

CUSTOM POWER SUPPLIES



Capabilities Presentation

PSC



POWER SUPPLY CONCEPTS, INC.

Table of Contents

This Table of Contents indicates, *by way of example*, a sampling of the innovative technology which PSC offers to the Military, High Reliability, and Industrial marketplaces.

While this presentation of products represents a particular variety of designs, its overall purpose is to demonstrate PSC's ability to address a wide variety of capabilities and unique solutions related to power supply technology.

Introduction to PSC

Background, philosophy, and practice 1

Lightweight, Ultra-Reliable, Combat Aircraft Power Supply

Modular, full MIL, high efficiency, high altitude. 2

M1 Armored Tank Display Supply

Nuclear hardened, Tempest-proof, hermetic, high shock 3

100% Modular Submarine Masthead Power Supply

High efficiency, remote sensing, fully protected. 4

Missile Launch System Power Supplies

Convection cooling in the Sahara! 5

Low-Noise SATCOM Power Supplies

Less than 100 μ V noise, high efficiency, worldwide inputs 6

Military Mobile Communications Systems Power Supplies

Lightweight, multiple outputs, seamless input changeover. 7

Mobile Worldwide Comm System Power Supplies

High efficiency and ultra-high density (32W/in³) 8

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POWER SUPPLY CONCEPTS, INC.

DESIGN AND MANUFACTURE OF CUSTOM MILITARY AND INDUSTRIAL POWER SUPPLIES

In order to accomplish the objective of manufacturing quality power supplies, PSC is able to utilize management's 38 years of design and manufacturing experience.

PSC is proud to be a supplier to the United States Government. In addition, PSC's expertise has enabled it to become a valued supplier to various NATO defense contractors.

Our customers have utilized PSC designs in such military systems as tanks, missiles, surface and submarine warships, and combat aircraft.

Our industrial designs are being used in satellite broadcast up-down converters, digital and analog mobile broadcast radios, and other general microwave communication equipment.

PSC is very aware of the need to provide high quality products at a competitive price. With over 500 library-based designs, we are able to provide fast, affordable solutions for virtually any requirement.



PSC is a *paperless* company. Using a central database, manufacturing and overhead costs are not only greatly reduced, but the possibility of manufacturing errors is virtually eliminated.

The end result is a family of design with an overall MTBF in excess of 1.2 *million* hours, while achieving the best possible price for the customer, regardless of volume.

The PSC commitment to quality is vital to our continued success. This paramount philosophy is shared by each member of our organization - from senior management to the bench.

We welcome the opportunity for you to review our Quality Assurance procedures.

Robert E. Smyth, President

Tornado ADV Supply

THE AIRCRAFT



Multi-role aircraft developed and built in cooperation with England, Germany and Italy. It is a compact twin-engined variable-geometry aircraft. The Tornado was also the first production military aircraft with flight-by-wire controls. There are strike-attack (IDS), air defence (ADV) and electronic warfare (ECR) versions. The ADV has an elongated nose. The original contractors bought 933 aircraft, but production is still underway for Saudi-Arabia.

Function: Fighter

Crew: 2

Wing Span: 13.91 m /8.60 m

Height: 5.95 m

Empty Weight: 14501 kg

Speed: 2333 km/h

Range: 3600 km

Year: 1982 To Present

Engines: 2 * 8530 kg Turbo-union RB199-34R Mk.104

Length: 18.08 m

Wing Area: 30.00 m²

Max.Weight: 27987 kg

Ceiling: 21335 m

Armament: 1*27 mm msl

THE POWER SUPPLY

Challenge: Design a lightweight ultra-reliable power supply with the following constraints:

Operation -55°C to 125°C

Maximum weight 10lbs

Mounting in unconditioned bay with aircraft zoom climb to 70,000 ft

Only fixings - four bolts to aircraft struts

Combat vibration 5g to 2000 Hz

Repairable in under 1 hour

Totally modular



Overall Specifications:

Input: 115VAC, 400 Hz, 3-Phase; Full US MIL STD 704. THD < 23%

6 Regulated DC outputs totaling 800 Watts

3-Phase distribution to other electronics in aircraft. Efficiency 80%

Monitoring of AC input including missing phase warning, temperature, all outputs

Test points for all relevant signals to enable the fast repair time

Each power supply ESS tested for 168 hours with *no failures allowed*

The RAF has declared this ADV supply as the most reliable electronics in the aircraft.

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M1 Tank Supply

THE VEHICLE



The M1 Abrams is a main battle tank produced in the United States. It is a well armed, heavily armored, and highly mobile tank designed for modern armored ground warfare. Notable features of the M1 Abrams include the use of a powerful gas turbine engine, the adoption of sophisticated composite armor, and separate ammunition storage in a blow-out compartment for crew safety. One of the heaviest tanks in service, the M1 weighs in at close to 70 tons.

Nuclear Hardened Tempest Proof Hermetically Sealed

Armament:

Chobham, RHA, steel encased depleted uranium mesh plating.

105 mm M68 rifled cannon (M1).

120 mm M256 smooth bore cannon (M1A1, M1A2, M1A2SEP)

1 x .50-Caliber (12.7 mm) M2HB heavy machine gun

2 x M240 7.62 mm machine guns

(1 pintle-mounted, 1 coaxial)

THE POWER SUPPLY

Challenge: Design a nuclear hardened, tempest proof tank plasma display supply capable of withstanding 1000g shock test in combat. Keep the unit lightweight and totally hermetically sealed.

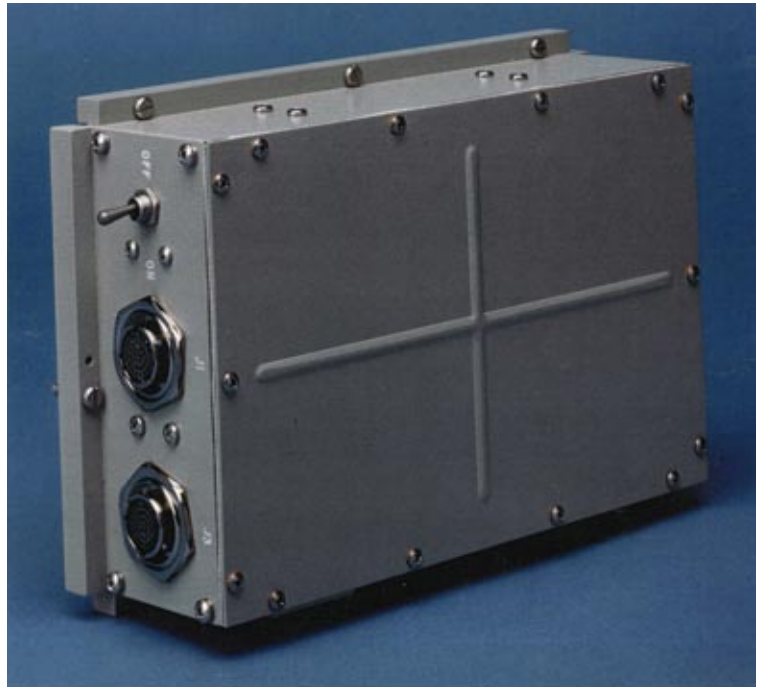
Overall Specifications:

Input: 14 - 100VDC to MIL STD 461

Multiple regulated outputs and control signals

Operating Temperature: -55°C to 85°C

Detail Specifications Classified



*This is the highest G-shock test for which PSC has designed power supplies.
Internal components are located in machined emi compartments and encapsulated.*

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Masthead Power Supply

THE VESSEL



On 13 November 1976, Lady Williams commissioned HM Submarine Superb at Barrow in Furness. A 'Nuclear Powered Hunter Killer Submarine', Superb is third in a Class Six 'Swiftsure Class' SSNs.

Superb is powered by a PWR-1 nuclear steam raising plant, providing steam for two steam turbines giving a top speed of 25+ knots. She is equipped with 5 x 21 inch torpedo tubes and carries Spearfish anti ship/submarine wire guided torpedoes as a primary weapon system,

On 18 May 1987 Superb surfaced at the North Pole in company with USS Billfish and USS Sea Devil sending the signal "On top of the world!" The reply from FOSM: "Steer South!"

THE POWER SUPPLY

Challenge: Supply to be installed under the central crew walkway of the submarine. Design a high-rel, high efficiency supply to power the masthead electronics from 400 ft away *and still have stable remote sensing.*



Overall Specifications:

(Detail Specifications Classified)

Input: 115VAC, 45-66 Hz

Three regulated outputs capable of 2V drops in the power leads

Must able to withstand any misconnection combination of power and sense leads without damage

100% modular interior for fast repair

These were the first U.K. power supplies to fully meet all the relevant sections of MIL STD 461

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Missile Launch Supplies

THE PLATFORM



Rapier is a British surface-to-air missile developed for the British Army and Royal Air Force. Entering service in 1971, it eventually replaced all other anti-aircraft weapons in Army service; guns for low-altitude targets, and the English Electric Thunderbird, used against longer-range and higher-altitude targets. As the expected air threat moved from medium-altitude strategic missions to low-altitude strikes, the fast reaction time and high maneuverability of the Rapier made it more formidable than either of these weapons, replacing most of them by 1977. It remains the UK's primary air-defense weapon after almost 35 years of service, and is expected to serve until 2020.

THE POWER SUPPLIES

(Detail Specifications Classified)

LASERFIRE: High efficiency linear 3-Phase, 400 Hz input. Convection cooled. Operation in Sahara.



EOT: Nuclear Hardened, Hermetically sealed with outer-thinwall cooling. Temperature -55°C to 105°C



PSC has designed and built power supplies for every version of Rapier since 1971.

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LOW NOISE SUPPLIES

In order to achieve the lowest possible phase noise on microwave frequency converters, power supplies must also provide ultra-low noise performance. An added challenge is designing a high efficiency power supply which operates on world-wide inputs. With over 20 years of expertise in low-noise switching power supply design, PSC has it down to a science.

THE SYSTEM



Microwave Frequency Converter

Sample Specifications for low noise units:

Input: 90 - 265VAC Typ (DC input available)

Up to 5 outputs (4 regulated)

Typical outputs:

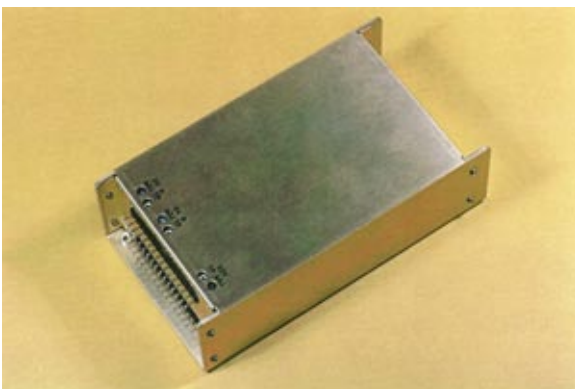
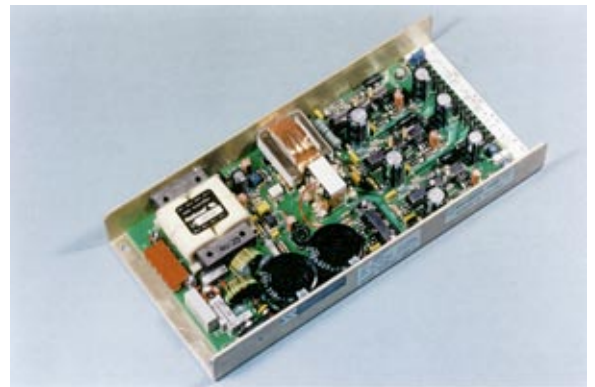
+15V to +24V

-12V to -15V

+5V "A", +5V "B", +12V

Low Frequency Noise: 100 μ V P-P

THE POWER SUPPLIES



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MOBILE SUPPLIES

TYPICAL SYSTEM



The TSSR is a complete lightweight line-of-sight microwave radio system that is designed specifically to enable teams to quickly establish communication links in the field. Whether it's communicating across difficult terrain, reconstructing trunks and links, or controlling remote satellite or radio terminals remotely from a command center, TSSR equipment is as flexible as it is easy to use.

TSSR equipment can be quickly set up to interconnect TRI-TAC equipment and GMF satellite terminals. It can be interfaced with, or substituted for, cable links employing modems, such as the MD-1026, or for the AN/TAC-1 fiber optic system. The MRC TSSR radio can carry digital traffic at speeds between 0.072 and 4.608 Mbps. It supports an analog or digital order wire interchangeably. Alternatively, it can carry a 6.144 Mbps pseudo NRZ signal when operating with the AN/TAC-1 fiber optic system. In addition, the MRC TSSR also can be employed with the TSSR DR-MUX to interconnect up to four commercial T1 (1.544 Mbps) signals. The MRC TSSR is easy to configure for video radio applications as well.

THE POWER SUPPLY

Challenge: Design power supplies that operate on various vehicle DC inputs as well as world wide AC line input with seamless changeover (*ie, there is never to be a loss of output*).

Sample Specifications:

Input: 11V - 60VDC (various models); 103VAC - 265VAC

Typical Outputs: +28V@0.2A

+15V@1.5A

+5V@0.75A

-15V@0.8A



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3KW TWT SUPPLY

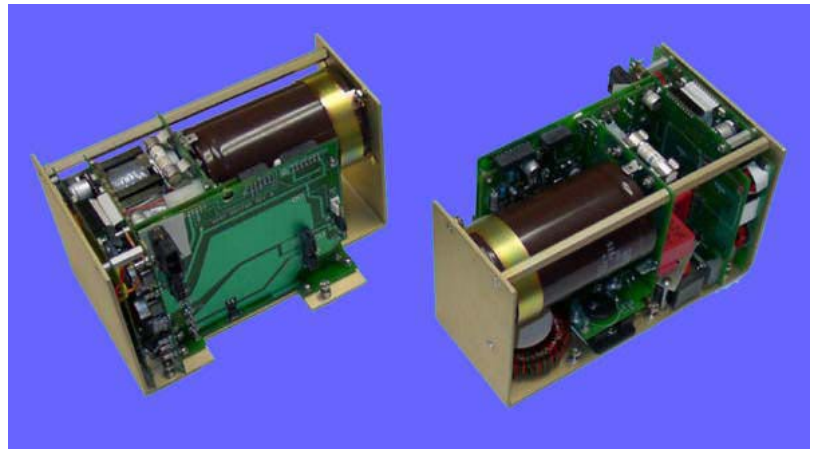


THE SYSTEM

The 4400 series TWT high power amplifier is among the most powerful in the world. It is not only used in major outdoor satellite broadcast uplink applications, but also used by the U.S. Military for secure communications worldwide.

THE POWER SUPPLY

Challenge: Design a 3KW high density supply to power the TWT power amplifier used in high humidity, non-hermetically sealed conditions, fully operational down to -40°C . *Achieve 32W per cubic inch in a customer-specified shape using pre-established fixings.*



Specifications:

Input: 180-265VAC, 50-60 Hz; Power Factor: 99%; THD: 8%
Regulated Outputs: 425V@6.3A, +15V@7.7A, +48V@6.3A, -15V@0.3A, +5.3V@3A
Temperature monitoring and over-temperature alarm
Operation: -40°C to $+70^{\circ}\text{C}$ 100% humidity
Efficiency: 85%
Power Density: 32W/in³
Lower power option with 42 - 60VDC input

This power supply meets full spec at -40°C even when covered in ice!

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THE PSC TEAM

The Power Supply Concepts design team has been at the forefront in the **design and manufacture of Custom-built Power Supplies for over 35 years.**

Our management team is made up of proven engineers who are experts in their field:

Robert Smyth, President

Qualification: Graduate London University, England

Profile: 32-year design career in military electronics with EMI - Guided Weapons Division, and Sperry Gyroscope. The author of many patents, Robert has been responsible for pioneering the design of digital multimeters, microwave sweepers and linear and switchmode power supplies while with Premier Precision, Racal/MESL Trio labs, and Trygon Electronics. In 1970, he'd founded REL Industrial LTD, which had become the largest Hi-Rel military and industrial power supply company in the UK.

Jim Norrish, Plant Manager

Qualification: Graduate Engineer University of Wisconsin

Profile: Previously in charge of the Semiconductor Division of ITT, Jim was responsible for the development of more than 150 products, including linear IC designs. Jim co-founded Micro-Circuit Engineering, building a 30,000 sq. ft. facility and growing it to 100 employees and \$5 million in sales. Joined PSC in 1996.

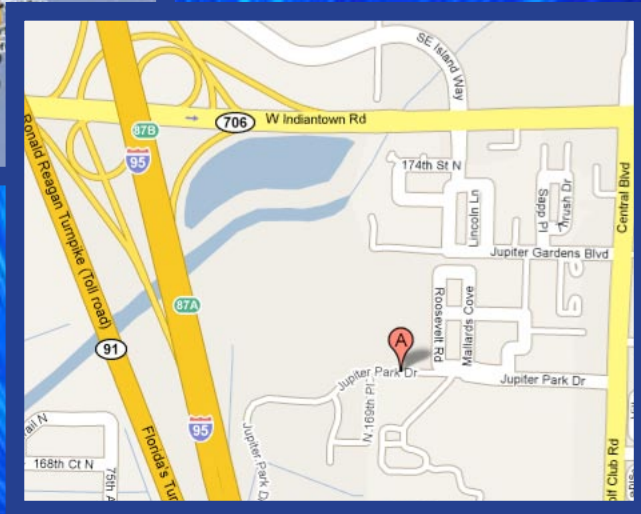
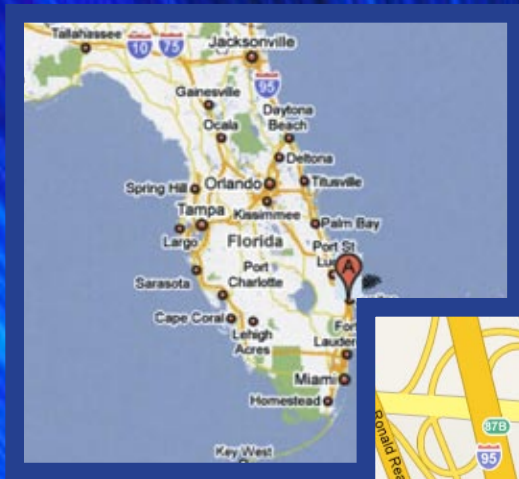
Werner Jager, QA Manager

Qualification: Graduate Engineer Freiberg, Germany.

Profile: Design experience in switch-mode power supplies and computer software. Established QA department for a large German company before living in the United States. Extensive experience in Reliability Assurance and computer programming knowledge. Joined PSC in 1996.



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PLEASE VISIT US AND EXPERIENCE OUR CAPABILITIES.

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AND 5 MINUTES FROM THE FLORIDA TURNPIKE AND I-95.**

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