drops below 9V. In this interrupt service routine, all idleWATCH™ II/battery parameters and battery status information is saved into non-volatile memory – FRAM. The saved data is read out at power up and used to continue battery monitoring. By doing this, the battery monitor can always start from the previous state instead of restarting from the default state.

In case the saved data is corrupted for any reason, the software will load default values and start from the default state.

The "Factory Reset" option, sets all parameters and battery states to their default values.

CAUTION: Do not reset *idleWATCH® II* parameters to factory defaults while the vehicle is running or the batteries are discharged. Inaccuracies in battery states will be introduced that will adversely affect system performance.

CAN Communication

J1939 CAN communication is supported by the idleWATCH™ II. The following CAN messages are available;

- Status
- Heartbeat
- Battery voltage(s) and current(s)
- Battery states
- Read and set idleWATCH™ II/battery parameters
- CAN bootloader (for reprogramming)
- DM1 messages
- Data logging
- Hardware/Software ID's

Please refer to the *Vanner idleWATCH® II CAN Specification* for details.

Auto Starting

Auto Start

This represents the condition the *idleWATCH® II* will be in after enabling Auto Start functionality upon arrival at a job site. In order for Auto Start functionality to be enabled, the following vehicle conditions must be met;

1. Ignition in "off" position (no key present)
2. Gear selector in park position for automatic transmission, neutral for manual transmission
3. Hood closed

***idleWATCH® II* States**

As long as the battery SOC is >= SOC_EngineOFF, the engine will not start.
Both Load A and Load B will be switched "on".

Key In

This represents the condition the *idleWATCH® II* will be in when the following vehicle conditions are met;

1. Key in barrel
2. Ignition in either "on" or "off" position
3. Gear selector in park position for automatic transmission, neutral for manual transmission
4. Hood closed

***idleWATCH® II* States**

Auto Start functionality is disabled
Both Load A and Load B will be switched "off"

Driving

This represents the condition the *idleWATCH® II* will be in while the vehicle is being driven. The following are the vehicle conditions in this state;

- Ignition in "on" position
- Gear selector out of park for automatic transmission, out of neutral for manual transmission
- Hood closed

***idleWATCH® II* States**

Auto Start functionality is disabled
Load A will be switched "off"
Load B will be switched "on"

Engine Start

This represents the condition the *idleWATCH® II* will be in while the engine is running during a battery recharge cycle. The engine will start if the state of charge achievable (SOCach) is less than or equal to the state of charge engine on (SOC_EngineON) setting. The following are the vehicle conditions in this state;

- Ignition in "on" position
- Gear selector in park position for automatic transmission, neutral for manual transmission
- Hood closed

***idleWATCH® II* States**

Auto Start is enabled
Engine Start is on (LED on dash mounted remote will be on)
Loads A and B will be switched "on"

5 – Fast Idle

This state represents the condition the *idleWATCH® II* will be in while the engine is running in the fast idle mode during a battery recharge cycle. The engine will enter the fast idle mode if the battery voltage (Vbatt) is less than the alternator maximum voltage (AltMaxVoltage) – 0.5 and the battery current (Ibatt) is less than or equal to the fast idle current (FastIdleCurrent) setting. The following are the vehicle conditions in this state;

1. Ignition in "on" position
2. Gear selector in park position for automatic transmission, neutral for manual transmission
3. Hood closed

***idleWATCH® II* States**

Auto Start is enabled
Engine Start is on (LED on remote will be on)
Fast idle mode is active (LED on remote will be on)
Loads A and B will remain "on"

6 – Load Shedding

This state represents the condition the *idleWATCH® II* will be in while in the "load shedding" mode. The "load shedding" mode can be entered from any of three modes, "auto start", "engine start" and "fast idle". If the state of charge achievable (SOCach) value is less than or equal to the state of charge load off (SOC_LoadOff) value, the *idleWATCH® II* will automatically turn loads A and B off to accelerate the recharging of the batteries. Once the state of charge achievable (SOCach) value is greater than the state of charge load off (SOC_LoadOff) value, the *idleWATCH® II* will return to the appropriate state. The following are the vehicle conditions in this state;

1. Ignition in "on" or "off" position
2. Gear selector in park position for automatic transmission, neutral for manual transmission
3. Hood closed

***idleWATCH® II* States**

Auto Start is enabled
Engine Start is either on or off depending on state it was in prior to entering "load shedding" mode
Fast idle mode is active (LED on remote will be on) or inactive
Loads A and B will be switched "off"

7 – Hood Open

This state represents the condition the *idleWATCH® II* will be in upon opening the hood while it is in state 1, 4 or 5. The following are the vehicle conditions in this state;

1. Ignition in "off" position
2. Gear selector in park position for automatic transmission, neutral for manual transmission
3. Hood open

***idleWATCH® II* States Auto Start is disabled**

Engine Start is off
Fast idle is off
Loads A and B will be switched "off"
Upon closing the hood, the *idleWATCH® II* state will return to the initial settings found in state 0.

Disabling Auto Start

Auto Start functionality can be disabled by pressing and holding the "Off" button for one second. The "Off" button is located on the panel mounted remote. Upon disabling Auto Start, the *idleWATCH® II* state will return to the initial settings found in state 0.

Turning Ignition Off and/or Returning Gear Selector to Park (Automatic) or Neutral (Manual)

If the ignition is turned off and the key removed from the ignition while in state 2, the *idleWATCH® II* will return to the initial settings found in state 0.

If the gear selector is returned to park (automatic) or neutral (manual), the ignition turned off and the key removed while in state 3, the *idleWATCH® II* will return to the initial settings found in state 0.

Idle Shutdown States

1 – Idle Shutdown Disabled

Idle shutdown functionality is disabled via the following;

- Dashboard software (see "Idle Shutdown Controls" in "Configurable Settings" section)
- Auto Start has been enabled via the remote

2 – Idle Shutdown Enabled

Idle shutdown functionality is enabled via the following;

- Dashboard software (see "Idle Shutdown Controls" in "Configurable Settings" section)
- Default software setup from factory.

3 – Idle Shutdown Ready

Idle shutdown controls will enter the "Ready" state when the following conditions are met;

- Key in the barrel
- Ignition is on
- Engine is running (started via key)
- Transmission in park (automatic) or neutral (manual)

4 – Idle Shutdown Activated

Idle shutdown controls are activated when;

- The parking brake is set after the conditions in section 3 are met.
- The transmission is shifted from drive to park (automatic) or a forward gear to neutral (manual).
    - For example, when the vehicle is driven to a jobsite and parked with the engine idling, idle shutdown controls will automatically activate. Setting the parking brake is not required.

The idle shutdown timer is user configurable (see "Idle Shutdown Controls" in "Configurable Settings" section) and starts upon activation.

5 – Idle Shutdown Alarm On

To alert the operator, an audible alarm and LED (located on the remote) initiate 30 seconds prior to the engine shutting down. An "Alarm Mute" button is provided to silence the buzzer, however, the LED will continue to flash.

6 – Idle Shutdown/Engine Shutdown

Once the idle shutdown timer has timed out, the engine will shut down, the buzzer will turn off (if it hasn't been silenced) and the LED will continue to flash. The LED will turn off when there is a change to any of the inputs, i.e., the ignition is turned off.

Re-activating Idle Shutdown

Idle shutdown will re-activate automatically upon restarting the engine provided;

- The parking brake is set (see section 4) or
- The vehicle has been driven and the transmission shifted to park (automatic) or neutral (manual).

Return to "Idle Shutdown Enabled" Mode

Idle Shutdown will return to the "Enabled" state from the "Ready", "Activated", "Alarm On" or "Engine Shutdown" states when any of the following conditions are met;

- Key out of barrel
- Ignition is off
- The transmission is shifted from park to drive (automatic) or neutral (manual) to a forward gear.

Installation Instructions

These symbols are used to note procedures that if not closely followed could lead to loss of life or damage to equipment or property due to electrocution.

Electrocution hazard exists

Fire hazard exists

A potentially dangerous condition

Explosive hazard exists

Corrosive hazard exists

Do not connect more than one conductor per terminal on the Vanner idleWATCH™ II*. Multiple wires in one contact will compromise the cable seal resulting in poor performance or create a hazardous condition. Products damaged by the installation of multiple conductors per terminal are not covered by the warranty.*

Fault protection devices must be installed between the idleWATCHII and the power source (battery*). A fault protection device would be any fuse or circuit breaker properly rated for the maximum DC current obtainable. This advisory is in accordance with SAE, NEC and UL, for mobile power applications. Install per applicable codes or within 18" of the battery.*

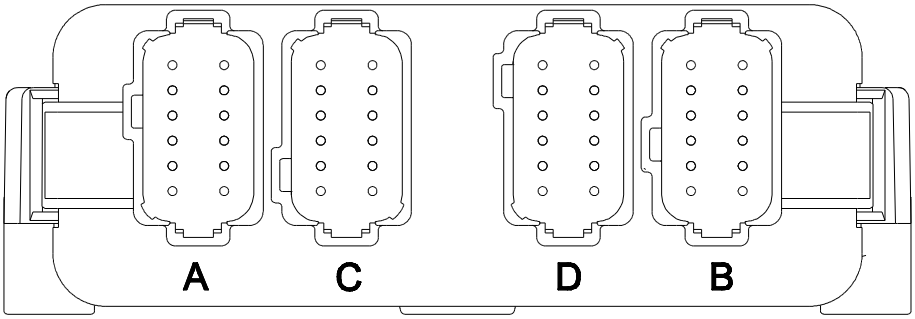
Caution: This equipment tends to produce arcs and sparks during installation. To prevent fire or explosion, compartments containing batteries or flammable materials must be properly ventilated. Safety goggles should always be worn when working near batteries

Mounting Hardware – Four counterbored holes are provided for mounting the idleWATCH™ II. The counterbores are designed to accept a 1/4-20 Socket Head Cap Screw, however, standard 1/4" hardware may be utilized provided a flat washer is placed between the bolt and plastic housing.

Mounting Location –The *idleWATCH® II* may be mounted in any orientation, on a flat mounting surface suitable for support during application. Locate the unit so that contact by people is unlikely.

idleWATCH® II Input/Output

Definitions and Functionality
(Front View)



idleWATCH® II Mating Connectors and Terminals

Deutsch connectors required to terminate I/O wiring to idleWATCH™ II (left to right)

- Position A (Grey): DT06-12SA
- Position C (Green): DT06-12SC
- Position D (Salmon/Pink): DT06-12SD
- Position B (Black): DT06-12SB

Deutsch Size 16 terminals (sockets) for all I/O wiring (terminals specified are for 18AWG TXL or GXL)

- 1062-16-0122 or 1062-16-0622 (Stamped and formed)
- 0462-201-16141 (Solid)

Position A: Vehicle Interfaces - Grey Connector

1. Engine Crank: Signal to vehicle controls to crank engine – 1 Amp to ground when engine crank is commanded
2. Ignition (12V or 24V): 12 or 24V signal from ignition
3. Engine Start: Supplies ignition signal to vehicle for engine starting
4. Fast Idle: Signal to vehicle controls enabling fast idle – 1 Amp to ground when fast idle is commanded
5. Park Switch: Parking switch input from vehicle – ground when transmission is in park
6. Hood Switch: Hood switch input from vehicle – ground when hood is open
7. Key Sense: 12/24V detection of key presence configurable as active hi, lo or not available
8. +12/24V, 2A Out: Signal for visual or audible indication that the SOC_EngineOff value has been reached and engine can be turned off manually
9. Auto Start Enabled: +12/24V 2A output signal for visual or audible indication that Auto Start functionality is enabled
10. +12/24V: Fused (15A) power input from battery
11. Power Ground: Battery negative (ground) terminal for power
12. Power Ground: Battery negative (ground) terminal for power

Position B: Sensors – Black Connector

1. CT12V - Low: Low range current sense signal (0 – 80A) on 12V battery
2. CT12V - High: High range current sense signal (0 – 600A) on 12V battery
3. CT12V - Sensor Ground: Ground to current sensor
4. CT12V - +5V Supply: Power to 12V current sensor
5. CT24V - Low: Low range current sense signal (0 – 80A) on 24V battery
6. CT24V - High: High range current sense signal (0 – 600A) on 24V battery
7. CT24V - Sensor Ground: Ground to current sensor
8. CT24V - +5V Supply: Power to 24V current sensor
9. 12V Battery Temp Sensor: Temperature signal from battery temp sensor
10. 12V Battery Voltage Sense: Battery positive terminal for voltage sensing – integral to temperature sensor and fused within housing
11. 12V Temp Sensor Ground: Ground to voltage and temperature sensor
12. +5V Temp Sensor Supply: Power to voltage and temperature sensor

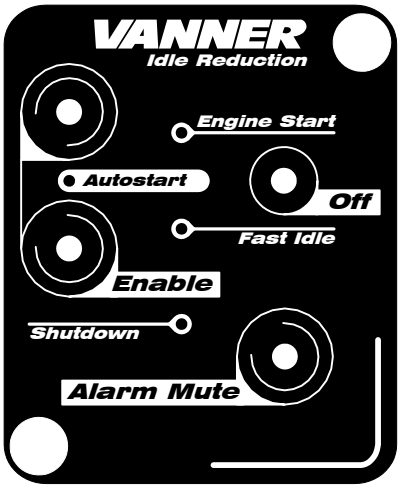
Position C: Remote – Green Connector

1. Spare
2. Buzzer Reset Switch: Signal from remote to reset buzzer
3. Buzzer (Audible Alarm on Remote): Signal to remote for audible alarm (audible alarm starts 30 seconds prior to engine shutdown)
4. Engine Shutdown (Remote Indicator): Signal to remote for visual indication that engine will shutdown. Indicator begins blinking 30 seconds prior to shutdown.
5. Spare
6. Fast Idle (Remote Indicator): Signal to remote for visual indication engine is in fast idle mode
7. Engine Run (Remote Indicator): Signal to remote for visual indication during engine running
8. Remote Switch Enable: Signal from remote enabling Engine Auto Start functionality
9. Remote Ground: Ground to remote
10. Auto Start Enabled (Remote Indicator): Signal to remote for visual indication that "Auto Start" functionality is enabled
11. +5V (Remote Supply): Power to remote
12. Remote Switch Disable: Signal from remote disabling Engine Auto Start functionality

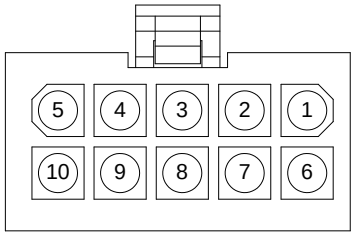
D - Vehicle I/O and CAN - Salmon/Pink Connector

1. Park Brake: Input from vehicle park brake – ground when brake is set
2. Neutral Input: Input from vehicle neutral switch - ground when transmission is in neutral
3. Tachometer: Input from vehicle to signify engine has started - stop cranking command to idleWATCH™ II
4. +24V Sense: Input from 24V battery for voltage sensing
5. Sense Negative: Battery negative (ground) terminal for voltage sensing
6. Aux-B: Power Output, 1 Amp to ground
7. Aux-A: Power Output, 1 Amp to ground
8. Engine Shutdown: Output signal, 1 Amp to ground, to shut engine down due to idle timeout
9. Spare
10. Can Shield: Shield connection for CAN bus
11. CAN High: High signal connection for CAN bus. CAN bus used for system configuration with Vanner CAN interface software.
12. CAN Low: Low signal connection for CAN bus

idleWATCH® II Remote



Wire insertion side of connector for remote



idleWATCH® II Remote Mating Connectors and Terminals

Ten Position Connector required to terminate I/O wiring to *idleWATCH® II* remote

- Tyco Part #770580-1

Terminals (sockets) required to terminate I/O wiring to *idleWATCH® II* remote (terminals specified are for 18AWG TXL or GXL)

- Tyco Part #170366-3

idleWATCH® II Remote Pinout Definitions

1. +5V Remote Supply: Power from *idleWATCH® II* (C11)
2. Remote Ground: Ground from *idleWATCH® II* (C9)
3. Remote Switch Enable: Signal to *idleWATCH® II* enabling Engine Auto Start functionality (C8)
4. Buzzer Reset Switch: Signal to *idleWATCH® II* to reset buzzer (C2)
5. Remote Switch Disable: Signal to *idleWATCH® II* disabling Engine Auto Start functionality (C12)
6. Auto Start Enabled LED: Signal from *idleWATCH® II* for visual indication that "Auto Start" functionality is enabled (C10)
7. Engine Run LED: Signal from *idleWATCH® II* for visual indication during engine running (C7)
8. Fast Idle LED: Signal from *idleWATCH® II* for visual indication engine is in fast idle mode (C6)
9. Engine Shutdown LED: Signal from idleWATCH™ II for visual indication that engine will shutdown. Indicator begins blinking 30 seconds prior to shutdown. (C4)
10. Buzzer/Audible Alarm: Signal from *idleWATCH® II* for audible alarm. The audible alarm starts 30 seconds prior to engine shutdown. (C3)

***idleWATCH® II* Remote Functionality**

The remote serves as a status indicator in addition to allowing the user to enable auto start functionality. The auto start feature is enabled by simultaneously pressing and holding the two "Enable" buttons, approximately three seconds, on the left side of the remote. When the auto start feature is enabled, the "Auto Start" LED will turn on.

The "Engine Start" LED turns on when the "Engine Start" signal is received from the *idleWATCH® II*.

The "Fast Idle" LED turns on when the "Fast Idle" signal is received from the *idleWATCH® II*.

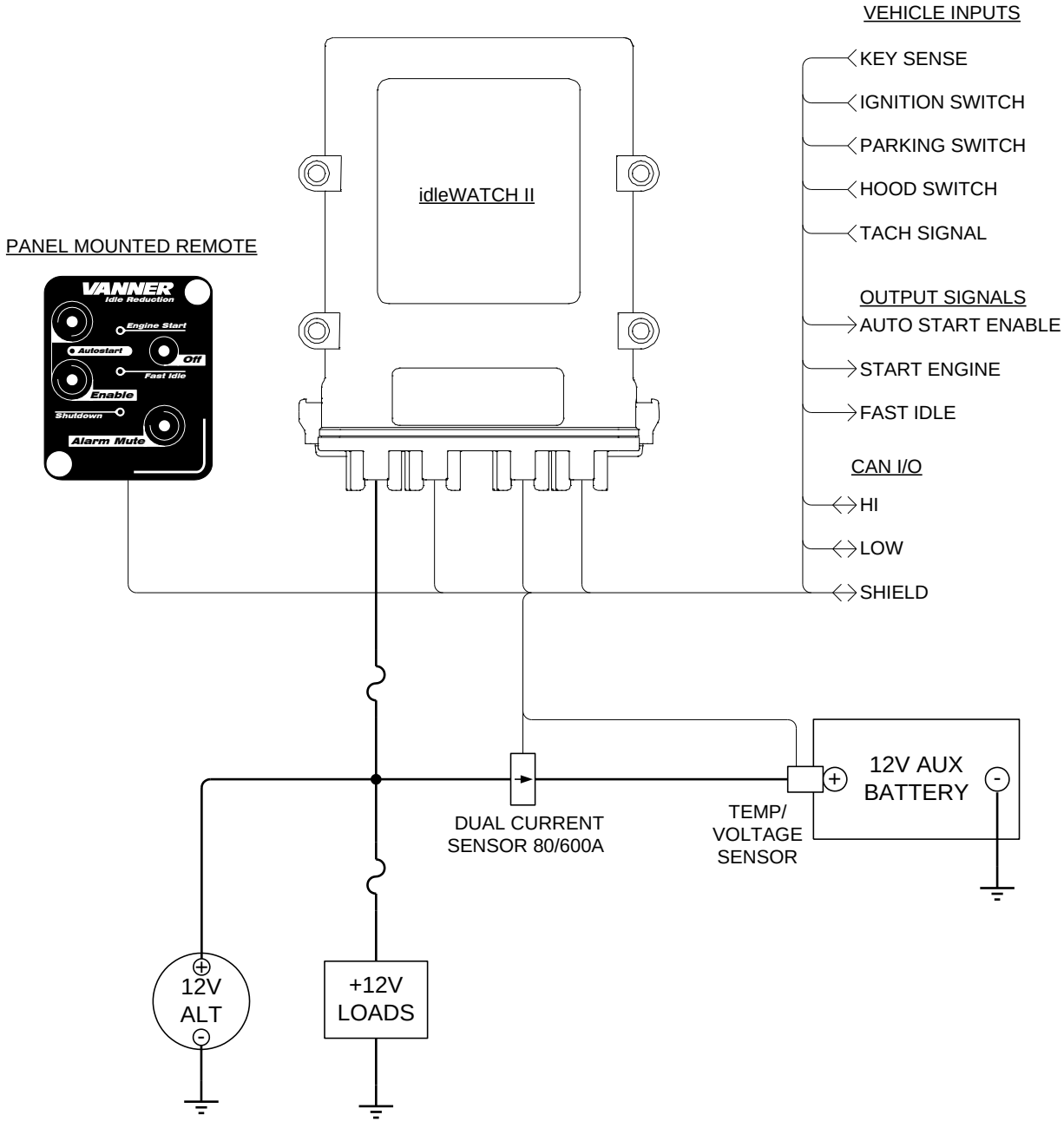
The auto start feature is disabled by simply pressing the "Off" button on the right side of the remote. The green "Auto Start" LED will turn off.

The "Shutdown" LED turns on 30 seconds prior to the engine shutting down when in "Idle Shutdown" mode. An audible alarm will start 30 seconds prior to engine shutdown as well.

Pressing the "Alarm Mute" button will silence the "Shutdown" buzzer.

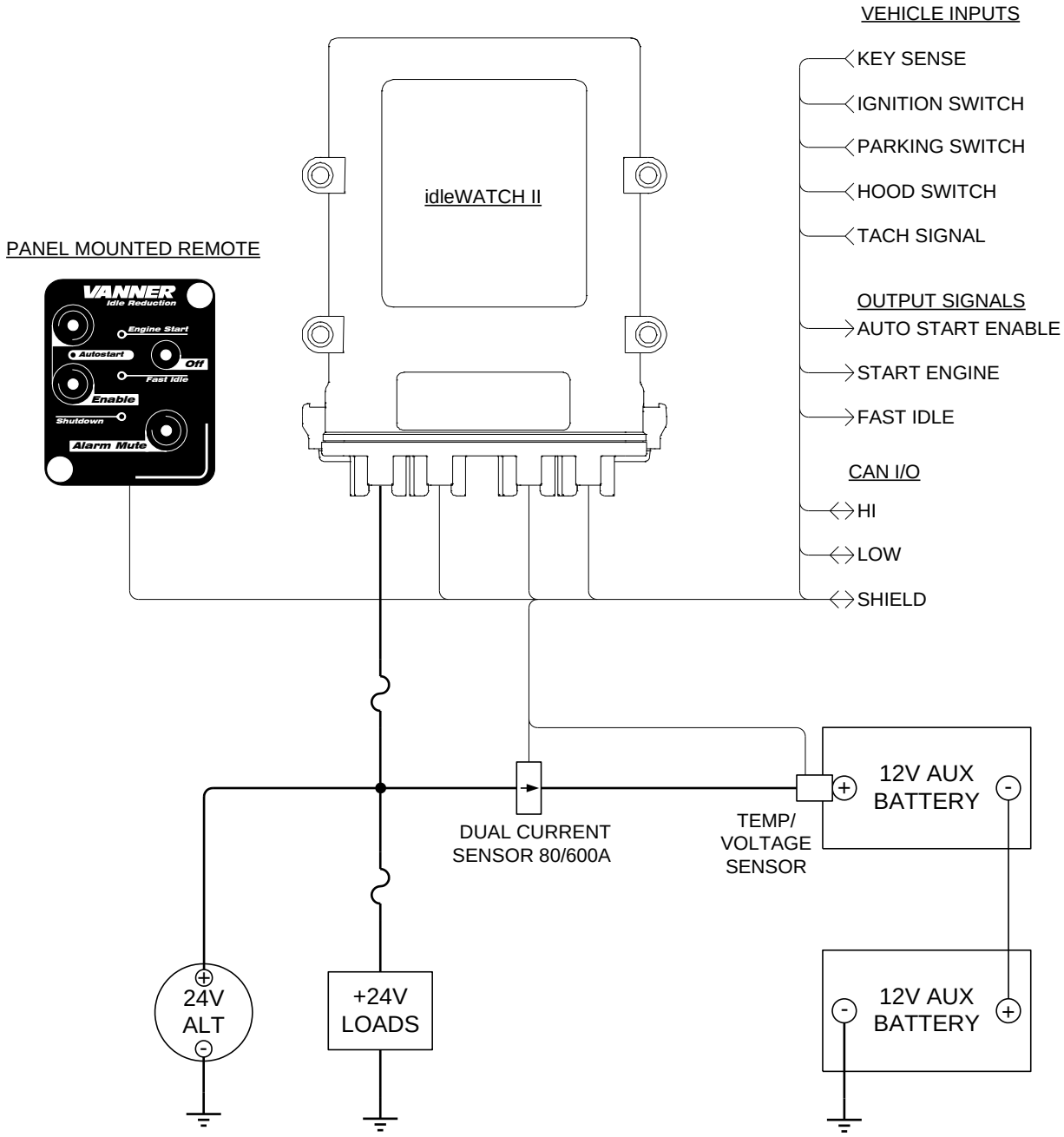
Typical Application/Wiring

12V Auxiliary Battery with 12V Loads



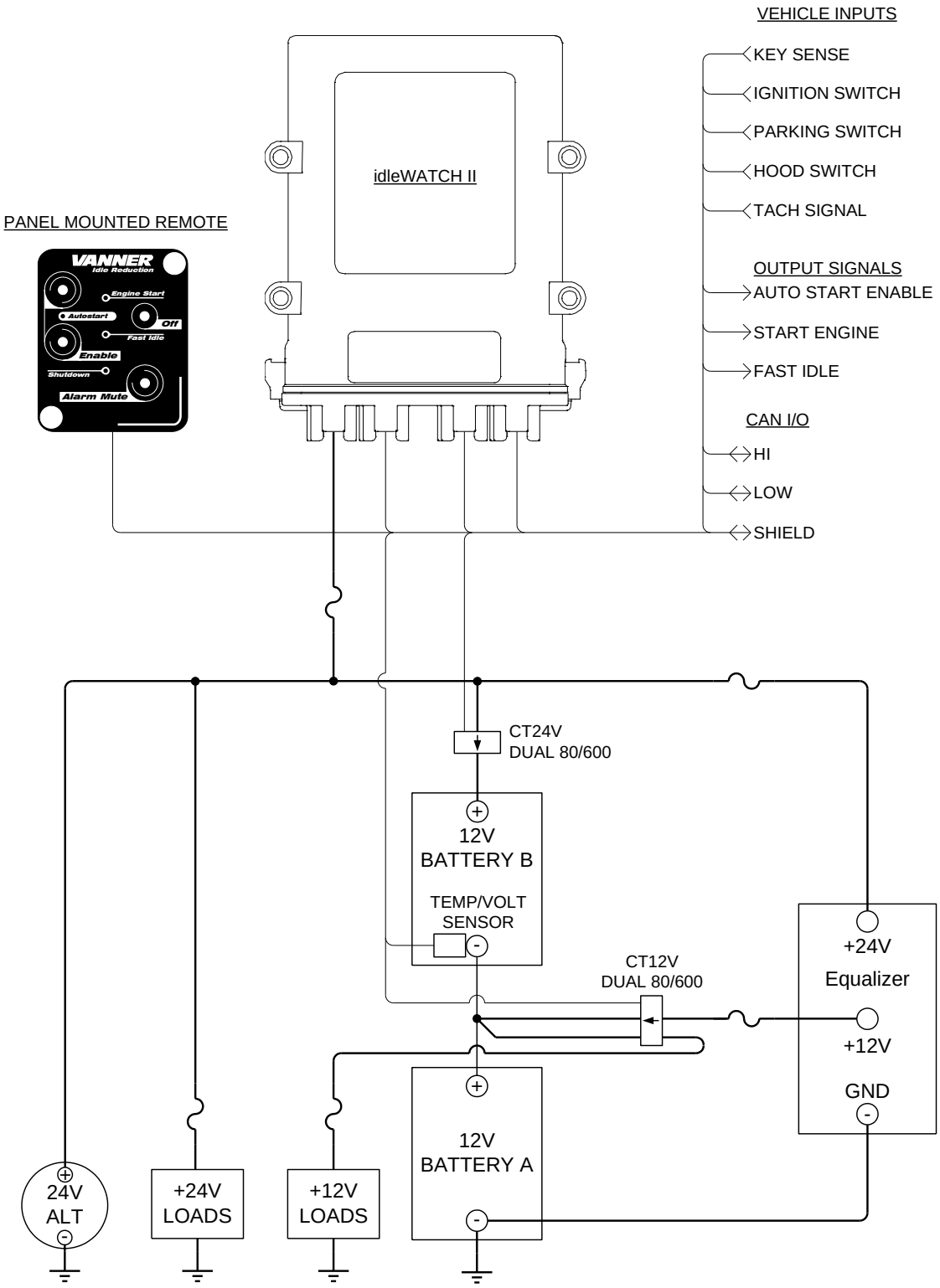
Typical Application/Wiring

24V Auxiliary Batteries with 24V Loads



Typical Application/Wiring

24V Auxiliary Batteries with 12V Loads Requiring a Battery Equalizer



Wire Size and Temperature Rating

Vanner recommends using 18AWG TXL wire (125°C) for all terminations to the *idleWATCH®II*. The fuse rating for the +12 or +24V input to the *idleWATCH®II* shall be 15A. For the 24V/12V dual voltage configuration, reference Vanner's Equalizer manual for proper wire and fuse sizing.

Troubleshooting

CAUTION

Servicing of electrical systems should only be performed by trained and qualified technical personnel.

Equipment Required

- VoltMeter having 0.01 volt resolution. (Fluke Model 115 Multimeter recommended)
- True-rms clamp-on current meter (Fluke Model 323 Clamp-on Meter recommended)
- Laptop computer provisioned with Vanner's CAN Interface Software
- **VANN-BUS PMEC-1939** kit consisting of the following;
  - USB to CAN adapter module - PEAK System's PCAN-USB IPEH-002021
  - Vanner CAN Interface Software

Trouble Shooting Guide for idleWATCH™ II

In the event the *idleWATCH®II* does not work properly, the following need to be reviewed / validated;

1. Utilizing the Vanner dashboard, have the *idleWATCH®II* settings been validated?
   a. Battery profile, Nb, Voltage settings, etc.

2. Is voltage present at the +12/24V input terminal?

3. Are the power and sensor grounds connected to the negative battery terminal?
4. Is the I/O wiring to/from the idleWATCH™ II installed/terminated correctly?
5. Is the I/O wiring to/from the remote installed correctly?
6. Is/are the current sensor(s) installed in the proper orientation? The arrow on the case of the sensor shall point toward the batteries.

7. Is the voltage / temperature sensor installed on the proper battery terminal?
8. Are the fuse voltage and current ratings correct?

Vanner Repair Service

In the event attempts to troubleshoot the *idleWATCH®II* in the field, Vanner offers a quick turn-around factory repair service. Send the unit to the address on last page with a note instructing Vanner to repair it. Include your name, phone number, shipping address (not a P.O. Box Number), and your purchase order number.

Notes

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