PART NO. 118450

PWA. O.I. 72

SPECIFIC OPERATING INSTRUCTIONS

TWIN WASP S1C3-G

DC-3 ENGINE

INSTALLATION ENGINEERING

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P R A T T & W H I T N E Y A I R C R A F T
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E A S T H A R T F O R D • C O N N E C T I C U T

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FOREWORD

These Operating Instructions are based on present information and are subject to amplification and revision as more information may become available.

Specific Operating Instructions for the Twin Wasp S1C3-G also apply to to the Twin Wasp S3C4-G when the latter is operating in low impeller ratio.

A general discussion of engine operation procedures can be found in the following Pratt & Whitney Aircraft publications:

The Aircraft Engine and Its Operation	PWA Oper. Instr. 100
The Use of Operating Curves	PWA Oper. Instr. 60

GROUND OPERATION

This section includes the normal procedures for starting, warm-up, and ground checks which may be the responsibility of either maintenance or flight crew personnel.

STARTING

CONTROL SETTINGS

Ignition	- Off
Mixture	- Idle Cut-off
Propeller	- High Rpm (Low Pitch
Carburetor Heat	- Cold (Off)
Filtered Air	- Unfiltered (Off)
Cowl Flaps	- Full Open
Oil Cooler Shutters	- Closed (or Automatic)
Throttle	- 1/10 to 1/4 Open (to give 800-1000 rpm after engine starts)

The following starting procedure is recommended with direct cranking starters.

1. Before starting the engine, note the manifold pressure gage reading, to use as a reference during subsequent power and magneto checks. This is field barometric manifold pressure.

2. Fuel supply - ON.

3. Auxiliary fuel pump - ON.

4. Motor engine over with the starter. If possible, watch propeller motion. At any sign of hesitation or stoppage, disengage the starter, turn off the auxiliary fuel pump and investigate. Do not prime until Step 6.

5. After the engine has turned freely fourteen blades for engines equipped with three-bladed propellers, to insure adequate oil supply being pumped to the reduction gears, turn ignition to BOTH. If less than one hour has elapsed since the previous shut-down, let it turn freely six blades and turn ignition to BOTH.

6. Prime while cranking - intermittently if engine is warm, continuously if cold.

7. After engine fires, slowly ease mixture control out of Idle Cut-off to Automatic Rich using prime as required until engine is securely started.

8. After engine starts, adjust throttle to 600-800 rpm, watching for oil pressure rise.

CAUTION: If oil pressure does not register on gage almost immediately STOP engine and investigate.

9. After oil pressure shows, adjust throttle to 1000 rpm for warm-up.

NOTE: If a start is not accomplished within a reasonable time, an investigation should be made to ascertain the cause.

WARM-UP

CONTROL SETTINGS

Mixture	- Automatic Rich
Propeller	- High Rpm
Carburetor Heat	- As required
Filtered Air	- As required
Cowl Flaps	- Full Open
Oil Cooler Shutters	- Closed (or Automatic)
Throttle	- 1000 Rpm

NOTE: With an extremely cold engine, the initial warm-up may have to begin at a lower speed if backfiring occurs at 1000 rpm.

The minimum requirement for warm-up of an engine cooled to ambient temperature is to run it until the oil temperature rises to 40°C, or during hot weather until an oil temperature rise occurs. Where practical an oil temperature of 60-75°C is desired before using increased power.

GROUND CHECKS

The purpose of the following ground checks is to provide assurance that engine operation is normal and satisfactory for flight. These are periodic checks, some of which are not necessarily performed prior to each take-off.

CONTROL SETTINGS

Mixture	- Automatic Rich
Propeller	- High rpm
Carburetor Heat	- Cold
Cowl Flaps	- Full Open
Oil Temperature	- 40°C minimum

1. Ignition Safety Check (1000 rpm). May be performed during warm-up.

a. Switch ignition from BOTH to RIGHT and back to BOTH.

b. Switch ignition from BOTH to LEFT and back to BOTH.

c. Switch ignition to OFF (momentarily) and back to BOTH.

A slight drop in rpm when operating on each separate magneto, and complete cutting out of engine at the OFF position indicates proper connection of ignition leads.

2. Propeller Governor Check

Check propeller governor according to manufacturer's recommendations.

3. Field Barometric Power Check

Open the throttle to field barometric manifold pressure. The rpm obtained will be approximately 2200, depending on the low pitch setting of the propeller.

When the rpm is once established for the installation, variation in altitude of various air fields will not change the rpm which results from opening the throttle to field barometric manifold pressure.

If the approximate check rpm cannot be secured at field barometric manifold pressure, either the engine is not delivering the correct power or the propeller is not set properly and an investigation should be made to determine the cause.

4. Magneto Check

a. Open throttle to field barometric manifold pressure.

b. Switch ignition from BOTH to RIGHT and back to BOTH.

c. Switch ignition from BOTH to LEFT and back to BOTH.

Normal drop-off in either RIGHT or LEFT position is 50 to 75 rpm and should not exceed 100 rpm. Difference in drop-off between RIGHT and LEFT should not exceed 40 rpm.

5. Fuel Pressure Check (approximately 2200 rpm)

Fuel pressure should be 15 ± 1 psi.

6. Oil Pressure Check (approximately 2200 rpm)

Oil pressure should be 80-90 psi at 60°C.

7. Carburetor Idling Mixture Strength Check (at desired idling rpm)

While observing the tachometer, slowly move the mixture control toward Idle Cut-off and note any changes in rpm. An immediate

drop-off in rpm indicates that the mixture strength is too lean which may cause backfiring during glide. A momentary rise of 20 rpm usually is desired, but different types of aircraft and types of operation may require a slightly richer (higher rpm rise) or leaner (lower rpm rise) setting.

NOTE: This check should be made in relatively still air with stabilized rpm and manifold pressure, and with cylinder head temperature at stabilized idling temperature. A strong wind or abnormal cylinder temperatures affect the rpm change. A magneto check should precede this check to insure proper functioning of the ignition system.

8. Consult airplane manufacturer's instructions for other engine equipment or accessories checks.

PREVENTION OF SPARK PLUG FOULING

Prolonged periods of idling may lead to the fouling of the spark plugs. "Clearing Out" of the engine at 10 minute intervals is recommended. This should be done by running the engine up to field barometric manifold pressure (indicated by manifold pressure gage reading before start) for one minute after each 10 minutes of idling. This recommendation is particularly pertinent during extended idling while awaiting runway clearance before take-off.

GROUND CHECK LIMITS

Throttle	- Set at field barometric manifold pressure
Magneto Check	- 100 rpm maximum drop-off
Oil Pressure	- 65 psi minimum
Fuel Pressure	- 14 psi minimum
Oil Inlet Temperature	- 85°C maximum
	- 40°C minimum
Cylinder Head Temperature	- 232°C maximum, 200°C or less desired

CAUTION: Never exceed 232°C cylinder head temperature during ground operation. Operation above 200°C should be confined to minimum possible period of high power running. Engine should be cooled below 200°C before shutdown.

STOPPING ENGINE

1. Idle until cylinder head temperature is less than 200°C.
2. At any idling rpm, move mixture control to Idle Cut-off.

3. When engine stops, turn ignition off.
4. Turn fuel selector off.

If Idle Cut-off does not stop engine:

1. Leave mixture control in Idle Cut-off.
2. Close throttle.
3. Turn ignition off.
4. Slowly open throttle.
5. Turn fuel selector off.

After stopping the engine, leave cowl flaps WIDE OPEN for at least 15 minutes.

FLIGHT OPERATION

This section includes normal procedures and precautions for flight, including take-off, climb, cruise, descent and landing, which are primarily the responsibility of flight crew personnel.

Before flight, check that engine is operating within ground check limits at field barometric manifold pressure.

PRE TAKE-OFF CONTROL SETTINGS

Mixture	- Automatic Rich
Propeller	- High Rpm
Auxiliary Fuel Pump	- As required by airplane manufacturer
Carburetor Heat	- Cold
Filtered Air	- As required
Cowl Flaps	- Full Open, until immediately before take-off
Cylinder Head Temperature	- 150-200°C desired, to allow for normal cylinder head temperature rise during take-off. 260°C maximum must not be exceeded during take-off.

TAKE-OFF

1. Immediately before take-off, adjust cowl flaps to a position suitable for take-off and initial climb.

2. Advance throttle for take-off (48.0 in. Hg at sea level).

3. Adjust propeller control as required to maintain 2700 rpm.

An alternate take-off rating of 47.0 in. Hg (sea level) and 2750 rpm is available.

POWER REDUCTION AFTER TAKE-OFF

1. Reduce manifold pressure to 42.5 in. Hg at sea level (minus 0.5 in. Hg for each 2500 feet above sea level).

2. Reduce rpm to 2550.

For further smooth reduction of power, it is suggested to first reduce manifold pressure by 4 in. Hg followed by a reduction of 200 rpm. Continue in successive steps until the desired rpm is obtained. Make final adjustment of manifold pressure.

CLIMB

CONTROL SETTINGS

Mixture	-	Automatic Rich
Propeller	-	Climb rpm - see below - 2550 maximum
Throttle	-	Climb manifold pressure - see below - 42.5 in. Hg maximum at sea level (minus 0.5 in. Hg for each 2500 feet above sea level)
Carburetor Heat	-	As required
Filtered Air	-	As required

An alternate normal rated power rating of 39.0 in. Hg maximum (sea level) and 2700 rpm is available (reducing manifold pressure to 38.0 in. Hg maximum at 10,000 feet).

1. Select desired climb power, based on Engine Operating Curve, and set climb rpm. Refer to Suggested Engine Operation Table.

2. Set manifold pressure for the chosen power and rpm, from the Engine Operating Curve, correcting for variation of carburetor air temperature from standard altitude temperature. Increase manifold pressure 0.5 in. Hg for each 10°C rise of carburetor air temperature above standard altitude temperature, or decrease 0.5 in. Hg for each 10°C that carburetor air temperature is below standard altitude temperature.

LIMITS

Cylinder Head Temperature - 260°C
- 200°C or less recommended (to the extent that is within the control of the operator)

Oil Inlet Temperature	- 100°C maximum
	- 40°C minimum
Oil Pressure	
2550 rpm	- 80 psi minimum
2200 rpm	- 65 psi minimum
Fuel Pressure	- 14 psi minimum
Carburetor Air Temperature	- 38°C maximum if preheat is used. No maximum limit if preheat control is in the COLD position.

ESTABLISHING CRUISE

1. After climb, trim the airplane for cruising flight.

2. The Engine Check Chart and Operating Curve Inst. 1680-11 specify a maximum cruise power of 700 bhp at 2325 rpm with Auto Lean mixtures. While it is possible to use this power and be within our maximum limits, experience obtained over many years indicates that cruise operation in excess of 600 bhp and 2050 rpm tends both to reduce engine overhaul life and to increase the frequency of malfunctions to a significant degree. Consequently Pratt & Whitney Aircraft recommends that cruise powers be limited to 600 bhp or less and that 2050 rpm be used at all powers for normal cruising. These recommendations have been incorporated in the Suggested Engine Operation Table on page 16.

3. Select the desired cruise power settings, based on the Engine Operating Curve. The manifold pressure for a chosen power and and rpm should be corrected for carburetor air temperature variation from standard altitude temperature. The correction is to increase manifold pressure 0.5 in. Hg for each 10°C that carburetor air temperature is above standard, or to decrease manifold pressure 0.5 in. Hg for each 10°C that carburetor air temperature is below standard altitude temperature.

4. Retain climb power while airplane is accelerating to anticipated air speed.

5. Close cowl flaps as cruising cylinder head temperatures are obtained with increased air speed.

6. Adjust throttle approximately to the selected manifold pressure for cruise.

7. Reduce engine speed to selected rpm for cruise.

8. Readjust throttle as required, to the selected cruise manifold pressure.

9. Readjust cowl flaps as required to maintain desired cylinder head temperature.

10. Move mixture control to Automatic Lean after engine has cooled to, or slightly below, normal temperatures for level flight.

CRUISING FLIGHT

CONTROL SETTINGS

Mixture Control	- Automatic Lean
Propeller	- Cruise rpm - see below - 2325 maximum
Throttle	- Cruise manifold pressure - see below - 31.0 in. Hg maximum at sea level, minus 1.0 in. Hg for each 5000 ft above sea level
Carburetor Heat	- As required
Filtered Air	- As required

LIMITS

Cylinder Head Temperature	- 232°C maximum - 200°C or less recommended (to the extent that is within the control of the operator)
Oil Inlet Temperature	- 85°C maximum - 60-75°C desired - 40°C minimum
Oil Pressure	
2200 rpm	- 65 psi minimum
1600 rpm	- 55 psi minimum
1400 rpm	- 45 psi minimum
Fuel Pressure	- 16 psi minimum
Carburetor Air Temperature	- 38°C maximum if preheat is used. No maximum limit if preheat control is in the COLD position.

The manifold pressure for a chosen power and rpm should be selected from the Operating Curves and corrected for carburetor air temperature variation from standard altitude temperature. This manifold pressure is the maximum to be used. Maximum manifold pressure as shown on these curves (corrected for temperature variation) must not be exceeded for the maximum power, rpm, and bmep permissible for Automatic Lean Operation.

ICING

ICING CONDITIONS

1. Visible moisture at temperatures below freezing, either in the form of clouds or as precipitation, forms impact ice in the airscoop and in or on the carburetor metering elements.

2. High humidity with a carburetor air temperature below $3^{\circ}C$ forms throttle ice on the carburetor throttle plate at part throttle.

3. High humidity with carburetor air temperatures in the range from $0^{\circ}C$ to $32^{\circ}C$ forms evaporation ice in the region between the carburetor and the impeller. Be alert for such icing which occurs at relatively high temperatures in sultry weather not generally associated with ice formation.

4. Prolonged exposure to severe low temperature conditions, from approximately minus $5^{\circ}C$ and below, can lower the fuel temperature to the point where it may cause icing in the internal passages of the carburetor during subsequent operation in high humidity atmosphere. This is known as mixture control bleed icing and is usually accompanied by severe enrichment of the mixture. It is most apt to occur if the aircraft is cold-soaked for many hours, possibly parked on a ramp. Experience to date indicates that it is not likely to occur if the temperature of the fuel entering the carburetor is at or above $0^{\circ}C$.

ICING PREVENTION

It is preferable to take action to prevent icing rather than have to rely on more drastic deicing procedures once it has occurred. When icing conditions are anticipated or encountered:

1. Set mixture control in Automatic Rich.

2. Apply preheat to maintain $32^{\circ}C$ (or up to $38^{\circ}C$ maximum) carburetor air temperature.

3. After carburetor air temperature and engine operation have stabilized, adjust mixture to the desired setting.

4. In flight it is desirable to use preheat at least 15 minutes before entering known or anticipated icing conditions, because preheat is most effective for prevention of ice and accompanying power loss if applied and maintained considerably in advance of encountering these conditions.

5. To prevent icing during take-off, maintain $32^{\circ}C$ up to $38^{\circ}C$ maximum carburetor air temperature during warm-up and ground run-

ning, but set preheat COLD several minutes before take-off. Keep preheat COLD for take-off and be ready to apply 32°C (or up to 38°C maximum) carburetor air temperature for ice protection during climb.

ICING INDICATIONS

When operating in icing conditions without carburetor preheat, there may be little warning that icing has occurred until it has progressed sufficiently to impair engine performance seriously. The following indications may accompany icing:

1. Decreasing power and airspeed at constant throttle and rpm, either with or without an accompanying decrease of manifold pressure. If there is no decrease in manifold pressure, the power loss is probably due to leaning or enrichment of the carburetor. If there is a reduction in manifold pressure the power loss is probably due to restricted airflow through the induction system.

2. A rapid loss of power, possibly accompanied by rough or erratic engine operation indicates severe leaning or enrichment of the carburetor.

3. Uneven response of manifold pressure to changed throttle settings due to ice jamming or sticking the carburetor throttle.

4. Erratic engine operation due to ice on metering elements, with resulting changes in mixture or mixture distribution to the cylinders.

DEICING PROCEDURE

If icing does occur, use the following deicing procedure, in sequence to eliminate the ice:

1. Shift mixture control to Automatic Rich.

2. APPLY FULL CARBURETOR PREHEAT CAPACITY. HOLD full preheat ON for 30 seconds.

CAUTION: If appreciable engine icing develops, the loss in power will be accompanied by a loss in preheat capacity, sharply reducing the effectiveness of full preheat in eliminating ice.

3. Check whether manifold pressure is restored by slowly returning preheat control toward COLD. If the increase in manifold pressure from full hot to full cold is consistent on successive checks, the ice is probably eliminated.

4. Adjust preheat to maintain 32°C carburetor air temperature.

When it is known that the temperature of the fuel is well below freezing which may cause power loss due to mixture control bleed icing:

1. Adjust preheat control to maintain maximum permissible preheat (38°C). This type of icing may require constant 38°C preheat for a considerable period of time (5 to 15 minutes or longer) before normal operation returns.

2. Readjust preheat to maintain 32°C carburetor air temperature.

EN ROUTE EMERGENCY

CONTROL SETTINGS

Mixture	- Automatic Rich
Propeller	
Below 9000 ft	- 2550 rpm maximum
Above 9000 ft	- 2700 rpm maximum
Throttle	
With 2550 rpm	- 41.0 in. Hg maximum
With 2700 rpm	- 38.0 in. Hg maximum
Carburetor Heat	- As required

LIMITS

Cylinder Head Temperature	- 260°C maximum
Oil Inlet Temperature	- 100°C maximum
	- 40°C minimum
Oil Pressure	- 80 psi minimum
Fuel Pressure	- 14 psi minimum
Carburetor Air Temperature	- 38°C maximum if preheat is used. No maximum limit if preheat control in the COLD position.

If more power is required for a short interval, increase rpm not to exceed 2700 and manifold pressure not to exceed 48.0 in. Hg.

CRUISING DESCENT

Flying conditions permitting, adjust throttle and/or propeller to maintain level flight cruise power during descent. If nature of flying conditions in descent requires a large reduction in power, reduce rpm as well as manifold pressure. For descents or other low power maneuvers, as perhaps a simulated engine failure, it is well to remember that each 100 rpm requires at least one inch Hg manifold pressure. For example 23 in. Hg at 2300 rpm. Operation at high rpm and low manifold pressure should be kept to a minimum.

Part throttle operation is often conducive to the formation of carburetor ice. If prolonged part throttle operation is required in icing atmosphere, especially in instrument weather, maintain the carburetor air temperature at 32°C.

APPROACH AND LANDING

CONTROL SETTINGS

Mixture	- Automatic Rich
Propeller Control Position	- As required
Throttle	- As required
Carburetor Heat	- Cold, unless definite ice forming conditions are present
Filtered Air	- As required
Cowl Flaps	- Slightly Open

Advance propeller control to high rpm position at a convenient time between landing and taxiing. After completing landing OPEN COWL FLAPS WIDE.

LANDING EMERGENCY

1. Advance throttle to 48.0 in. Hg maximum.

2. Adjust propeller control as required to maintain 2700 rpm maximum.

3. Adjust cowl flaps to keep cylinder head temperature below 260°C.

ENGINE CHECK CHART TWIN WASP (R-1830) SIC3-G ENGINE

CARBURETOR: PD-12H1 or PD-12H4

FUEL: GRADE 100/130 or 91/98
OIL: S.U.S. at 210°F - 100 or 120

POWER SETTINGS: CURVE INST. 1680-11
1680-12

FLIGHT OPERATING CONDITION					OPERATIONAL LIMITS							
POWER RATING OR SETTING	BHP	MIXTURE CONTROL POSITION	CRITICAL ALTITUDE	RPM	MAXIMUM MANIFOLD PRESSURE IN. HG	OIL INLET TEMP °C MIN.	OIL INLET TEMP °C MAX.	OIL PRESSURE PSI MIN.	OIL PRESSURE PSI MAX.	CYLINDER HEAD TEMP. °C RECOMMENDED	CYLINDER HEAD TEMP. °C MAX.	MAXIMUM CARB. AIR TEMP.°C (1)
Take-off (5 min.)	1200	Auto Rich	4800	2700	46.0 (48.0 S.L.)	40	100	80	110	150 to 200 (Pre Take-off)	260	38
Normal Rated Power	1050	Auto Rich	7000	2550	41.0 (42.5 S.L.)	40	85 (2)	80	110	200 or less	232 (3)	38
Normal Rated Power - Alternate	1000	Auto Rich	10,000	2700	38.0 (39.0 S.L.)	40	85 (2)	80	110	200 or less	232 (3)	38
Maximum Cruising Power (4)	700	Auto Lean	14,800	2325	28.0 (31.0 S.L.)	40	85 (5)	65	90	200 or less	232	38
Approach and Landing		Auto Rich		2300 (6)	As required	40	85	65			232	38

OIL PRESSURE: Desired adjustment at 2200 rpm and 60°C Oil Inlet Temperature: 80-90 psi
Normal Operating Range:
2550 - 2700 rpm - 80 - 110 psi
2000 - 2200 rpm - 65 - 100 psi
1600 rpm - 55 - 90 psi
1400 rpm - 40 psi minimum
Idling - 15 psi minimum

FUEL PRESSURE: 14-16 psi
Idling-7 psi

GROUND PROCEDURE CHECKS AND LIMITS (7)								
PROCEDURE	MIXTURE CONTROL POSITION	PROPELLER CONTROL	THROTTLE CONTROL	OIL INLET TEMP. °C MIN.	OIL INLET TEMP. °C MAX.	OIL PRESSURE PSI MIN.	OIL PRESSURE PSI MAX.	CYL. HEAD TEMP. °C (7) MAX.
Pre-start	Motor Engine Over With Starter							
Start	Idle Cut-off then Auto Rich	High rpm	1/10 to 1/4 Open			Show almost immediately		
Warm-up	Auto Rich	High rpm	1000 rpm		85	40		200
Ground Test	Auto Rich	High rpm	(9)	40	85	65	100	232 (8)
Stop (7)	Idle Cut-off	High rpm			85	15 for Idle		200 (8)

NOTES

(1) Limit on Carburetor Air Temperature applies only when preheat is used.

(2) 100°C allowed during climb.

(3) 260°C allowed during climb.

(4) Maximum bmep 140 psi when operating with Auto Lean mixture. bmep = 432 x bhp/rpm

(5) Desired normal 60-75°C.

(6) Propeller control setting, not actual rpm.

(7) Cowl flaps must be full open for all ground operation and for at least 15 minutes after shutdown.

(8) Operation above 200°C should be confined to the minimum possible period of high power operation. Engine should be cooled below 200°C before shutdown.

(9) Use field barometric manifold pressure. This reading may be obtained by reading the manifold pressure gage before starting the engine.

SUGGESTED ENGINE OPERATION TABLE TWIN WASP (R-1830) S1C3-G

CLIMB AND CRUISE - NO RAM (1,2)

POWER CONDITION	MIXTURE CONTROL POSITION	BHP (2)	RPM	MANIFOLD PRESSURE IN. HG (3,4)	CRITICAL ALTITUDE (5)	APPROX. FUEL GAL/HR/ENG.
CLIMB	AUTO RICH	640 - 700	2050	31.0	10,000	55
CRUISE	AUTO LEAN	600	2050	27.5 (30.5 S.L.)	13,000	45
CRUISE	AUTO LEAN	575	2050	26.5 (29.5 S.L.)	14,000	43
CRUISE	AUTO LEAN	550	2050	25.5 (28.5 S.L.)	15,000	41
CRUISE	AUTO LEAN	525	2050	24.0 (28.0 S.L.)	16,500	39
CRUISE	AUTO LEAN	500	2050	23.0 (27.0 S.L.)	17,500	38

NACA STANDARD DAY TEMPERATURES (2,4)

PRESSURE ALTITUDE - FEET	S.L.	2000	4000	6000	8000	10,000	12,000	14,000
O.A.T. OR C.A.T. - °C	15	11	7	3	-1	-5	-9	-13

O.A.T. IS OUTSIDE AIR TEMPERATURE

C.A.T. IS CARBURETOR AIR TEMPERATURE

NOTES

(1) CRITICAL ALTITUDES WILL BE INCREASED BY THE AMOUNT OF RAM DEVELOPED IN ANY PARTICULAR INSTALLATION.

(2) ALL POWER SETTINGS ARE BASED UPON NACA STANDARD ATMOSPHERIC CONDITIONS OF TEMPERATURE AND PRESSURE WITH NO CARBURETOR HEAT.

(3) THE MANIFOLD PRESSURES SHOWN FOR EACH CRUISE POWER SETTING INCLUDE BOTH THE MANIFOLD PRESSURE REQUIRED AT THE CRITICAL ALTITUDE AND THAT REQUIRED AT SEA LEVEL. THE THROTTLE CORRECTION REQUIRED TO OBTAIN A SELECTED BHP AT ANY ALTITUDE BELOW THE CRITICAL IS TO INCREASE THE MANIFOLD PRESSURE SHOWN FOR THE CRITICAL ALTITUDE BY APPROXIMATELY 0.2 IN. HG FOR EACH THOUSAND FEET THAT THE OPERATING ALTITUDE IS BELOW THE CRITICAL ALTITUDE.

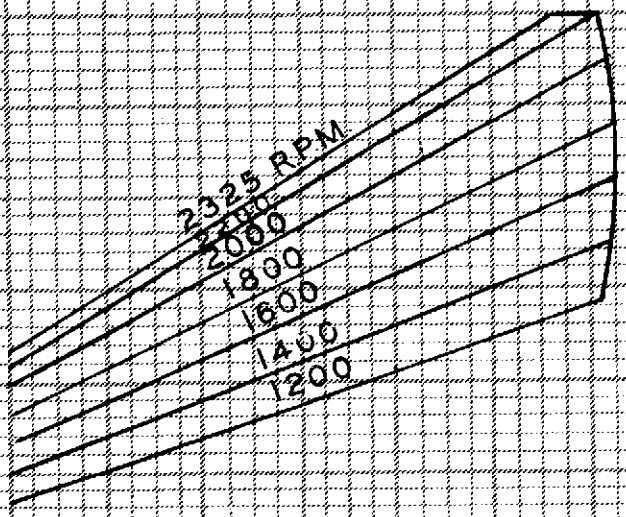
(4) THE PART THROTTLE MANIFOLD PRESSURE CORRECTION FOR ANY VARIATION FROM NACA STANDARD TEMPERATURE IS TO ADD APPROXIMATELY 0.5 IN. HG FOR EACH 10°C INCREASE ABOVE NACA STANDARD DAY VALUES, OR SUBTRACT 0.5 IN. HG FOR EACH 10°C BELOW NACA STANDARD DAY TEMPERATURES. THE FULL THROTTLE CORRECTION IS TO INCREASE ENGINE SPEED 20 RPM FOR EACH 12°C ABOVE STANDARD TEMPERATURE.

(5) 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 FEET ABOVE THE FULL THROTTLE (CRITICAL) ALTITUDE.

FORM CAL. 50
8-5-41

SEA LEVEL CALIBRATION HORSE POWER VS. MANIFOLD PRESSURE
WITH AUTO LEAN MIXTURE

TWIN WASP-SIC
AUTO LEAN O
HORSEPOWER AND M
WITHOUT RA



800
600
400
200
BRAKE HORSE POWER

PROBABLE MAXIMUM I
POWER ± 2
FUEL CONSUMPT
AUTO-LEAN ±

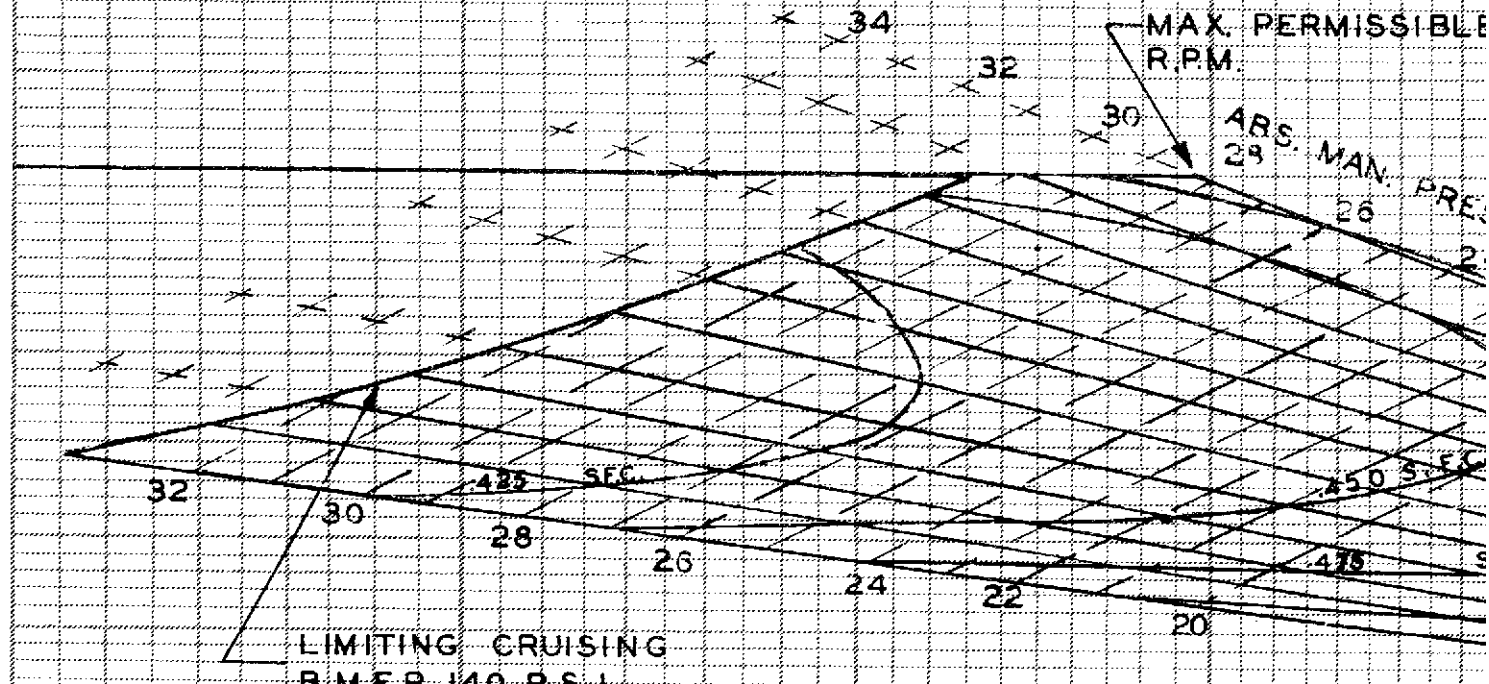
CALIBRATION TEMP
CYLINDER HEAD MAXIMUM
OIL INLET 140° TO 167° F.

20 22 24 26 28 30 32 34 36 38
ABSOLUTE MANIFOLD PRESSURE IN. HG.

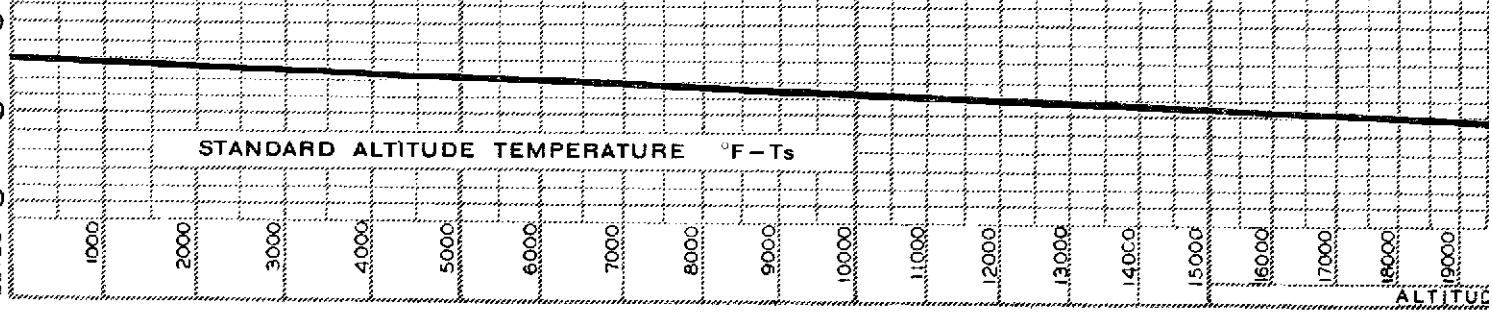
+100
0
-100
SEA LEVEL

ALTITUDE CALIBRATION — HORSE POWER AND MANIFOLD PRESSURE AT STAND
PHERIC CONDITIONS WITH **AUTO LEAN** MIXTURE

WASP-SIC3G
EAN OPERATION
R AND MAN. PRESS.
HOUT RAM



MAXIMUM TOLERANCES
± 2½ %
CONSUMPTION
-LEAN ± 4 %
N TEMPERATURES
MAXIMUM 450°F. (232°C.)
° TO 167°F. (60° TO 75°C.)



SPEC. NO.

CURVE NO. INST. 1680-11

ARD ATMOS.

PRATT & WHITNEY AIRCRAFT
ENGINE CALIBRATION

ENGINE MODEL TWIN WASP S1C3G
PROP GEAR RATIO .500, .5625, .667
COMPRESSION RATIO 6.7:1
IMPELLER GEAR RATIO 7.15:1
IMPELLER DIA., IN 11
FUEL METERING SEE NOTE BELOW
FUEL GRADE 100/130
DATE 2-24-43
REV 3-18-43
4-18-44
8-21-44
12-28-44

AUTO LEAN ISO S.F.C.

CRUISING B.H.P. AND

S. IN. HG.
22
20
2325
2200
2000
1800 R.P.M.
1600
500 S.F.C.
1400
1200

FUEL METERING
PD-12H1-1
PD-12H4-1

+100
0
-100

IN FEET
20000 21000 22000 23000 24000 25000 26000 27000 28000 29000 30000 31000 32000 33000 34000 35000 36000 37000 38000 39000 40000 41000 42000 43000 44000 45000 46000 47000 48000 49000 50000

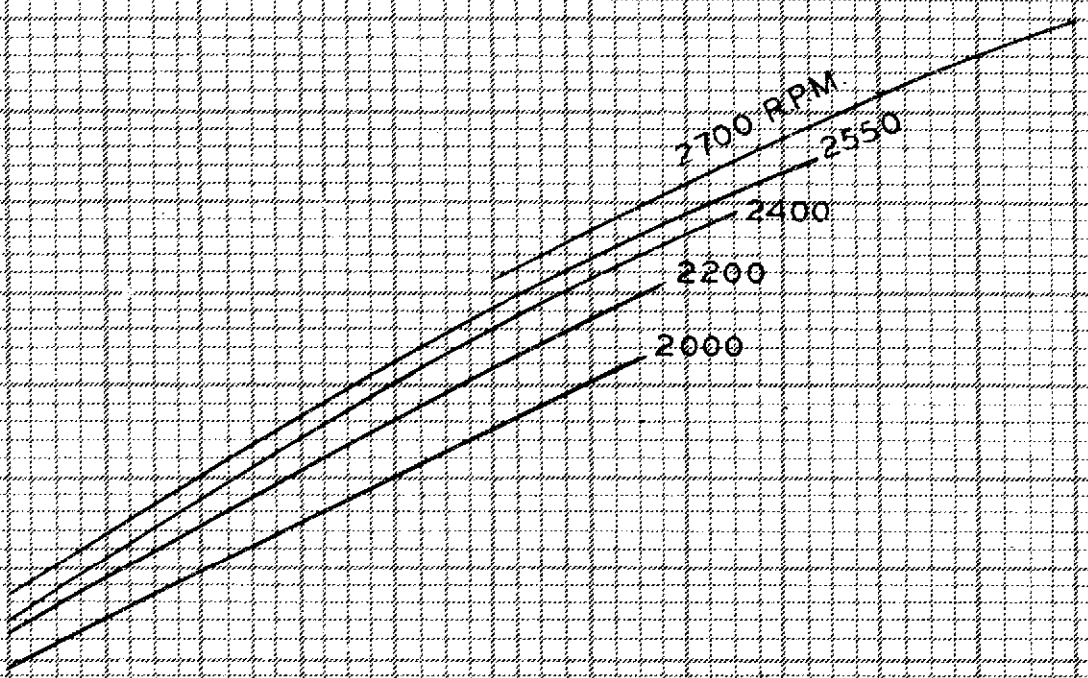
FORM CAL. 50
8-5-41

SEA LEVEL CALIBRATION HORSE POWER VS. MANIFOLD PRESSURE
WITH **AUTO RICH** MIXTURE

TWIN WASP—

AUTO RICH
HORSEPOWER AND
WITHOUT

ALTERNATE TAKE-OFF
2750 R.P.M. AT 47 IN. HG MAN PRESS.



120
POWER
100
80
HOR
60
40
BRAKE

PROBABLE MAXIM
POWER
FUEL CONSU
AUTO-RICH

CALIBRATION T
CYLINDER HEAD MAXI
OIL INLET 140° TO 16

+
-

26 28 30 32 34 36 38 40 42 44 46 48
ABSOLUTE MANIFOLD PRESSURE IN. HG.

URE

IN WASP — S1C3G

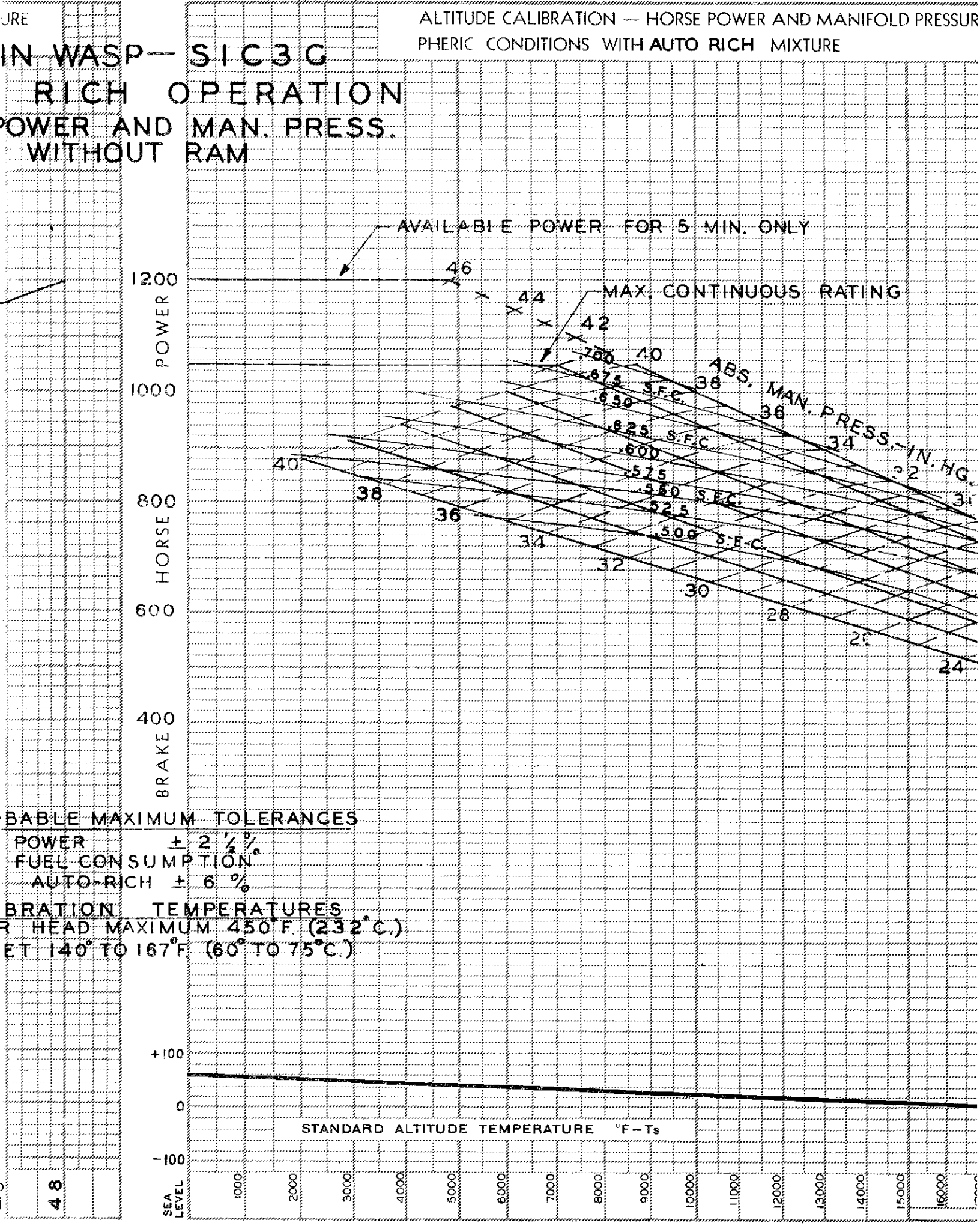
RICH OPERATION

POWER AND MAN. PRESS.

WITHOUT RAM

ALTITUDE CALIBRATION — HORSE POWER AND MANIFOLD PRESSUR

PHERIC CONDITIONS WITH **AUTO RICH** MIXTURE



BABLE MAXIMUM TOLERANCES

POWER ± 2 ½ %

FUEL CONSUMPTION

AUTO-RICH ± 6 %

BRATION TEMPERATURES

R HEAD MAXIMUM 450°F. (232°C.)

ET 140° TO 167°F. (60° TO 75°C.)

SPEC. NO

CURVE NO. INST.1680-12

E AT STANDARD ATMOS.

PRATT & WHITNEY AIRCRAFT
ENGINE CALIBRATION

ENGINE MODEL TWIN WASP S1C3G
PROP GEAR RATIO .500 .5625 .667
COMPRESSION RATIO 6.7:1
IMPELLER GEAR RATIO 7.15:1
IMPELLER DIA., IN 11
FUEL METERING SEE NOTE BELOW
FUEL GRADE 100/130
DATE 2-26-43
REV 3-17-43
5-16-44
12 23-44
4-6-45

FUEL METERING
PD-12H1-1
PD-12H4-1

AUTO RICH ISO S.F.C.