



Apogee Owner's Manual

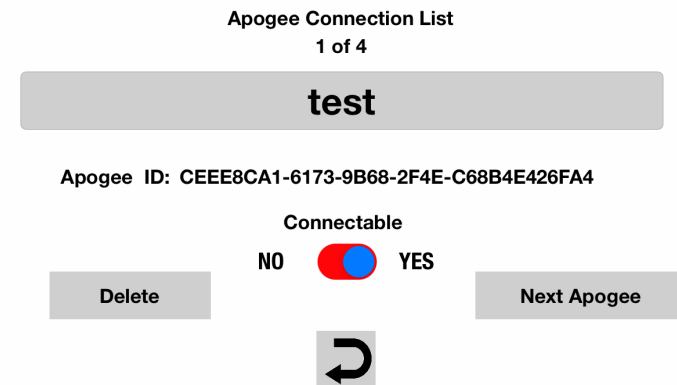
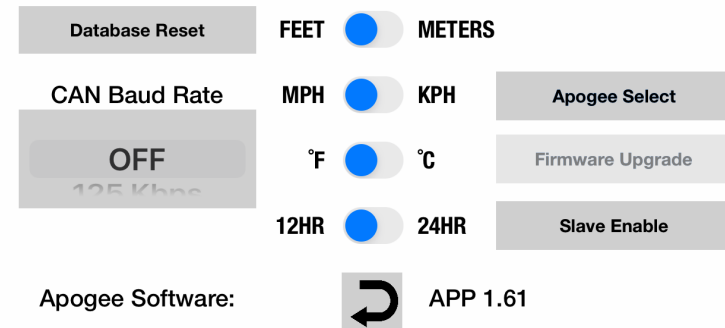
6/15/2022
Rev 0

Congratulations on your purchase of the Arboreal Systems Apogee integrated power distribution and control system. Not only does this product represent the state of the art in power distribution and control, but offers a range of essential information. Additionally, Apogee offers extreme interconnection and expansion capabilities.

Installation of the system is covered under the installation guide available on our support site, so we won't cover that again here. The purpose of this manual is to show you how to use the system to its fullest capability.

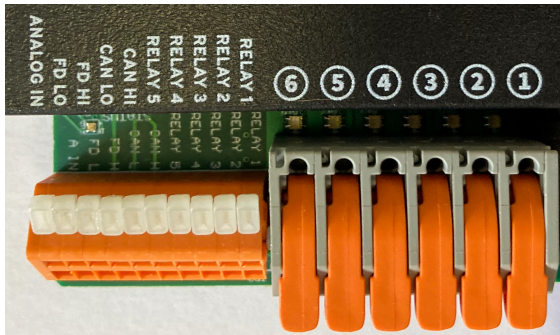
Connection and Configuration

The first thing to do is to tell your Apogee that it's ok to communicate with your phone. To do this tap the GLOBAL button on the first page of the app and then tap the Apogee Select button. Then select the Apogee module and tap the connectable yes button.



Note: your phone must be connected to Apogee in order to program the module. Settings are saved when the ignition is shut off. If you shut down the app before the ignition, settings won't be saved.

1. **Assigning circuits.** Apogee has 6 circuits. These are the larger orange connections labeled 6-1. All circuits can be set to a maximum of 25 amps with maximum for the entire module of 60 amps.



Note on grounding. Apogee does not include a ground plane, so it's necessary to obtain chassis ground or use a ground block to connect the negative side of the powered devices.

The smaller connections to the left of the outputs are an analog relay input, CAN FD low and high (used for connecting multiple Apogee units), CAN low and high (used to monitor host vehicle CAN), and relay inputs 1 through 5. Details about these connections are found in the installation guide.

2. **Diagnostics.** Now that you've got all your circuits hooked up it's time to talk about diagnostics.

First, the module includes a status LED on the backside of the board "tongue"...opposite the orange connectors. Normal operation is for this LED to glow green when the vehicle ignition is on and white when a phone is connected. On shutdown it should go from white to red to off within a few seconds.

The system includes circuit level diagnostics both on the module and in the phone app. Let's first talk about the on-board module diagnostics.

If you look at the base of the circuit board, where it exits the case, you will see 6 LEDs. Each of these indicates the status of the corresponding circuit. If there is no light, the circuit is not energized. If there is an amber light, the circuit is energized and everything is normal. If there is a red light, however, this means that there is an overload or short circuit.

You can also get similar information from the application. As a circuit is energized the bar will change from blue to red. If, however, there is a short circuit, the voltage indicator will turn red. In multi-Apogee installations tapping the red voltage display will take you to the offending circuit.

In the event of a fault the circuit breaker will immediately shut the circuit down and will stay shut down until

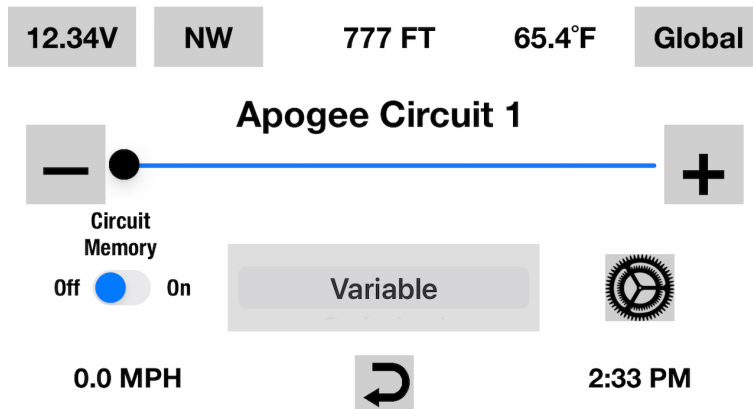
12.34V	NW	778 FT	65.4°F	Global
Apogee Circuit 1	Apogee Circuit 4	0.3 MPH		
Apogee Circuit 2	Apogee Circuit 5			
Apogee Circuit 3	Apogee Circuit 6	2:33 38 PM		
No Connection				

condition is rectified and the circuit turned off and then back on.

3. Configuring circuits

In order to configure the circuits you will need to launch the Apogee app and make sure you are connected. In order to make a connection the ignition system of the host vehicle must be switched on.

To get started, tap any one of the circuits and the following screen will appear.



Starting from the left, the first option is circuit memory. If set to “off” this circuit will revert to the off state after a restart. If set to the “on” this circuit will return to the state it was in when the system was last shut down. Very convenient for circuits that need to be on whenever the vehicle is on or after stopping for fuel.

The next option on this screen is a (hidden) scroll wheel that offers the following choices for circuit behavior:

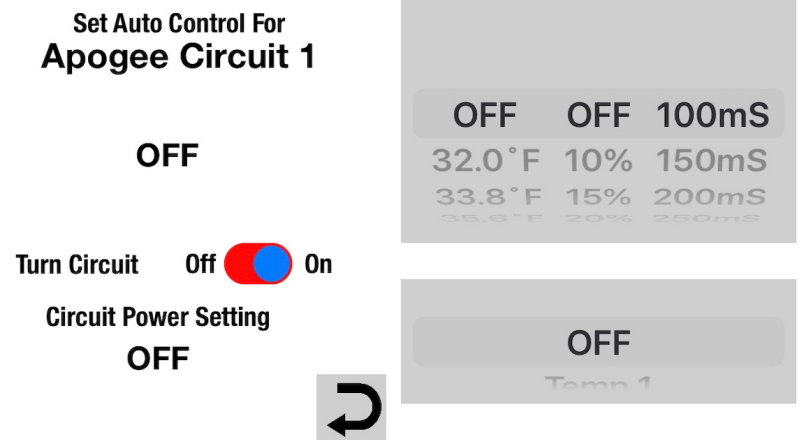
- variable

- switched
- momentary
- pulse +
- pulse -
- brake flash

These options determine what the circuit will do when activated. Variable allows for infinite gradation of circuit activation...useful for heated gear and dimming lights.

Switched causes the circuit to act like a switch...100% on or 100% off. This is useful for circuits that need 100% power all the time. Examples would be power supplies, GPS units, radios and USB power sources.

Momentary allows for only a quick blip of circuit activation. This is designed for accessories that require only a spike to activate...such as garage door openers. (optional garage door activator module available)



You can adjust the duration of a momentary pulse by tapping the gear icon and selecting auto circuit control. From there twirl the upper right scroll wheel to the desired pulse duration. (between 100ms and 2 seconds)

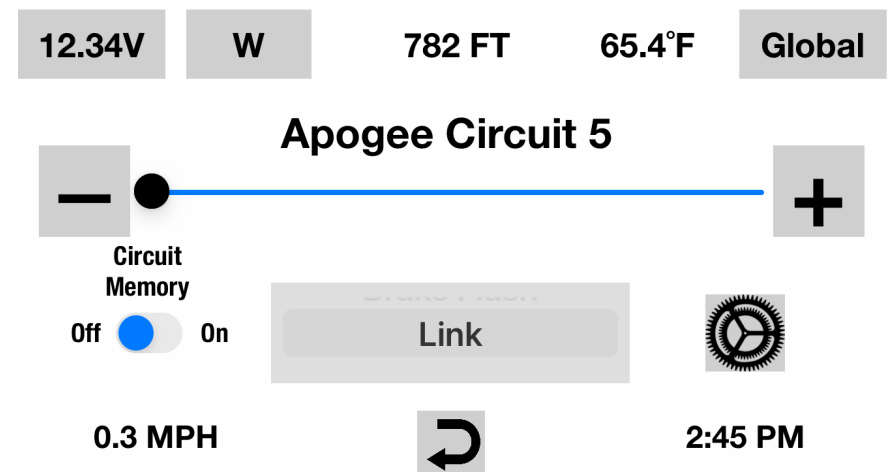
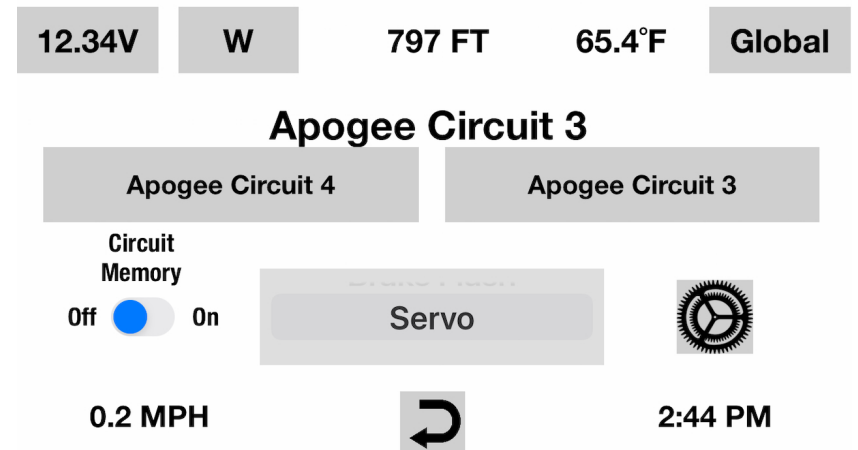
Pulse + and pulse - generate a 4 hz pulse useful for daytime lighting conspicuity. The difference between the two is that they are 180 degrees out of phase, so that it's possible to have multiple lights activating in an alternate pattern.

Brake flash generates a series of pulses with an underlying background level required for 3rd party brake light activation.

This covers the circuit behavior options for circuits 1,2,3 and 5.

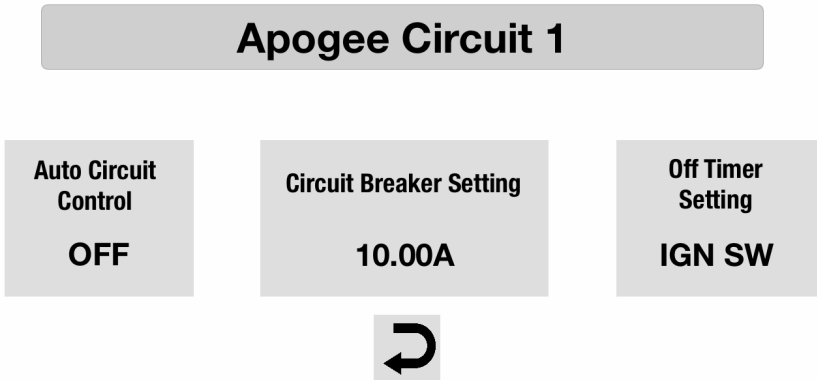
Circuits 3, 4, 5, and 6 offer 2 additional choices:

Servo and link. Link allows you to link circuits 5 and 6 so that they activate simultaneously. This is intended to allow Apogee to power very high startup current devices. To use this feature you configure either circuit 5 or 6 to be linked and the other is automatically linked. Servo also uses both circuits 3 and 4, but for a different purpose. This mode is intended to allow you to control servo motor operated devices such as exhaust valves, hood lifters and wing actuators. Holding your finger on either the reverse or forward buttons will activate the servo motor in the intended direction. (requires optional servo adapter)



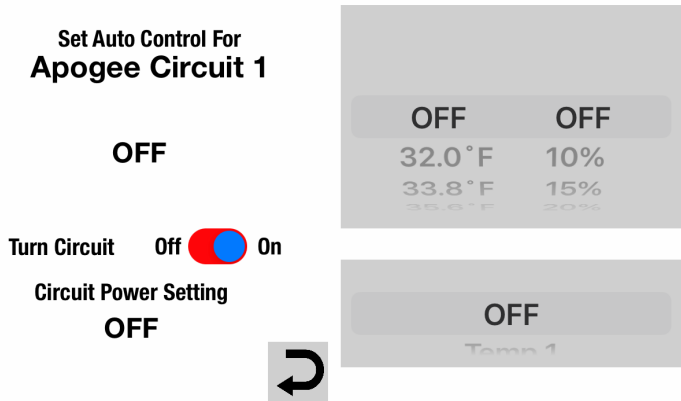
Note: For both servo and link functionality it's essential to set the circuit breaker levels to be the same on both circuits.

Moving further to the right is the gear icon which will take you to circuit customization screen.



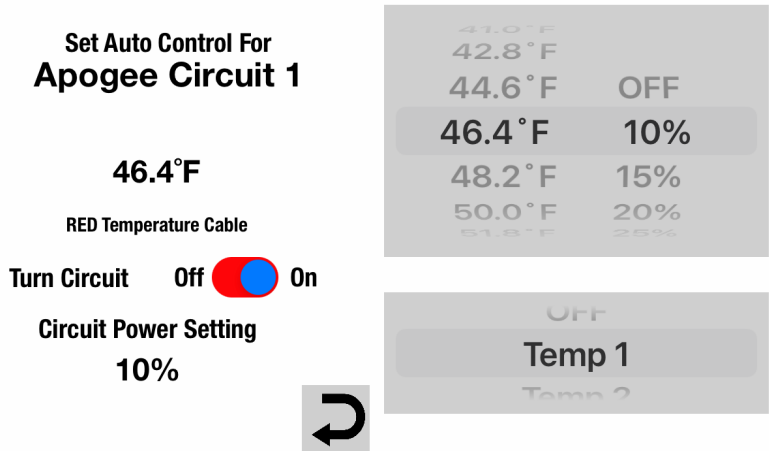
This screen allow you to name the circuit by tapping the circuit name, set the auto circuit control option (if desired), set the circuit breaker limit, and set how the circuit behaves when the ignition is off.

Starting with auto circuit control there are a number of options. Upon tapping this button you will see this screen.



There are 3 scroll wheels and a mode switch.

The bottom scroll wheel which where you enable auto circuit control...or not. The off position simply means that you want manual control for that circuit. As you twirl the wheel down the first option is temperature. Each Apogee module has 2 temp sensors, Temp 1 (red) and Temp 2 (black). You may set each independently so they can activate or deactivate circuits based on completely different temps.

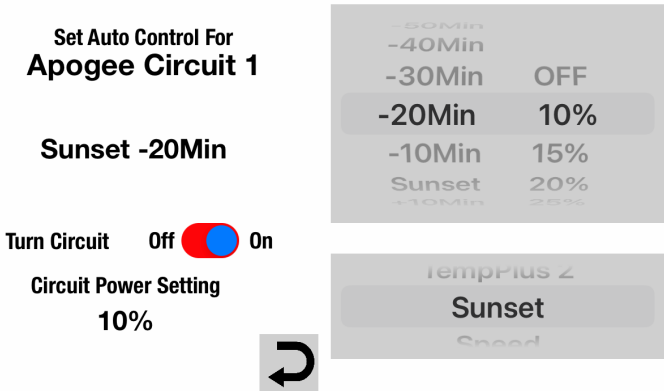


To set this up twirl the upper left wheel to the desired temperature and the upper right wheel to the percentage on. When the sensed temp drops to that level or below the circuit will activate as configured.

The next option on the bottom scroll wheel is temp plus which is an enhanced version of temperature. The difference is that the on percentage will automatically increase about 10% for every 2.5 degree drop in ambient temperature. This works great for heated gear and for controlling cooling fans, automatically increasing

and decreasing the on percentage as the sensed temperature changes.

The next option is sunset, which allows you to set the circuit to automatically activate based on actual sunset time plus or minus up to 2 hours on any day of the year anywhere on the planet without further intervention on your part. (Calculated using the phone's GPS engine) This is very useful for controlling lighting.



The next option are speed and speed plus, which are similar to temp/temp plus but instead use vehicle speed. With speed plus a circuit will automatically increase or decrease its on state as speed increases. This is useful for automatically activating or deactivating devices when the vehicle is moving and activating a warning of excessive speed....and myriad other uses.

Set Auto Control For
Apogee Circuit 1

35 MPH

Turn Circuit Off ☒ On

Circuit Power Setting
15%

20 MPH	OFF
25 MPH	OFF
30 MPH	10%
35 MPH	15%
40 MPH	20%
45 MPH	25%
50 MPH	30%

Sunset
Speed
SpeedPlus

The next option is auto brake, which uses deceleration to automatically activate the circuit. Deceleration is calculated based on GPS speed. This is useful for 3rd party brake lights. When auto brake is selected on the lower scroll wheel, you can now fine tune the rate of deceleration to set the deceleration threshold you prefer on the upper left scroll wheel. (meters/second)

Set Auto Control For
Apogee Circuit 1

0.4mpS

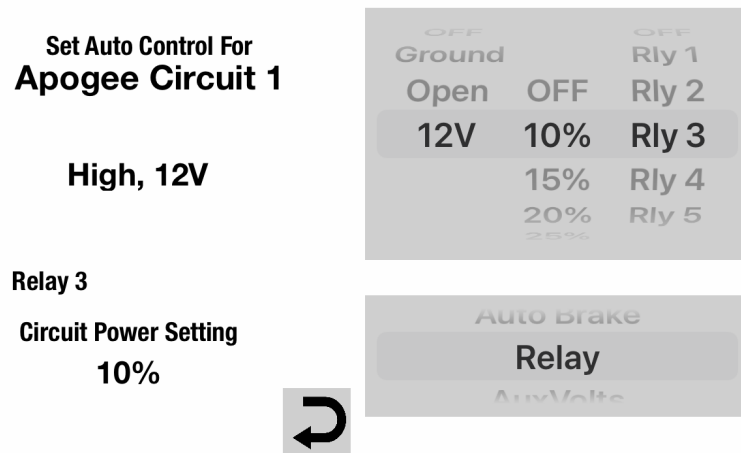
Turn Circuit Off ☒ On

Circuit Power Setting
10%

OFF	
0.3mpS	OFF
0.35mpS	OFF
0.4mpS	10%
0.45mpS	15%
0.5mpS	20%
0.52mpS	25%

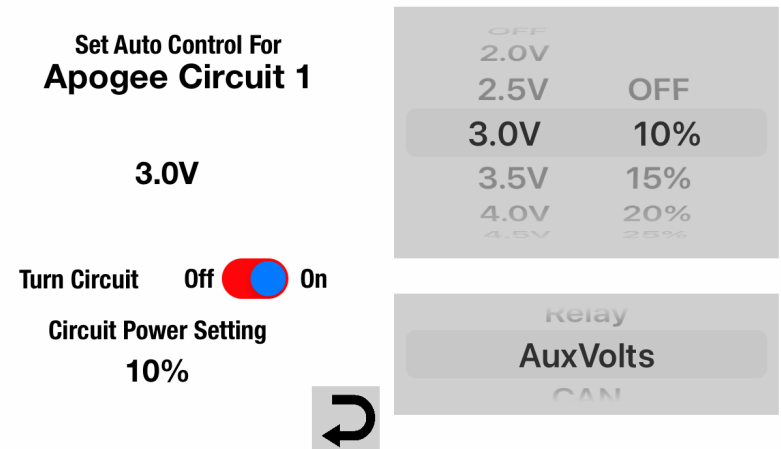
SpeedPlus
Auto Brake
Delay

The next option is relay. Relay acts by sensing voltage (or lack of voltage) at the relay input terminals 1 through 5. There are 3 options to choose from in the upper left scroll wheel. Ground, open, and 12V. The circuit will activate to the percent on level set in the right scroll wheel when it senses one of the 3 conditions set by the left scroll wheel. For example, if you set the wheel to ground, the circuit will be activated when ground is sensed on the input. For open the circuit will activate when neither ground nor +12V is sensed, and for +12V the circuit will activate when sensing positive voltage.

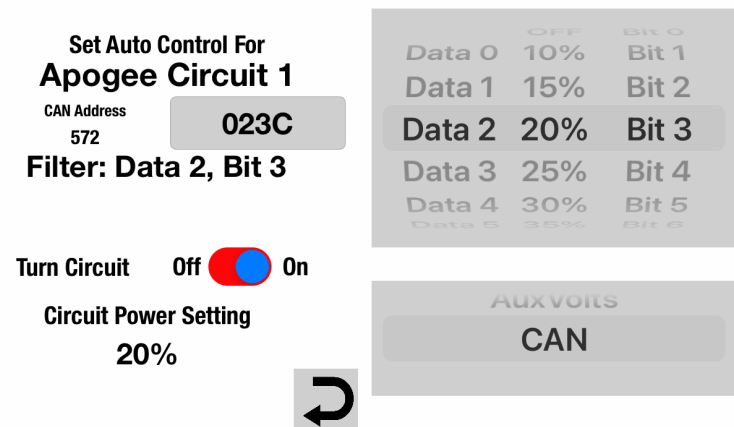


As these variable can be set differently for each circuit this provides enormous flexibility in using Apogee to manage your electrical devices. If you were to tap into the high beam switch you could use this input to activate a set of auxiliary lights on one circuit while simultaneously deactivating another set on a different circuit. The possibilities are nearly limitless.

Next is Aux Volts. This is another relay input that allows for a selectable voltage threshold.



The final option is CAN. This allows the Apogee to monitor the host vehicle CANbus and activate the circuit based on a particular CAN address/status activation on the host.



Entry of the CAN address is facilitated by tapping the CAN address field and bringing up a hexadecimal

keyboard where you can enter the address, then the byte and then the bit. Once this is entered please press done to save the setting. Note: it's essential to set the BAUD rate that's appropriate for your vehicle on the Global settings screen.

Set Auto Control For
Apogee Circuit 1

CAN Address
572

23C

123AB

456CD

789EF

DONE0

OFFBit 0

Data 010%Bit 1

Data 115%Bit 2

Data 220%Bit 3

Data 325%Bit 4

Data 430%Bit 5

Data 535%Bit 6

AUXVOIRS

CAN

Going back to the previous screen, the next option is circuit breaker level. Tapping this button will bring up a scroll wheel that allows you to disable the circuit or change the breaker level from 2 amps up to 25 amps.

Set Circuit Breaker For
Apogee Circuit 1

10.00A

11.50A

11.00A

10.50A

10.00A

09.50A

09.00A

08.50A

The third option on the gear screen is off-timer setting. This is where you can set the circuit to remain on after the vehicle has been shut down. The choices are for up to 4 hours or voltage dependent, which will keep that circuit on until the battery voltage drops below that level.

Database Reset

FEETMETERS

SN: EC0E804B107B5410

CAN Baud Rate

MPHKPH

500 Kbps

250 Kbps

1000 Kbps

°F°C

12HR24HR

Apogee Select

Firmware Upgrade

Slave Enable

Apogee Software:

APP 1.61

Apogee 1.10

Set Circuit Off Timer Delay For
Apogee Circuit 1

6 MIN

3 MIN

4 MIN

5 MIN

6 MIN

7 MIN

8 MIN

9 MIN

These are the basics of circuit setup. Please note that each circuit is independent and all the parameters set for that circuit will be unique to that circuit.

4. Global settings

Database Reset

FEET ☒ METERS

CAN Baud Rate

MPH ☒ KPH

Apogee Select

OFF 125 Kbps

°F ☒ °C

Firmware Upgrade

12HR ☒ 24HR

Slave Enable

Apogee Software: APP 1.61

This page has a number of setup elements including units of measure, the CAN BAUD rate, the ability to enable Apogee connection, firmware update mode enable, and satellite enable. It also includes a button to reset the system database should this become necessary.

CAN BAUD rate should be set to match the BAUD rate the host vehicle CANbus is operating at. Typically this is 500kbs.

Firmware update mode should be selected when you need to update the system firmware. To do this first establish a connection between the Apogee and the phone, then tap the firmware update button, and then

shut the system down by removing power from the yellow trigger wire.

Then remove the Bluetooth radio dongle from the USB socket. Restart the system and the Apogee status LED should be rapidly blinking red and green. Insert a USB thumb drive with the Apogee firmware update and after a few seconds the status LED should go to solid green. Remove the thumb drive and reinsert the Bluetooth radio dongle and you are good to go.

Satellite enable allows you to enable multiple Apogee modules. To do this make sure to connect satellite units as per the installation guide. Then enable the satellite by tapping the enable button and back out to the opening screen.

Satellite 1 121

Enable Slave

Slave Count 0 of 7

Next Slave

After a few seconds you should be able to access the first satellite by swiping either direction.

To enable more than one satellite repeat the process described above for each unit. Don't attempt to enable multiple satellites in one session, instead add satellites one at a time.

Electrical settings

To access these tap the voltage indicator on the first page and you will be presented with a grid view of the entire electrical system. Here you can see the realtime status of each circuit, the current amperage draw by circuit, total amperage draw. You can also adjust the alarm voltage. To do this, tap the alarm voltage button on the lower left of the screen and you will get a scroll wheel where you can set a voltage at which you want the system to let you know that the vehicle voltage is below what you deem to be a safe level. This will also cause the automatic shutdown voltage to be set at 1 volt lower than the alarm setting. As discussed earlier, this shutdown voltage will be used to shut down a circuit where you have designated it as being voltage-dependent.

Circuit:	Status:	Amps:	Breaker:
Apogee Circuit 1	<div><div></div></div>	00.00A	10.00A
Apogee Circuit 2	<div><div></div></div>	00.00A	10.00A
Apogee Circuit 3	<div><div></div></div>	00.00A	10.00A
Apogee Circuit 4	<div><div></div></div>	00.00A	10.00A
Apogee Circuit 5	<div><div></div></div>	00.00A	10.00A
Apogee Circuit 6	<div><div></div></div>	00.00A	10.00A
Alarm Volts	Shutdown Volts	Aux Volts	Temp 2
00.00V	59.00V	00.00V	72.8°F
		Total	Total
		00.00A	60.00A

Now that the system is all set up the way you want it, it's time to use it to actually control circuits. Here's how it works.

5. Using the system

There are several different ways to use Apogee.

First, there's manual control. Any combination of circuits can be set up to be purely manually controlled. This means that it takes just a finger moving on the screen to turn a circuit on, turn the temperature up...whatever you wish. To access circuits on any off the satellite units just swipe left to right or right to left and make the desired adjustments.

Of course you may have circuits set to automatically activate when the system starts up, and these can be manually overridden as desired. If desired one can configure Apogee to perform basic power distribution functions without connection to a smart phone.

Then there's relay control;. In this scenario an input is taken from a horn or high beam or any other vehicle circuit and fed into any of the 6 relay switch input terminals on the Apogee module.

It's a simple matter to configure any number of circuits to automatically activate or deactivate based on sensing voltage (or lack of voltage) at any of the relay switch input terminals.

It's entirely possible to have several circuits set to always activate when the ignition is energized while several others are manually controlled, while a couple more are activated based on the status of an external circuit.

Circuits can be set to automatically activate when a desired CAN address activation happens on the host vehicle.

Finally, there are many fully automated circuit activation options with Apogee. Circuits can be set to activate based on temperature, speed and sunset time. They can even activate based on deceleration.

Apogee offers a wide range on control options with total circuit independence, allowing you extreme flexibility in how you configure your system.

Notes:

1. Don't reverse polarity! As noted in the quick setup guide shipped with the Aurora module, it's critically important that you don't reverse polarity when you connect the module to the battery. If you do, you may cause irreparable damage to the Aurora module that cannot be repaired and will not be covered under the warranty
2. While we know this is motherhood and apple pie stuff, please don't make circuit adjustments and the like unless it's completely safe to do so. Operating a motor vehicle while distracted is extremely dangerous to you and every creature around you, so please be careful. We strongly recommend that circuit adjustments only be made when on the open road, far away from other vehicles, with flat terrain, and with minimal chance of animal interactions. Better yet, stop the vehicle and make the adjustments.

3. Since Apogee can switch big loads without relays there is little need, but sometimes they can't be avoided. Apogee includes reverse flow diodes so there is no need to add external diodes to protect the system from reverse current flows common to relays and inductive loads.
4. While the Apogee module is completely waterproof, if you mount it where water can get to the powered accessory connections it's important that you waterproof these connections. We recommend the use of silicone grease for this purpose as it's easily applied, easily removed, and will definitely keep water from affecting the circuit connections. We also recommend mounting it with the terminal block facing down so that water can't pool.
5. Since Apogee doesn't have a high current ground plane it's necessary to obtain the ground side of the circuit from a chassis ground. We offer a ground distribution module to facilitate easy ground connections.

Specifications:

Apogee is .9" thick, 3" wide, and 2" deep,
exclusive of wires and connector strip.
Epoxy encapsulated and waterproof.
Weight 12 oz.

Electrical:

Total capacity is 60 amps at 12.5 volts.
Individual circuit capacities: 25 amps max

Parasitic losses:

Running w zero circuits on...29mA
Additional load per circuit activated is
16mA
Drain when unit is shut down is 1.1mA
Trigger wire drain is .2mA

Connectivity:

Data: USB socket on pigtail accepting
USB> BTLE adapter.

Connections: Six tool-less output
terminals capable of up to 12 AWG wire.

Ten 20-24 AWG tool-less connectors for
data inputs/outputs

Wire Inputs:

Two remote thermosensors.
Ignition status sensor.

Just in case:

In the unlikely event of a software lockup
please disconnect the positive lead from
the Aurora module to the battery
momentarily. This should reset the
module to normal operation.

Warranty: one year (or longer)

Please download the Apogee install guide at:

[http://media.wix.com/ugd/
d44451_eca6e02deb7142ecbe71612c97a03
84d.pdf](http://media.wix.com/ugd/d44451_eca6e02deb7142ecbe71612c97a0384d.pdf)

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