

AMERICAN POWER SYSTEMS, INC.

CASE STUDY: BATTERY ISOLATOR FOR REMOTE WEAPON STATION

CASE

Battery Isolator for Remote Weapon Station

American Power Systems, Inc. provided a 24-Volt Battery Isolator for a remote weapon station placed in the rear of a commercial truck.



SUMMARY

Client: Pratt & Miller, New Hudson, Mich.

Application: Toyota LandCruiser 79 and Remote Weapon Station

Solution: APS 24-Volt Battery Isolator

OVERVIEW

Pratt & Miller is a US-based research and development firm specializing in advanced engineering, with extensive experience in developing suspension systems for the defense sector.¹

In partnership with Orbital ATK, a US aerospace and defense company,² Pratt & Miller in 2016 began work on a project using a Toyota LandCruiser 79 as a weapons platform because of the vehicle's ubiquity and toughness.¹ (Orbital ATK has since been purchased by Northrop Grumman Corporation, with the acquisition complete in June 2018.³)

In June 2016, Pratt & Miller approached American Power Systems, Inc. (APS) for assistance with a Toyota LandCruiser 79 integration with an unmanned weapon system known as M230LF.¹

APS designs and manufactures advanced mobile power systems and auxiliary power units (portable generator sets) for armored, security, commercial, marine and purpose-built specialty vehicles. APS specializes in custom design and development of high-output alternators, dual alternator bracket kits, and power conversion and distribution systems from 12 VDC to 58 VDC, up to 10kW for diverse applications.

Working together with Pratt & Miller, APS evaluated electrical system requirements for the project and recommended an APS 24-Volt Battery Isolator (solid-state dual rectifier) to isolate the battery required to operate the vehicle from the battery being used in conjunction with an auxiliary power system connected to unmanned weaponry in the rear of the vehicle.

PROJECT TIMELINE

The APS team began evaluating the system for the Remote Weapon Station integration with a Toyota LandCruiser 79 in 2017 at APS company headquarters in Davenport, Iowa (US).

APS provided first articles to Pratt & Miller for testing in September 2017 and continues to manufacture for ongoing production.

APPLICATION DESCRIPTION

Toyota LandCruiser 79⁴

Engine Type: 4.0-liter V8 petrol

Vehicle Specifications

- Gross weight:
7,495 lb (3,400 kg)
- Width x height x wheelbase:
70.5 inches (1,790 mm) x 77.5 inches
(1,970 mm) x 125.2 inches (3,180 mm)
- Payload capacity: 2,690 lb (1,220 kg)



Standard (OE) Power Specifications

- Maximum power (kW): 151
- RPM for maximum power: 3,400

SOLUTION DESCRIPTION

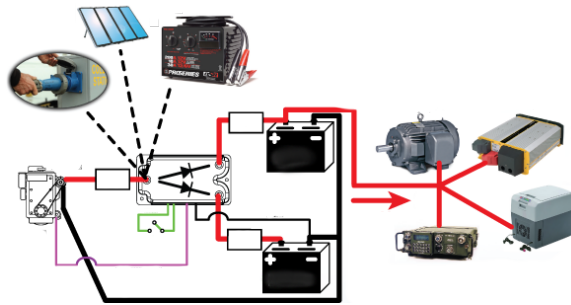
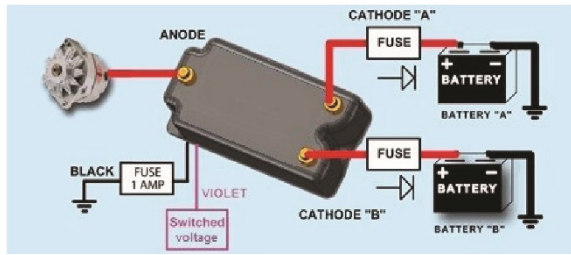
American Power Systems, Inc. 24-Volt Battery Isolator

APS Battery Isolators (Solid-State Dual Rectifiers) allow dual batteries or banks to be charged from a single power source (e.g. alternator) and independently discharged without drawing current from the opposing battery or bank.

When the vehicle is running, all batteries get charged to the full voltage regulation setpoint of the alternator. With the engine off, the auxiliary battery load continues to operate and discharge the dedicated auxiliary battery independently of the main battery. When load is applied to the main battery, current draw is limited to the main battery and does not pass from the auxiliary battery.

SPECIFICATIONS & PERFORMANCE

APS 24-Volt Battery Isolator | APS-PG24DR/BBAC (legacy model*)



Electrical specifications

Rated power: 7.2 kW
 Rated voltage: 24 VDC nominal
 Current handling: 300 amps nominal
 Charge voltage: 25.6-28.2 VDC
 Turn on: MOSFET
 Plug interface: Hard wire
 Amps maximum: 300 amps
 Efficiency: 99.7% typical
 Turn-on speed: 1800 shaft speed
 Efficiency: 80% typical

Mechanical specifications

L x W x H: 6.0 in (152.4 mm) x 3.2 in (81.3 mm)
 x 1.2 in (30.5 mm)
 Mount: Flange
 Weight: 4 lb (1.9 kg)
 Cooling: Ambient

Key Features & Benefits

- MIL-STD 461E compliant
- High surge capacity
- Low voltage, high current capacity
- Highest amperage isolator available
- Patented arrayed MOSFET technology
- Solid state: No moving parts to wear
- Ultra-low on-state resistance
- No de-rating required over full temperature range
- Accommodates large cabling
- Onboard LED visual feedback
- Quick-turn capable
- Expansion port for external monitoring display
- No heat sinks or airflow required
- Optional battery combine feature for self-jumping
- CNC-cut and -plated internal conductors

*Current models do not require setup programming, are 99.9% efficient at maximum current, and include onboard LED visual feedback.

DOCUMENTATION

References

1. “Orbital ATK: Progress Through Partnerships.” *www.monch.com/mpg/news*. Retrieved 13 July 2018.
2. “Northrop Grumman to Buy Orbital ATK for \$7.8 Billion.” *www.wsj.com/articles*. Retrieved 16 July 2018.
3. “Northrop Grumman Completes Orbital ATK Acquisition, Blake Larson Elected to Lead New Innovation Systems Sector.” *news.northropgrumman.com/news/releases*. Retrieved 16 July 2018.
4. “LandCruiser 70 Specifications.” *www.toyota.com.au/landcruiser-70/specifications/single-cab-chassis-workmate*. Retrieved 16 July 2018.

Notes

For more information about Pratt & Miller, please contact the company by phone or via the web contact form: +1-248-446-9800 or prattmiller.com/contact.

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