ENGINE CHECK CHART WASP (R-1340) S3H1 & S3H1-G ENGINES

CARBURETOR: NA-Y9J, and others (1) FUEL GRADE: 80/87 (5) POWER SETTINGS: CURVE INST. 7333-1 & -2

OIL S.U.S. at 210°F: 100 or 120

OPERATING CONDITION	BHP	PROP CONTROL OR RPM	MAX. MANIFOLD PRESS. IN. HG	MIXTURE CONTROL (1)		MIN. F/A FOR MANUAL LEANING	OIL-IN. TEMP. °C		OIL PRESS.		CYL. HEAD TEMP. °C MAX. (7)	CARB. AIR TEMP. °C MAX. (6)
				NA-Y9J	Others		MIN.	MAX.	MIN.	MAX.		
Start		Low, then High rpm (2)	1/10 to 1/4 throttle	Auto Rich	Full Rich				Pressure to show almost immediately			
Warm-up		High rpm (2)	1000 rpm	Auto Rich	Full Rich			93			232	
Ground Test		High rpm (2)	(4)	Auto Rich	Full Rich		40	93	60		232	
Take-off — 80/87 Fuel	600	2250	36.0 (8)	Auto Rich	Full Rich		40	93	70	90	260	38
Alternate Take-off (Grade 91/96 Fuel)	600	2250	36.5 (8)	Auto Rich	Full Rich		40	93	70	90	260	38
Normal Rated Power — 80/87 Fuel	550	2200	33.5 (8)	Auto Rich	Full Rich	0.092	40	93	70	90	260	38
Alternate NRP — 91/96 Fuel	550	2200	34.0 (8)	Auto Rich	Full Rich		40	93	70	90	260	38
Max. Cruise	400	2000	26.0	Auto Lean	Rich Best Power	0.080	40	93	60		232	38
Max. Economy	400 or less	1900 or less	27.5 or less	Auto Lean	Lean Best Power	0.072	40	93	50		232	38
Dive or Max. Overspeed		2640 max. (3)	Over 12 (3)	Auto Rich	Full Rich		40	93				
Glide and Approach		2000 (2)	As required	Auto Rich	Full Rich		40	93	60		232	
Stop		High, then Low rpm (2)	Idle	Idle Cut-off	Idle Cut-off				10 for Idle		200	

OIL PRESSURE: Desired adjustment at 2000 rpm, 60°C Oil-Inlet Temp.: 75-85 psi

Normal Operating Range:

2000 rpm	60 psi minimum
1400-1800 rpm	50 psi minimum
Idling	10 psi minimum

FUEL PRESSURE:

Above 1200 rpm 5 ± 1 psi

Below 400 rpm 2 psi minimum

NOTES

(1) The NA-Y9J carburetor incorporates an automatic mixture control unit to maintain uniform mixtures in Auto Rich or Auto Lean. Other models do not have this unit and require manual mixture adjustment to compensate for changes in altitude and temperature.

(2) Propeller Governor Setting: High rpm is full low pitch; low rpm is full high pitch. Counterweight type propellers are stopped and started in low rpm for mechanical reasons.

(3) During dives or rapid descent, use as high a manifold pressure as practicable, preferably over 12 in. Hg, to reduce masterod bearing loads. The maximum rpm (2640) is time limited to 30 seconds maximum.

(4) Set field barometric manifold pressure, which is equal to that shown on manifold pressure gage before starting. (Approx. 30 in. Hg at Sea Level.)

(5) The ratings for this engine are based upon grade 80/87 fuel. If it is desired to use grade 91/96 or higher, increased take-off and normal rated manifold pressures may be used as shown in these charts. Higher grade fuels are less desirable due to increased lead content.

(6) Carburetor air temperature limit of 38°C max. applies only when Preheat is used. With NA-Y9C carburetors, always maintain 32°C. CAT for cruise and climb; with other carburetors, 32°C is desirable for best climb and cruise operation.

(7) For all ground and flight operation, 200°C cylinder head temperature or less is recommended for normal use.

(8) Max. manifold pressure limit at sea level. For limits at altitude, refer to Suggested Engine Operation Table on next page.

SUGGESTED ENGINE OPERATION TABLE

TAKE-OFF, CLIMB, and CRUISE — NO RAM (4)

POWER CONDITION	% NORMAL RATED POWER	BHP (2)	RPM	MANIFOLD PRESSURE IN. HG	MIXTURE		APPROX. FUEL GAL./HR.	CRITICAL ALTITUDE (1)
					NA-Y9J	OTHER (5)		
Take-off — 80/87 Fuel		600	2250	35.5	Auto Rich	Full Rich	65	3,000
Take-off — 91/96 Fuel		600	2250	36.0	Auto Rich	Full Rich	66	4,500
Normal Rated — 80/87	100	550	2200	32.5	Auto Rich	Full Rich	55	5,000
Normal Rated — 91/96	100	550	2200	33.0	Auto Rich	Full Rich	56	4,500
Climb	91	500	2200	29.5	Auto Rich	Full Rich	47	8,000
Climb	82	450	2100	27.5	Auto Rich	Full Rich	40	9,000
Climb	73	400	2000	26.0	Auto Rich	Full Rich	34	10,500
Max. Cruise	73	400	2000	26.0	Auto Lean	0.080	32	10,300
Cruise (3)	64	350	1900	23.5	Auto Lean	0.072	28	12,500
Cruise	64	350	1800	25.0	Auto Lean	0.072	28	10,500
Cruise	64	350	1700	27.0	Auto Lean	0.072	28	8,100
Cruise (3)	55	300	1800	21.5	Auto Lean	0.072	25	14,500
Cruise	55	300	1650	23.5	Auto Lean	0.072	24	11,500
Cruise	55	300	1500	26.5	Auto Lean	0.072	24	7,500
Cruise (3)	45	250	1700	19.0	Auto Lean	0.072	22	17,000
Cruise	45	250	1550	21.5	Auto Lean	0.072	21	13,500
Cruise	45	250	1400	24.0	Auto Lean	0.072	21	9,800

NOTES

(1) Critical altitudes will be increased by the amount of ram developed in any particular installation.

(2) Specified bhp is at the critical altitude shown, at the designated rpm, manifold pressure, and mixture settings. To obtain this bhp at lower altitudes with part throttle, increase manifold pressure approximately 0.3 in. Hg for each thousand feet below the critical altitudes shown.

(3) The cruise power settings include a range of rpm, the highest rpm being on propeller load and the lowest at approximately 120 bmep. $\left(\text{bmep} = 591 \times \frac{\text{bhp}}{\text{rpm}}\right)$

(4) All power settings are based upon NACA standard atmospheric conditions of temperature and pressure with no carburetor heat. During climb, cruise and descent, it is desirable whenever practicable to maintain 32°C carburetor air temperature for best engine operation. With NA-Y9C carburetors, 32°C CAT must be maintained during climb and cruise. This will require increased manifold pressure at part throttle and increased rpm at full throttle to obtain the specified power. The correction amounts to about 0.5 in. Hg more manifold pressure (part throttle) or 20 more rpm (full throttle) for each 10°C increase above NACA standard day values.

(5) For carburetors not equipped with automatic mixture control units, and when above 5000 feet altitude, lean the mixture to the minimum required for smooth engine operation, or to the desired F/A ratio if such instrumentation is provided.