SECRET

D.H. 98

DE HAVILLAND MOSQUITO

Mks. VIII, IX and XVI

(Merlin 72, 73, 76 and 77)

OPERATIONAL PERFORMANCE NOTES

These notes must not be taken into the air

D.H. Aero Dept/6/G.W.T./98.

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DE HAVILLAND MOSQUITO

Mks. VIII, IX and XVI

MERLIN 72, 73, 76 & 77 ENGINES

OPERATIONAL PERFORMANCE NOTES.

300

Issued by

THE DE HAVILLAND AIRCRAFT CO., LTD.

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INTRODUCTION

The following notes, tables and diagrams are intended to give a general picture of the performance and economy of the Mosquito (Mks. VIII, IX and XVI) together with instructions for the most efficient operation of the aircraft under all usual conditions, and the main differences in performance between these versions and those with Merlin 21 type engines. They are compiled to cover all types of Mosquito with the above engines, (Bomber, P.R., etc.) and are given for two weights, 22,000 lb. and 18,500 lb. which correspond approximately to the weight of the bomber on the outward and homeward journeys respectively. On the outward journey, the weight of the P.R. Mosquito is about 21,000 lb. and thus the outward A.M.P.G. will be correspondingly increased above that of the bomber. Many of the recommendations are the same as for the Merlin 21 type Mosquito, but the figures quoted for speed and range will be found to be different.

In quoting range and performance figures it has been assumed throughout that external fuel tanks and air intake snowguards are fitted.

MOSQUITO VERSIONS

Mark No.	Duties	Engines
VIII	P.R.	Merlin 72
IX	P.R.	" 72 or 76
IX	Bomber	" 72 or 76
XIV	Night Fighter	" 67
XVI	P.R. (Pressure Cabin)	" 73 or 77
XVI	Bomber (Pressure Cabin)	" 73 or 77

These notes cover all versions with Merlin 72 and 73 engines

When the Merlin 76 and 77 engines (Bendix Type Carburettor) are fitted, it is anticipated that none of the operational recommendations will be materially affected, but it is possible that there may be some improvement in fuel consumption and A.M.P.G.

The Merlin 67 engines (Bendix Type Carburettor) are designed for lower altitude operation, and give increased maximum level speed below about 8000 ft. In general the operational recommendations will hold for machines with these engines. From sea level to 10,000 ft. there may be a slight improvement on the speed and A.M.P.G. figures quoted in the notes, but there will be a reduction in the altitude performance. The notes will of course hold for the corresponding versions of overseas production.

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1. Definitions
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1. DEFINITIONS

I.A.S. = Indicated airspeed m.p.h. as read on the cockpit instrument (not corrected for position - error and compressibility.)

T.A.S. = True air speed m.p.h.
= I.A.S. corrected for instrument and position error, compressibility and altitude (i.e. atmospheric density.) (The Compressibility and Altitude corrections are automatically included in the Navigational Computor Mk. III.D.)

A.M.P.G. = True air miles per gallon

$$= \frac{\text{T.A.S.}}{\text{gallons per hour}}$$

Most economical speed = Speed for maximum value of A.M.P.G.

Economical cruising = Cruising for maximum range, as recommended in Paragraph 4 (b).

Maximum continuous cruising = Cruising at the maximum permissible power output for continuous operation, 2650 r.p.m. and + 7 lb. (The mixture is automatically weak up to + 7 lb.)

Normal maximum rate of climb = Rate of climb obtained with full climbing power output, 2850 r.p.m. + 12 lb.

Operational ceiling = Altitude at which the maximum rate of climb has fallen to 500 feet per minute.

M.S. and F.S. gears. = Moderate supercharger and full supercharger gears.

Note: When the supercharger gear change switch is at "MOD" the engines will always be in M.S. gear. At "AUTO" the supercharger will automatically change from M.S. to F.S. gear at approximately 21,000 ft. when climbing, and from F.S. to M.S. gear at approximately 19,500 ft. when descending.

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2. DIFFERENCES BETWEEN Mks. VIII, IX & XVI AND MERLIN 21 TYPE MOSQUITO

The main advantages of the Mks. VIII, IX and XVI are the considerable increases in maximum level speed and in operational ceiling. It is possible to cruise at altitudes at least 5000 ft. higher than on the Merlin 21 Type Mosquito when carrying the same load, and at these respective operational altitudes the maximum level speed is over 30 m.p.h. greater on the Mks. VIII, IX and XVI.

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4. ECONOMICAL CRUISIN

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The price to be paid for this increased performance at high altitude is a loss in range. At sea level the range of the Mks. VIII, IX and XVI is about the same as that of the Merlin 21 Type Mosquito with the same fuel, but at their respective operational altitudes, when carrying the same load, it is about 15 per cent. less.

The Mk IX and XVI bombers operate at about 2000 lb. greater all-up weight than the Merlin 21 type, due to heavier engines and greater load.

Unlike the Merlin 21 type Mosquito, there is nothing to be gained in economical cruising A.M.P.G. by flying in M.S. Gear above the supercharger gear change height.

There is no boost control cut-out - the maximum boost is obtained with the throttle fully open through the gate.

The radiator shutters are manually operated and can be set at any desired position.

3. CLIMB

The Mosquito climbs well at 2650 r.p.m. and + 4 lb. at 175 I.A.S., and it is recommended that this be used for operational purposes. Set the supercharger gear change switch to "AUTO". Do not attempt to climb with the radiator shutters closed. It is uneconomical to climb at lower horse-power or higher I.A.S. than this. Above 20 000 ft. increase the boost and R.P.M. as desired (up to the maxima of + 12 lb. and 2850 r.p.m.) Above 30,000 ft. reduce the I.A.S. by 1 - 2 m.p.h. per 1000 ft. A fully loaded bomber, when climbing as recommended above, reaches 30 000 ft. in about 50 minutes, over a distance of about 180 miles using approximately 150 gallons of fuel average A.M.P.G. 1.2.

When climbing at 2650 r.p.m. and + 7 lb. the above figures will be reduced to approximately 35 minutes, 120 miles and 110 gallons of fuel average A.M.P.G. 1.1.

The normal maximum rate of climb is obtained by using the full climbing power - 2850 r.p.m. + 12 lb. The time taken and fuel used to reach a given height are less than when climbing at 2650 r.p.m. + 4 lb., but the overall range is unaffected, and the strain on the engines more severe.

In military emergency, the maximum combat power, 3000 r.p.m. and + 18 lb. may be used. When very near the ceiling, if the maximum possible rate of climb is desired, the radiator shutters may be partly closed and the speed reduced to a minimum of 155 I.A.S., provided the oil and coolant temperatures are not excessive.

The operational ceiling of a fully loaded bomber is about 31,000 ft. - it is therefore not possible to cruise much above this altitude on the outward flight. On the homeward flight the operational ceiling is about 36,000 ft. and cruising up to this altitude is possible.

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4. ECONOMICAL CRUISING

(a) General

As has been explained in the Operational Performance Notes for the Merlin 21 type Mosquito, the highest attainable boost together with the lowest possible r.p.m. provide the most economical engine conditions for any required power output.

By applying the following rules, the best engine conditions will automatically be obtained.

CRUISING RULES

Cruising Rule 1.

Cruise normally at the highest attainable boost (not exceeding + 4 lb)

Cruising Rule 2.

Control I.A.S. entirely by adjusting the r.p.m. between a minimum of 1900 and a maximum of 2650.

Cruising Rule 3.

Put the supercharger gear change switch to "AUTO"

It will be observed that Rules 1 and 2 automatically ensure that the condition of maximum boost and minimum r.p.m. is obtained. The minimum r.p.m. of 1900 is determined by propeller governing.

Unlike the Merlin 21 Mosquito, the A.M.P.G. at a given I.A.S is almost the same in both gears, and thus there is nothing to be gained by flying in M.S gear above the change-gear height.

(b) Recommended Conditions

It is convenient to consider high and low altitudes separately since different conditions obtain.

(1) High Altitudes

The two left-hand curves shown in Fig. 1 show the A.M.P.G. at 30,000 ft. and above, over the cruising-speed range of the aircraft. It will be seen that the speed for maximum range is 195 I.A.S. on the outward, and 180 I.A.S. on the homeward journey. However, for operational purposes it is better to fly at a rather higher speed - the drop in A.M.P.G. is small, and from the point of view of stability and general comfort, a higher speed is more satisfactory for prolonged operations. Thus, the recommended speed is 220 I.A.S. on the outward and 210 I.A.S. on the homeward journey (giving an approximate figure for A.M.P.G. of 2.6 and 2.9 respectively), but any speed within the green band of the range curves may be used. It must be remembered that when flying under these conditions, the Cruising Rules (see 4(a) must be observed. Do not fly slower than the speed for maximum range, unless maximum endurance is required, as the A.M.P.G. will be decreased thereby.

When flying at the recommended cruising speed, the following table shows the approximate A.M.P.G., T.A.S. and Fuel Consumption, gallons per hour, at various altitudes.

TABLE 1 Approxime

Altitude ft.	A.M.P.
20,000	3.0
25,000	2.8
30,000 and above	2.6

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TABLE 1

Approximate A.M.P.G., T.A.S. and Fuel Consumption for Economical Cruising.

Altitude	Outward Journey			Homeward Journey		
ft.	A.M.P.G.	T.A.S.	galls. per hr.	A.M.P.G.	T.A.S.	galls. per hr.
20,000	3.0	295	98	3.2	280	88
25,000	2.8	320	114	3.1	305	98
30,000 and above	2.6	350	135	2.9	335	115

From this it will be seen that the best range is obtained at around 20,000 ft.

(ii) Medium and Low Altitudes

Fly at 1900 r.p.m. and highest attainable boost (not exceeding + 4 lbs.) accepting whatever I.A.S. above 220 which these conditions give. At altitudes approaching 20,000 ft. increase the r.p.m. as necessary to maintain 220 I.A.S.

The right-hand curve of the graph shows the A.M.P.G. obtained at sea level. The green band of the curve indicates approximately the speed when flying as recommended above - about 250 T.A.S., and fuel consumption about 90 gallons per hour. In order to keep the diagram as simple as possible, only the range curves for sea level and high atitudes are given. At intermediate altitudes the approximate A.M.P.G., when flying as recommended above, is given by the following table.

TABLE 2

Approximate A.M.P.G. at Intermediate Altitudes

Altitude	A.M.P.G.	
ft.	Outward Journey	Homeward Journey
5,000	2.8	2.9
10,000	2.9	3.0
15,000	2.9	3.1

As with the Merlin 21 type Mosquito, only the engine conditions are specified for economical cruising at low altitude.

Note: The gain in A.M.P.G. by flying at boost below + 4 lb. is very small compared with the large loss in speed, and is not recommended unless maximum duration is required. For economical cruising the use of boost above + 4 lb. is not recommended, since this causes a considerable drop in A.M.P.G. below that when flying as recommended above.

In conclusion:-

Fly high, with low r.p.m. and high boost for economy.

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5. HIGH SPEED CRUISING.

If a higher cruising speed is required, the cruising boost should be increased from + 4 lb. to + 7 lb., and the desired speed obtained by adjusting the r.p.m. between 1900 and 2650.

This is definitely more economical than increasing the r.p.m. at + 4 lb.

The mixture is automatically weak up to + 7 lb. and, as the boost is increased above this figure, the mixture becomes gradually richer. There is no sharp jump weak to rich mixture at + 7 lb.

When flying at maximum continuous Cruising Power (2650 r.p.m. + 7lb) the approximate I.A.S., T.A.S. and A.M.P.G. are given by the following table.

TABLE 3

Approximate I.A.S., T.A.S. and A.M.P.G.
for Maximum Continuous Cruising

Altitude (ft.)	I.A.S.	T.A.S.	A.M.P.G.
Sea level	287	285	2.1
10,000	276	316	2.3
20,000	260	349	2.4
30,000	236	378	2.5

Above about 35,000 ft. the speed and range are the same as for economical cruising, since the maximum attainable speed (at 2650 r.p.m.) lies within the green band of the range curves.

At these speeds the effect of weight is small and the above figures have been given for a weight of about 20,000 lb.

It will be seen that below 30,000 ft. there is a gain of 30-50 T.A.S. but a loss of about 25% in A.M.P.G. compared with economical cruising.

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6. MAXIMUM LEVEL SPEED

Maximum level speed at any altitude in obtained by flying at 3000 r.p.m. with the throttle fully open through the gate and the supercharger gear change switch at "AUTO".

The A.M.P.G. in M.S. gear varies from 1.2 at sea level to 1.8 at 20,000 ft., and F.S. gear from 1.3 at 25,000 ft. to 1.6 at 30,000 ft.

Fuel Consumption . . . . 280 gallons per hour in M.S. Gear
" " . . . . 300 " " " " F.S. Gear

The best heights at which to fly will be given at briefing.

Note: The maximum permissible combat boost must not be used at r.p.m. below 2850.

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7. WHEN VERY SHORT OF FU

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7. WHEN VERY SHORT OF FUEL.

As may be seen from the graph it is more economical on a light weight to fly at high rather than low altitude.

On a very light weight (about 16,000 lb..) the approximate A.M.P.G. in level flight is:-

2.9 at Sea Level
3.4 at 20,000 ft.
3.2 at 30,000 ft.

Above about 15,000 ft. reduce I.A.S. to 180 by reducing the r.p.m. (Minimum 1900). If the speed still exceeds 180, reduce the boost as necessary.

If flying above 20,000 ft. descend slowly to this altitude, where the maximum A.M.P.G. is obtained and there engage M.S. Gear. Maintain this height until near enough to safety (about 150 miles) to start a gentle descent, still at 180 I.A.S. but increasing the speed gradually below 15,000 ft. to 230 I.A.S. at sea level.

On a return flight of about 300 miles, an overall A.M.P.G. of 4-5 may be obtained. If flying low, do not, however, attempt to climb to a more economical altitude, or to feather one propeller and fly on the other engine.

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8. EFFECT OF VARIATION IN ATMOSPHERIC TEMPERATURE

The performance given in these notes relates to standard atmospheric conditions. Variations in atmospheric temperature cause considerable variation in performance, which, in general, is worse when the day is hot.

When the temperature is about 20°C. above standard (i.e. in very hot summer weather):- The take-off run is increased by approximately 14%. The climb takes longer, more fuel is used and the operational ceiling is lower by about 2500 ft. At a given altitude, the I.A.S. reads 8-14 m.p.h. lower, but due to decreased density, the T.A.S. is approximately unchanged.

As on the Merlin 21 engine, the fuel consumption at given r.p.m. boost and altitude does not vary with atmospheric temperature. Thus, there is little or no decrease in A.M.P.G.

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9. FUEL CONSUMPTION

Up till now, only the A.M.P.G. has been considered, but it is often desirable to know the fuel consumption (gallons per hour) of the engines under various conditions.

M S Gear

The following table gives the approximate total fuel consumption for economical cruising from sea level to 20,000 ft. The figures hold over this range irrespective of whether the engines are throttled or at full throttle

Above 20 000 ft. the consumption at a given r.p.m. and boost increases with altitude by about 1 gallon per hour every 2,000 ft.

TABLE 4

Total Fuel Consumption for Cruising Outputs

M.S. Gear - Sea Level to 20,000 ft.

Boost lb.	Total Fuel Consumption galls per hr.		
	2650 r.p.m.	2300 r.p.m.	1900 r.p.m.
+ 7	143	120	101
+ 4	126	107	90
+ 2	114	98	84
0	103	90	78
- 2	92	82	72
- 4	82	74	66

F.S. Gear

At all altitudes the fuel consumption at a given r.p.m. and boost in F.S. Gear is about 4 gallons per hour above that in M.S. Gear at the same r.p.m. and boost. As in M.S. Gear the consumption at a given r.p.m. and boost increases with altitude by about 1 gallon per hour every 2000 ft.

From this and the above table the fuel consumption can be obtained at any other altitude.

Example:

What is the consumption in F.S. Gear at 28 000 ft. at 2300 r.p.m. and + 2 lb.?

Consumption at 20 000 ft. in M.S. Gear	= 98 gallons per hour.
Increase to F.S. Gear	= 4 " " "
" for altitude	= 4 " " "
Consumption at 28 000 ft.	= 106 gallons per hour.

The total fuel consumption for the higher powers is given in the following table.

TABLE 5

Total Fuel Consumption for the Higher Powers

Engine Conditions	r.p.m.	Boost	Total Fuel Consumption - galls per hr.	
			M.S. Gear	F.S. Gear
Maximum Combat Power	3000	+18	280	300
Maximum Climbing Power	3000	+15	260	280
	2850	+12	210	230

10 MAXIMUM DURATION

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11 FAILURE OF ONE ENGIN

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10 MAXIMUM DURATION

Maximum duration is important for all patrol duties, and when waiting for the weather to clear, etc. Fly at 180 I.A.S. with the lowest possible r.p.m. (minimum 1900). Though a lower speed than this is possible, the above is recommended for comfortable control of the aeroplane.

When flying as recommended above on a weight of 18,500 lb. the approximate consumption is

65 gallons per hour at Sea Level
75 " " " " 20,000 ft.
105 " " " " 35,000 ft.

When flying on a heavy weight (approximately 22,000 lb.) these consumptions will be increased by 3 - 10 gallons per hour.

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11 FAILURE OF ONE ENGINE

The Mosquito has a satisfactory performance on one engine.

Feather the propeller of the dead engine as instruced in the Pilots Notes and close the radiator shutter. Jettison bombs and, if they are full, the external wing tanks.

Open the radiator shutter of the live engine, but close it partly if the temperatures allow.

Full climb power, 2850 r.p.m. + 12 lb. is available for emergency cruising on one engine, and at this power a coolant temperature of 125°C. is permitted. The cooling should be quite satisfactory under all conditions provided that the speed is not reduced below 165 I.A.S.

On light load (approximately 18,500 lb.) it should be possible to maintain an altitude of about 15,000 ft. at full climb power and 170 I.A.S. and even on a heavy weight (full fuel less bombs and wing tanks) height, 1000 - 2000 ft., can be maintained at this power and speed.

Watch the oil and coolant temperatures, and do not let the speed drop below 165 I.A.S. as the cooling will suffer.

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12. CALCULATION OF OPERATIONAL RANGE

The following tables show the approximate operational range under various conditions of flight, and may be used as a basis for planning sorties.

The ranges have been given for the bomber with maximum bomb load (fuel capacity 540 gallons) and for the P.R. with maximum fuel load (760 gallons) and for two conditions of flight:-

(a) Economical Cruising (see paragraph 4)
(b) High Speed Cruising (see paragraph 5)

TABLE 6

(a) Economical Cruising

Altitude	Operational Range (miles)	
ft.	Bomber (540 gallons)	P.R. (760 gallons)
Sea Level	1080	1540
10,000	1120	1620
25,000	1070	1580
30,000	1000	1500

(b) High Speed Cruising

Altitude	Operational Range (miles)	
ft.	Bomber (540 gallons)	P.R. (760 gallons)
Sea Level	820	1170
10,000	880	1260
25,000	890	1300
30,000	895	1320

The reserve of fuel for all contingencies is about 23%
i.e. 125 gallons with a capacity of 540 gallons
175 " " " " " 760 "

It will be seen from Table 6 (a) that the economical cruising operational range does not increase with altitude to the same extent as is the case with the Merlin 21 type Mosquito. The maximum is obtained at around 20,000 ft., and above this altitude there is a decrease. This is partly due to the greater operating weight of the Mks. VIII, IX and XVI.

Note:

The above ranges have been obtained by taking 75% of the Still Air Range which is defined as follows:-

The Still Air Range is the distance covered by the aircraft at the given altitude, speed etc. after the following allowances have been made:-

Warming up and taxying	20 gallons	
Climb to 10,000 ft. at Full Climb Power	40 "	20 miles
Climb to 25,000 ft. " " " "	80 "	65 "
Climb to 30,000 ft. " " " "	95 "	90 "

The distance covered on the climb is credited to the range

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13. OPERATION OF THE

(a) General

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14. I.A.S. CORRECTION A

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13. OPERATION OF THE PRESSURE CABIN ON MK. XVI

(a) General

The cabin pressure is controlled by a Westland Pressure Control Valve opening into the bomb cell. This valve starts to build up pressure in the cabin at 15,000 ft., the pressure difference above the outside atmosphere increasing with altitude to 2 lb./sq.in. at 30,000 ft. and above. It should be possible to maintain the full 2 lb./sq.in. pressure difference at these altitudes even at economical cruising conditions. A red warning light on the pressure cabin instrument panel shows when the cabin pressure is ½ lb./sq. in. below the standard. This light may flicker on and off on the climb.

The pressure difference of 2 lb./sq.in. reduces the effective cabin altitude at 35,000 ft. by about 10,000 ft.

(b) Controls and Instruments.

(i) Low Altitudes

Spill Valve, All the blower air may be spilled overboard if desired by lifting the catch on the Temperature Control, - on the left of the navigator's seat - and depressing the lever below the "Cold Air" position. It may be necessary to spill the air in warm weather to prevent excessive cabin temperature and to permit cold air to be supplied by the Punkah Louvre

(ii) High Altitudes

The Emergency Pressure Release Valve is situated to the left of the navigator's seat and, when turned anti-clockwise, releases the cabin pressure. It should normally be kept closed.

Temperature Control. Before it reaches the cabin the air may be passed through a heater, if desired. This is controlled by a "Hot Air" and "Cold Air" lever on the left of the navigator's seat.

Pressure Difference and Cabin Altitude. Two gauges in front of the navigator's oxygen control valve indicate the cabin pressure difference and the effective cabin altitude.

It should be noted that when the blower air is spilled and the punkah louvre closed there is no definite circulation of air through the cabin. In order to obtain cold air from the punkah louvre above 15,000 ft. both the Release Valve and the Spill Valve should be open.

(c) Pilot's Responsibility (before take-off)

(i) Check that the emergency pressure release valve is fully closed.

(ii) Check that the catches of the D.V. opening windows are screwed up tight.

(iii) Check that the screw cap over the undercarriage emergency selector is not too tight to be unscrewed by the pilot.

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14. I.A.S. CORRECTION AND STALLING SPEED

For navigational purposes the I.A.S. reading corrected for position error is required. (The compressionability correction is automatically incorporated in the navigational computor Mk. IIID)

The position error of the Mosquito is given in the following table:-

TABLE 7

Position Error

Speed I.A.S.	Correction I.A.S.
	DEDUCT
Stall (flaps up or down)	9
150	2
200	2
250	2
300	2
350	4

The position error may vary from machine to machine by ± 4 m.p.h. from the average values given above.

The approximate stalling speeds are given below. They are independent of altitude:-

	22,000 lb.	18,500 lb.
Flaps Up	137 I.A.S.	125 I.A.S.
Flaps Down	118 I.A.S.	107 I.A.S.

It is better to check the stalling speed with the flaps up and engines off. With flaps down there is considerable buffeting and fluctuation of I.A.S. reading.

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15. MOSQUITO PERFORMANCE

Maximum Level Speed

Accurate speed checks on production machines show a slightly greater variation than on Merlin 21 type Mosquito, but even so are very consistent.

If it is desired to obtain a rough check on the performance of a Mosquito, the following procedure is recommended, rather than random speed runs at maximum power, which may give misleading results.

Choose a day when the temperature is about standard (15°C. at sea level), when there is not much cloud, no high winds and no bumpy or surgy conditions. Fly with external wing tanks and air intake snowguards on a light weight (about 19,000 lb.) in M.S. gear at 10,000 ft. at 2650 r.p.m. and + 7lb. for not less than 5, and preferably for 10 minutes, keeping the altitude, r.p.m. and boost constant. If an I.A.S. reading of 278 is obtained, the aeroplane is up to standard. Repeat the test at 25,000 ft. at 2650 r.p.m. and + 7 lb. in F.S. gear, and 242 I.A.S. should be obtained. Do not forget to close the radiator shutters.

Checking the Boo

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16. GENERAL NOTES

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(i) Radiator

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(ii) Undercarri

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(iii) Windows an

Keep the windows
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(iv) General air

Poor external co
Care should be taken to avo
surface should always be kep

Checking the Boost

When flying with external wing tanks and snowguards, the following figures give a rough indication of the boost that may be expected at 35,000 ft.

3000 r.p.m.	+ 7 lb.
2650 r.p.m.	+ 3 lb.

These figures will be higher with the Merlin 76 and 77 engines.

The boost may vary from the above figures by about + 1 lb. depending on the engines, intakes and atmospheric temperature, being lower on a hot day. If the expected boost is not obtained, see that the intake is fitting correctly before making carburettor adjustments.

The boost obtained at climbing I.A.S. will naturally be less than the above.

The above figures do not hold when tropical air intakes are fitted.

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16. GENERAL NOTES

The following points should be remembered. Several of them have been mentioned in the Operational Performance Notes for the Merlin 21 type Mosquito, but they are given again as they are of great importance.

(i) Radiator Shutters

Unlike the Merlin 21 type Mosquito, the radiator shutters are manually operated and can be set in any desired position. The cooling is satisfactory in level flight under normal conditions with the shutters closed, but in very hot weather or in prolonged tight turns it may be necessary to have them partly open. However, always keep an eye on the temperature and do not open the shutters more than necessary.

The shutters should always be fully open on the climb and on the ground.

The maximum level speed is reduced by 20 - 25 T.A.S. and the A.M.P.G. for economical cruising by about 8% if the shutters are fully open. These losses will be correspondingly reduced if the shutters are only partly open.

(ii) Undercarriage, bomb doors and flaps

Occasionally put the relevant selector levers to "Up" and allow them to return to "Neutral". It is particularly important that the undercarriage, tail wheel, bomb doors and flaps should all be fully up for maximum level speed.

(iii) Windows and trailing aerial

Keep the windows shut and trailing aerial in (if fitted) whenever possible - essential for maximum level speed.

(iv) General aircraft condition.

Poor external condition of the aeroplane reduces the performance. Care should be taken to avoid bent cowlings and leaky cowling seams, and the surface should always be kept as clear as possible from dirt, oil, etc.

(v) Tropical air intakes

Tropical air intakes (if fitted) cause a considerable reduction in the altitude to which a given boost can be maintained, and a subsequent loss in boost and speed above this altitude. These intakes have a small detrimental effect on A.M.P.G. for economical cruising.

(vi) External fuel tanks and wing bombs

Throughout these notes the range and performance figures quoted have been for aircraft fitted with external fuel tanks. The removal of these tanks increases the maximum level speed by about 5 T.A.S., and the A.M.P.G. for economical cruising by about 2%

The fitting of external wing bombs (2 x 500 lb.) in place of the external fuel tanks causes corresponding additional reductions of about 6 T.A.S. and 2%.

There is no appreciable effect on the handling of the aircraft due to the fitting of external fuel tanks or wing bombs.

(vii) One engined flight

Keep the speed up to provide satisfactory cooling (not below 165 I.A.S.) and open the engine up to give the power necessary to maintain height.

(viii) Pressure cabin operation Mk. XVI

See that the emergency pressure release valve is closed and that the catches of the D.V. opening windows are screwed up tight.

MOSQUITO O

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ADDENDUM

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Feather the prope
Pilot's Notes, and close the
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engine, but close it partly i

Full Climb Power,
one-engined flight, though it
at low altitudes.

The following tab
ceiling with full climb power
minimum power to maintain heig
normal weather conditions:-

Weight lb.	Ceiling ft.
21,000	13,000
19,000	15,000
17,000	17,000

The weight with fu
will be under 21,000 lb.

Maintain a speed o
satisfactory under all conditio
165 I.A.S. On full climb powe
90°C. respectively are permitte
under normal conditions these r

If flying at an alt
maintain 170 - 180 I.A.S. and l
possible.

Watch the coolant a
drop below 165 I.A.S. as the coo

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MOSQUITO OPERATIONAL PERFORMANCE NOTES

Mks. VIII, IX & XVI

ADDENDUM

ONE-ENGINED FLIGHT

The Mosquito has a satisfactory performance on one engine, and can easily maintain height on a heavy load, but it is important that pilots should be conversant with the correct technique for single engined flight.

Feather the propeller of the dead engine as instructed in the Pilot's Notes, and close the radiator shutter. Jettison bombs and, if they are full, the external wing tanks. Open the radiator shutter of the live engine, but close it partly if the temperatures allow.

Full Climb Power, 2850 r.p.m. +12 lb. is available for emergency one-engined flight, though it should not be necessary to use as much power at low altitudes.

The following table gives approximate figures for one-engine ceiling with full climb power in M.S. Gear at 170 I.A.S., and also the minimum power to maintain height at 170 I.A.S., at 1,000 to 2,000 ft. under normal weather conditions:-

Weight	Ceiling	Minimum power to maintain height at 1,000 - 2,000 ft.	
		R.P.M.	Boost.
lb.	ft.		
21,000	13,000	2850	+9
19,000	15,000	2850	+7
17,000	17,000	2650	+6

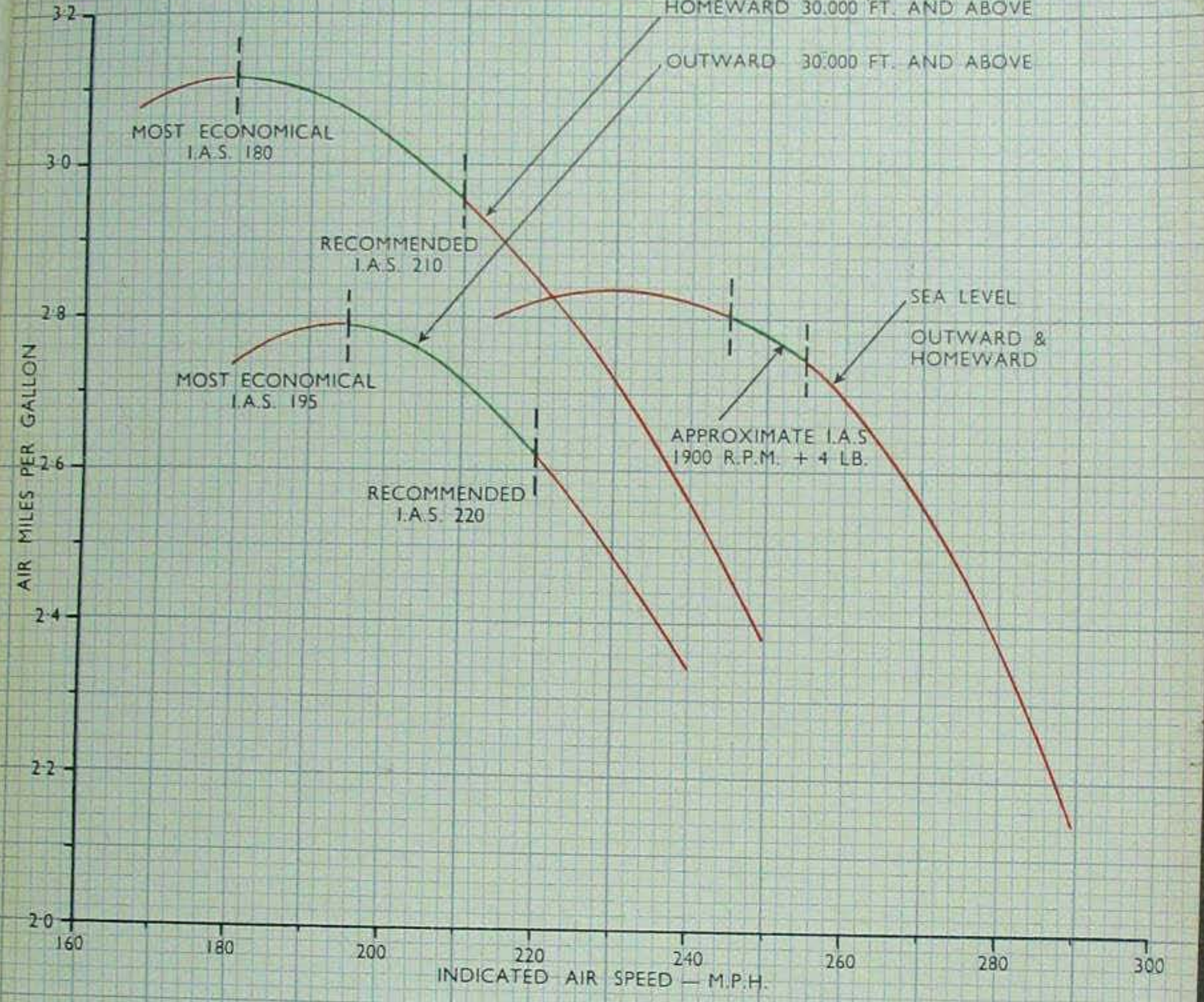
The weight with full fuel, less bombs and external wing tanks, will be under 21,000 lb.

Maintain a speed of 170 - 180 I.A.S. The cooling should be quite satisfactory under all conditions provided that the speed is not reduced below 165 I.A.S. On full climb power coolant and oil temperatures of 125°C. and 90°C. respectively are permitted (and 135°C. and 105°C. for five minutes), but under normal conditions these figures will probably not exceed 110°C. and 80°C.

If flying at an altitude greater than the ceiling given above, maintain 170 - 180 I.A.S. and lose height gradually until level flight is possible.

Watch the coolant and oil temperatures, and do not let the speed drop below 165 I.A.S. as the cooling will suffer.

FIG. 1 RANGE CURVES



APPROXIMATE A.M.P.G. WHEN CRUISING AS RECOMMENDED IN PARA. 4 (b)

ALTITUDE FEET	A. M. P. G.	
	OUTWARD JOURNEY	HOMEWARD JOURNEY
SEA LEVEL	2·8	2·8
5,000	2·8	2·9
10,000	2·9	3·0
15,000	2·9	3·1
20,000	3·0	3·2
25,000	2·8	3·1
30,000 AND ABOVE	2·6	2·9