



NEWS

AIRCRAFT SERVICE EQUIPMENT

April 2009

The future of engine washing... GENx shows the way

For the full story, see inside front cover ►

GE Victorville -
Functional testing to
establish flow rate before
connection to the engine
and the commencement
of the trials

Cover Story-

Trial wash for the new GENx rig

*New remote control option -
now available*

Waste water collection

Probe and accessory list

Juniper rigs and de-icing

Training and commissioning

Full customer list & map

*Long engine probes -
the range expands*

*The new trailer mounted
Foamer 250*

and more...

JUNIPER



Juniper's new GEnx rig passes the test..!

You may remember the cover story of our 2006 newsletter highlighting the built in engine water wash system on the GP7200 engine jointly developed by GE and P&W for the Airbus A380 aircraft. Well, three years on and GE have included an option for this system on the GEnx engine fitted to the Boeing 787 Dreamliner and Boeing 747-800.

The new system is designed to flush water through the engine core at idle speed, eliminating the need to collect waste water and contaminants, as these are burned up during the wash and expelled as steam.



Juniper have developed a new rig specifically for this engine, and in November 2008 it was put through it's paces on a GEnx1B engine fitted in the number two position on GE's flying test-bed Boeing 747 at the Victorville site in California. Having undergone some modification and improvement during development, we were keen to see how the rig performed.

Results were impressive and the rig acquitted itself very well; in fact a 7° EGT recovery was achieved, which is remarkable considering the engine was a relatively clean one.

Juniper's growing family of Foaming Rigs...

Juniper has long manufactured a range of foaming rigs for exterior aircraft washing; from the relatively small and maneuverable 50ltr rig, up to the self contained petrol or diesel compressor driven 250ltr version.

The newly developed trailer mounted Foamer 250 (JMP/FOAM/D/6602) is the

latest addition to this comprehensive range and was one of nineteen items of ground support equipment purchased for demonstrating to potential HAWK customers at RAF Valley, North Wales. For years now Juniper Foaming rigs have given excellent service worldwide, and this latest trailer mounted version incorporates some important enhancements and

modifications. Another example of Juniper's rolling programme of continuous development and improvement. To find out more, please contact us.



Left: The trailer mounted Foamer 250.
Above: The Foamer 250 single outlet.
Above Right: The Foamer 250 dual outlet
Bottom Right: The Foamer 50

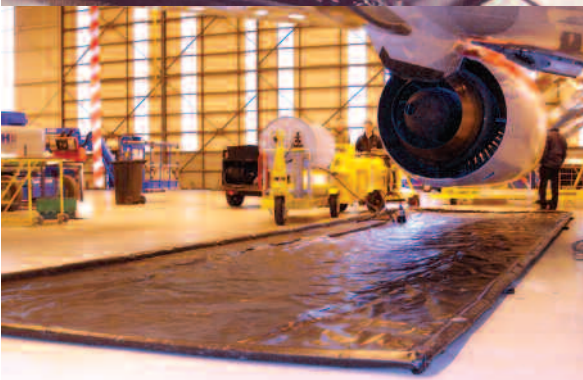


Waste water collection - progress...!



At Juniper, we have long been concerned with the collection of waste water and contaminants during washes and have investigated most of the collection systems available.

We see a lot of potential in the Latimat Containment System, invented by Doug Latimer, and now marketed by Kyoto Containment Systems Inc. of Ontario, Canada who acquired the exclusive licence to the patents in 2008. In fact, having tested the system, we have developed a transportation and deployment trolley for the Kyoto Containment Mat (as it is now called) that complements the Juniper equipment perfectly. To find out more about the Kyoto system in conjunction with Juniper equipment please contact us.



Training & Commissioning

Madrid



Commissioning of 2x50 gallon rig for Air Europa Lineas Aereas S.A.U., Madrid

UK



Commissioning of 2x25 gallon rig for BMI at Heathrow Airport, London

Tunisia



Commissioning of 2x25 rig and staff training for Tunisair, Aeroport tunis, Tunisia

Indonesia



Staff training and commissioning of 2x25 gallon rig for GMF AeroAsia Garuda Indonesia Group

Turkey



Commissioning of 2x25 gallon rig for Onur Air, Attaturk Airport, Turkey



General Manager, Cornelis Radjawane receives his certificate from Steve Marshall at the completion of the training session

Early starts with China Southern...!

In China at the beginning of 2008, Steve Marshall, Juniper's MD visited the Aircraft Maintenance Engineering Company (GAMECO) with Zhang Quan and Cui Lei from our Chinese agents, The Beijing Power-Ring Tech & Trading Co. to perform demonstration engine washes using our 2x25 gallon compressor washing rig.

First up, the portability and convenience of the Juniper rig was highlighted with a 5.00am trip to a remote part of Baiyun International Airport for an engine wash on a CFM56-5B engine fitted to an Airbus A320 for China Southern Airlines. This was followed 24 hours later by another early morning wash - a V2500 engine fitted to an Airbus A319.

The next day, Steve together with Zhang Quan and Cui Lei, met Mr. Nix Li, Managing Engineer - Power Plant for GAMECO for a very pleasant lunch before rounding things off that night with the final engine wash on a Boeing 777-21B fitted with GE90-92B engines, again for China Southern Airlines; this time using a set of our GE90-115B long engine probes (JMP/GE-90115B/D/4948).

The washes all went well with plenty of positive feedback for Juniper's equipment.



Zhang Quan and Cui Lei from our Chinese agents, Beijing Power Ring Tech and Trading Co. preparing the Juniper 2x25 gallon rig for a demonstration wash on an Airbus A320 for GAMECO at Baiyun International Airport. GAMECO's engineer, Brad Chen is at the rear of the rig.



After the demonstration engine washes, a very pleasant lunch with Mr. Nix Li, Manager, Engineer Power Plant GAMECO and Zhang Quan and Cui Lei from our Chinese Agents.

JT8D Probes Juniper's longest yet

In February, 2008 Steve Marshall travelled to Istanbul Attaturk Airport, Turkey primarily to commission a 2x25 gallon compressor washing rig (JMP/CFM56/D/4777/C200) for Onur Air and perform a trial wash using the newly developed JT8D long engine probes (JMP/JT8D/D/6627).

Steve was particularly interested in these trials as they are the longest probes that Juniper has produced and were still relatively untested. As it happens we were only able to carry out a trial fit of the probes on one of their P&W JT8D-219 engines fitted to their MD83 aircraft. After some experimentation it was established that probes at the 3 o'clock and 9 o'clock



Above: Steve Marshall with Zeki Koroglu from Millennium Aerospace Supplies Trading, Juniper's representative in Turkey.

Below: Installation of Juniper's JT8D-219 long engine probes on the JT8D engine fitted to a MD83 aircraft for Onur Air, Turkey.



positions worked best and Onur Air have since performed successful engine washes using this configuration. While he was there, Steve took the opportunity to make a number of courtesy calls accompanied by Juniper's Turkish agent, Zeki Koroglu of Millennium Aerospace Supplies Trading.

The first visit was to MMG Technic to discuss aircraft exterior washing with interest also being shown in the prototype JT8D long probes. From there, Steve and Zeki paid a visit to Turkish Airlines to check how the recently purchased 2x25 compressor washing rig was performing and answer any questions they may have. They expressed themselves delighted with the rig and Juniper was able to help them with a number of issues arising from its use. All in all, a well timed visit.

**Some of the
commercial aviation
companies Juniper
now deals with:**

Juniper -

Aer Lingus
Air Algerie
Air Arabia
Air Astana
Air Atlanta Aero Engineering
Air Atlantique
Air Berlin
Air Bridge Carriers Ltd.
Air Canada
Air Deccan (India)
Air Europa (Mallorca)
Air France
Air Hanson
Air Jamaica
Air Luxor SA
Air Madrid
Air Mexico
Air New Zealand
Air Pacific Ltd.
Air Transat
Air Transport International
All Nippon Airways
American Airlines
Amiri Flight
Amre Flight UAE
Atlas Air
Atlas Jet (Turkey)
Austrian Airlines
Bangkok Airways
BASCO
BH Air (Bulgaria)
Britannia Airways
Britannia Airways (Sweden)
British Airways (Gatwick Airport)
British Airways (Glasgow)
British Airways (Heathrow Airport)
British Midland International
BWIA West Indies Airways Ltd.
Carnival Airlines (USA)
CCM Airlines
China Southern Airlines
Comair Ltd.
Continental Airlines
Copa Airlines Panama
Cyprus Airlines
Cyprus Airways
DHL Air Ltd.
El Al Israel Airlines
Emerald Airways
Emirates Airline
Eurocypria Airlines
Eva Air
Evergreen Aviation tech Corp. Taiwan
F.B.S. Ltd.
FFV Aerotech
Fields Aviation
FMW Sweden
F.R. Aviation
Futura Internac (Mallorca)
GAMCO - UAE
GE
Greenwich Caledonian
Grove Park Maintenance (London)
Hapag Lloyd
Hunting Aviation
Iberia Lineas Aereas De Espana
Iberworld Airlines (Mallorca)
Inter Airlines (Turkey)
Inter Appro (France)
Isle of Scilly Skybus Ltd.
Japan Airlines
JEA

Jet Airways (India) Ltd.
Jet Blue
JIT Aviation USA
KLM
Korean Air
Kuwait Airways
Lan Airlines S.A.
Lanchile
Lauda Air
LOT Polish Airlines
Lufthansa Cityline GMBH
Lufthansa (Frankfurt)
Lufthansa (Stuttgart)
Lufthansa Technik Philippines
MNG Airlines Turkey

Monarch Airlines
MyTravel
North West Airlines (Snecma)
North West Airlines (Snecma) Mineapolis
North West Airlines (Snecma) Tampa
Nova Airlines
Oman Air
Onur Air
Pakistan International Airways
Pegasus Hava
Qantas Airways
Qatar Airways
Royal Air Maroc
Pegasus Hava
Qantas Airways



Far and Wide

Qantas Airways
Qatar Airways
Royal Air Maroc
Royal Jordanian
Ryanair
Sabena
Safair
Sahara Airlines
Saudi Airlines
Saudi Airways
Schreiner Airways
Shenzhen Airlines
Sichuan Snecma China
Singapore Airlines
Skymark Airlines

Slovak Airlines
South African Airways
Sun Country Airlines
Sunstate Airlines
Taikoo(Shandong) Aircraft Engineering Co. Ltd.
Tam Linhas Aereas SA
TAP Portugal
Thai Airways
Traficair
Transavia
Transocean Air
Turkish Airlines
UAE
US Airways
Varig Airlines

Vernair
Vietnam Airlines
Virgin Atlantic Airways
Wencor West
West Jet
Westland Helicopters
Wideroe
Wizz Air
Yemen Airways

Juniper now deals with **322** customers worldwide...



Now here's something Remotely Interesting..!



Juniper can now offer remote operation on their 2x25 and 2x50 gallon rigs, primarily for use in test cells.

There are two ways of achieving this modification. The first option is a supplied addition to an existing rig and consists of an actuated ball valve between the outlet of the delivery hose and the twin hose assembly. The valve is housed in it's own box and comes supplied with a 'plug and go' remote device. Connection of the valve is via quick release couplings, with the remote control switch attached using the supplied cable and Harting connector. This switch can now be positioned outside the test cell.

The second and preferred option, requires replacing the standard outlet ball valves with actuated ball valves during the rig's manufacture. As in option one, a remote switch is connected to the rig via a cable and Harting connector enabling operation from outside the test cell.

The plug and go system was ordered and developed for Rolls Royce in Derby, England for use with it's Juniper 2x25 gallon rig in their test bed, and the factory fitted option was delivered to GE Engine Services in Malaysia for one of their test cells near Kuala Lumpur.



Top Photo: the 'Plug and Go' option for remote operation.
Above: The actuated ball valves in position on the rig.

The 2x25 gallon rig factory fitted with the remote option before despatch to GE Engine Services in Malaysia.

Tunisair - first rig!

April 2008, and it's a visit to Aeroport Tunis, Tunisia for personnel training and the commissioning of a 2x25 gallon compressor washing rig complete with the 115/200v, 3 phase, 400Hz heating system for Tunisair. This was their first experience of engine water washing and we were keen to demonstrate the benefits of the Juniper system.

An Airbus 320 fitted with CFM56-5A engines was made available to us, and using Juniper's CFM56-2/5A probes (JMP/CFM56/D/4435), a very successful training session and demonstration engine wash was performed.



Thumbs up from American Airlines

During his visit to the USA late in 2008, Steve Marshall took the opportunity to pay a courtesy visit to American Airlines, a long-standing and valued customer, to see how things were going with the Juniper equipment they were using and get some feedback on it's operation.

While he was there Steve met Herb Williams, the Technical Crew Chief, who uses the Juniper rig daily and was very impressed with the results they have been achieving - in fact, figures quoted in American Airline's own newsletter state that regular engine washing accounts for fuel savings of \$135 million a year and prolongs an engine's effective life.



Can we do it..? Yes we can.



65ltr. Inhibiting Rig
(JMP/SKGB/D/0647/C400) ▲

20ltr. Inhibiting Rig
(JMP/GEM/D/6310) ▶

Adaptors for CFM56
(JMP/CFM56/A/6782) and RB211
(JMP/RB211/A/6779) available for
both of these Inhibiting Rigs

The 2x7 Gallon Compressor
Washing Rig for use on the T800
turboshaft engine fitted in the
Augusta Westland Super Lynx 300
helicopter (JMP/T800/D/4796) ▼



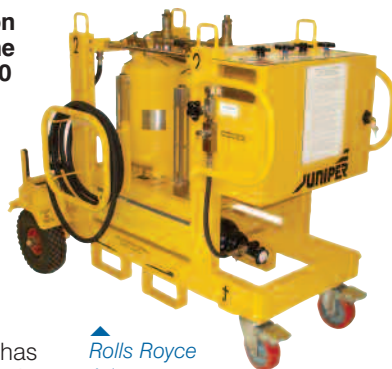
Juniper is building a deserved reputation around the world for our compressor engine washing system using the 2x25 and 2x50 gallon rigs partnered with a rapidly expanding range of wash probes and lances, but it's worth remembering that we also develop and manufacture a wider range of ground support equipment for the aviation industry.



When washing on the wing simply doesn't do the job and an engine has to be removed, then Juniper is there to help with a range of fuel system inhibiting rigs, ranging in capacity from a lightweight and maneuverable 20 litres (5 gallon) up to 227 litres (50 gallons).

With specialist toilet cleaning rigs for commercial airliners, oil replenishment rigs in a range of capacities and our expanding family of foaming rigs for exterior aircraft washing - the whole range embodies the key Juniper trademarks of rigorous build quality and attention to detail, allied to an unrivalled training and back-up service.

Contact us for more information about Juniper's full range, or visit the website for the latest developments.



▲ Rolls Royce
Adour
Inhibiting Rig
(JMP/ADOUR/D/6642)

Lightweight Diaphragm
Pump Industrial Washing
Rig, primarily for oil and
gas production platforms
(JMP/AGT/D/6004) ▼



Back to school..!

In January 2009, Steve Marshall visited the GMF AeroAsia Garuda Indonesia Group in Indonesia to commission their new 2x25 gallon rig.

Training was also to be given to the engineers who would be using the equipment; 32 of them in total, so a big classroom was needed..!

After intensive training sessions, the rig was put through it's paces. For the first wash, the CFM56-3 engine on a Boeing 737-300 was tackled using the Juniper CFM56-3 probes (JMP/CFM56/D/4538) before moving on to the CF6-80C2 engine fitted to a Boeing 747-400 using the CF6-80C2 probes (JMP/CF6/D/4037). Both washes were a success, and in the final question and answer session back at the classroom, the engineers were unanimous in their praise for the Juniper system.



Above: Back to the classroom for these engineers!

Below: getting a little closer to the action....



Technical Representation for Juniper in India

Juniper has a growing network of agents representing the company all around the world, and in 2007 we welcomed Chandrakant Sheth and his company Chandra International, who now represent Juniper in India. Mr Sheth has a colourful history and is credited with introducing the ballpoint pen into India..!



Chandrakant Sheth (second left), vice president Mihir P. Sheth (far right) and Sant S. Duggle, Manager In-Flight Supplies, with Steve Marshall on a visit to Ash House in April 2007

LIST OF WASHING PROBES FOR USE WITH JUNIPER'S 2 X 25 AND 2 X 50 GALLON COMPRESSOR WASHING RIGS

(Each Juniper Part Number refers to a set of two probes)

Aircraft Type	Engine Probes	Juniper Part
Boeing 737-300-400 Airbus A320	CFM56-3	JMP/CFM56/D/4538
RE-Engined DC8, AWACS Airbus A321	CFM56-2 & 5A CFM56-5B (Long Probes Thrust Reversers closed) 89"	JMP/CFM56/D/4435 JMP/CFM56/D/6527
Airbus A320, A340	CFM56-5B/C	JMP/CFM56/D/4605
Boeing 737-700/800	CFM56-7	JMP/CFM56/D/4462
* Boeing 737-700/800	CFM56-7B (Long Probes Thrust Reversers closed)	JMP/CFM56/D/6645
(MDC)DC-10-30	CF6-50	JMP/CF6/D/4966
(MDC)DC-10-10/DC-10-30	CF6-6D/6K/-50	JMP/CF6/D/4510
Boeing 747/767	CF6-80C2	JMP/CF6/D/4037
(MDC)MD-11, Airbus A300, A310	CF6-80C2 D1F/A5F/A5/A3	JMP/CF6/D/6418
Airbus A310	CF6-80A2/A3	JMP/CF6/D/4247
Boeing 747/767	CF6-80C2	
Airbus A330-200	CF6-80E1	
(MDC)MD-11	CF6-80C2 D1F (Long Probes Thrust Reversers closed) 98"	JMP/CF6/D/6511
Airbus A300-600F	CF6-80C2 A5F	
Airbus A310-200F	CF6-80C2 A3	
Airbus A330	CF6-80E1	JMP/CF6/D/4947
Boeing 777	GE90 (Short Probes)	JMP/GE90/D/4081
Boeing 777	GE90 (Long Probes Thrust Reversers closed) 127½"	JMP/GE90/D/4599
Boeing 777-300ER	GE90-115B(Short Probes)	JMP/GE90-115B/D/4949
Boeing 777-300ER	GE90-115B (Long Probes Thrust Reversers closed)135"	JMP/GE90-115B/D/4948
* Boeing 787	GENx 1B & 2B (Long Probes Thrust Reversers closed)	JMP/GENx/D/6698
Embraer 170 & 175 Bombardier CRJ700, CRJ900, CRJ1000	CF34-8C/E	
Bombardier Challenger, 870, 890		JMP/CF34/D/6553
Embraer 190 & 195	CF34-10E	JMP/CF34/D/6000
Boeing 757	RB211-535E4	JMP/RB211/D/4153
Boeing 747-400	RB211-524 G&H Long Probes 178"	JMP/RB211/D/4249
Airbus A320	V2500	JMP/V2500/D/4040
Airbus A320	V2500(Long Probes Thrust Reversers closed)160"	JMP/V2500/D/6561
(MDC)MD-90	V2525 D5	JMP/V2500/D/4703/MD
(MDC)MD-90	V2525 D5 (Long Probes Thrust Reversers closed)150"	JMP/V2500/D/6562/MD
Airbus A340-600	TRENT 500	JMP/TRENT/D/6188
Airbus A340-600	TRENT 500 (Long Probes Thrust Reversers closed)113"	JMP/TRENT/D/6615
Airbus A330	TRENT 772	JMP/TRENT/D/4702
* Airbus A330	TRENT 772 (Long Probes Thrust Reversers closed)185"	JMP/TRENT/D/6592
Boeing 777-200ER	TRENT 800	JMP/TRENT/D/6328
Airbus A380-800/900	TRENT 900 (Long Probes Thrust Reversers closed)133"	JMP/TRENT/D/6776
Boeing 787	TRENT 1000 (Long Probes Thrust Reversers closed)156"	JMP/TRENT/D/6754

LIST OF WASHING PROBES FOR USE WITH JUNIPER'S 2 X 25 AND 2 X 50 GALLON COMPRESSOR WASHING RIGS

(Each Juniper Part Number refers to a set of two probes)

Boeing 767-200/300	P & W 4000-94" Fan	
Airbus A300/A310,(MDC)MD-11	(PW 4152/4158/4462)	JMP/PW4000/D/4856
Boeing 767-300	P & W 4000-94"Fan (Long Probes	
Airbus A300/A310,(MDC)MD-11	Thrust Reversers closed) 85"	JMP/PW4000/D/6601
Boeing 747-400		
Airbus A330/200/300	P & W 4000-100"Fan	JMP/PW4000/D/6216
* Boeing 777-200	P & W 4077-112"Fan (Long Probes	
	Thrust Reversers closed)	JMP/PW4000/D/6728
(MDC)MD-83	P & W JT8D-219 (Long Probes	
	Thrust Reversers closed) 201"	JMP/JT8D/D/6622
Boeing 747-200	P & W JT9D	JMP/JT9D/D/4154
BAE 146, RJ70/100	Allied Signal LF507	JMP/LF507/D/4809
Ilyushin IL96	PERM PS-90A 185"	JMP/PERM/D/6581

* Denotes probes in development

For details of **Spray Rings** for Hercules C130 and P3 Orion Aircraft, **Washing Wands & Lances** for Puma, Seaking and other helicopters, please contact us direct.

Juniper and Isopropyl Alcohol

Juniper cautions against the use of Isopropyl Alcohol (IPA) in water wash carts equipped with immersion heaters due to its flammability. GE concurs with this and cautions are provided in the Aircraft Maintenance manuals to this effect.

If water washing at temperatures lower than 5°C / 40°F is desired, GE recommends:

1. Disable the immersion heaters.

The immersion heaters should be isolated. This is achieved by padlocking the isolation switch on the electrical control panel in the off position and tagging the padlock with a warning label.

2. Use IPA for anti-icing as defined in the AMM.

To revert back to hot water washing proceed as follows:

3. After washing flush the water tanks at least twice with water to ensure that all IPA has been removed.

Water washing below -10°C / 4°F is not recommended.

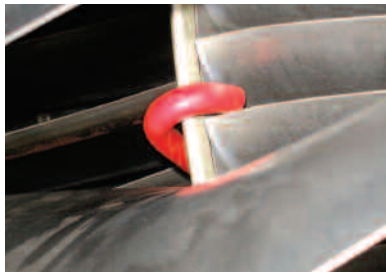
Industry alternatives to IPA have been considered, but have not proved acceptable.

No other alternatives have yet been identified, though GE are continuing to look.

Long probes make the job easier...

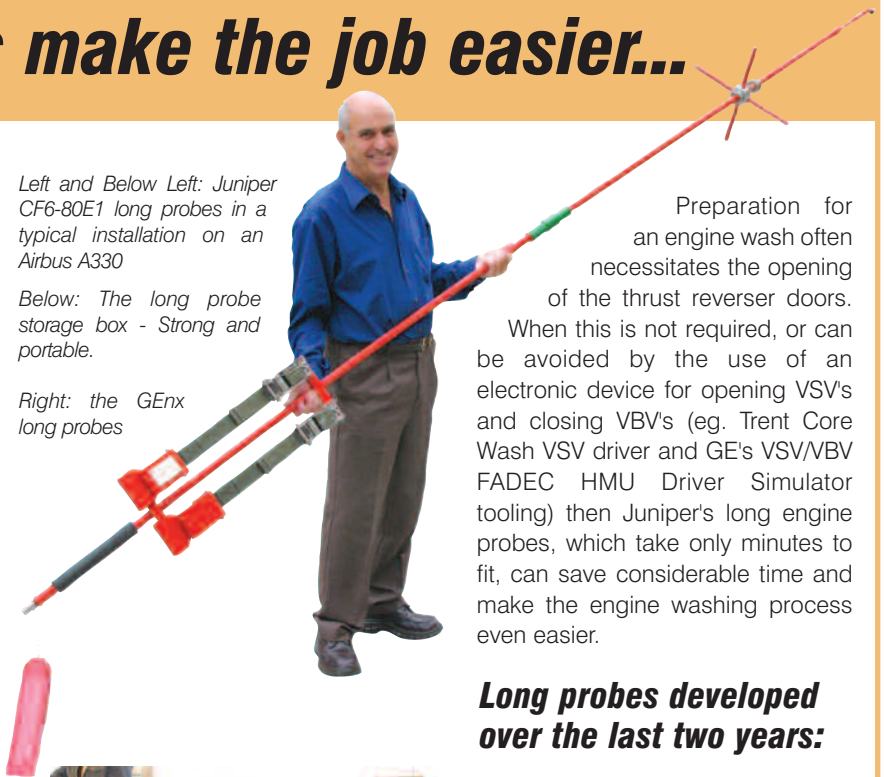


Left and Below Left: Juniper CF6-80E1 long probes in a typical installation on an Airbus A330



Below: The long probe storage box - Strong and portable.

Right: the GENx long probes



Preparation for an engine wash often necessitates the opening of the thrust reverser doors. When this is not required, or can be avoided by the use of an electronic device for opening VSV's and closing VBV's (eg. Trent Core Wash VSV driver and GE's VSV/VBV FADEC HMU Driver Simulator tooling) then Juniper's long engine probes, which take only minutes to fit, can save considerable time and make the engine washing process even easier.

Long probes developed over the last two years:

TRENT 500

JT8D-219

GENx 1B & 2B

TRENT 1000

TRENT 900



Since March of 2008 one hundred and twenty new machines have been delivered to customers all over the world.

77 Compressor Washing Rigs

10 Industrial Compressor Washing Rigs

10 Foaming Rigs

5 Oil Replenishment Rigs

9 Oleo Charging Rigs

2 Inhibiting Rigs

Pacific Dynamics makes a splash

Robert Bonazza of Pacific Dynamics, Juniper's agent in Australia, was interviewed early last year for Aviation Business Asia Pacific magazine after securing an order for nine Universal 2x25 gallon rigs (JMP/HER/D/1144C600) with the RAAF. Robert went on to explain the benefits of regular engine washing and hot water washing in particular, while outlining the advantages of the Juniper system.



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