CEN19MA190 Powerplants Group Chairman's Factual Report

Attachment A

Fuel Control S/N 20565991 Acceptance Test Sheets January 15, 2020

PRATT & WHITNEY CANADA
ACCESSORIES BUSINESS

TEST RECORD SHEET
NO: TR. 1577 REV.:15

TEST AS RECEIVED
~~FINAL TEST~~ Investigation D

CS ORDER: Crash Investigation

PART NAME: FUEL CONTROL UNIT

TESTED IN ACCORDANCE WITH
WGC CMM 73-20-08 REV.08

PART NUMBER:
SUPPLIER P/N
8061-333

SERIAL NUMBER Q-.nGc}-1C\I

EXPORT CONTROL CLASSIFICATION

• Data is subject to the jurisdiction of the Export and Import Controls Bureau of the Department of Foreign Affairs and International Trade of Canada, Department of Commerce of the United States and/or Department of State of the United States.

•• Data is not subject to the jurisdiction of the Department of Commerce of the United States or Department of State of the United States but would become subject if exoosed to any US involvement.

Regulation	Class. Number
Canadian ECL(s)•	
ECCN(s)*	
P-ECCN(s)**	9E991
USML(ITAR)*	
P-USML**	

A- Pressure and internal leakage test - Ref. Table 114

P1 - Pb (psid)		
Min	Record	Max
---		1350

P1 -Pb {psid)		
Min	Record	Max
1200		---

Overboard drain leakage (cc/min)		
Min	Record	Max
---		0 33

Test Point	P/L (deg)	C/L (deg)	Wfi (pph)	Speed (rpm)	Pb (psig)	P3 (psia)	P1-Pb (psid)	Wfi-Wf (pph)
1 2	Max. Fwd	18	200	1000	60	Adj	150	85

Wfi - Wf (pph)		
Min	Record	Max
---		85

B- Lever torques - Ref. Table 126

Test Point	P/L (deg)	C/L (deg)	W (ppH	Speed (rpm)	P3 (psia)	Pn (psig)	Pb (psig)
2 1	Max Rev 18		1494	6000	120	900	60

	Torque (in. lb.) Min	Record
Rotate P/L [CW], record max. torque		
Rotate P/L [CCW], record max. torque		

Condition of unit precludes measuring P/L stops due to damaged PL linkage and stops. P/L stops and P/L torque considered unrelated to engine performance of interest.

Test Point	P/L (deg)	W (pph	Speed (rpm)	P3 (psia)	Pn (psig)	Pb (psig)
2 2	Max L 18	1149	4383		800	60

		Torque (in. lb.) Min	Record	Max
Rotate C/L from 18° to 0° : [CW]		---		20
Rotate C/L from 18° to 42° : [CCW]		---		14
Set C/L to maximum; Rotate P/L from Max Rev to Max Fwd:	[CW]	---		10
	[CCW]	---		10

C- Condition lever and shut down test - Ref. Table 116 Condition of unit precludes accurate positioning of P/L for idle checks due to damaged PL linkage. Low and high idle operation considered unrelated to engine performance of interest, given these are low power settings.

1. Idle and high idle test:

Set Power/Lever free to follow S/O lever, Pb = 50 psig Adj

	Test Point	C/L (deg)	Wfi (pph)	(psia)	Pn (psig)	Wf (pph)	Speed (rpm) Min	Record	Max
Low idle (-5°)	3 1a	18.5 ± 3	980	40	65	157	3935		3955
High idle	3 2a	Max	1090	48			43 3		4393
Transient resp. from Idle (P/L=-5°)	3 3a	18	980	40				3945	---

Ref. Table 119A

Quickly rotate P/L from low to max forward, No hesitation in flow Transient response: Acc. D Rej. D

Wfi (pph)	Speed (rpm)
	2181
	2181

	Min	Record	Max
Min. S/O Lever angle	-10		+10
Max. S/O Lever angle	38°		46°
C/L Lever rigging	17°		19°

Shutoff checks of FCU considered unrelated to engine performance of interest.

The export control classification with respect to this document is contained on the first page

0- Power lever test - Ref. Table 118

Set C/L angle to 18°, Pb = 50 psig Adjust and record speed required to obtain flow (Wf}

Test Point	P/L (deg)	Wfi (pph}	Pn (psig)	P3 (psia)	Wf (pph)	Speed (rpmJ Min	Record	Max
4 1	Max Rev	1320	205	78	311	5313		5333
4.2	Max. Fwd	1620	876	140	727	6502		6522
4.3	Arli	an	40		---	3559		3579

Condition of unit precludes accurate positioning of P/L for P/L checks due to damaged PL linkage. Governor droop schedule of section E verifies proper governor operation at the higher power condition of interest.

		Angle (deg} Min	Min	Min
4.4a	Record Max Reverse [P/L) stop angle	---		---
4.55a	Record angle where the Low Idle Stop screw first contact its Stop	---		---
	Record reverse travel · TP. 4.5 - TP 4.4	11		21
4 6a	Record angle where the Low Idle Stop screw lifts off its Stop	---		---
	Note: For Vector Aerosgace onlll lease set Dead Band at maximum limit of 14 ·			
	Record P/L Dead Band . TP. 4.6 - TP. 4.5	12		14
	Record max. forward P/L stop angle	53		59

E- Governor droop schedule - Ref. Table 125

Set C/L = 18°, Pb = 50 psig.

Test Point	P/L (deg)	Wfi (pph)	P3 (psia)	Speed (rpm) Min	Rec.	Max.	Pn (psig)		Wf recorded) Min	Record	ooh) Max
5.1	Max. fwd	1610	100		6469		538	Wf(1}	---	lt?	--- S'ilo
5.2	Max. fwd	1650	100		6636		317	Wf(2}	---	l..(C}(	---3<if l
								Wf(1) - Wf(2)	130	41-	195/(..<;
									C::: mP flnw <>c: in		p !'l 1
5 3	Max fwd							Wf(1)	---		---
5 4	50			9				Wf(4)	---		---
5 5	50			1(				Wf(5}	---		---
								Wf(4) - Wf(5)	24		36

Condition of unit precludes accurate positioning of P/L for governor checks due to damaged PL linkage. Low governor operation considered unrelated to engine performance of interest, given these are low power settings.

r - '-"Ut' ,.…., sc;r,.... ..,•c - '"'"· r ao1e r .c..c.

Set Speed = 5000 RPM , P/L at max.Fwd , C/L at 18°, inlet flow = 1244 pph, Pb = 50 psig

Test Point	COP (P3) (psia)	Pn (psig)		Norn. Flow	Recorded Wf (pph) Min	Record	Max
6.1	40	105	---	230	221	Il-fZ,	239
6.2	60	218	Wf(2}	345	331	"351	359
6.3	80	369	---	460	442	47(o	478
6.4	100	557	---	575	552	O '10	598
6.5	120	783	---	690	662	700	718
6.6	60	218	Wf(6}	---	---	3C,l..	---

	Min	Record	Max
Wf(6) - Wf(2) (pph)	-5	-J- ,S-	15

CDP (P3) Schedule can be run to verify proper flow scheduling. Additionally, bellows leak check to be completed by dwelling at TP 6.5 conditions for 20 minutes and monitoring Wf for drift. Pb may require lowering to help minimize external leakage from base plate during extend leak check.

The export control classification with respect to this doc

56D6 fPW\ 130 P3 WS -=- 1 - ® ro:v1 (i_ VV'

e,u,r = 73Sff @ra:l1'1 &v0-

G- CDP (P3), Py schedule · Ref. Table 123

Set P/L to max. , C/L = 18°, Speed = 5000 RPM , P3 = 100 psia, Wfi = 1244 pph, Pb = 50 psig.
Approach from higher P3 and speed

Test Point	Pn (psig)	Py (psia)	Norn. Flow	Recorded Wf (pph)		
				Min	Record	Max
7.1	525	95	553	531	St,,,0	575
7.2	342	75	438	421	l/S S"	455

CDP (P3) Py Schedule can be run to verify proper Py bleed flow scheduling.

H-Deceleration schedule - Ref. Table 124

Set P/L to Low Idle (-5°), C/L = 18°, Pb = 50 psig, approching from higher speed (6300 rpm), and P3 =130 psia, check flows.

Deceleration Schedule can be run to verify proper decel flow

Test Point	Inlet Flow (Wfi) (pph)	Pn (psig)	P3 (psia)	Speed (rpm)	Norn. Flow	Recorded "			
						Min	Record	Max	
8 1	1480	237	120	5938	300	270	Z. qs-	330	
8.2	1335	127	80	5354	200	180	Ic;· L.	220	
8.3	1200	56	40	4828	122	110	(z. o	134	
8.4	1090	31	14.7	4383	87.5	85	q z	90	Min. Flow

L. maybe off decel due to P/L damage

I- Start and acceleration test - Ref. Table 120

Set Pb = 50 psig

Remainder of Start and Acceleration schedule can be run to verify low P3 fuel flows.

Test Point	Wfi (pph)	Speed (rpm)	Pn (psig)	P3 (psia)	P/l:Adj, C/l: 18° Norn. Flow	Wf<ooh Min	Rec	Max	P/L: -5°. C/l: 18° Norn. Flow	Wf (ooh Min	Rec	Max	P/L: Max. Fwd, C/l:18° Norn. Flow	Wf (ooh Min	Rec	Max
9.1	200	810	31	15	92.5	87.5		97.5	87.5	82.5		92.5	87.5	82.5		92.5
9.2	300	1218	32	16.1	100	95		105	93	88		98	93	88		98
9.3	400	1604	34	17.7	112	107		117	102	97		107	102	97		107
9.4	475	1914	36	19.2	121	116		126	110	105		115	110	105		115
9.5	600	2418	39	22.2	140	135		145	128	123		133	128	123		133
9.6	705	2834	48	25.2	159	153		165	145	139		151	145	139		151
9.7	795	3196	55	28.2	---	---	---	---	--	---	---	--	162	156		168
9.8	915	3672	82	35	---	---	---	---	---	---	---	---	201	193		209
9.9	1145	4596	174	53	--	---	---	---	---	---	---	---	305	293		317
9.10	1360	5464	370	80	--	--	---	--	---	--	---	---	460	442		478
9.11	1434	5761	444	85	---	---	---	---	---	---	---	---	511	493		529
9.12	1500	6033	533	90	---	---	---	---	---	---	---	---	566	548		584
9.13	1559	6262	592	95	---	---	---	--	---	--	--	--	599	581		617

J- Maximum flow test

- Set Pb = 50 psig, *Ref Table 121*

10.1	1545	6200	925	140				750	740		760

Unit tested per referred documents and found: **Ace: D** **Rej:** D

July 24th, 2019

Tested By: _____

Validated By: [redacted]

- End of Report

[redacted] 1/16/2020