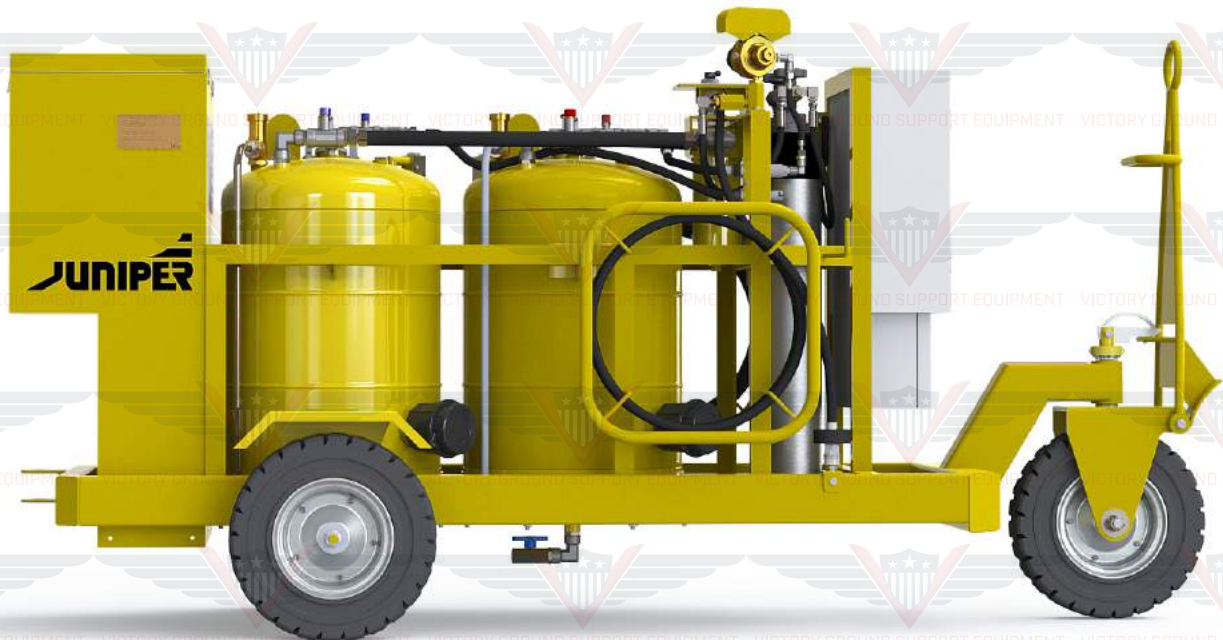


A T JUNIPER (LIVERPOOL) Ltd

**2 x 25 GALLON (50 GALLON) MULTI-
ENGINE COMPRESSOR WASH RIG
(Part No. JMP/CFM56/D/4777/C200)
(NSN 1730-99-668-7936)**

**GENERAL AND TECHNICAL INFORMATION
PARTS CATALOGUE AND RELATED INFORMATION**



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LEADING PARTICULARS

Part No....	JMP/CFM56/D/4777/C200
NSN	1730-99-668-7936
Overall dimensions:						
Length (excluding drawbar)	...	...	...	...	...	99 in. (2515 mm)
Width	...	...	...	...	...	42 in. (1067 mm)
Height	...	...	...	...	...	51 in. (1296 mm)
Weight (dry)	...	...	...	...	...	775 lb (352 kg)
Number of fluid vessels	...	...	...	...	...	2
Fluid capacity of each vessel	...	...	...	...	...	25 imp. gal
Number of nitrogen cylinders	...	...	...	...	...	2
Nitrogen cylinder capacity (each cylinder)	...	...	...	...	...	70 cu. ft (1996 ltr.)
Nitrogen charging pressure, at 15 deg. C	...	...	...	...	...	2500 lbf/sq. in. (172.4 bar)
Nitrogen cylinder test pressure	...	...	...	...	...	4844.3 lbf/sq. in. (334.0 bar)
Towing speed (Max)	...	...	...	...	...	10 mph (16 kph)
Electrical power requirements	...	...	...	...	...	115V/200V, 3-phase AC, 400Hz

Introduction

1 The 2 x 25 gallon (50 gallon) multi-engine compressor wash rig (Part No. JMP/CFM56/D/4777/C200) consists of two 25 imperial gallon stainless steel pressure vessels mounted on a rigid steel chassis. The chassis is supported by three heavy duty wheels with 16 inch super elastic tyres, one of which is mounted on a heavy duty steering castor unit. A drawbar, which can be locked in the upright position for storage and safety, is attached to the steering castor unit. A drawbar operated parking brake acts on the front wheel when the drawbar is locked in the upright position.

2 Each pressure vessel is fitted with a filler cap, gauze strainer, pressure gauge, sight glass, and a pressure relief valve. A 3/4 in. BSP drain valve is installed at the bottom of each pressure vessel.

3 An immersion heater is installed at the bottom of each pressure vessel to heat the fluid to a temperature of 70° C.

4 The two outlet delivery hoses are stowed, one on either side, towards the front of the rig.

5 A dual delivery hose is stowed in a box at the rear of the rig. A stowage box is provided at the rear of the rig for stowing the optional engine probe assemblies.

DESCRIPTION (Figs. 1 to 15)

General

7 The fluid in the pressure vessels is pressurised by two nitrogen cylinders which are mounted, in the upright position, on the chassis forward of the pressure vessels. The nitrogen supply to the pressure vessels is controlled by a regulator which reduces the cylinder pressure down to 80 lbf/sq in. (5.51 bar). The reduced pressure is distributed to the top of each pressure vessel via a nitrogen inlet manifold. A 3/8 in. BSP half socket on the manifold provides for the installation of a blow-gun and nitrogen hose which can be used to clear the engine sensing lines.

8 When the vessels are pressurised, the fluid is forced up the outlet stack pipe to the appropriate fluid outlet isolation ball valve. From there it is directed through the filter to the 3-way engine selection ball valve which controls the output to the appropriate outlet hose. The outlet hoses are wound on stowages located, one at either side, towards the front of the rig. The hose on the right side of the rig (as viewed from the front) is 21 ft (6.4 m) long, 3/4 in. NB; the left hand hose (as viewed from the front of the rig) is 20 ft (6 m) long, 1/2 in. NB. Quick release couplings are installed on the end of each hose. Rubber protective collars are installed on the end of each hose to protect the couplings from damage.



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Electrical system

8 The 2 x 25 gallon (50 gallon) multi-engine compressor wash rig has two 6 kW immersion heaters that require a 115V/200V, 3-phase AC, 400 Hz electrical power supply. The rig is available with two options; without interlock and with interlock.

8.1 Without interlock (GPU) (Figs. 5 and 7) Rigs without interlock are primarily for use with ground power units. To enable the power supply to connect to the rig, the control switch on the GPU must be set to 'BYPASS'.

8.2 With interlock (Hangar and GPU) (Figs. 6 and 8). Rigs with interlock are for use in hangars and with a ground power unit (GPU) where an interlock system is required to enable the GPU to apply power. A 12V battery installed in the rig electrical enclosure provides the power necessary for the interlock to operate and allow the power supply to be connected to the rig.

NOTE

Other optional electrical systems are available for use with the 2 x 25 gallon (50 gallon) multi-engine compressor wash rig. For details refer to the Appendix of this manual.

Immersion heaters (Figs. 1 to 8)

9 To promote better cleaning, an immersion heater is installed at the bottom of each pressure vessel to heat the fluid to a temperature 70° C. The immersion heaters are controlled from an electrical control box at the front of the rig via an isolator switch. Two red (POWER ON) indicator lights indicate that electrical power is applied to the rig. STOP and START pushbuttons are provided for each immersion heater. Green (HEATER ON) indicator lights, one for each immersion heater, are located above the applicable STOP and START pushbuttons to indicate that the immersion heater is operative. When the green (HEATER ON) indicator light is out it indicates that the fluid in the vessel has reached the pre-determined temperature of 70° C and the immersion heater is switched off. During the heating cycle the green (POWER ON) indicator light will illuminate and extinguish at regular intervals to indicate that the immersion heater is keeping the fluid at 70° C. Pressing the STOP pushbutton(s) switches the immersion heater(s) off. Setting the isolator switch to the off (O) position) switches off the electrical supply to the heater system.

Sight glasses

10 Sight glasses, installed on each pressure vessel, give visual indication of the quantity of fluid in each pressure vessel. A metal guard, which incorporates a scale calibrated in imperial gallons and litres, is fitted to each sight glass. The maximum indication is 25 imperial gallons (113.5 litre).

Nitrogen cylinders

11 The two nitrogen cylinders each have a capacity of 70 cu ft. (1996 litres) with a maximum charging pressure of 2500 lbf/sq in. (172.4 bar). Each cylinder is controlled by a handwheel valve fitted on the outlet of the cylinder. Rotating the handwheels anti-clockwise opens the valves. A re-charging manifold, to which a charging valve is fitted, is connected to the nitrogen cylinders. The charging valve (Part No. MS28889-2) facilitates recharging of the two nitrogen cylinders without removing them from the rig. The valve connection is common to all aircraft hangars, i.e. male thread 0.305 x 32. An accessory valve, Part No. SM297-1, to fit on the delivery hose of your nitrogen trolley for connection to this valve is available.

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High pressure regulator

12 The high pressure regulator is a multi-stage device which reduces the high pressure in the nitrogen cylinders from 2500 lbf/sq in. (172.4 bar) to 80 lbf/sq in. (5.5 bar). A 0 to 6000 lbf/sq in. (0 to 414 bar) pressure gauge, fitted to the regulator, indicates the pressure in the nitrogen cylinders. A 0 to 230 lbf/sq in. (0 to 16 bar) pressure gauge (reference only) indicates the maximum regulated output (the max. deliverable pressure is 80 lbf/sq in. (5.5 bar)).

Non-return valves

13 A non-return valve is fitted in each vessel nitrogen inlet line, prior to the inlet ball valves. The non-return valves eliminate any back pressure from the vessels and prevent fluid entering the nitrogen supply lines. A further non-return valve is fitted in the line between the high pressure regulator and the nitrogen inlet manifold. This non-return valve prevents air from an outside air supply source entering the high pressure regulator.

Steam pressure relief valves

14 A steam pressure relief valve is fitted to the top of each pressure vessel to relieve pressure in the vessel overboard to the base of the frame. The relief valves are pre-set to vent at 80 lbf/sq in. (5.5 bar).

Pressure gauges

15 A stainless steel pressure gauge is fitted to the top of each pressure vessel. To provide for smooth movement and protect the gauge from shock they are filled with glycerine. Each pressure gauge has a scale which indicates 0 to 100 lbf/sq in. (0 to 6.9 bar). A steel guard protects each pressure gauge from accidental damage.

Filler caps

16 The filler caps, which are fitted to the top of each pressure vessel, incorporates a sealing washer and a hinged cross-bar, fitted with a hand screw and link plates which form a catch. The filler caps are opened by rotating the hand screws and pressing the caps downwards to release the catch. The filler orifices are fitted with wire gauze strainers. After the pressure vessels have been filled with fluid the filler caps must be secured before nitrogen pressure is applied to the vessel. The filler caps must be closed when heating the fluid.

Fluid filter (Fig. 4)

17 The fluid filter houses a 120 mesh stainless steel, cleanable element. The stainless steel bowl of the fluid filter is secured to an aluminium alloy filter head by a stainless steel bolt. The filter element is held against the filter head by a stainless steel spring situated in the bottom of the bowl. Fluid is forced under pressure from the supply vessel and enters the filter inlet port situated in the filter head. The fluid then passes through the filter element to a central passage which connects to a filter outlet port, also situated in the filter head.

Fluid outlet ball valves

18 The fluid outlet from each pressure vessel is controlled by a 3/4 in. BSP ball valve.

3-way engine selection ball valve

19 The 3-way engine selection ball valve selects the applicable output hose. The ball valve comprises a 3/4 in. BSP valve and can be set in two designated on positions, A and B, and one off position.



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20 Position A selects the 3/4 in. bore delivery hose which on earlier rigs was marked GE90 and CF6-80C2. Position B selects the 1/2 in. bore delivery hose which on earlier rigs was marked CFM56 and V2500. For details of optional engine washing probe types and the engine types applicable to the washing probes that can be used at each position refer to Table 1.

Chassis

21 The chassis is rigidly manufactured from mild steel rectangular box section. A solid axle, which has two wheels fitted to it, is attached to the rear of the chassis. The front of the chassis is supported by a single wheel, which is mounted on a heavy duty steering castor unit. The castor unit has a towing arm attached which is fitted with a standard NATO eye. The three wheels are heavy duty type and are fitted with 16 in. diameter solid super elastic tyres.

Accessories

22 The following accessories are installed on the rig:

22.1 Dual delivery hose. Used to operate two probes from one outlet. Stowed in the rear stowage box.

22.2 Immersion heater spanner. Used to remove the immersion heaters. Installed in the front stowage box.

22.3 Blow-off gun and nitrogen hose. Used to clear fluid from pressure sensing lines on the engines. The nitrogen hose for the blow-off gun connects directly to the nitrogen inlet manifold on the engine compressor wash rig, on which an outlet is provided.

Optional accessories

23 The optional washing probes for different engine types are detailed in Table 1. A stowage for these probes is available in a box at the rear of the rig.

Table 1 Optional engine washing probe types

Aircraft type	Probe type	Part No.	3-way engine selection ball valve position	
			A = ¾ in.	B = ½ in.
Boeing 737-300-400	CFM56-3	JMP/CFM56/D/4538		B
Airbus A320 Re-Engined DC8, AWACS	CFM56-2 & 5A	JMP/CFM56/D/4435		B
Airbus A321	CFM56-5B (Long Probes Thrust Reversers closed) 89"	JMP/CFM56/D/6527		B
Airbus A320, A340	CFM56-5B/C	JMP/CFM56/D/4605		B
Boeing 737-700/800	CFM56-7	JMP/CFM56/D/4462		B
Boeing 737-700/800	CFM56-7B (Long Probes Thrust Reversers closed)	JMP/CFM56/D/6645		B
* Sukhoi Superjet 100	SaM 146	JMP/SaM146/D/6797		B
(MDC)DC-10-30	CF6-50	JMP/CF6/D/4966	A	
(MDC)MD-10-10/DC-10-30	CF6-6D/6K/-50	JMP/CF6/D/4510	A	
Boeing 747/767	CF6-80C2	JMP/CF6/D/4037	A	
(MDC)MD-11. Airbus A300, A310	CF6-80C2 D1F/A5F/A5/A3	JMP/CF6/D/6418	A	



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Table 1 Optional engine washing probe types (Continued)

Aircraft type	Probe type	Part No.	3-way engine selection ball valve position	
			A = ¾ in.	B = ½ in.
Airbus A310	CF6-80A2/A3	JMP/CF6/D/4247	A	
Boeing 747/767	CF6-80C2			
Airbus A330-200 (MDC)MD-11	CF6-80E1 (Long Probes			
Airbus A300-600F	CF6-80C2 D1F Thrust			
Airbus A310-200F	CF6-80C2 A5F. Reversers	JMP/CF6/D/6511	A	
	CF6-80C2 A3 closed) 98"			
Airbus A330	CF6-80E1	JMP/CF6/D/4947	A	
Boeing 777	GE90 (Short Probes)	JMP/GE90/D/4081	A	
Boeing 777	GE90 (Long Probes			
	Thrust Reversers closed)			
	127 1/2"	JMP/GE90/D/4599	A	
Boeing 777-300ER	GE90-115B (Short Probes)	JMP/GE90-115B/D/4949	A	
Boeing 777-300ER	GE90-115B (Long Probes			
	Thrust Reversers closed) 135"	JMP/GE90-115B/D/4948	A	
*Boeing 787	GENx	JMP/GENx/D/6783	A	
*Boeing 787	GENx (Long Probes			
	Thrust Reversers closed)	JMP/GENx/D/6698	A	
Embraer 170 & 175	CF34-8C/E			
Bombardier CRJ700,				
CRJ900, CRJ1000				
Bombardier Challenger				
870, 890		JMP/CF34/D/6553		B
Embraer 190 & 195	CF34-10E	JMP/CF34/D/6000		B
Boeing 757	RB211-535E4	JMP/RB211/D/4153		B
Boeing 747-400	RB211-524 G & H Long			
	Probes 178"	JMP/RB211/D/4249		B
Airbus A320	V2500	JMP/V2500/D/4040		B
Airbus A320	V2500 (Long Probes			
	Thrust Reversers closed) 160"	JMP/V2500/D/6561		B
(MDC)MD-90	V2525 D5	JMP/V2500/D/4703/MD		B
(MDC)MD-90	V2525 D5 (Long Probes			
	Thrust Reversers closed)	JMP/V2500/D/6562/MD		B
Airbus A340-600	TRENT 500	JMP/TRENT/D/6188	A	
Airbus A340-600	TRENT 500 (Long Probes			
	Thrust Reversers closed)	JMP/TRENT/D/6615	A	
Airbus A330	TRENT 772	JMP/TRENT/D/4702	A	
*Airbus A330	TRENT 772 (Long Probes			
	Thrust Reversers closed) 185"	JMP/TRENT/D/6592	A	
Boeing 777-200ER	TRENT 800	JMP/TRENT/D/6328	A	
irbus A380-800/900	TRENT 900 (Long Probes			
	Thrust Reversers closed) 133"	JMP/TRENT/6776	A	
Boeing 787	TRENT 1000 (Long Probes			
	Thrust Reversers closed)	JMP/TRENT/D/6754	A	



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Table 1 Optional engine washing probe types (Continued)

Aircraft type	Probe type	Part No.	3-way engine selection ball valve position	
			A = ¾ in.	B = ½ in.
Boeing 767-200/300 Airbus A300/A310 (MDC)MD-11	P & W 4000-94" fan (PW 4152/4158/4462)	JMP/PW4000/D/4856	A	
Boeing 767-300 Airbus A300/A310 (MDC)MD-11 Boeing 747-400	P & W 4000-94" fan (Long Probes Thrust Reversers closed) 85"	JMP/PW4000/D/6601	A	
Airbus A330/200/300	P & W 4000-100" fan	JMP/PW4000/D/6216	A	
* Boeing 777-200 (MDC)MD-83	P & W 4077-112" fan (Long Probes Thrust Reversers closed)	JMP/PW4000/D/6728	A	
	P & W JT8D-219 (Long Probes Thrust Reversers closed)201"	JMP/JT8D/D/6627	A	
Boeing 747-200	P & W JT9D	JMP/JT9D/D/4154	A	
BAE 146, RJ70/100	Allied Signal LF507	JMP/LF507/D/4809		B
Ilyushin IL96	PERM PS-90A 185"	JMP/PERM/D/6581	A	

NOTES

- (1) * Denotes probes in development.
- (2) Each Juniper Part Number refers to a set of two probes.
- (3) For details of spray rings for Hercules and P3 Orion aircraft, washing wands and lances for Puma, Sea King and other helicopters, please contact A T Juniper direct.

