

OPERATING LIMITATIONS

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QUEBECAIR INC. REGULATIONS

POWER PLANT

1. The DC-3 airplane is fitted with two Pratt & Whitney R-1830(-94)M or -94 Twin Wasp radial, air-cooled single stage, single speed, supercharged 14 cylinder engines.
2. Engine Fuel and Oil Specifications
 - (1) Fuel - Grade 91/98 and 100/130. Fuel of a lower grade than 91/98 rating must not be used.
 - (2) Oil - ~~SAE~~ No. 100. w
 - (3) Engine Data - Standard Conditions

PRATT & WHITNEY R-1830(-94)M

Condition	Time Limit (Minutes)	RPM	MP (°Hg)	ALT (ft)	Throttle Position	BHP	Mixture Control	Fuel Flow per/eng. (Gals/hr.)
Take-off	1 (Normal)	2700	48	S.L.	Part	1200	A.R.	125
Maximum	5 (Mfrs.)		46	4800	Full	1200		
Take-off	5	2700	44	S.L.	Part	1125	A.R.	118
Normal			44	6000	Full	1150		120
Maximum	Unres- tricted	2550	41.5	S.L.	Part	1050	A.R.	105
Continuous			39.5	7500	Full	1050		
QBA Normal Climb	Unres- tricted	2250	35	S.L.	Part	740	A.R.	62.5
				11000	Full	800		67.5
QBA NORMAL Cruise	Unres- tricted	2050	28.5	S.L.	Part	625	A.L.	36.5
				2050	25.25	15000		Full

IMPORTANT: The EMERGENCY RICH position of the Mixture Control should

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POWER PLANT (continued)

only be used if the Automatic fuel control incorporated in the AUTO RICH & AUTO LEAN positions becomes inoperative. This Automatic control maintains the correct fuel/air ratio for all flight conditions, compensating for pressure (altitude) and/or temperature changes. In the EMERGENCY RICH position the fuel flow would become excessively rich with increase in altitude and/or temperature resulting in fuel waste and also incurring an actual power loss due to the excessively rich mixture.

ISSUED: January 10, 1957.

EFFECTIVE: January 1, 1957.

QUEBECAIR INC. REGULATIONS

CRUISE CONTROL CHART

PRATT & WHITNEY R1830-92 engines in auto-lean mixture.

Press. Alt.
& Std. Temp.

Correction for Carburetor Air
Temperature Difference from
Standard.

BHP	BHP/ENG			Correction for Carburetor Air Temperature Difference from Standard.
	525	550	575	
Sea Level RPM	2050	2050	2050	
15 ^o 5 MP	27.75	28.50	29.25	Add. 0.5 in. Man. Press. for each 10 ^o C above I.S.A.
Two Eng. Cal/HR	71	73	75	
1000'	2050	2050	2050	
13 ^o C	27.50	28.25	29.00	Subtract 0.5 in. Man. Press. for each 10 ^o C below I.S.A.
	71	73	75	
2000'	2050	2050	2050	
11 ^o C	27.25	28.00	28.75	
	71	73	75	
3000'	2050	2050	2050	
9.1 ^o C	27.00	27.75	28.50	
	71	73	75	
4000'	2050	2050	2050	
7.1 ^o C	26.75	27.50	28.50	
	71	73	75	
5000'	2050	2050	2050	
5.1 ^o C	26.50	27.25	28.25	
	71	73	75	
6000'	2050	2050	2050	
3.1 ^o C	26.25	27.00	28.00	
	71	73	75	
7000'	2050	2050	2050	
1.1 ^o C	26.00	27.00	28.00	
	71	73	75	
8000'	2050	2050	2050	
-.8 ^o C	25.75	26.75	27.75	
	71	73	75	
9000'	2050	2050	2050	
-2.8 ^o C	25.75	26.50	27.50	
	71	73	75	
10000'	2050	2050	2050	
-4.8 ^o C	25.50	26.25	27.50	
	71	73	75	

NOTES:

- To maintain constant climb or cruise powers above the altitude at which the engine reaches full throttle, increase engine speed 50 RPM for each 1000' above the full throttle altitude. (Critical altitude, the limit at which the engine(s) cannot develop any more manifold pressure).
- Climb 2250 RPM, 33" Hg. Man. Press. no Temp. or Alt. correction required.
- For descents or other low power manoeuvres as perhaps a simulated engine failure, it is well to remember that each 100 RPM required at least one inch Hg. manifold pressure. For example, 22" at 2200 RPM. Operation at high RPM and low manifold pressure should be kept to a minimum.

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Pilots Condensed Check Chart

Operating Condition	Eng. RPM	Max. Man. Pressure (Ins. Hg)	Alt (Ft)	Mixture Control	Carb. Heat	Oil Temp. °C			Oil Press. (psi)			Cyl. Head Temp (°C)			Cowl Flaps	Fuel Press. (psi)	
Pull Thru	-	-	-	Idle Cut-off	Cold	-	-	-	-	-	-	-	-	-	Full Open	-	-
Start	700	1/10-1/4 Throttle	-	Auto Rich	Cold	-	-	-	Must show 40 psi. in 30 secs.			-	-	-	Full Open	14	16
Warm up	1000	-	-	Auto Rich	Cold	40	68	85	40	85	110	120	150	200	Full Open	14	16
Ground Test	2000	22-24	-	Auto Rich	Cold	40	68	85	70	85	110	120	150	230	Full Open	14	16
Take-off Normal	2700	44.0	-	Auto Rich	Cold or as Req'd	40	68	90	80	85	110	Max 200 at start of Take-off 120 200 260			As req'd	14	16
Take-off Maximum	2700	48.0 46.0	S.L. 4800	Auto Rich	Cold or as Req'd	40	68	90	80	85	110	Max 200 at start of Take-off 120 200 260			As Req'd	14	16
Cruise Maximum	2250	28.0	15000	Auto Lean	As Req'd	40	68	85	75	85	110	120	200	230	As Req'd	14	16
Maximum Continuous	2250	41.5 39.5	S.L. 7500	Auto Rich	As Req'd	40	68	90	80	85	110	120	200	260	As Req'd	14	16
QBA Nor. Climb	2250	33	11000	Auto Rich	As Req'd	40	68	90	80	85	110	120	200	260	As Req'd	14	16
QBA Nor. Cruise	2050	MP for 550 BHP	S.L. 11000	Auto Lean	As Req'd	40	68	85	70	85	110	120	200	230	As Req'd	14	16
Descent	2050	-	-	-	As Req'd	40	68	85	70	85	110	120	200	230	As Req'd	14	16
Stop	Full Incr. RPM	-	-	Idle Cut-off	Cold	-	-	-	-	-	-	-	-	200	Full Open	-	-

ISSUED: January 10, 1957.

EFFECTIVE: January 1, 1957.

QUEBECAIR INC. REGULATIONS

CRUISE CONTROL CHART

PRATT & WHITNEY R1830-92/94 Cyl. engines in auto-lean mixture.

Press. Alt.
& Std. Temp.

Correction for Carburetor Air Temperature Difference from Standard.

	BHP/BMEP/ENG			
	600	625	650	686
BHP	600	625	650	686
BMEP	127	133	135	139
Sea Level	RPM 2050	2050	2100	2100
15°S	MP 30.25	30.75	31.25	32.40
Two Eng. G/HR	78	80	82	84
1000'	2050	2050	2100	2100
13°C	30.00	30.50	31.00	32.25
	78	80	82	84
2000'	2050	2050	2100	2100
11°C	29.75	30.25	30.75	32.00
	78	80	82	84
3000'	2050	2050	2100	2100
9.1°C	29.50	30.00	30.50	31.75
	78	80	82	84
4000'	2050	2050	2100	2100
7.1°C	29.25	29.75	30.25	31.40
	78	80	82	84
5000'	2050	2050	2100	2100
5.1°C	29.00	29.50	30.00	31.25
	78	80	82	84
6000'	2050	2050	2100	2100
3.1°C	28.75	29.25	29.75	31.00
	78	80	82	84
7000'	2050	2050	2100	2100
1.1°C	28.75	29.25	29.75	30.75
	78	80	82	84
8000'	2050	2050	2100	2100
-.8°C	28.50	29.00	29.50	30.50
	78	80	82	84
9000'	2050	2050	2100	2100
-2.8°C	28.50	28.50	29.50	30.40
	78	80	82	84
10000'	2050	2050	2100	2100
-4.8°C	28.25	28.25	29.25	30.25
	78	80	82	84

If Carb. Air Man. Press. is above Standard. Add. 0.5 in. for each 10°C above I.S.A. Add. 25 RPM for each 10°C above I.S.A.

If Carb. Air Man. Press. is below Standard. Subtract 0.5 in. for each 10°C below I.S.A. Subtract 25 RPM for each 10°C below I.S.A.

NOTES:

- To maintain constant climb or cruise powers above the altitude at which the engine reaches full throttle, increase engine speed 50 RPM for each 1000' above the full throttle altitude. (Critical altitude, the limit at which the engine(s) cannot develop any more manifold pressure).
- Climb 2300 RPM, 35" Hg. Man. Press. no Temp. or Alt. correction required.
- For descents or other low power manoeuvres as perhaps a simulated engine failure, it is well to remember that each 100 RPM required at least one inch Hg. manifold pressure. For example, 22 in. at 2200 RPM. Operation at high RPM and low manifold pressure should be kept to a minimum.

**QUEBEC AIR INC.
REGULATIONS**

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[REDACTED]

QUEBECAIR ^{INC.} REGULATIONS

SPEEDS

1. "Never Exceed"

	<u>I.A.S.</u>	^{C.R.S} <u>T.I.A.S.</u>
(1) Maximum Level Flight	201 mph (175k)	205 mph (178k)
(2) Maximum Glide or Dive V_{ne}	246 mph (214k)	250 mph (217k)
(3) With Flaps Extended	110 mph (96k)	112 mph (98k)
(4) With Landing Gear Extended Extended	156 mph (136k)	160 mph (139k)

2. "Minimum Controllability Speeds"

	<u>I.A.S.</u>	<u>T.I.A.S.</u>
(1) Minimum Lift-off and Critical Engine Failure Speed (110% Minimum Control Speed)	93 mph (81k)	97 mph (84k)
V_{mc} (2) Minimum Controllability Speed (One engine inoperative T.O. Power or less on operating engine)	84 mph (73k)	88 mph (77k)
(3) Minimum Initial Approach Speed for Landing	98 mph (85k)	102 mph (89k)
(4) Minimum Final Approach Speed for Landing (120% Stalling Speed-full flap)	85 mph (74k)	87 mph (76k)
(5) Minimum Speed for gradual retraction of flaps (overshoot)	84 mph (73k)	86 mph (75k)

stalling speed clean $mp=26200$ 68
21000
21000

CREW

1. The maximum crew consists of four persons, a Captain, a First Officer, a Cabin Attendant and an Observer.
2. The minimum crew for safe operation of the airplane is a Captain and First Officer.

WING FLAPS,

Take-off

1. Flaps are not used for take-off. GENERAL OPERATION

Final Approach & Landing

2. Flaps may be extended up to 45° (full flap) on final approach. The amount of flap to be used will depend on wind and runway conditions. Flap extensions over $\frac{1}{2}$ should not be used if it is necessary to land with a cross wind component. Under low wind conditions flap extensions of $\frac{1}{2}$ to full flap will lower the landing run. Under high gusty wind conditions flap extensions of 0 to $\frac{1}{2}$ should normally be used; this lowers any ballooning tendency in gusts and allows a little better aileron control under such conditions. With the wheels definitely on the ground, ballooning tendencies in high gusty winds may be lowered by raising the flaps during the landing roll.
3. Under slushy snow conditions or with water on the runways, zero or very little flap should be used to prevent flap damage; if used, flaps should be retracted as soon as possible after the wheels are on the ground.

QUEBECAIR ^{INC.} REGULATIONS

TAXIING

1. The "Landing Gear Safety Latch Lever" is to be locked to the floor at all times during taxiing.
2. Ensure that the Hydraulic Pressure Gauge reads above 500 Psi. *
3. Taxi by use of brakes and engines - apply pressure lightly on toe brake pedals.
4. Do not turn with one wheel locked.
5. Slow the airplane down when approaching a sharp turn, unlock the tail wheel and start the turn with the brakes, assisting the turn by accelerating the outboard engine.
6. If a severe application of brakes has been made at weights above 24,000 lbs., the main landing gear, its attachments and the adjacent wing structure should be immediately inspected for evidence of possible damage.
7. The airplane has large vertical stabilizer and rudder areas and it may be necessary to use differential throttle when taxiing under crosswind conditions.
8. Cowl flaps should be left open during taxiing to prevent overheating of the engines.
9. The maximum taxiing speed is to be 5 mph in the vicinity of obstructions. At all other times, it should be governed by the judgement of the Captain.
10. When taxiing at night use only one landing light except in the vicinity of obstructions when two may be used.