Parker Defense Systems

THERMAL MANAGEMENT SYSTEMS

Parker Meggitt
Defense Systems Division

Parker Meggitt Defense Systems Division (DSD), provides thermal management systems and components, including fans, pumps and compressors used by militaries around the world.

In the extreme heat of battle, mission critical electronics draw maximum power and generate significant heat. Network centric warfare and future force protection will continue to exponentially increase the power and functional density of these electronics. Due to these increases, additional heat will be generated on both current and future platforms making thermal management a mission critical system for all manned and unmanned combat and support platforms and systems.

The deployment of affordable, rugged, thermal management systems and cooling solutions for military platform electronics, electronics upgrades, and the warfighter, could be the quintessential force multiplier that determines victory.

Aerospace Fans

Our mechanical, electrical & hydraulic driven aerospace fans may be found on the majority of US armored combat vehicles, helicopters, and a number of ground based weapon systems. Our aerospace fans are designed for minimum weight, high performance, and maximum efficiency. We design and produce vaneaxial, mixed flow, and centrifugal fans that operate from -65°F – +220°F, at speed between 3,600 – 24,000 RPM, with flows ranging from 50 – 23,000 CFM, and with pressure rises from 2'' – 35" WG. Our aerospace fans come complete with properly sized integrated AC/DC motors for 115/200 VAC, 28, 270 and 600 VDC. The fans can also be sized and linked up to independent AC/DC motors, hydraulic motors, and to direct gearboxes and engine PTO's.




Aerospace Pumps

We have many years' experience producing high-performance aerospace pumps. Our design process considers all aspects of the application before forming an integrated solution resulting in maximum flow and pressure increase for a given volume and weight. We have a wide variety of lubrication and cooling pumps on aerospace, land, and sea applications. Our aerospace pumps have been produced in a wide variety of configurations, ranging from gerotors to centrifugal pumps with various drives. Drive methods include the use of AC induction, brushless DC, and direct shaft drive. Parker Meggitt aerospace pumps are found on many platforms, such as the Apache AH-64, Osprey V-22, Eagle F-15, and LCAC. Meggitt is developing pumps for various Future Combat Systems (FCS) vehicles for aerospace, land, and sea applications.

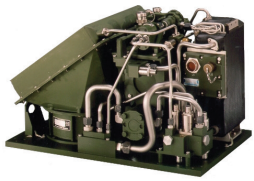



Compressors

Our compressors are lightweight, durable, high-performance reciprocating machines with integrated components. They employ a unique "keystone" cam which eliminates multiple crankshaft journals for a compact and dynamically-balanced design. They are used in a number of high-pressure pneumatic applications such as pneumatic systems on military and commercial aircraft, land and ocean-based weapons systems and support equipment.

M1A2 SEP Thermal Management System

The Thermal Management System (TMS) is designed to remove the excess heat produced by modern electronic equipment employed in today's ground combat systems. The TMS also ensures that crew combat performance is not degraded due to heat stress.



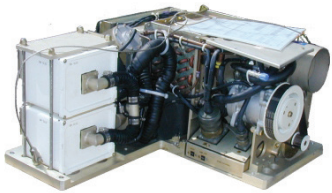
The modular design was developed to maximize the flexibility of the TMS and to limit its intrusion into the Abrams fighting compartment. A Vapor Compression System Unit (VCSU), which houses the hydraulically-driven refrigeration equipment, is mounted in an armored container located in the left corner of the turret bustle rack. The VCSU connects to the Air Handling Unit (AHU) by armor-protected tubes that deliver cooled propylene glycol and water. The AHU in turn provides more than two tons of cooling via a bulk air discharge into the crew compartment. Designed for the M1A2 SEP tank, the TMS is readily adapted to other ground combat systems.

Auxiliary Cooling and Power System

The Auxiliary Cooling and Power System (ACPS) is designed to thrive in modern combat environments. It provides cooling for crew comfort and electronic packages in addition to auxiliary power. The ACPS is a rugged, self-contained system ready for todays' modern fighting vehicles. The ACPS consists of three major components, the Auxiliary Cooling and Power Unit (ACPU), the Air Handling Unit (AHU), and a Control Module.

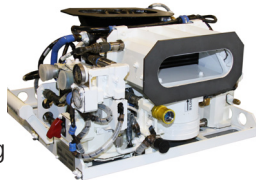
The ACPU is a rugged self-contained cooling and power unit that is located on the exterior of the vehicle. On the M1 Abrams, the ACPU is mounted on the turret bustle rack. The unit contains a refrigerant based liquid cooling system and 28 VDC power generation system driven by a heavy-fuel based engine. The AHU consists of a 28 VDC electrically driven fan and liquid-to-air heat exchanger. The AHU provides conditioned air to crew as well as electronics inside the vehicle.

M9 ACE NBC Microclimate Cooling System



The Microclimate Cooling System (MCS) is a self-contained Vapor Cycle System (VCS) that cools and ventilates the MOPP IV NBC protective vest and face mask of the operator of the armored tracked combat engineering vehicle, the M9 Earthmover. It provides both heat, ventilation or cooling while maintaining NBC and environmental protection. The MCS is designed to MIL-STD-810 and is thus able to withstand the tracked vehicle's severe shock and vibration. The Centricip main ambient air intake filter provides up to 96% dust efficiency for cooling and condenser heat sink air.

F/A-18E/F IRST Environmental Control Unit

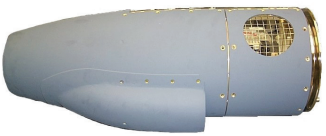


Under contract from Boeing, Parker Meggitt Defense Systems Division is developing the Environmental Control Unit (ECU) for the Super Hornet's new Infrared Search and Track (IRST) capability. The ECU provides up to 1.7 kW of cooling for the pod-mounted Infrared Search and Track sensor and its associated signal processing electronics. The IRST ECU meets the severe environmental demands of the aircraft carrier and the supersonic speed of the Super Hornet.

C-130 AMP Environmental Control System

Under contract from Boeing, Parker Meggitt Defense Systems Division has developed the Vapor Cycle System for the C-130 Avionics Modernization Program. The ECS cools the flight deck and cargo bay using a 90cc semi-hermetic scroll compressor providing cooling of 12 - 14.7 kW. The system is designed to meet MIL-STD-810F environmental testing. Our COTS automotive-based compressors have been demonstrated extensively in ground combat vehicles, and chosen by our customers for performance and affordability.

Pathfinder Environmental Control Unit

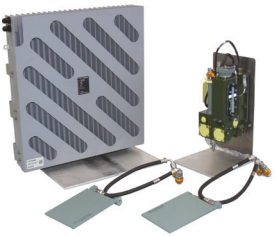


The F-16 Pathfinder Pod Environmental Control Unit (ECU) is very compact, extremely lightweight, and capable of providing electronic thermal management throughout the flight envelope of high performance aircraft such as the F-16. The ECU supplies 1.0 kilowatt of cooling in a package that is 9.75 inches in diameter, 26 inches in length, and less than 60 pounds in overall weight.

ALMDS Environmental Control System

The Environmental Control System (ECS) for the Airborne Laser Mine Detection System (ALMDS) Program provides up to 4.0 kW of cooling capacity in a package that is 19 inches in diameter, 19 inches in length, and weighs less than 135 lbs. It is designed to maintain and control precise fluid temperatures over the entire spectrum of the helicopter's harsh operating environment and is specifically designed to withstand the severe salt-water marine operational environment.

P-8 Poseidon Forward Array Cooling



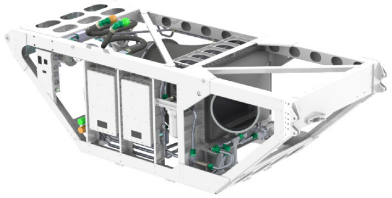
Now in Low Rate Initial Production for Boeing, the Forward Array Cooling System (FACS) is a very compact unit for cooling sensitive antennae on the P-8 Poseidon. Run on 28 DC aircraft power, the reservoir/pump/controller and heatsink subsystems reside on the Poseidon's flight deck, while the antenna's cold plate is close-coupled to the antenna outside of the pressurized fuselage.

Liquid Cooled Rack System

The Liquid Cooled Rack System (LCRS) contains and controls the environment for a set of Circuit Card Assemblies (CCA) for use in military aircraft. The LCRS provides structural support and EMI shielding for the CCA housing, and provides thermal management to CCA's with a maximum heat generation of 3,400 watts, while maintaining the chassis wall temperature of 20°C to 50°C during normal operation. The LCRS chassis, with its modular design, can easily be adapted for use in airborne or ground military applications.

Large Airborne Vapor Cycle System 64kW

The Large Airborne VCS/LCS are self-contained subsystems that cools ethylene glycol/water (EGW) coolant. This cooling can take place either by rejecting heat directly to ram air when possible, or by running one or both conventional vapor cycle systems when it is necessary to cool the EGW below the temperature of the ram air.



The Large Airborne VCS/LCS contains a pump to circulate the coolant and a closed system type accumulator to accommodate the thermal expansion of the coolant. The Large Airborne VCS/LCS is also equipped with a ground fan and two internal ram air doors to either select the ground fan or bypass most of the ram air for airborne operation.

The system is equipped with a myriad of sensors and a digital controller running Parker Meggitt's proven cooling system control software. This electronics package monitors the health of the system and continues to operate on a best effort basis even in the event of a failed component. Multiple sensors and multiple vapor cycle systems provide a substantial degree of redundancy.

Parker Meggitt's innovative liquid palletized solution provides essential cooling to mission critical equipment and sensors, ensuring safe flight operation. This is just one of many thermal management products Meggitt supplies to the P-8A and other military aircraft.

Compact Vapor Cycle System 17.2 kW

Parker Meggitt Defense Systems Division has designed, developed and delivered a Compact Vapor Cycle System (CVCS) for an unmanned application.

The CVCS is a fully qualified Vapor Cycle System (VCS) that provides 17.2 kW of cooling power. The VCS provides conditioned Polyalphaolefin (PAO) for the Liquid Cooling System by means of an R-134a VCS. The CVCS contains a proprietary solid state electronic controller, evaporator, filter/dryer, electric expansion valve, and compressor unit, and along with a separate condenser provides 17.2 kW of cooling power.

Parker Meggitt
Defense Systems Division
9801 Muirlands Boulevard
Irvine
California
92618 USA

Tel: +1 949 465 7700
Fax: +1 949 465 9560

www.meggittdefense.com

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