



SPTRONICS

Spark Performance Electronics

Installation Instruction for SEM201
Standalone Engine Management

Warning

The SEM201 allows for total flexibility in engine tuning, misuse of this product will destroy your engine

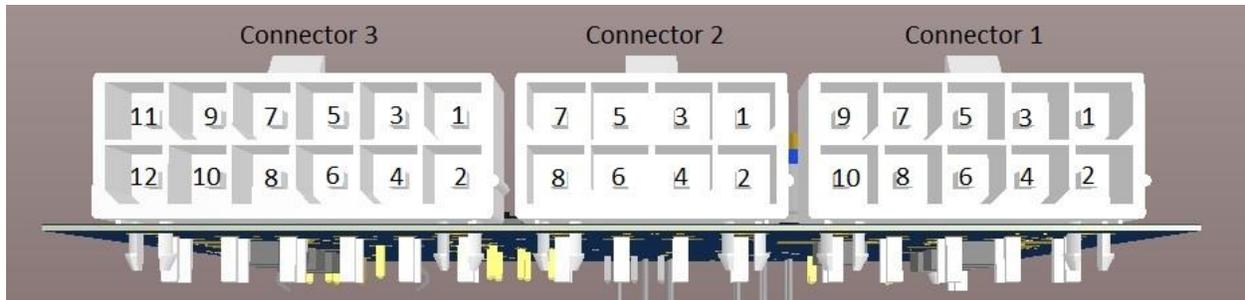
SPTRONICS holds no responsibility for any engine damage that may results from the misuse of this product

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SEM201 Specifications:

Trigger Inputs:	2 x Differential Inputs Hall, VR and Opto
Output Drivers:	9 x Low side drivers Saturated (8 ohm minimum, High Impedance Only)
Coil Drivers:	Up to 8 x 0-5V, 12V 1.5A max (do not connect directly to coil primary)
Inputs:	4 x digital Inputs and/or 4x analog inputs shared with Ignition outputs.
Knock Sensor Input	1x Programmable sensor input
Throttle Position Input	1 x 0-5V
Manifold Pressure Sensor	1 x 0-5V
Internal 4 bar Map sensor	Internal sensor
Coolant Temperature Sensor	1 x analog
Inlet Air Temperature Sensor	1 x analog
O2 Sensor	1 x 0-5V
USB	1 x PC Communication
CAN	1 x Programmable Send / Receive
5 Volt Reference	1 x 5 volt output for sensor supply

Wiring Diagram:



Looking at PCB connectors

Connector 1:

Pin	Name	Wire Color	Comment
1	Injector 1 output	Orange	
2	Injector 2 output	Orange	
3	Injector 3 output	Orange	
4	Injector 4 output	Orange	
5	Injector 5 output	Orange	

6	Injector 6 output	Orange	
7	Injector 7 output	Orange	
8	Injector 8 output	Orange	
9	IAC1 output	Brown	
10	GND	Black	

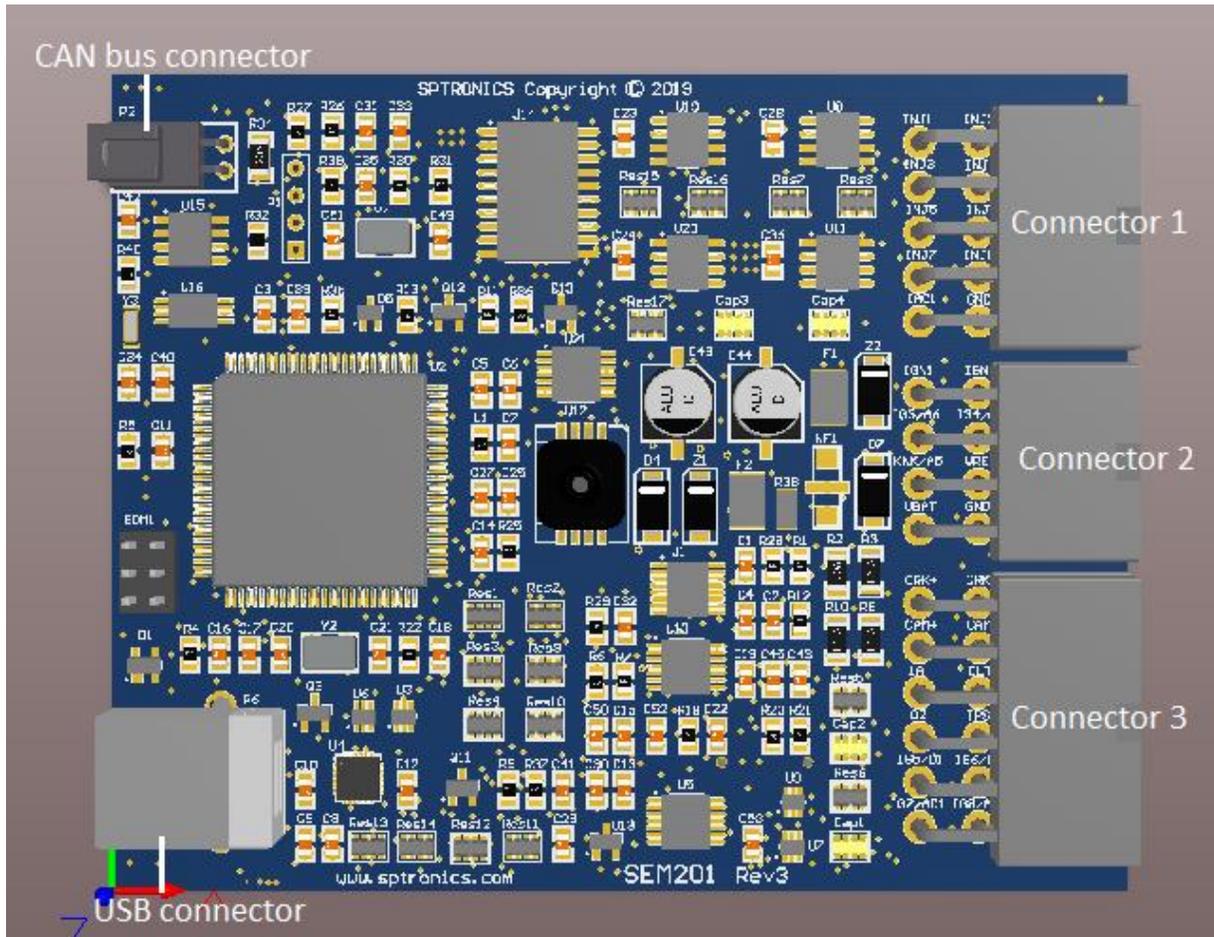
Connector 2:

Pin	Name	Wire Color	Comment
1	Ignition output 1	Green	
2	Ignition output 2	Green	
3	Ignition output 3 / ADC12	Green	If S4/P4 On, Ign3 Output. If off ADC12 Input.
4	Ignition output 4 / ADC13	Green	If S4/P3 On, Ign4 Output. If off ADC13 Input.
5	Knock input / ADC11	White	ADC11 if knocking not installed.
6	Sensors Reference Voltage (+5V)	Blue	
7	Switched +12V	Red	
8	GND	Black	

Connector 3:

Pin	Name	Wire Color	Comment
1	Crank input +	Yellow	
2	Crank input -	Black	
3	Cam input +	Yellow	
4	Cam input -	Black	
5	Intake air temperature input	White	
6	Coolant temperature input	White	
7	O2 sensor input	White	
8	Throttle position input	White	
9	Ignition output 5 / PE0	Green	If S5/P4 On, Ign5 Output. If off PE0 Input.
10	Ignition output 6 / PT4	Green	If S5/P3 On, Ign6 Output. If off PT4 Input.
11	Ignition output 7 / ADC6	Green	If S5/P2 On, Ign7 Output. If off ADC6 Input.
12	Ignition output 8 / ADC7	Green	If S5/P1 on, Ign8 Output. If off ADC7 Input.

PCB Top View:

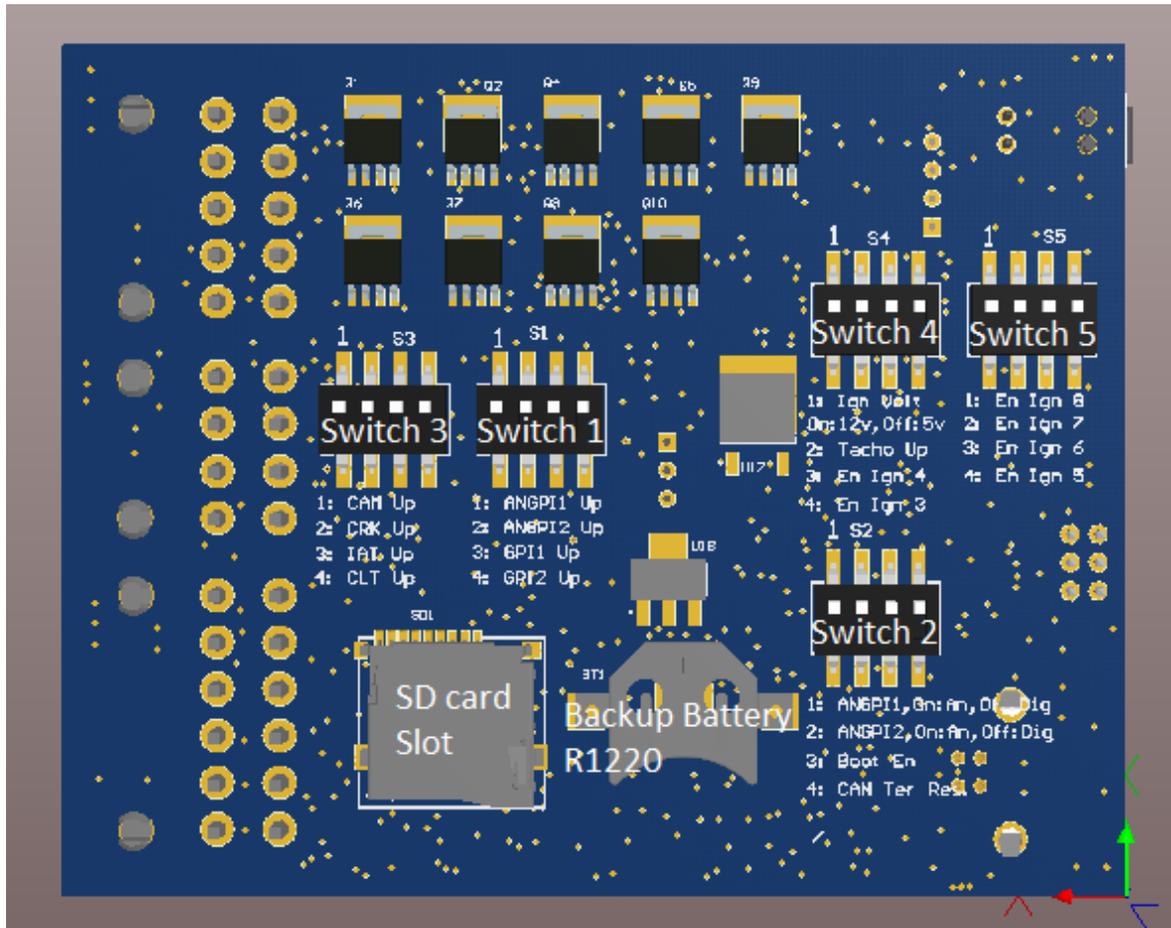


Connector 1,2 and 3 are for harness connection as explained above.

CAN bus connector is to connect any other CAN bus supported device to SEM201 such as SPTRONICS Wideband controller WB101 or Thermocouple amplifier TC201. Or any Megasquirt CAN us compatible device can be connected.

USB connector is to connect the SEM201 to computer, the connector is USB B type and the cable is included in the full package.

PCB Bottom View:



SD card slot is for using micro SD card for data logging.

Backup battery slot is for powering the RTC circuit to save the time for data logging while the device is not connected to the main power, CR1220 battery should be used.

Switch 1 control the following functions:

- Pin1, when it is ON, it pulls up "Ignition output 7 / ADC6" Connector 3, 11
- Pin2, when it is ON, it pulls up "Ignition output 8 / ADC7" Connector 3, 12
- Pin3, when it is ON, it pulls up "Ignition output 5 / PE0" Connector 3, 9
- Pin4, when it is ON, it pulls up" Ignition output 6 / PT4" Connector 3, 10

Switch 2 control the following functions:

Pin1, when it is ON, it enables "Ignition output 7 / ADC6" Connector 3, 11 to work as analog input.

Pin2, when it is ON, it enables "Ignition output 8 / ADC7" Connector 3, 12 to work as analog input.

Pin3, when it is ON, it enables the processor boot mode.

Pin4, when it is ON, it enables the CAN bus 120ohm termination resistor.

Switch 3 control the following functions:

Pin1, when it is ON, it pulls up the CAM input CAM+

Pin2, when it is ON, it pulls up the CRK input CRK+

Pin3, when it is ON, it pulls up the IAT input.

Pin4, when it is ON, it pulls up the CLT input.

Switch 4 control the following functions:

Pin1, when it is ON, the ignition outputs will be 12V otherwise it is 5V

Pin2, when it is ON, it enables IAC1 output to work as RPM output.

Pin3, when it is ON, it enables Ignition 4 "Ignition output 4 / ADC13" otherwise it works as ADC13

Pin4, when it is ON, it enables Ignition 3 "Ignition output 3 / ADC12" otherwise it works as ADC12

Switch 5 control the following functions:

Pin1, when it is ON, it enables Ignition 8 "Ignition output 8 / ADC7" otherwise it works as ADC7

Pin2, when it is ON, it enables Ignition 7 "Ignition output 7 / ADC6" otherwise it works as ADC6

Pin3, when it is ON, it enables Ignition 6 "Ignition output 6 / PT4" otherwise it works as PT4

Pin4, when it is ON, it enables Ignition 5 "Ignition output 5 / PE0" otherwise it works as PE0

Installation:

Grounding:

The ECU must have an electrically secure ground connection, which means that the battery negative must be properly grounded to the chassis AND engine. The ground wire, whether it is from the battery or to the chassis and engine, must have perfect electrical conductivity. This means that there must not be any paint or rust under the wire terminal. Make sure that when you install the ground wire there is bare metal exposed where the wire contacts the vehicle

component. Both of black wires should be connected to secure ground and we also recommend that the ground wire be as short as possible.

Power Requirement:

The SEM201 requires a minimum supply voltage of 10V or greater to run. We recommend that the ECU be supplied with 13.8V nominal operating voltage. Ensure that the vehicle's charging system is in perfect operating condition prior to installation. The red wire should be connected to ignition switched and fused to the battery source.

Sensors Reference Voltage:

The SEM201 has one 5V sensor voltage supply that will be needed during standalone installation. The pink wire output has resettable fuse rated at 0.5A max

Trigger Inputs:

SEM201 has two differential trigger input crank input+ and crank input- for the Crank signal and cam input+ and cam input- for the CAM signal. Each one has an option to be connected as differential or as single input. The following table summarize trigger connection:

Mode	Connection
Opto Input	<ul style="list-style-type: none">• Input Signal to Input+• Leave Input- unconnected.
VR Sensor	<ul style="list-style-type: none">• Connect VR Sensor to Input+/Input- for Standalone connection• Connect VR+ Sensor to Input+ and leave Input- unconnected for Piggyback connection.
Hall Input	<ul style="list-style-type: none">• Connect Hall sensor (Collector/Drain) to Input+, Close CRK/CAM UP jumper for pull-up resistor for standalone connection.• Connect Hall sensor to Input+ for piggyback connection.• Leave Input- unconnected.

Throttle Position Sensor (TPS):

Name	Wire	Color	
+5.0 volts, Vcc	Connector 2,6	Blue	5V Sensor Reference Voltage
TPS Signal	Connector 3,8	White	TPS 0-5V signal
Ground	GND	Black	Connect to GND

Air Temp Sensor (IAT):

Name	Wire	Color	
IAT Signal	Connector 3,5	White	IAT 0-5V signal
Ground	GND	Black	Connect to GND

IAT UP jumper connects the IAT Signal to pull up resistor 2.49K ohm that will be needed in standalone setup.

Coolant Temp Sensor (CLT):

Name	Wire	Color	
CLT Signal	Connector 3,6	White	CLT 0-5V signal
Ground	GND	Black	Connect to GND

CLT UP jumper connects the CLT Signal to pull up resistor 2.49K ohm that will be needed in standalone setup.

O2 Sensor:

Name	Wire	Color	
O2 Signal	Connector 3,7	White	O2 0-1V signal
Ground	GND	Black	Connect to GND

Knock Sensor:

Name	Wire	Color	
Knock Signal	Connector 2,5	White	
Ground	GND	Black	Connect to GND

SEM201 has one knock sensor input shared with analog input ADC11. If the knocking circuit is not installed the input can be used as ADC11.

General Purpose Outputs:

9 low side output each rated at 3A, 8 for injectors and one IAC1. Up to 8 cylinder can be driver sequentially, unused output can be used as general port output.

Ignition Outputs:

Up to 8 Ignition outputs to drive 8-cylinder engine sequentially. Ign1 and Ign2 work only as ignition outputs, from Ign3 till Ign8 are shared with analog\digital inputs. The selection between ignition output and analog\digital inputs is explained in about in the switches functions.

Analog Inputs:

Ignition output 3 / ADC12, Ignition output 4 / ADC13, Ignition output 7 / ADC6 and Ignition output 8 / ADC7 can be used as analog input. To select between ignition output and analog input can be made from switches as explained above.

Digital Inputs:

Ignition output 5 / PE0, Ignition output 6 / PT4, Ignition output 7 / ADC6 and Ignition output 8 / ADC7 can be used as digital input. To select between ignition output and analog input can be made from switches as explained above.

Warranty

SPTRONICS warrants to the consumer that all High Performance products will be free from defects in material and workmanship for a period of twelve (12) months from date of the original purchase. Products that fail within this 12-month warranty period will be repaired or replaced at SPTRONICS's option, when determined by SPTRONICS that the product failed due to defects in material or workmanship.

This warranty is limited to the repair or replacement of the SPTRONICS part. In no event shall this warranty exceed the original purchase price of the SPTRONICS part nor shall SPTRONICS be responsible for special, incidental or consequential damages or cost incurred due to the failure of this product. Warranty claims to SPTRONICS must be transportation prepaid and accompanied with dated proof of purchase. This warranty applies only to the original purchaser of product and is non-transferable. All implied warranties shall be limited in duration to the said 12-month warranty period. Improper use or installation, accident, abuse, unauthorized repairs or alterations voids this warranty. SPTRONICS disclaims any liability for consequential damages due to breach of any written or implied warranty on all products manufactured by SPTRONICS.

SPTRONICS will not be responsible for electronic products that are installed incorrectly, installed in a non-approved application, misused, or tampered with.

Any SPTRONICS electronics product can be returned for repair if it is out of the warranty period. There is a minimum charge of \$20.00 for inspection and diagnosis of SPTRONICS electronic parts. Parts used in the repair of SPTRONICS electronic components will be extra. SPTRONICS will provide an estimate of repairs and receive written or electronic authorization before repairs are made to the product.