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INTRODUCTION

This chapter contains information concerning DC-3 performance calculations, standard power settings, powerplant performance and operations, and limitations.

GENERAL

The average fuel consumption (block-to-block) of the Pratt & Whitney R-1830-92 is 90 gallons per hour. Standard climb and cruise power settings will be used in accordance with appropriate Power Charts contained in this chapter.

OPERATION

SPEEDS

| | |
|---|------------|
| Normal Climb Speed | 115 |
| Single engine cruise speed | 115 to 120 |
| Normal inst. holding speed | 105 to 120 |
| Normal inst. approach speed | 105 |
| Normal inst. final apch. speed | 88 to 100 |
| Normal over the fence speed | 84 |
| 1.3 V _{so} (Short field landing) | 75 |

KIAS

TAKEOFF

Takeoff Performance

Minimum takeoff distance at 25,200 lbs. with no wind using 1200 BHP/Engine (48"/ 2700 RPM):

| | |
|-------------------------|------------------------------|
| <u>Density Altitude</u> | <u>Minimum takeoff dist.</u> |
| Sea level | 890 ft. |
| 5000 ft. | 1140 ft. |

Minimum takeoff distance at 25,200 lbs. with no wind using 1050 BHP/Engine (42"/ 2550 RPM):

| | |
|-------------------------|------------------------------|
| <u>Density Altitude</u> | <u>Minimum takeoff dist.</u> |
| Sea level | 1070 ft. |
| 5000 ft. | 1370 ft. |

CLIMB POWER

Normal climb power produces 700 horsepower with power settings at 2050 RPM and the mixture control in the AUTO RICH position. Normal fuel consumption during climb is 105 gallons per hour.

Set the manifold pressure in accordance with altitude and carburetor air temperature as indicated on the chart in the next column. Adjust the manifold pressure during climb and cruise as follows:

- At least every 1000 feet change in altitude.
- When a change occurs or any adjustment is made in carburetor air temperature.

Climb Power Chart

AUTO RICH

2050 RPM (700 BHP)

"CAT" = Carburetor Air Temperature

| CAT ° C | -20 | -10 | 0 | +10 | +20 | +30 |
|----------------------|--------------------------|------|------|------|---------------|------|
| Pressure Alt. | Manifold Pressure | | | | | |
| S.L. | 31.7 | 32.2 | 32.7 | 33.2 | 33.7 | 34.2 |
| 2,000 | 31.5 | 32.0 | 32.5 | 33.0 | 33.5 | 34.0 |
| 4,000 | 31.3 | 31.8 | 32.3 | 32.8 | 33.3 | 33.8 |
| 6,000 | 31.0 | 31.5 | 32.0 | 32.5 | 33.0 | 33.5 |
| 8,000 | 30.7 | 31.2 | 31.7 | 32.2 | Full Throttle | |
| 9,000 | 30.4 | 30.9 | 31.4 | | | |
| 10,000 | 30.1 | 30.6 | | | | |
| Above 10,000 | Full Throttle | | | | | |

This chart is used by setting 2050 RPM with the Mixture Control in AUTO RICH and then selecting the manifold pressure (IMP) on the basis of pressure altitude and Carburetor Air Temperature (CAT). These settings ensure constant BHP regardless of CAT or altitude until full throttle is reached. When it becomes necessary to climb above the full throttle gray area, climb at full throttle and 2050 RPM.

Climb Performance

Maximum rate of climb with gear up at sea level on a standard day:

| | |
|-------------------|------------|
| <u>BHP/Engine</u> | <u>FPM</u> |
| 1200 | 1410 |
| 1050 | 1220 |

CRUISE POWER

Normal cruise power produces 625 horsepower with power settings at 2050 RPM and the mixture control in the AUTO LEAN position. Normal fuel consumption with cruise power set is 93.75 gallons per hour.

Leveling off at the desired cruising altitude and setting cruise power should be accomplished as follows:

- Maintain climb power during level off until airspeed reaches the normal cruising airspeed.
- Set manifold pressure in accordance with altitude and carburetor air temperature as indicated on the following Cruise Control Chart.
- Place mixtures in AUTO LEAN position.
- Close cowl flaps (adjust as required by CHT).
- Trim aircraft for level flight.

Cruise Power Control Chart

AUTO LEAN

2050 RPM (625 BHP)

"CAT" = Carburetor Air Temperature

| CAT °C. | 0 | 10 | 20 | 30 | 40 | 50 | 60 |
|----------------------|--------------------------|------|------|------|------|------|------|
| Pressure Alt. | Manifold Pressure | | | | | | |
| 1,000 | 30.2 | 30.7 | 31.2 | 31.7 | 32.2 | 32.7 | 33.2 |
| 2,000 | 30.1 | 30.6 | 31.1 | 31.6 | 32.1 | 32.6 | 33.1 |
| 3,000 | 30.0 | 30.5 | 31.0 | 31.5 | 32.0 | 32.5 | 33.0 |
| 4,000 | 29.9 | 30.4 | 30.9 | 31.4 | 31.9 | 32.4 | 32.9 |
| 5,000 | 29.8 | 30.3 | 30.8 | 31.3 | 31.8 | 32.3 | 32.8 |
| 6,000 | 29.7 | 30.2 | 30.7 | 31.2 | 31.7 | 32.2 | 32.7 |
| 7,000 | 29.6 | 30.1 | 30.6 | 31.1 | 31.6 | 32.1 | 32.6 |
| 8,000 | 29.5 | 30.0 | 30.5 | 31.0 | 31.5 | 32.0 | 32.5 |
| 9,000 | 29.4 | 29.9 | 30.4 | 30.9 | 31.4 | 31.9 | 32.4 |
| 10,000 | 29.3 | 29.8 | 30.3 | 30.8 | 31.3 | 31.8 | 32.3 |

HOLDING

During holding operations, set the following Manifold Pressure settings with 2050 RPM in ISA conditions:

| <u>Altitude</u> | <u>Manifold Pressure</u> |
|-----------------|--------------------------|
| 1000 ft..... | 22.4 |
| 3000 ft..... | 22.0 |
| 5000 ft..... | 21.7 |
| 7000 ft..... | 21.3 |
| 9000 ft..... | 21.0 |
| 11,000 ft..... | 20.6 |

Increase the manifold pressure approximately 0.5 IMP for each increase of 10° C. above ISA. Approximate fuel flow with these settings will be 64 gallons per hour.

FUEL CONSUMPTION

The formula for calculating fuel consumption per engine is: 0.45 Lb. X BHP. Representative total fuel consumption calculations are listed below:

| <u>BHP/ Engine</u> | <u>Total Fuel Consumption (GPH)</u> |
|--|-------------------------------------|
| 625 | 93.75 |
| 700 | 105 |
| 800 | 120 |
| 1050 | 157.5 |
| 1200 | 180 |
| Min. consumption/ max. endurance | 49 |

DESCENT

Under normal conditions, descend at approximately 300 FPM. Normally the airspeeds in the descent will be from 135 KIAS to 185 KIAS depending on the rate of descent required to arrive at the airport at the appropriate altitude.

Maintain cruise power during descent. Leave the Mixture Control in AUTO LEAN until the Approach Checklist is accomplished. Reduce throttles to maintain CRUISE power manifold pressures as altitude is decreased. Do not allow manifold pressure to exceed the normal cruise power setting.

ROUGH AIR PROCEDURE

When rough air or turbulent weather conditions are encountered or anticipated reduce airspeed to V_A (120 knots).

Do not lower gear or flaps in severe turbulence unless it becomes necessary to increase the engine power to maintain the minimum Cylinder Head Temperatures.

SINGLE ENGINE OPERATION

Climb performance on a standard day with the critical engine inoperative and its propeller feathered at 25,200 pounds:

| <u>Altitude (ft. MSL/ METO Power)</u> | <u>FPM</u> |
|---------------------------------------|------------------|
| Sea Level | 425 |
| 6,300 | 200 |
| 9,200 | 100 |
| 10,800 | 50 |
| 12,500 | Absolute Ceiling |

LIMITATIONS

POWERPLANT

Engine rated power for takeoff and climb:

| <u>Power setting</u> | <u>BHP/ Eng.</u> |
|------------------------------------|------------------|
| 48"/ 2700 (T/O - 1 minute) | 1200 |
| 42"/ 2550 (Max. Cont./ METO) | 1050 |
| 36"/ 2350 (Initial Climb) | 800 |
| 31"/ 2050 (Normal Climb) | 700 |

Engine power settings for cruise:

| <u>Power setting</u> | <u>BHP</u> |
|-----------------------------------|------------|
| 31-33"/2050 (to 10,000 ft.) | 625 |

Operational Ceilings

The Absolute Ceiling with one engine operating is 12,500 feet.

Operational ceilings with two engines operating on a standard day:

| <u>Type</u> | <u>Altitude (ft.)</u> |
|------------------------|-----------------------|
| Absolute Ceiling | 26,500 |
| Service Ceiling | 24,800 |

Crosswind Limits

The critical crosswind component for this airplane has not been determined. The maximum crosswind component under normal conditions is 13 knots.

Tailwind Limits

This airplane has been demonstrated and approved for landings with tailwinds up to 9 knots.

SPEEDS

| <u>Speed</u> | <u>KIAS</u> |
|--|-------------|
| V _{SO} | 64 |
| V _{S1} | 68 |
| V _{MC} | 76 |
| V ₁ / V ₂ | 84 |
| V _R | 84 |
| V _X | 84 |
| V _{Xse} | 84 |
| V _Y | 91 |
| V _{Yse} | 95 |
| V _{LO} | 84 |
| V _A | 120 |
| V _{NO} | 158 |
| V _{NE} | 190 |
| V _{LE} | 148 |
| V _F (one-quarter flaps) | 135 |
| V _F (one-half flaps) | 99 |
| V _F (full flaps) | 97 |

———— End of Chapter ————