

APO3e User's Manual

The APO3 is a black box designed to prevent a vehicle battery from being discharged and damaged by a DC load. Typically it is used to switch a radio transceiver off 10 minutes after the vehicle is shut off.

The APO3 is designed for 12 volt vehicle electrical systems with negative ground. It can switch up to 20 amps and carry up to 30 amps. The shutdown voltage can be set to one of four preprogrammed voltages (11.8, 12.1, 12.7, 13.05 volts) using two DIP switches and the shutdown delay can be set to one of four preprogrammed times (0, 5, 10, 20 minutes). The device is housed in a sturdy ABS plastic case.

Installation

To install the APO3, you will need to cut the power cable to your radio and splice the APO3 in line. The red and orange wires are positive and the black wires are ground. The APO3 incorporates internal over current protection for its circuitry; therefore no additional fusing is required. We recommend that you use butt type crimp connectors for connecting the APO3 to your radio wiring. For high vibration environments, we recommend that you use adhesive lined, heat shrinkable, crimp connectors.

If you have an APO3 with Anderson Power Pole connectors, the installation is as easy as connecting the APO3 in series with your load. Make sure to match the red and black connectors correctly. **Important:** The APO3 is not suitable for installation within the engine compartment.

Operation

The APO3 is a voltage controlled switch. When the vehicle voltage is higher than the APO3 setpoint, the relay is turned on, and power is provided to the load side. When the voltage drops below the APO3 voltage setpoint and stays there for longer than the time delay setpoint, the APO3 relay turns off and power is removed from the load side.

The voltage and time delay setpoints are set using DIP switches inside the APO3 case. To access those switches, remove power from the APO3 and remove the four black lid screws. The switch settings are printed on a label inside the case. **Important:** Power MUST be removed when changing the DIP switches. Settings are only loaded on power-up.

The yellow LED indicates the APO3 status. When power is first applied to the APO3, the LED will flash 10 times. After flashing, the APO3 begins normal operation. The override is on when the front switch is nearest to the case edge. In override mode, the APO3 will always apply power to the load, regardless of the setpoints and voltage.

When the override switch is off, the LED will be lit when the voltage is below the setpoint and the shutdown count is in progress. The LED will turn off after the load has been disconnected (see Fig. 1 on reverse side).

Specifications

Operation:

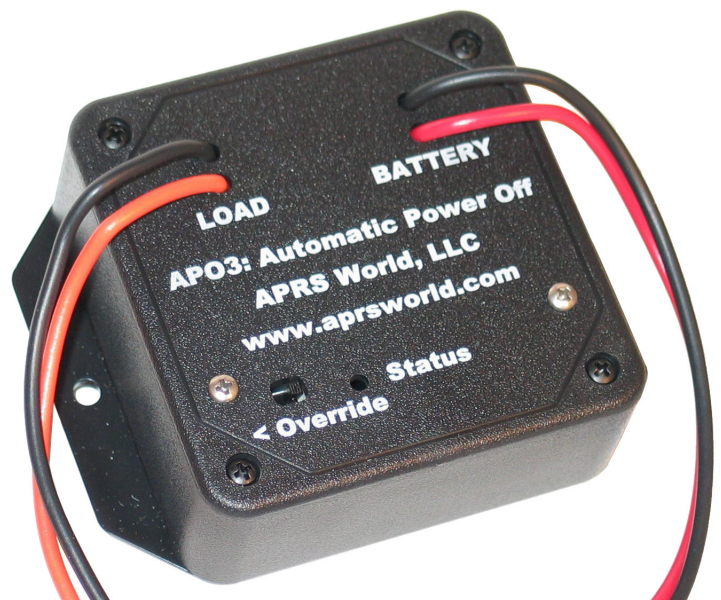
- Voltage setpoints: 11.8, 12.1, 12.7, 13.05 volts DC.
- Time delays: 0, 5, 10, 20 minutes. Selectable by DIP switch.

Physical dimensions and materials:

- Weight: 159g (5.6 oz) with wire leads
- Weight: 164g (5.8 oz) with Anderson Power Poles
- Overall Dimensions: 121mm wide, 84mm long, 34mm deep (4.75 x 3.3 x 1.35 in)
- Case Material: Flame retardant ABS plastic; UL's best flame rating of 9405VA (case only)
- RoHS compliant, no lead used in manufacture

Power:

- 7 to 20 volt DC
- 1.85 mA @ 13.8 volts with relay off, LED off
- 90.5 mA @ 13.8 volts with relay on, LED off



APO3 Voltage vs. Time

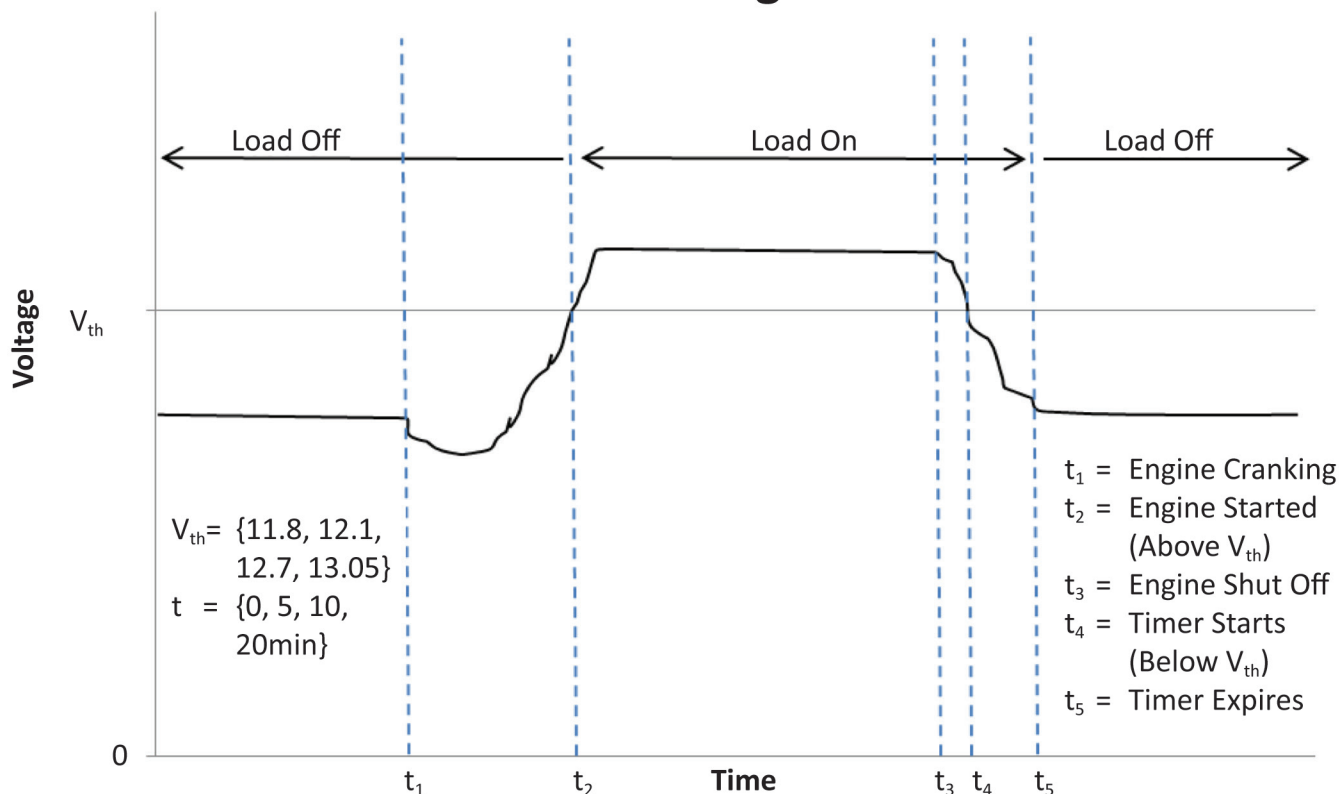


Figure 1: APO3 voltage vs. time. Once vehicle voltage crosses the APO3 threshold voltage (V_{th}), power is provided and the load is on. After the vehicle voltage drops below the threshold voltage and remains there for longer than the time set point, the APO3 relay expires and the load is turned off.

$t_1 = \text{Engine Cranking}$
 $t_2 = \text{Engine Started (Above } V_{th})$
 $t_3 = \text{Engine Shut Off}$
 $t_4 = \text{Timer Starts (Below } V_{th})$
 $t_5 = \text{Timer Expires}$
 $V_{th} = \{11.8, 12.1, 12.7, 13.05\}$
 $t = \{0, 5, 10, 20\text{min}\}$

$t_1 = \text{Engine Cranking}$
 $t_2 = \text{Engine Started (Above } V_{th})$
 $t_3 = \text{Engine Shut Off}$
 $t_4 = \text{Timer Starts (Below } V_{th})$
 $t_5 = \text{Timer Expires}$

Warranty

APRS World's support policy is simple; we want you to be happy! If you have a problem, please feel free to contact us and we will do our best to get you up and running as soon as possible.

The APO3 has a one-year limited warranty. We will repair or replace your APO3 if you encounter any problems within one year of purchase. We reserve the right to charge a reasonable fee for repairing units with user-inflicted damage. It is your responsibility to ship the defective unit back to APRS World, LLC. We will pay for shipping the replacement to you. We reserve the right to upgrade your equipment to an equivalent or better model.

Further Information

Further information can be found on our website, including the device schematic and embedded software source code.

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