

WASHING ACROSS THE WORLD



Juniper's reliable and flexible response to the commercial and military aviation industry's needs for precise maintenance, performance efficiency and safety is being experienced across the world.

Our new compressor washing systems have been sold to engine manufacturers Rolls Royce, GE and Snecma - and over 50 airlines.

Juniper demonstrations using our own rig are available for the cost of its transportation by the airline or manufacturer.

We received an order recently from



Air Europa following a simultaneous compressor wash of one engine of a Boeing 737 classic and one engine of a Boeing 737 new generation in Palma, Mallorca.

The aircraft were positioned side-by-side and the engines nearest to each other treated.

Our rig was ferried between both engines during the drain period after each wash.

S. Marshall

Managing Director

A star is **born!**

GE in Cincinnati were so impressed with excellent results using the Juniper washing system on their CFM 56 engines that they have produced a training film and distributed it to all CFM 56 operators worldwide. Hopefully, this will encourage them to incorporate the system on a routine maintenance basis.

This is a beautifully produced CD featuring a wealth of detail and

information. For your free copy please approach your local CFMI/GE representative or contact Juniper direct.



Commercial Airlines
Juniper now deals with:

- Air Berlin**
- Air Canada**
- Air Europa (Mallorca)**
- Air France**
- Air New Zealand**
- American Airlines**
- Britannia**
- British Airways (Gatwick Airport)**
- British Airways (Heathrow Airport)**
- British Midland International**
- Carnival Airlines**
- China Southern Airlines**
- Continental Airlines**
- Czech Airlines**
- El Al Israel Airlines**
- Euralair Industries**
- FLS Aerospace (Dublin)**
- FLS Aerospace (Manchester)**
- FLS Aerospace (Stansted)**
- Futura Internac (Mallorca)**
- GE Greenwich Caledonian**
- GE Pebbles, Cincinnati**
- GE South Wales**
- Hapag Lloyd**
- Iberworld (Mallorca)**
- Jet Airways**
- KLM**
- Kuwait Airways**
- Lauda Air**
- LOT Polish Airlines**
- Lufthansa (Frankfurt)**
- Lufthansa Technik Philippines**
- Monarch Airlines**
- North West Airlines (Snecma)**
- Oman Air**
- Pegasus Hava**
- P & W America**
- Qantas Airways**
- Royal Air Maroc**
- Royal Jordanian**
- Safair (Pty) Ltd**
- Sahara Airlines**
- Saudi Airways**
- Shezhen Airlines**
- Sichuan Snecma China**
- Snecma Services (CFMI Factory)**
- South African Airways**
- Thai Airways**
- Transavia**
- Turkish Airlines**
- Varig Airlines**
- Virgin Atlantic Airways**

Hire of Compressor Washing Rig and Operator



Juniper keeps on stand-by a 2 x 25 gallon rig complete with heaters and operator to provide a service to any company that needs a wash, but does not have the equipment.

This facility was first made available to ATC Lasham in the early days, using our smaller CFM56 rig on the Boeing 737 classic. Later, the first 2 x 25 gallon rig went to FLS Aerospace, at Manchester International for washing the V2500. Subsequent washes were on CFM56-2/5, RB211-535E4, CF6-80C2 and Trent 772 until FLS purchased their own rig.

BMI and ATC Lasham use this service regularly for washing

the Airbus A320, and Boeing 737 classics and new generation aircraft.

Recently our rig was hired to a leasing company based at Gatwick International Airport. The work was carried out by Marshalls of Cambridge on an ex-Ansett Airlines Boeing 737-700. Their main problem was that the aircraft had been laid up and one engine was indicating a serious loss of EGT Margin, to the extent that the aircraft could not be leased out.

After a hot water wash it was reported by Aviation Management, an independent assessor, that our prompt action saved the engine from being removed.

We come out on top Down Under



The RAAF purchased four of our Hercules rigs for use on the P3 Orion Aircraft and the procurement package included commissioning and training. Juniper, with the help of their representative in Australia, Pacific Dynamics Pty. Ltd., trained 40 personnel.

A classroom briefing was followed by a rig familiarity exercise and an actual wash of four engines on one of their P3 Orion aircraft. This all went to plan and to the service's satisfaction.

Qantas purchased a 2 x 25 gallon rig for use on their new generation Boeing 737-800

and Juniper took the opportunity to also send a set of CF6-80C2 engine probes, with the hope that an opportunity might arise to give a demonstration.

The airline was able to provide a B767 and a hot water wash was performed on a selected bad engine at Melbourne International Airport. The resultant gain in EGT was still holding up five months later.

There are three new customers for our popular Hercules compressor washing rig; Sri Lanka Airforce, Austrian Airforce and Belgium Airforce.

We can refresh the parts

Juniper was concerned that our Foamer 250 rigs were not being used correctly.

This was brought to light when one of the RAF bases spent time trying to fix a problem that did not exist. These rigs are designed to apply the chemicals and let the chemicals do the cleaning. They are not high pressure washers.

In light of this experience, MOD asked us to give refresher courses at RNAS Yeovilton and Culdrose.

Both stations were pleased with the results and the courses are now to be extended to the RAF.

It was also established during the trials that Gel alone should be applied to any aircraft painted with grey matt camouflage, as this is the most effective. The detergent (shampoo) should be used only on light to moderate soiling of gloss finishes.



US Army's Chinook Choice

Our tried and tested Chinook compressor washing rigs, first bought by the US Army in 2000, continue to be first choice, and our latest order for 36 more brings the total to 52. Reports say they are highly successful in the field.



NEW RIGS PRODUCED SINCE OUR LAST NEWSLETTER

Compressor Washing Rigs

Customer: UK Ministry of Defence

Conversion of the single tank 50 gallon Hercules compressor washing rig for use on the AWACS Sentry E3A Aircraft. An extra solution tank was fitted and a set of CFM56-2/5 engine probes provided. Two rigs were converted for RAF Waddington.



Customer: Lufthansa, Germany

A special 2 x 25 gallon rig was designed for Lufthansa for their maintenance base at Frankfurt. Our popular 2 x 25 gallon rig was mounted on one of the airline's standard trolleys. This rig was provided with engine probes for the CFM56-3, CFM56-5B/C, CF6-80C2, CF6-50, V2500 and P & W 4000 94in. fan engines. We have just received an order from Lufthansa in Frankfurt for another special rig of twice the capacity. This will be mounted on their standard trolley and heaters will be fitted in the tanks.



Customer: Royal Australian Navy

Compressor Wash and Inhibiting Rig for use on their Sea King helicopter away from base. The prototype rig was trialled at sea on one of their ships, followed by further tests at base and a visit by Juniper, in April 2002, to HMAS Albatross, Nowra, NSW. It was discovered that the built-in spray ring in the sand filter on the aircraft was reducing the flow rate and preventing an engine wash in accordance with Rolls Royce recommendations. Some small modifications to prevent corrosion at sea, together with a higher allowable cylinder charge pressure, made our rig acceptable - and a further five were ordered.



Customer: Rolls Royce Deutschland

Our small CFM56 rig was purchased for use on their BR family of engines. Commercially, these engines have been fitted in the Bombardier Global Express, Gulfstream V and the new Boeing B717. An order for two more of these rigs has recently been received.

Customer: Bangkok Airways

A Juniper CFM 56 rig was purchased for use on their Boeing 717. Our photograph shows Juniper commissioning the rig in Bangkok.



Customer: British Midland International

A new compressor washing rig for the Embraer 145, Rolls Royce AE3007A engines - Juniper Part No. JMP/EMB145/D/4813

Customer: GE Cincinnati

The GE test facility at Peebles, Cincinnati, currently testing the world's most powerful engine the GE 90-115B, has been supplied with a set of long and short engine probes for use with our 2 x 25 gallon rig. This engine will be used on the new Boeing 777-300ER and use of these probes has been given approval even before the introduction of the engine to the market.

Customer: Royal Netherlands Air Force

Juniper is currently co-operating with the RNLAf in order to establish the exact requirement at their Gilze Rijen Air Base for compressor washing for the GE T700 701C engines on their Apache fleet. A power restoration wash on an Apache was carried out in January 2003 at Gilze Rijen using Juniper's small 2 x 10 gallon compressor washing rig. From the initial comments it was established the rig needs larger capacity fluid tanks, must be self contained and towable. Our 2 x 20 gallon rig, used by Augusta Westland on their commercial EH101, was offered, and an order for four has been received.



Customer: Royal Airforce

Our Hercules rig, Pt No. JMP/HER/D/1144/C500NL, has been identified for use on the BR710 engine fitted in the Nimrod MRA4. It will also be used to clean out the composite intake to the compressor. This intake prevents fan flutter and requires cleaning from time to time.

Oil Replenishing Rigs

Customer: Britannia

Boeing 767 Shock Strut Fluid Rig, 10 Gallon Capacity, Pt No. JMP/B767/D/4747
Boeing 767 Hydraulic Oil Replenishing, 10 Gallon Capacity. Pt. No. JMP/B767/D/4748



Customer: Augusta Helicopters

Apache Engine Oil Rig. 1 US Gallon Re-fillable Re-oiling Gun, Pt No. JMP/APACHE/A/4939

Customer: Royal Australian Navy

HMAS Albatross, Nowra, NSW. New Framework for Shimmy Damper rig to protect the filter and pressure gauge and make the rig more user friendly.



Customer: UK, Germany, Spain & Italy

Our 10 Gallon Oil Replenishing Rig PD4 RRS, Pt No. JMP/PD4/D/0227 has been chosen by the Eurofighter Project Team to replenish and top up engine and gearbox oil on this aircraft. This equipment was designed for Rolls Royce in the early 60s for use on Concorde and has since been used on the Panavia Tornado and the Italian AMX Trainer. Juniper has given the rig a new part number JMP/EFA/D/4854 to identify the rig with the aircraft.



Other New Rigs

Fuel Blending Rig, Pt. No. JMP/BIOBOR/D/4896

For the prevention of microbial growth in aircraft fuel tanks Biobor JF is added periodically to the fuel in the aircraft holding tanks. On the new generation Boeing 737 there is no over-wing aperture to enable this to be carried out. Juniper has recently supplied Britannia Airways, of Luton Airport, with a Fuel Blending Rig to allow this process during re-fuelling. This system has subsequently been used on their 757 and 767 fleet.



F16 – Grey with worry



Problems with ageing equipment and ineffective chemicals were being experienced by the Belgium Air Force in cleaning the matt grey camouflage finish on their F16 aircraft. The existing application method was causing health problems as personnel breathed in airborne chemicals.

Juniper, with the help of our Dutch representative Aviquipo Holland BV, was asked to demonstrate the Foamer 50 with their chemicals at the Florennes Air Base.

Although the cleaning was not good because the gel and detergent products had little effect on the dirt, the method of application to the aircraft made an immediate impression.

Some weeks later we were asked to go to the Kleine Brogel base in Belgium to use the same process with a different chemical. This time the gel product worked well.

No final conclusion has been reached by the BAF, but we are confident that our rig and the new chemicals are showing the way forward.

New Customers for Foamer 50

Eight Foamer 50s were supplied to the Italian Army for cleaning small helicopters. Two Foamer 50s were supplied to BNFL Magnox Generation Dungeness A Power Station for cleaning down the nuclear flasks before dipping in the 'ponds' to encase the fuel rods.

This brings the total number of Foamer 50s manufactured to 73.

Juniper strikes while the engine's still hot!

Juniper was approached by Impulse Airlines in Australia when they suffered a bird strike to one of their B717s and needed to perform a compressor wash within 200 hours to avoid removal of the engine.

Via our Australian agent Pacific Dynamics Pty. Ltd., we located one of our CFM56 rigs sold to Qantas in the early days. We also identified the part number of the tooling required from Rolls Royce Deutschland and sent over an adaptor and delivery hose to enable Impulse to carry out the wash.

Engine Probes for use with 2x25 gallon rig.

Engine	Probe DRG. No.
CFM56-3 OPEN ORIFICE	JMP/CFM/56/D/4538
CFM56 - 2 & 5A OPEN ORIFICE	JMP/CFM/56/D/4435
CFM56 - 5 B/C	JMP/CFM/56/D/4605
CRM56 - 7 OPEN ORIFICE	JMP/CFM/56/D/4462
CF6 - 50	JMP/CF6/D/4966
CF6 - 80 C2	JMP/CF6/D/4037
CF6 - 80 A2/A3	JMP/CF6/D/4247
CF6 - 80 E1	JMP/CF6/D/4947
RB 211 535 E4	JMP/RB211/D/4153
RB 211 542 G & H (TEST CELL)	JMP/RB211/D/4249
GE90	JMP/GE90/D/4081
GE90 (THRUST REVERSER CLOSED)	ASSYJMP/GE90/D/4599
V2500	JMP/V2500/D/4040
V2525 D5 WASH PROBES (MD 90)	JMP/V2500/D/4703/MD
TRENT 772 ENGINE WASH PROBES	JMP/TRENT/D/4702
JT9D	JMP/JT9D/D/4154
ALLIED SYGNAL LF507	JMP/LF507/D/4809
PUMA WASHING HAND	JMP/PUMA/A/4470
T56	JMP/HER/D/1851
T56	JMP/T56/D/1847
RR GNOME	AND/AAC/911
P & W PT6 WASHING HAND	JMP/PT6/C/1365

Aircraft Cleaning

Foamer saves chemicals



Yingsun Ratapipat, MD of Sun Intertrade together with his washing team and Steve Marshall, MD of Juniper.

Better ways of washing an aircraft were being sought by Thai Airways of Bangkok. Juniper set out, with the help of Sun Intertrade Co. Ltd., a local oil filter manufacturer, to give them a demonstration using our Foamer 50.

A team of four of Sun Intertrade's personnel were trained on how to use the Foamer 50 and shown a copy of the training video "How to clean an Aircraft". We used chemicals brought over from the UK and Holland to demonstrate on a Thai Airways Boeing 747.

This showed the saving in chemicals that could be made by using the system.

Four of our Foamer 80s were purchased and are ready for commission.



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