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Introduction

Aircraft require a high level of attention in order to achieve corrosion control, and more importantly corrosion prevention. The ability to wash aircraft continues to present itself as the opportunity to prevent corrosion and reduce the need to retroactively perform corrosion control in the future. The Riveer ACDS has been designed and manufactured for the specific purpose of capturing corrosion prevention with airframe and engine wash operations on rotary wing and small fixed wing aircraft.

The Riveer ACDS is a hydraulic powered aircraft wash cart with upgraded capabilities allowing fixed wash rack assets in a mobile solution. Two hot water (no more than 140 degree F) rinse wands provide 8 gallons per minute (GPM) each at an aircraft safe 30, 80, or 175psi. The onboard air compressor and foam system delivers a dirt busting 50+ gallons of foam per minute, matching or exceeding hard mounted foam systems. The new and improved turbine flush system allows for delivery of gas path cleaner or rinse water at 2.5gpm, 5gpm, or 10gpm – allowing the ACDS to do a turbine flush system on a variety of power plants or multi-engine aircraft.

The onboard compressor can provide up to 24 cfm at 120psi for bleed band closure and other requirements. An onboard generator includes a convenience outlet with a standard 120v outlet for additional power needs. The compact design allows internal air transport in the Chinook and larger aircraft plus the unit can be forklifted onto a trailer, train-car, shipping container, or loading dock.



ACDS Briefing





- Tier IV certified 0 Optima[™] Red Top AGM battery
- 0 0 30-gallon fuel tank

25 HP water cooled Kubota® diesel

- Runs on diesel or JP-8 fuels 0
- Complete instrumentation 0
 - Low oil, high heat, hour meter, tachometer
 - Constant engine speed
- Central Hydraulic System

0

- Power is transmitted to all primary 0 functions on the ACDS from the diesel engine driven hydraulic pump.
- All functions onboard the ACDS are driven 0 by an individually selectable hydraulic drive motor dedicated to that output function.
- Each hydraulic output is metered based 0 upon power available from the diesel engine and the user demands in order to maintain optimum engine speed and functional output.
- In order to maximize service life and 0 efficiency, the ACDS does not contain any belt driven systems.
- Hydraulically driven Wanner Engineering® Positive Displacement Rinse/Foamer Pump with run dry capability
- Hydraulically driven Wanner Engineering® Positive Displacement Turbine Engine Flush Pump with run dry capability
- 2 independent heater coils
- 140-degree maximum wash water, regulated
- 2 rinse wands @ 8 GPM each with adjustable pattern gun, 100' of hose on a reel, 175 PSI maximum (max output of pump is 16 gpm - if both guns are in use)

MIL Standard Compliance

- TM 1-1500-344-23-2, TO 1-1-691, GEN MIM 2005-005
- MIL-STD-209K
- MIL-STD-461 G
- A-A-5255

- MIL-STD-810G W/ Change 1
- MIL-STD-HDBK-1791
- NFPA 70
- A-A-50271

- Built-in on demand hydraulically driven cast iron 24 CFM, 120 PSI air compressor with 75'of hose on reel (operates common air tools)
- One button winterization of the entire system using air purge of all lines and fittings for freeze protection from onboard air compressor
- Autonomous Freeze Protect Mode: When armed, the ACDS will actively monitor ambient temperature within the rinse water holding tank, and system enclosure and will start engine, diesel burner and engage hydraulics without any user input to circulate water through diesel burner and holding tank to maintain temperature within the cart to avoid freezing.
- 15-gallon soap concentrate and 15-gallon gas path solution tanks
- Built-in Turbine Engine Flush, designed for C-130J, CH-47, H-58, H-60 and H-64.
- Run dry protection on pumps
- 12 volt electrical controls
- AGSE parking brake and AGSE style cart with SP® 8,000lb running gear and Ackerman style steerable front axle assembly
- Complete custom steel tube frame construction, MIL-STD 810F painted with 2-part epoxy
- 8 tie down "D" rings
- Pintle hook with 6" to 28" range can be towed by a wide variety of commonly found vehicles
- 6.90 x 9- 10 ply tires with optional foam filled configuration
- Proven air transportability
- Fully documented spares list
- Complete manuals with 3-d drawings and
- comprehensive bill of materials
- Easily operated with minimal training
- Powder coated enclosures and durable epoxy powder coated frame coating
 - MIL-DTL-5624W MIL-DTL-83133J
 - ASTM D 1655







Chassis

The ACDS is built on an AGSE style chassis with a steerable front axle and towbar in order to eliminate tongue weight and enable maneuverability by commonly found AGSE equipment. Chassis construction begins with a full MIG welded 2" x 4" steel tube frame for added rigidity over traditional steel channel construction. Throughout the fabrication process, Riveer includes 8 lift/tie-down rings, and 6 fork pockets to enable forklift access from three sides and lift and tie down access all around.

Once fabrication is complete, the chassis is media blasted and treated to a 4 stage

zirconium pretreatment and an epoxy primer for proper surface preparation in order to achieve proper adhesion of the powder coat finish. Optionally the entire unit can be hot dip galvanized for maximum corrosion resistance.

Following fabrication and finishing, the frame is mated to a 4 wheel Ackerman type 8,000b running gear setup with steerable front axle. Suspension is provided with leaf springs on all four corners and 6.90 x 9- 10 ply tires with optional foam filled configuration.









Diesel Hydraulic Propulsion

Propulsion onboard the ACDS begins with a 25 Hp Kubota Tier IV F compliant diesel

ACDS

engine driving a central hydraulic pump. Power is transmitted to the functional components utilizing hydraulics for greater dependability, select ability and efficiency over traditional belt drive systems. This diesel over hydraulic powerplant will provide power to all onboard systems including, the primary rinse water pump, turbine engine flush pump, 24 CFM, 120 psi onboard air compressor, and 3kW generator.

Each positive displacement pump, compressor and generator on board is powered independently for individual selection enabling flight line supply of compressed air, or electrical power without the need to run all pump systems. The ACDS' ability to disengage pump rotation and engage air compressor rotation allows the unit to self winterize itself with its own air compressor.







Controls

The control package on the ACDS is based upon a CAN bus system controlled through a single Human Machine Interface (HMI) screen located at the operational end of the cart. Engine start/stop is enabled through the HMI along with, rinse pump, hot water, foamer, electrical power generation, turbine engine flush, and compressed air engagement. Additionally, users can configure turbine engine flush parameters for flow as well as air compressor output depending upon which aircraft powerplant is being flush and how many are being addressed at once.

Rinse pump demand is monitored in real time by the onboard computer to adjust hydraulic fluid flow, hydraulic motor speed and rinse pump output in order to maintain a constant volume and pressure of rinse water per gun as users open and close spray wands.

Rinse parameters including rinse pressure, rinse temperature as well as environmental parameters such as rinse water holding tank temperature are actively monitored through the HMI. Based upon observed conditions the ACDS can autonomously execute freeze protection operations and one button winterization.









Automated Freeze Protection & Winterization

Freeze protection mode is enabled on the HMI and when the unit is left with power on. In freeze protection mode, the ACDS will constantly monitor water temperature within the enclosure and rinse water holding tank temperature. Once a threatening temperature is sensed, the diesel engine, a diesel burner and the rinse pump will engage to cycle hot water through the system until holding water temperature reaches 90 degrees F to avoid a freezing condition within the system plumbing.

One Button winterization achieves a full purge of water within the internal plumbing. As users select "winterize" on the HMI, the ACDS will engage hydraulics to run the air compressor delivering compressed air to all internal plumbing to purge water from the internal plumbing as well as the rinse hoses.







Wash & Rinse & Fluid Delivery System

The ACDS provides full wash capabilities with an onboard foam generator as well as two 8 GPM rinse guns. The foam generator begins the wash process by producing and delivering 50 GPM of soap foam to the airframe. This production and delivery rate is fast enough to cover the side of a CH-47 Chinook in under 60 seconds continuously.

Rinse operations are enabled using two hot water rinse guns delivering 8 GPM per gun at 175 psi for a total flow rate of 16 GPM for full compliance with TM 1-1500-344-23-2, TO 1-1-691, and GEN MIM 2005-005 guidelines for safe aircraft cleaning. With triple the flow rate of a traditional pressure washer, the ACDS conducts rinse operations 3 times faster.

The ACDS maintains organization with five hose reels for quick and secure stowage of the foam gun, rinse gun and compressed air lines inside the illuminated wash compartment with a quick access, roll up door. Rinse guns are connected to 100' rinse hoses and feature an adjustable pattern gun for selection between conical "full fog" and long reach spray patterns.











Turbine Engine Flush System

The ACDS features an onboard turbine flush system which allows for selectable delivery of gas path cleaner or rinse water at 2.5gpm, 5gpm, 10gpm, 12 GPM modes within pressure selection between 20- 125 psi- allowing the ACDS to do a turbine flush system on a variety of power plants or multi-engine aircraft.

The turbine engine flush system is enabled by a hydraulically driven, independent positive displacement pump with run dry capabilities for extended service life. The hydraulically driven onboard central air compressor provides up to 24 cfm at up to 120psi for simultaneous bleed band closure of (4) bands.



